

The Sixth Annual Emerging Information Technology Conference

Nanotechnology,
MEMS,
System-on-Chip,
Bioinformatics,
C4I,
Emerging Energy Technology,
Venture Capital
Workshops

August 10 – August 11 (Thursday, Friday), 2006
Conference Center, the University of Texas at Dallas
August 12 (Saturday), 2006
The Westin Galleria Dallas

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Welcome Message

Distinguished colleagues:

It is with great excitement and honor that we warmly welcome all of you to come to 6th EITC, held for the first time in middle United States. We are confident that you will find the Conference exciting, and maybe even provocative in intellectual and economic dimensions.

Seven years ago, a group of visionary Chinese Americans from East and West Coasts of United States, recognized that in the new millennium, global conditions are ripped for accelerated intellectual and economic interactions between North America and Asia Pacific. Such interactions will surely be one of the most important components for enhancing quality-of-life for humanity in the 21st century.

The driving forces of the interactions are as much scientific/technological as they are entrepreneurial, with a touch of cultural flavor. Yet, while there were many conferences which serve as platforms for interactions for one disciplines or another, there was not one where it admixes the highest level of discussions in science, technology and their economic implications for leading individuals in North America and Asia Pacific, with an Asian cultural flavor.

Hence, the birth of EMERGING INFORMATION TECHNOLOGY CONFERENCE, now known globally as EITC.

While the main purpose of any conference is to transmit state-of-the-art information, the networking component must also be underscored. Indeed, this dimension is even more critical for young and aspiring individuals who need networking to map their career paths. We are confident that with so many truly outstanding and legendary leaders attending this conference, the multi-dimensional aims of the conference can and will be accomplished.

Finally, success is not created from vacuum. The excitement created for this conference is no exception. It stands on the shoulders of the previous five conferences, held on East Coast United States as well as Taipei. Those five conferences provided the much needed EITC's name-recognition and substances. They serve as underpinnings of the present conference. Indeed, it made the organization of this conference easier, although not easy.

Once again, thank you for taking your most valuable professional time to come to EITC-06. Your presence in EITC-06 defines our success.

Sincerely yours

Da Hsuan Feng, UT Dallas
Jyuo-Min Shyu, ITRI
Conference Co-Chairs

Conference Themes

Nanotechnology Workshop

Nanotechnology, emerging from nanoscience and nanoengineering is expected to lead the next industrial revolution through the 21st century. It is tiny, on the scale of one billionth of a meter (nano-meter or nm), yet its impact on our life will be tremendous. It is expected to change everything from agriculture to medicine and from electronics to mechanics. Nanometer scaled devices are imagined to be the smallest and fastest computer, smart and potent medicine, and self-replicating machines. Two approaches are being adopted to fabricate these devices. The top-down process such as to shrink the MEMS to NEMS and the bottom-up approach by synthesizing nano- parts via self-assembly process.

There is an intense interest in Nanotechnology stemming from the fact that developed countries and visionary businesses are rushing to invest and taking a leading position in. Additionally this vast frontier technology is open to chemists, physicists, molecular biologists, material scientists, engineers and literally anyone with new ideas and a want to explore and discover. If you have a thirst for exploration and wish to make your mark in science history, join us to learn more, make contacts, and share ideas with other experts in this brand new field.

MEMS Workshop

Microelectromechanical systems (MEMS) is an enabling technology that will potentially impact the economy and society every bit as much as microelectronics have these past few decades. Silicon integrated-circuit fabrication technology, through the practice of batch fabrication and reduction of scale, revolutionized the electronics industry. Applying these same principles and similar technologies to MEMS, the future shall bring microsystems in the biological, chemical, optical, electrical or mechanical domains that will create new and unforeseen markets. Already, MEMS products have reached the consumer marketplace. Examples include the silicon accelerometer in the automotive and video/computer games industries and the Texas Instruments Digital Mirror Device for projection displays. Yet, this is only the beginning. MEMS have the potential to provide critical enabling solutions to many new technology areas including wireless communications, optical communications and biotechnology. Examples include RF switches and other passive elements for personal communication systems; micro-optical switches for optical fiber networks; chemical "lab on a chip" and implant systems for biomedical applications.

To further this vision the sixth Emerging Information Technology Conference is being organized by a group of Chinese-American professionals and professional organizations. The conference would be a forum for the latest developments, issues, and trends in MEMS in the areas of 1) MEMS Fabrication Technology, 2) Consumer Products; 3) Wireless Communication; 4) Biomedical Implant; 5) Biotechnology; 6) Industrial Application. MEMS have reached a stage for real applications in many fields. Experiences and considerations in practical functional systems would be welcome.

The rapid growth and success of high technology industries around Asia have transformed many economies including Taiwan's, which has a thriving semiconductor and electronics industry. Now, with the movement of the high-tech sector into

information technology, and biotechnology, MEMS may have a significant future role in these economies.

One goal of this conference is to build and strengthen technical and business relationships among professionals, institutions and industries around the Pacific Rim. The conference would provide an opportunity for experts and industry leaders to exchange research developments in MEMS technologies, business experiences and to jointly explore new directions and opportunities.

System on Chip Workshop

Driven by the rapid growth of the Internet, wireless communications, and pervasive computing, the integration of an entire VLSI system onto a single silicon chip has brought revolutionary changes to the IT industry and become increasingly important. The proliferation of System-on-Chip (SoC) devices is evidenced by the ubiquity of cellular phones, portable music and video players, set-top-boxes, digital cameras, etc. The design and manufacturing of SoC systems have become the driving force behind the march to even smaller, faster, and cheaper semiconductor devices.

The SoC track of EITC-2006 provides a forum for sharing recent advances and discussing new challenges in the SoC design. We hope it will bring together SoC experts from both academic and industrial communities to discuss and solve critical hardware and software issues in SoC designs. It is our goal to develop cost-effective, low-power, and secure SoC systems and applications with increased productivity. At EITC-2006, topics of interest on the SoC track include, but are not limited to, design methodology, design automation tools, system architectures, real-time OS and applications, security, and manufacturing technologies.

Bioinformatics Workshop

The world is in the midst of an information and communication technological revolution that is transforming almost every aspect of our lives. The intersection of information technology and biotechnology has become critically important because of the vast amount of data involved in the study of biology. Bioinformatics is very much a discipline in expansion as evidenced by the convergence of Biology, Computer Science, Information and Communication Technology, Mathematics and Statistics.

Bioinformatics highlights the application of statistics, data mining, artificial intelligence, neural networks, machine learning and natural language processing techniques to computationally difficult problems in molecular biology. It is dedicated to provide researchers the knowledge and skills necessary for the invention of algorithms and the creation of computational systems that facilitate the understanding of biological processes and application of these tools and methods to individuals and communities through public health and prevention programs. The Human Genome Project has transformed molecular biology into an information-based science. However, the lack of agreement over the number of human genes, even with the genome essentially complete, depicts the difficulty of certainty in biology and points to the need for substantially better algorithms and validation techniques. It is envisaged that bioinformatics will help to advance biomedical research *in silico*.

The bioinformatics approaches to biotechnology have broadened the conventional ability to study genomics and proteomics. Pharmacogenomics and pharmacogenetics approaches have further advanced drug discovery and drug development, and disease diagnostics device development. Investigation of the relationship between inter-individual genetic variability (polymorphism) in drug response (including efficacy and safety) or drug metabolism has moved forward the practice of molecular biology and the view of the future potential of medicine such as individualized medicine. Analogous to high throughput/data intensive analytical methods for genomic research, the single nucleotide polymorphism (SNP) array technology will rely on the bioinformatics and statistical algorithms to properly define SNP haplotypes so as to understand individual profiles, which entail individual susceptibility to drug toxicity and/or drug response.

The Bioinformatics Track of EITC-2006 will focus on the current bioinformatics research and development frontiers in both academia and industry, with leading scientist presenting on issues like gene annotation, protein annotation, data integration, tool integration, and data analysis and data mining algorithm development. It will engage dialogues across disciplines and invite discussions in the forefront of the exciting biomedical informatics research.

Content, Computer, Communications, Consumer Electronics, and Integration (C4I) Workshop

“Internet Services”

With the dramatic and progressive improvement of computing and communications technologies, the Internet today has evolved into a diverse computing platform and infrastructure to support programmability and software-driven services on a global scale. The Internet services arena represents the next major bellwether in the IT industry, very much like the PC revolution and the web. Internet services such as search, web community, web email, and instant messaging have already made a huge impact on people’s daily lives, and have changed the nature of work and interactions. With the ubiquity of broadband and wireless networking, people are increasingly being drawn toward software-based Internet services. This is because of the pervasiveness and simplicity of such services, and its ability to deliver integrated and seamless user experiences. The Internet services wave is not only causing a paradigm shift in computing that started with consumers but is also progressively working its ways toward enterprise development with the growing importance of service-based Internet economics. A good example is the new business model now emerging in the form of advertising-supported services and software.

To understand the new challenges and opportunities Internet services presents, the Content, Computer, Communications, Consumer electronics, and Integration (C4I) program track will bring together industry leaders to share their insights on technical trends and discuss what the IT industry can do to leverage the Internet services wave.

Emerging Energy Technology (EET) Workshop

The energy technology is one of the four key technologies for the 21st century. The world is moving from the oil economy toward the hydrogen economy due to the fact that oil fields are mainly located at the politically unstable region, the economic growth of China and India, the limitation of fossil fuel supply and the requirement of emission

reduction (due to the Kyoto Protocol). Worldwide researches on hydrogen energy technology have been very intensive recently including the hydrogen production, hydrogen storage, hydrogen transportation, regulation and infrastructure, and fuel cell technology. At the same time, there are also extensive researches on renewable energy technology, including solar energy, wind power, biomass, etc.

Hydrogen is not a primary energy source but an energy carrier. Hydrogen must be produced from chemical species with hydrogen, e.g., methane (natural gas), methanol, or water. Traditionally, hydrogen has been mainly generated based on the steam reforming of natural gas. Recently, there have been abundant researches on hydrogen production based on decomposition of water based on thermal chemical reaction using nuclear energy. Indeed, nuclear energy is a critical option for hydrogen economy. On the other hand, there have also been active researches on the production of hydrogen using renewable energy such as solar energy. As for the hydrogen storage, researches have been focused on the metal hydride, carbon nanotubes, as well as the pressurized tanks.

Several different kinds of fuel cells have been extensively studied. Nanotechnologies have been applied to develop new catalyst, new materials for electrolyte as well electrodes. Polymer electrolyte membrane fuel cells are most probable for transportation uses; hybrid power systems of solid oxide fuel cell and gas turbine potentially have significantly higher energy efficiency, while micro direct methanol fuel cells are probably most suitable for the power source of 3C products due to their potentially high energy density.

The energy technology track will provide a platform for the exchange of the state-of-the-art technologies on hydrogen, nuclear and renewable energy.

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Conference Program

Day 1 (Thursday, August 10, 2006)

Wednesday, August 9, 2006

8/09 (Wed) 7:00 pm – 10:00 pm : Reception (Invited guests only)
Host: The Taipei Economic and Cultural Office in Houston

Thursday, August 10, 2006

8/10 (Thu) 8:00 am - 9:00 am : Registration

8/10 (Thu) 9:00 am - 9:30 am : Opening Speech

Room: CN 1.112

Dr. Da Hsuan Feng

Vice President for Research and Economic Development
The University of Texas at Dallas

(達拉斯德州大學馮達旋副校長)

“Global Technology and Commercialization in the 21st Century”

Henry Ross Perot

U.S. Presidential Candidate in 1992 and 1996

Founder of Reform Party

Founder of Electronics Data Systems (EDS) and Perot Systems

8/10 (Thu) 9:30 am - 11:00 am : Keynote Session K1

Chair: Dr. Sean Shao-Hwa Wang, President, ITRI International Inc.

(工業技術研究院北美公司總經理王韶華博士)

Room: CN 1.112

“Agrienergy (Agriculture/Energy): What Does The Future Hold?”

Nobel Laureate Alan G. MacDiarmid

James Von Ehr Distinguished Chair in Science and Technology and Professor of Chemistry and Physics at the University of Texas at Dallas, Blanchard Chair in Chemistry at the University of Pennsylvania

“Nuclear Power Development toward a Sustainable Energy Source”

Professor Chin Pan

Dean of College of Nuclear Science, National Tsing Hua University, Hsin-Chu, Taiwan

(新竹國立清華大學潘欽院長)

“Design for Manufacturing”

Professor Martin D. F. Wong

The University of Illinois at Urbana-Champaign

(伊利諾大學電機與計算機工程系黃定發教授)

8/10 (Thu) 11:00 am - 11:10 am : Break

8/10 (Thu) 11:10 am - 12:40 pm : Keynote Session K2

Chair: Professor Chin Pan, National Tsing Hua University, Hsin-Chu, Taiwan
(新竹國立清華大學潘欽教授)

Room: CN 1.112

"Moore's Law and CMOS Technology"

Professor Tso-Ping Ma

Chair of Electrical Engineering Department, Yale University

(耶魯大學電機工程系主任馬佐平教授)

"New Technologies from UTD's NanoTech Institute: From High Performance Nanotube Yarns and Sheets to Fuel Powered Artificial Muscles"

Professor Ray Baughman

Director of NanoTech Institute, the University of Texas at Dallas

"Cyber Crimes and Terrorism: A Major Threat to Our Society"

Professor Peter Pin-Shan Chen

M. J. Foster Distinguished Chair Professor of Computer Science Louisiana State University

(路易斯安那州立大學計算機科學系陳品山教授)

8/10 (Thu) 12:40 pm - 2:00 pm : Lunch

Host: The Industrial Technology Research Institute, Hsin-Chu, Taiwan

Room: Main Gym.

8/10 (Thu) 2:00 pm – 3:30 pm : Technical Session T1 – Nanotechnology (I)

Chair: Professor Yonhua Tzeng, Auburn University and National Cheng Kung University

(國立成功大學電機工程系講座曾永華教授)

Room: CN 1.112

"Silicon Nanoclusters Embedded in Silicon Nitride Matrix"

Professor Ching-Ting Lee and Tai-Cheng Tsai

Dean of EECS College, National Cheng Kung University, Tainan, Taiwan

(國立成功大學電機資訊學院李清庭院長)

"Towards Integrated Heterogeneous Nanosystems"

Professor Kang L. Wang and Kos Galatsis

Director of Western Institute of Nanoelectronics, UCLA

(洛杉磯加州大學奈米電子西方研究院主任王康隆教授)

"Carbon Nanotube p-n Junction Diodes"

Dr. Ji-Ung Lee

General Electric Global Research Center, Niskayuna, New York

8/10 (Thu) 2:00 pm – 3:30 pm : Technical Session T2 – System-on-Chip (I)

Chair: Professor Jiangjiang Liu, Lamar University

(德州拉瑪大學計算機科學系劉江江教授)

Room: CN 1.102

"The Challenges of Low Power SoC Design"

Dr. Wei Hwang

Acting President of National Chiao-Tung University, Hsin-Chu, Taiwan
(新竹國立交通大學代理校長黃威博士)

“Behavioral Transformations for Efficient High-level Synthesis of Distributed Logic-memory Architectures”

Professor Chao Huang and Xinping Zhu Department of Electrical & Computer Engineering, Virginia Tech, Blacksburg, VA
(維州理工大学电机与计算机工程系黃超教授)

“Frequency Synthesis in a Digital RF Processor (DRP) for Mobile Phones”

Dr. Robert Bogdan Staszewski and Dr. Chih-Ming Hung
Wireless Analog Technology Center, Texas Instruments, Dallas, TX

8/10 (Thu) 2:00 – 3:30 pm : Technical Session T3 – Bioinformatics (I)

Chair: Professor Hsueh-Fen Juan, National Taiwan University

(國立台灣大學分子與細胞生物學研究所阮雪芬教授)

Room: EECS 2.410

“Text Extraction and Mining of DNA Methylation Information”

Yu-Ching Fang, Hsuan-Cheng Huang, and Hsueh-Fen Juan
Institute of Molecular and Cellular Biology, National Taiwan University
(國立台灣大學分子與細胞生物學研究生方昱慶)

“Remote Blood Pressure Monitoring Using a Wireless Sensor Network”

William Walker, Todd Polk, Abhiman Hande, and Dinesh Bhatia
Department of Electrical Engineering, the University of Texas at Dallas

“BSIP – A Web Server for Biological Network Structure Identification”

Chern-Han Ou, Chih-Chin Chang, Hung-Ching Hsia, Feng-Sheng Wang, Hsueh-Fen Juan, and Hsuan-Cheng Huang
Department of Life Science, National Taiwan University
(國立台灣大學學生歐承翰)

8/10 (Thu) 2:00 pm – 3:30 pm : Technical Session T4 – RFID Applications (I)

Chair: George Wan, Texas Instruments Inc.

(華美半導體協會達拉斯分會萬其俊主席)

Room: EECS 2.412

“The Texas RF Innovation & Technology Center: A Collaboration of North Texas Universities”

Dr. Richard Billo
Associate Dean, College of Engineering, the University of Texas at Arlington

“RFID Essentials”

Himanshu Bhatt
National Manager of U.S. RFID & Sensors Practice, Sun Microsystems Inc.

“The Commercial Vehicle Operation’s Service Technique and Application in Taiwan’s Market,”

Shing TenqChen, Yuan-Kuang Tu, Ching-Hung Wang, Chao-Haw Lee, Shen-Lung Tung, and Sao-Jie Chen

Chunghwa Telecom Laboratories, Taiwan
(中華電信公司電信研究所鄧陳興博士)

8/10 (Thu) 2:00 pm – 3:30 pm : Technical Session T5 – Emerging Energy Technology

Chair: Dr. Stephen Kuo, BP p.l.c.
(英國石油公司郭世興博士)
Room: EECS 2.415

“CFD Analysis for Wind Turbine Airfoils”

Juan-Chen Huang, Herng Lin, and **Professor Ching-Chang Chieng**
Engineering & System Science Department, National Tsing Hua University
(新竹國立清華大學工程與系統科學系錢景常教授)

“A performance Study for a Fuel Cell Micro-Channel Reformer”

Professor Ru Yang
Dept. of Mechanical & Electro-Mechanical Engineering, Sun Yat-sen University
(國立中山大學機械與機電工程系楊儒教授)

“A Bibliometric Analysis of Hydrogen Energy Literature, 1965-2006”

Professor Ming-yueh Tsay and Pao-hua Chen
Institute of Library, Information and Archival Studies, Chengchi University, Taipei
(國立政治大學圖書資訊與檔案學研究所蔡明月教授)

8/10 (Thu) 3:30 PM - 4:00 pm : Break

8/10 (Thu) 4:00 pm – 5:30 pm : Technical Session T6 – Nanotechnology (II)

Chair: Professor Yonhua Tzeng, Auburn University and National Cheng Kung University
(國立成功大學電機工程系講座曾永華教授)
Room: CN 1.112

“New forms of carbon for advanced functionality in devices”

Professor Vladimir Blank
Director of Technological Institute for Superhard and Novel Carbon Materials, Russia

“Charge-to-Spin Conversion of Entanglement States and Free-Spin Solid-State Quantum Computer”

Professor Wei-Min Zhang
Department of Physics, National Cheng Kung University, Tainan, Taiwan
(國立成功大學物理系張為民教授)

“The 18 mm² Classroom”

Professor Timothy Dallas, Dr. Jordon Berg, and Dr. Richard Gale
Department of Electrical & Computer Engineering, Texas Tech University

8/10 (Thu) 4:00 pm – 5:30 pm : Technical Session T7 – System-on-Chip (II)

Chair: Professor Chao Huang, Virginia Polytechnic Institute and State University
(維州理工大学电机与计算机工程系黄超教授)
Room: CN 1.102

“Trends and Advances on Embedded Prognostics for Smart Products and Service Systems”

Professor Jay Lee

Dept. of Mechanical, Industrial and Nuclear Engineering, University of Cincinnati
(辛辛那提大學機械工業核子工程系李傑教授)

“The Emerging Secure Processor Designs”

Professor Youtao Zhang

Department of Computer Science, University of Pittsburgh
(匹茲堡大學計算機科學系張有弢教授)

“New Attacks on Randomized ECC Algorithms”

Professor Zhijie Jerry Shi

Department of Computer Science & Engineering, University of Connecticut
(康乃狄克大學計算機科學與工程系史志杰教授)

“Mobile System Design for Digital Health Diaries”

Professor Lin Zhong and Ahmad Rahmati

Department of Electrical & Computer Engineering, Rice University
(德州來斯大學電機與計算機工程系鍾林教授)

8/10 (Thu) 4:00 pm – 5:30 pm : Technical Session T8 – Bioinformatics (II)

Chair: Professor Hsuan-Cheng Huang, National Yang-Ming University, Taipei, Taiwan
(國立陽明大學生物資訊研究所黃宣誠教授)

Room: EECS 2.410

“An Interaction-Dependent Model for Transcription Factor Binding”

Dr. Li-San Wang, Shane Jensen, and Sridhar Hannenhali

School of Medicine, University of Pennsylvania
(賓州大學醫學院王立三博士)

“A Knowledge Base for Biological Experiments”

Pooja Sachar, Nary Subramanian, Ali Azghani

Department of Computer Science, University of Texas at Tyler

“Outline-based Clustering and Visualization of Time Series Gene Expression”

Dr. Yu Qian, Kang Zhang, and Richard Scheuermann

The University of Texas Southwestern Medical Center at Dallas
(德州大學西南醫學中心錢宇博士)

8/10 (Thu) 4:00 pm – 6:00 pm : Technical Session T9: RFID Applications (II)

Chair: George Wan, Texas Instruments Inc.

(華美半導體協會達拉斯分會萬其俊主席)

Room: EECS 2.412

Dr. Daniel Engels

Director of Research, Auto-ID Labs, Massachusetts Institute of Technology
Director of the Texas Radio Frequency Innovation and Development Center Department
of Electrical Engineering, the University of Texas at Arlington

“RFID Trends in Pharmacy and Transportation”

Gregory Fitzpatrick

IT Architect of Global Solution Center, IBM Sales & Distribution, Operations

“The RFID (R)evolution”

Enu Waktola

Manager of Livestock Business Development, Texas Instruments

“Using Radio Frequency Identification (RFID) Tags and Readers Implemented on Buses and Bus Lanes to Assist Collecting Traffic Data for ITS Applications,”

Yung- Kuei Huang, Foun-Shea Chang, Kluo-Yueh Chen, Yong-Chun Lee, Yuan-Kuang Tu, Ching-Hung Wang, Chao-Hao Lee, Shen-Lung Tung, **Dr. Shing TenqChen**, Bo-Wen Lu, and Wan-Yu Chen, Chunghwa Telecom Laboratories, Taiwan

(中華電信公司電信研究所鄧陳興博士)

8/10 (Thu) 4:00 pm – 6:00 pm : Technical Session T10 – Electrical Energy Technology

Chair: Professor Wei-Jen Lee, the University of Texas at Arlington

(阿靈頓德州大學電機工程系李偉仁教授)

Room: EECS 2.415

“Challenges in Coal-to-Hydrogen and Hybrid-Fuel-Cell Clean Power Generation Systems”

Professor Minking K. Chyu

Chair of Mechanical Engineering Department, University of Pittsburgh, PA

(匹茲堡大學機械工程系主任邱民京教授)

“Electrodeposition of platinum-ruthenium nanoparticles on carbon nanotubes directly grown on carbon cloths and passive microfluidics for the anode of a direct methanol fuel cell”

Professor Chin Pan

Dean of College of Nuclear Science, National Tsing Hua University, Hsin-Chu, Taiwan

(新竹國立清華大學原子科學院潘欽院長)

“Emerging Photovoltaic Technologies”

Professor Meng Tao

Department of Electrical Engineering, the University of Texas at Arlington

(阿靈頓德州大學電機工程系陶萌教授)

“Wind Generation and its Impact on the System Operation”

Professor Wei-Jen Lee

Department of Electrical Engineering, the University of Texas at Arlington

(阿靈頓德州大學電機工程系李偉仁教授)

8/10 (Thu) 7:00 pm – 10:00 pm : Dinner (Invited guests only)

Host: The Chinese Institute of Engineers, the Dallas-Fort Worth Area Chapter

Day 2 (Friday, August 11, 2006)

Friday, August 11, 2006

8/11 (Fri) 8:00 am - 9:00 am : Registration

8/11 (Fri) 9:00 am - 11:00 am : Keynote Session K3

Chair: Professor Yonhua Tzeng, Auburn University and National Cheng Kung University
(國立成功大學電機工程系講座曾永華教授)

Room: CN 1.112

Dr. Robert Jih-Chang Yang

CEO of Hong Kong Applied Science and Technology Research Institute
(香港應用科技研究院楊日昌總裁)

"The Prospects of New Energy Technologies in Taiwan"

Dr. Sean Shao-Hwa Wang

President, ITRI International Inc. (a subsidiary of ITRI)
(工業技術研究院北美公司總經理王韶華博士)

"Challenges Related to Reliability in Nano Electronics"

Professor Way Kuo

Dean of the College of Engineering, The University of Tennessee, Knoxville
(中央研究院院士 田納西大學工學院院長 郭位 博士)

"Text Data Mining and Searching for Biomedical Discovery"

Dr. Harold R. (Skip) Garner

The University of Texas Southwestern Medical Center at Dallas

8/11 (Fri) 11:00 am - 11:10 am Break

8/11 (Fri) 11:10 am - 12:40 pm : Keynote Session K4 - University Administrator Forum

Chair: Dr. David E. Daniel, President of the University of Texas at Dallas
Room: CN 1.112

"Global Responsibilities of Research Universities in the Flat World"

Dr. Paul Ching-Wu Chu

President of Hong Kong University of Science and Technology, Hong Kong
(香港科技大學朱經武校長)

Dr. Wei Hwang

Acting President of National Chiao-Tung University, Hsin-Chu, Taiwan
(新竹國立交通大學代理校長黃威博士)

Dr. Ruey-Jen Sung

Vice president of National Cheng Kung University, Tainan, Taiwan

(國立成功大學宋瑞珍副校長)

Dr. Ching-Hua Lo

Dean of Science College, National Taiwan University, Taipei, Taiwan

(國立台灣大學理學院羅清華院長)

8/11 (Fri) 12:40 pm - 2:00 pm : Lunch

Host: The Industrial Technology Research Institute, Hsin-Chu, Taiwan

8/11 (Fri) 2:00 pm – 3:30 pm : Technical Session T11 – Nanotechnology (III)

Chair: Professor Yonhua Tzeng, Auburn University and National Cheng Kung University

(國立成功大學電機工程系講座曾永華教授)

Room: CN 1.112

“Challenges Related to Reliability in Nano Electronics”

Professor Way Kuo

Dean of the College of Engineering, The University of Tennessee, Knoxville

“Bionanomaterials and Nanobiomedicine”

Professor Dar-Bin Shieh

Institute of Oral Medicine, National Cheng Kung University, Tainan, Taiwan

(國立成功大學口腔醫學研究所謝達斌教授)

“What is L5, a Recently Discovered Biological Nanoparticle, and How does it Affect Your Health?”

Professor Chu-Huang (Mendel) Chen

Clinical Director, Behavioral Medicine Research Center,

Baylor College of Medicine, Houston, TX

(貝勒醫學院行為醫學研究中心臨床主任陳珠璜教授)

“Application of Micro/Nano Scale Magnetostrictive Particle Biosensors in Food Safety”

Professor Tung-Shi Huang

Department of Nutrition and Food Science, Auburn University, Auburn, AL

(奧本大學營養與食品科學系黃東時教授)

8/11 (Fri) 2:00 pm – 3:30 pm : Technical Session T12 – System-on-Chip (III)

Chair: Dr. Chih-Ming Hung, Texas Instruments Inc.

(德州儀器公司洪誌銘博士)

Room: TI Auditorium

“Dual-Cores SOC Simplifies Digital Video Systems”

Dr. Thanh Tran

Hardware Productization Manager, Texas Instruments Inc.

“Integrated Circuits for 6.4Gbps Per-Pin Chip-to-Chip Interconnection”

Sao-Jie Chen and **Chi-Hsin Wang**

Department of Electrical Engineering, National Taiwan University

(國立台灣大學電子工程學研究生王啟欣)

“Improving Performance of Off-Chip Memory Bandwidth: A Survey”

Professor Jiangjiang (Jane) Liu

Department of Computer Science, Lamar University

(德州拉瑪大學計算機科學系劉江江教授)

8/11 (Fri) 2:00 pm – 3:30 pm : Technical Session T13 – Bioinformatics (III)

Chair: Professor Chokchai “Box” Leangsuksun, Louisiana Tech University

Room: EECS 2.410

“Fast Knowledge Integration in Gene Expression Databases Using High-Performance Parallel Computing”

Prerna Sethi and **Professor Chokchai “Box” Leangsuksun**

Computer Science, Louisiana Tech University

“Topological Similarity of Protein Interaction Network and its Correlation with Gene Expression Profiles”

Nancy Lin, Jia-Je Li, Hsueh-Fen Juan, Shyh-Horng Chiou, **Hsuan-Cheng Huang**

Institute of Bioinformatics, National Yang-Ming University, Taipei, Taiwan

(國立陽明大學生物資訊研究所黃宣誠教授)

“Fusion for Semi-automatic Indexing of Scientific Articles”

D. Frank Hsu and Kuan-Tse Huang

Department of Computer & Information Sciences, Fordham University, New York

(Fordham University 許德標教授)

8/11 (Fri) 2:00 pm – 3:30 pm : Technical Session T14 – C4I (I)

Chair: Dr. Wei-Ying Ma, Microsoft Research Asia

(微軟亞洲研究院馬維英博士)

Room: EECS 2.412

“The Response to IT Complexity: Autonomic Computing”

Richard (Ric) Telford

Vice President of Autonomic Computing, Tivoli Software, IBM Software Group

“Software as a Service: A Best Practices Perspective”

Dr. Jeane Chen

Executive Vice President of Engineering, Kintera, Inc., San Diego, CA

(Kintera 執行副總裁陳淑君博士)

“Next Generation Web Search Technologies”

Dr. Hsiao-Wuen Hon

Assistant managing director of Microsoft Research Asia

(微軟亞洲研究院副院長洪小文博士)

8/11 (Fri) 2:00 pm – 3:30 pm : Technical Session T15 - MEMS (I)

Chair: Professor J. Andrew Yeh, National Tsing Hua University, Hsin-Chu, Taiwan

(新竹國立清華大學葉哲良教授)

Room: EECS 2.415

“Vibrating RF MEMS in Electronic Systems”

Dr. Wan-Thai Hsu

Chief Science Officer, Discera Inc., Ann Arbor, MI

(Discera 科技長徐萬泰博士)

“Core Technologies for III-Nitride Integrated Microsensors”

Professor Kevin Jing Chen

Hong Kong University of Science and Technology

(香港科技大學陳敬教授)

“In-Situ Stiction Characterization of a MEMS”

Professor Timothy Dallas, R. Ranganathan, G. Sivakumar, and Dr. Richard Gale

Department of Electrical & Computer Engineering, Texas Tech University

8/11 (Fri) 3:30 pm - 4:00 pm : Break

8/11 (Fri) 4:00 pm – 5:00 pm : Technical Session T16 – Nanotechnology (IV)

Chair: Professor Yonhua Tzeng, Auburn University and National Cheng Kung University

(國立成功大學電機工程系講座曾永華教授)

Room: CN 1.112

“Nanoimprint for Next Generation Nanoelectronics and More”

Professor Yonhua Tzeng

Auburn University and National Cheng Kung University

(國立成功大學電機工程系講座曾永華教授)

“Magnetic Nanoparticles and Nanocomposite Magnets”

Professor J. Ping Liu

Department of Physics, the University of Texas at Arlington

(阿灵顿德州大学物理系刘家平教授)

“Novel Photonic Crystal Structures for Active Nanophotonic Devices”

Professor Weidong Zhou, Li Chen, Geetha Thiruvengadam, Hongjun Yang, Zexuan

Qiang Department of Electrical Engineering, the University of Texas at Arlington

(阿灵顿德州大学电机工程系周卫东教授)

“Modeling of Gain Threshold Condition in Photonic Crystal Defect-Mode Lasers”

Dr. Zexuan Qiang and Weidong Zhou

Department of Electrical Engineering, the University of Texas at Arlington

(阿灵顿德州大学电机工程系强则焯博士)

8/11 (Fri) 4:00 – 5:30 pm : Technical Session T17 – System-on-Chip (IV)

Chair: Chen Ding, Texas Instruments Inc.

(德州仪器公司丁辰硕士)

Room: TI Auditorium

“Physical Design and Manufacturability Closure Issues for Nanometer VLSI/SOC”

Professor David Z. Pan

Electrical & Computer Engineering Department, the University of Texas at Austin

(奧斯丁德州大學電機與計算機工程系潘志剛教授)

“A CMOS Direct Conversion Receiver RF Front-End for TD-SCDMA Application”
Kexin Luo, **Professor Rong Luo**, Huazhong Yang, and Hui Wang Department of
Electronic Engineering, Tsinghua University, Beijing, China
(清華大學電子工程系羅嶸教授)

“Parallel Correction and Adaptation Engines for I/Q Mismatch Compensation”
Imtinan Elahi, Khurram Muhammad, and Poras Balsara Texas Instruments Inc.,
Dallas, TX

8/11 (Fri) 4:00 pm – 5:30 pm : Technical Session T18 – C4I (II)

Chair: Dr. Wei-Ying Ma, Microsoft Research Asia

(微軟亞洲研究院馬維英博士)

Room: EECS 2.412

“Towards the Semantic Web: Collaborative Tag Suggestions”

Dr. Zhichen Xu

Principal Engineer and Technical Lead of Social Search Advanced Development
Yahoo! Inc.

(雅虎搜索主工程師與技術領導徐智晨博士)

“Mining and Searching Opinions in User-Generated Content on the Web”

Professor Bing Liu

Department of Computer Science, University of Illinois at Chicago

(伊利諾大學芝加哥分校計算機科學系劉兵教授)

“Web Advertising and Mining”

Dr. Ying Li

General Manager of Research and Mining, Microsoft adCenter

(微軟廣告中心 科研總經理李穎博士)

8/11 (Fri) 4:00 pm – 5:30 pm : Technical Session T19 - MEMS (II)

Chair: Professor Kevin Chen, Hong Kong University of Science and Technology

(香港科技大學陳敬教授)

Room: EECS 2.415

“Microfluidic Signal Processing for Biomedical Applications”

Professor Carlos Mastrangelo

Department of EECS, Case Western Reserve University, Cleveland, OH

“Electrically Actuated Microfluidics for Micro-Optical Imaging”

Professor J. Andrew Yeh, Chih-Cheng Cheng, Jing-Yi Huang, and Yen-Sheng Lu

MEMS Institute, National Tsing Hua University, Hsin-Chu, Taiwan

(新竹國立清華大學微機電所葉哲良教授)

“Microsystem Technology for Fully Implantable Cochlear Prosthesis”

Professor Darrin Young

Department of EECS, Case Western Reserve University, Cleveland, OH

(凱斯西儲大學電機工程與計算機科學系楊駿教授)

8/11 (Fri) 6:00 pm - 10:00 pm : Reception (Invited guests only) Host: Mr. John Lau, President of JNC Partners, Limited.

Day 3 (Saturday, August 12, 2006)

Location: The Westin Galleria Dallas

Saturday, August 12, 2006

Location: The Westin Galleria Dallas

8/12 (Sat) 9:30 am – 12:00 pm : Keynote Session K5 – Venture Capital

Chair: Dr. Da Hsuan Feng, Vice President of the University of Texas at Dallas

(達拉斯德州大學馮達旋副校長)

“What a Technologist Should Know About VC”

Wu-Fu Chen

Co-founder of Acorn Campus, Genesis Campus, and iD SoftCapital

(通訊網路創業投資大師陳五福先生)

“Venture Capital and the Growth of China's New Techpreneurs Economy”

Howard Chen, Esq.

Intellectual Property Transactions

Partner of Preston Gates & Ellis LLP, San Francisco Office

(環球普蓋茨法律事務所合夥人陳雷應律師)

“Global Business-Academic Platforms to Translate Research Discovery into Medical Products”

Professor Ziwei Huang

CEO of Raylight Corporation, La Jolla, CA

Director of Medicinal Chemistry, the Burnham Institute, La Jolla, CA

(美国睿光国际集团董事长黄子为博士)

“How to Start a High Tech Company”

Matthew S. Blanton

Chief Executive Officer of STARTech Early Ventures, Richardson, TX

General Partner of STARTech Seed Fund II

Abstracts and Biographies

General Conference Chairs

Dr. Da Hsuan Feng

Vice President
Research and Economic Development
The University of Texas at Dallas, U.S.A.
Tel: 972-883-4564
Email: fengd@utdallas.edu

BIOGRAPHY



Born in New Delhi, India, Dr. Feng moved to Singapore as a young boy. After completing his elementary, secondary education and two years in civil engineering from Singapore Polytechnic, Dr. Feng received his Bachelor and Doctorate degrees from Drew University and the University of Minnesota respectively. Prior to joining the Physics Department of Drexel University in 1976, where he eventually became the M. Russell Wehr Professor of Physics, he was a postdoctoral fellow at the University of Manchester and the University of Texas at Austin. During his tenure at Drexel University, he served for two years as Program Director of Theoretical Physics at the National Science Foundation and visiting Professor of the Niels Bohr Institute. Feng has been a consultant to the theoretical physics groups of Los Alamos National Laboratory, Oak Ridge National Laboratory, Brookhaven National Laboratory and United Kingdom's Daresbury Laboratory. He is also an honorary/guest professor of eight distinguished Chinese university and Academia Sinica. In 1996, Feng was elected Fellow of the American Physical Society "For outstanding contributions to the understanding of nuclear structure physics, particularly for the applications of the coherent states to physics and nuclear physics"

In 1997-1998, Feng served as technical advisor to Congressman Curt Weldon, currently Vice Chair of the House Armed Services, regarding South Africa, Central Europe, (especially Hungary) and China. He accompanied two Congressional Delegations to East Asia (January and March of 1997) and Central Europe in December of 1999. From April of 1998 until December of 2000, he was on leave of absence from Drexel University to serve as Vice President and HUBS (Hospitals, Universities, Businesses and Schools) General Manager of Science Applications International Corporation (SAIC), a multinational, Fortune 500 company. At SAIC, Feng was responsible for developing the HUBS project, a project inspired by the political leadership of the "Four States" (Delaware, New Jersey, Maryland and Pennsylvania)

and is designed to be the catalyst and the integration of information systems in that region. From FY98 to FY03, the project received over \$60 million of federal funding.

On December 9, 2000, Feng resigned from both Drexel University and SAIC to assume the position of Vice President for Research and Graduate Education and Professor of Physics at the University of Texas at Dallas. Feng's objective at UT Dallas, as designated by the President and the Provost, is to rapidly build the UT Dallas' research breath and depth. As the first VP for Research and Graduate Education, Feng devised the following mission statement for his position: "The Office of the Vice President for Research and Graduate Education of the University of Texas at Dallas identifies areas of intellectual importance, promotes the university as an economic and innovation engine as well as further activates UT Dallas's development as a world class university. In addition, the office promotes the university's "knowledge" products and collaborates synergistically with local, regional, national and international corporations and governments to enhance the global vision and impact of science and technology." The goal is to drive the University to be a major international research University.

Feng has published more than 180 scientific papers, edited more than 20 books, supervised 5 Ph.D. students and 4 postdoctoral fellows, and served as editor of four scientific journals. Feng's other professional affiliations include: Special advisor to the Editor-in-chief of Korean American Science and Technology Network (which is read by 15,000 Koreans globally), a member of the Computer Science/Engineering Technical Evaluation Advisory Task Force (1998) of the University of South Carolina, a member of the United States Department of Education (2000) Field Initiated Studies Technology Panel, and currently a member of the National Defense Industrial Association (NDIA) Science and Engineering Technology (SET) Executive Committee and a Board Director of CellStar Corporation.

General Conference Chairs

Dr. Jyuo-Min Shyu

Executive Vice President
Industrial Technology Research Institute
Hsinchu, Taiwan, Republic of China
Email: shyu@itri.org.tw

BIOGRAPHY



Jyuo-Min Shyu is Executive Vice President of the Industrial Technology Research Institute (ITRI), the primary research and development institute for industry in Taiwan. He received his BS and MS degrees from the Electrical Engineering Department of National Taiwan University, and his PhD degree from the Department of Electrical Engineering and Computer Science of the University of California, Berkeley. Dr. Shyu joined ITRI in 1988 and has been involved in various R&D as well as technology transfer projects for the development and advancement of microelectronics and flat-panel displays industries in Taiwan. During his 17 years at ITRI, from a researcher to the current position, he initiated many high-impact R&D programs and took the lead in exploring new technologies. In particular, in 2000, he founded SoC Technology Center in ITRI and served as its first general director; and in 2004, he founded the *Taiwan Nanotechnology Industry Development Association* and served as its first president. He was Executive Director of Taiwan's *National Nanotechnology Science and Technology Program* during 2004-2006.

Technical Program Committee Chair

Professor Yonhua Tzeng

National Cheng Kung University/Auburn University
Telephone Number: 886-6-2757575 ext. 31381 (Taiwan), 1-334-844-1869 (US)
E-mail: tzengyo@mail.mina.ncku.edu.tw, tzengyo@auburn.edu, tzengyo@gmail.com

BIOGRAPHY



Personal Information

Yonhua Tzeng, Ph.D.
B.S. in Electrical Engineering, 1977, National Taiwan University
MS. & Ph.D. in Electrical Engineering, 1981 & 1983, Texas Tech University, Lubbock, Texas
Telephone Number: 886-6-2757575 ext. 31381 (Taiwan), 1-334-844-1869 (US)
E-mail: tzengyo@mail.mina.ncku.edu.tw, tzengyo@auburn.edu, tzengyo@gmail.com

Positions

2005-present Acting Director
 Institute of Nanotechnology and Microsystems Engineering
 Director
 Center for Micro/Nano Science and Technology
 National Cheng Kung University
 Tainan, Taiwan, Republic of China
1983-present Alumni Professor/Professor/Associate Professor/Assistant Professor
 Alabama Microelectronics Science and Technology Center
 Department of Electrical and Computer Engineering
 Auburn University
 Auburn, Alabama 36849 USA

Society Activities

2005-present Fellow, IEEE
2005-present Vice President, Technical Activities, IEEE Nanotechnology Council
2004-present Chair, Technical Committee on Nanotechnology, IEEE Industrial Electronics Society.
1991-present Executive Committee Member, Applied Diamond Conference/ Nanocarbon Conference (New name of the conference “New Diamond and Nano Carbon” effective 2007)

Conference Program Chairs

Professor Darrin J. Young

Department of Electrical Engineering and Computer Science
Case Western Reserve University
Email: djy@case.edu

BIOGRAPHY



Dr. Darrin Young received his BS with honors, MS, and PhD degrees from the Department of Electrical Engineering and Computer Sciences at University of California at Berkeley in 1991, 1993, and 1999, respectively. He pioneered the research work in MEMS-based, high-Q, tunable capacitors and on-chip 3-D coil inductors in low-phase noise RF voltage-controlled oscillator (VCO) design for wireless communications applications. His doctoral thesis work demonstrated the first RF-CMOS VCO employing on-chip high-Q passive devices achieving the stringent GSM phase noise requirements. Between 1991 and 1993, he worked at Hewlett-Packard Laboratories in Palo Alto, California, where he designed a shared memory system for a DSP-based multiprocessor architecture. During the summer of 1997, he worked at Rockwell Semiconductor Systems in Newport Beach, California, where he designed silicon bipolar RF analog circuits for cellular telephony applications. Between 1997 and 1998, he was also at Lawrence Livermore National Laboratory, working on the design and fabrication of three-dimensional RF MEMS coil inductors for wireless communications. Dr. Young joined the Department of Electrical Engineering and Computer Science at Case Western Reserve University in 1999, where he is currently an Associate Professor. His research interests include MEMS and nano-electro-mechanical device design, fabrication, and integrated circuit design for biomedical implants, wireless sensing, powering, communications, and general industrial applications. He has published many technical papers in journals and conferences. His research has been supported by U.S. Army Research Office, NSF, NIH, NASA, and U.S. Department of Veterans Affairs.

Conference Program Chairs

Professor Zhijie J. Shi

University of Connecticut

Email: zshi@enr.uconn.edu

BIOGRAPHY



Zhijie J. Shi is an assistant professor of Computer Science and Engineering at the University of Connecticut. He is the director of the Security and Architecture Laboratory at the University of Connecticut (SALUC). His current research interests are in the areas of computer architecture and computer security. He is interested in the security of computer systems including embedded systems and general-purpose processors. Specifically, he has been investigating the essential hardware that not only accelerates cryptographic algorithms but also provides efficient mechanisms for upper system layers such as operating systems and applications to achieve security goals. He is also interested in the design and application of new cryptographic algorithms that utilize novel operations to achieve the same level of security as existing ciphers but have higher performance and lower power consumption. In addition, he has been working on several projects in computer architecture, such as high-performance and low-power processor for multimedia information processing and sensor node and system designs for underwater wireless sensor networks. He is a member of Association for Computing Machinery (ACM) and Institute of Electrical and Electronics Engineering (IEEE). He received his Ph.D. degree in Electrical Engineering from Princeton University in 2004 and the M.S. and B.S. degrees in Computer Science from Tsinghua University, Beijing, China, in 1996 and 1992, respectively.

Conference Program Chairs

Professor Frank Hsu

Fordham University
Email: hsu@cis.fordham.edu

BIOGRAPHY



D. Frank Hsu is the Clavius Distinguished Professor of Science and a professor of computer and information science at Fordham University in New York. He received his PhD from the University of Michigan (1979). He has served as visitor and on visiting faculty at Boston University, JAIST (Kanazawa, Japan) (as Komatsu endowed chair professor), Keio University (Tokyo, Japan) (as IBM endowed chair professor), MIT, Taiwan University, Tsing Hua University (Hsin-Chu, Taiwan), and University of Paris-Sud (and CNRS). Dr. Hsu's research interests are in combinatorics, algorithms and optimization; network interconnection and communication; informatics and intelligent systems; and information and telecommunications technology and infrastructure. He is interested in both microinformatics and macroinformatics with applications to a variety of domains such as information retrieval, target recognition and tracking, biomedical informatics, and virtual screening. Dr. Hsu has served on editorial boards of several journals including *IEEE Transactions on Computers*, *Networks*, *Inter. J. of Foundation of Computer Science*, *Monograph on Combinatorial Optimization*, and *Journal of Interconnection Networks (JOIN)*. He is currently editor-in-chief of *JOIN*. Dr. Hsu has served on program committees of several conferences including I-SPAN, DIMACS workshop series, AINA conferences, and IETC series. He is a senior member of IEEE, a foundation fellow of the Institute of Combinatorics and Applications, and a fellow of the New York Academy of Sciences. Dr. Hsu can be contacted by e-mail at hsu@cis.fordham.edu.

Conference Program Chairs

Dr. Wei-Ying Ma

Microsoft Research Asia.
Beijing, China
Email: wyma@microsoft.com

BIOGRAPHY



Dr. Wei-Ying Ma is a Principal Researcher at Microsoft Research Asia where he currently leads the Web Search & Data Mining Group. He received the B.S. degree in electrical engineering from the National Tsing Hua University in Taiwan in 1990, and the M.S. and Ph.D. degrees in electrical and computer engineering from the University of California at Santa Barbara in 1994 and 1997, respectively. From 1994 to 1997 he was engaged in the Alexandria Digital Library (ADL) project in UCSB while completing his Ph.D. During this time, he developed a web-based image retrieval system called Netra which has been frequently cited by other researchers and is regarded as one of the most representative image retrieval systems. From 1997 to 2001, he was with HP Labs where he worked in the field of multimedia adaptation and distributed media services infrastructure. He currently serves as an Editor for the ACM/Springer Multimedia Systems Journal and Associate Editor for ACM Transactions on Information System (TOIS). He joined Microsoft Research Asia in 2001. Since then, he has been leading the Web Search & Data Mining Group to conduct research in the areas of information retrieval, web search, data mining, mobile browsing, and multimedia management. He has served on the organizing and program committees of many international conferences including ACM Multimedia, ACM SIGIR, ACM CIKM, WWW, ICME, CVPR, SPIE Multimedia Storage and Archiving Systems, SPIE Multimedia Communication and Networking and was the general co-chair of the International Multimedia Modeling (MMM) Conference 2005 and International Conference on Image and Video Retrieval (CIVR) 2005. Over the course of his career, he has published 5 book chapters and over 150 international journal and conference papers.

Conference Program Chairs

Professor Chin Pan

Dean
College of Nuclear Science
National Tsing Hua University
Hsinchu, Taiwan, Republic of China
Email: cpan@ess.nthu.edu.tw

BIOGRAPHY



Dr. Chin Pan is a professor of the Department of Engineering and System Science and the Dean of the College of Nuclear Science at the National Tsing Hua University (NTHU). At which, he also serves as the director of the Center for Energy and Environmental Research. Dr. Pan received his BS degree in nuclear engineering from National Tsing Hua University in 1979, MS and Ph.D degrees in nuclear engineering from University of Illinois at Urbana-Champaign (UIUC) in 1983 and 1985, respectively. After receiving his doctoral degree, Dr. Pan served as a visiting research assistant professor at UIUC before joining NTHU as an associate professor in 1986 and was promoted to full professor in 1990. From the August 1992 to August 1993, Dr. Pan conducted research and served as a Visiting Professor of the Department of Nuclear Engineering at UIUC with a fellowship from the National Science Council of Taiwan, ROC. In the summer of 1998, he conducted microchannel boiling studies in the Department of Engineering Science at the University of Oxford as an academic visitor with a visiting fellowship from Engineering and Physical Sciences Research Council, UK. In the next summer, he conducted researches on multidimensional modeling of two-phase flow in the Rensselaer Polytechnic Institute as a visiting scholar with a fellowship from the National Science Council of Taiwan, ROC. He served as the Chairman of the Department of Engineering and System Science at NTHU from February, 2001 to January, 2004.

Dr. Pan's research activities for the past twenty years have been in the areas of two-phase flow, boiling heat transfer and energy engineering with a special focus on transition boiling, nucleate boiling near CHF, nuclear reactor thermalhydraulics, two-phase flow instability with or without nuclear coupling, two-phase natural circulation loops, microchannel two-phase flow, microchannel boiling, microchannel heat sink, microchannel reactor, and thermal-fluid transport in fuel cell systems, especially micro direct methanol fuel cells. He published a book in Chinese entitled "Boiling Heat Transfer and Two-phase Flow" in 2001. He authored and co-authored more than fifty SCI journal papers and more than 60 conference papers. He received

an outstanding research award in 1998 and three excellent research awards earlier from the National Science Council of Taiwan, ROC. He also received an outstanding industry – academy collaboration award from the Ministry of Education of Taiwan, ROC in 2003. He served as the chairman of the academic committee for joint projects of Atomic Energy Council and National Science Council from 2001 to 2005.

Advisory Board Chair

Professor Cathy H. Wu

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BIOGRAPHY



Academic/Professional Appointments

- Professor, Department of Biochemistry and Molecular & Cellular Biology, Georgetown University Medical Center (GUMC)
- Professor, Department of Oncology, GUMC
- Director, Protein Information Resource (PIR), GUMC
- Council, Human Proteome Organization (HUPO)
- Advisory Board, Protein Data Bank (PDB)
- Advisory Committee, Protein Structure Initiative, NIGMS, National Institutes of Health
- Cyberinfrastructure User Advisory Committee, National Science Foundation
- Education Committee, International Society for Computational Biology (ISCB)
- Advisory Board, Association of Chinese Bioinformaticians

Brief Bio

Dr. Wu has educational background in both biology and computer science. She has conducted bioinformatics research since 1990 and developed several protein classification systems and databases. She has managed large software and database projects and led the PIR project since 1999. PIR is a protein bioinformatics resource that supports genomic and proteomic research. PIR is also a member of the UniProt—Universal Protein Resource that produces the world's most comprehensive catalog of information on proteins.

Dr. Wu has served on several advisory boards, many bioinformatics review panels, and numerous Program Committees for international bioinformatics conferences. She has published about 110 peer-reviewed papers and three books, and given more than 80 invited lectures at universities, companies, and conferences. Her research interests include protein family classification and functional annotation, biological data integration, proteomic informatics, biomedical text mining and ontology, and bioinformatics cyberinfrastructure.

Advisory Board Vice Chair

Professor Yu-Hen Hu (胡玉衡)

University of Wisconsin at Madison
Email: yhhu@wisc.edu

BIOGRAPHY



Yu Hen Hu received BSEE from National Taiwan University in 1976, and MSEE and PhD degrees from University of Southern California in 1982. He has been a faculty member in the Electrical Engineering Department of Southern Methodist University, Dallas, Texas. Currently, he is a professor at the University of Wisconsin – Madison, Department of Electrical and Computer Engineering.

His research interests include multimedia signal processing, artificial neural networks, fast and parallel algorithms and design methodology for application specific system-on-chip, as well as computer aided design tools for designing nano-scale micro-architecture. He has published more than 200 technical papers and edited two monographs in these areas.

Dr. Hu is a fellow of IEEE. He is a former associate editor (1988-1990) for the IEEE Transactions of Acoustic, Speech, and Signal Processing in the areas of system identification and fast algorithms. He is currently associate editor of IEEE Signal Processing letters (2002-2003), Journal of VLSI Signal Processing, and European Journal of Applied Signal Processing. He is a founding member of the neural network signal processing technical committee of IEEE signal processing society and served as chair from 1993-1996. He is a former member of VLSI signal processing technical committee of the signal processing society. He served as the secretary of the IEEE signal processing society (1996-1998), a board member at IEEE neural network council, and is currently a steering committee member of the international conference of Multimedia and Expo on behalf of IEEE Signal processing society, and chair of IEEE signal processing society multimedia signal processing technical committee. He has served as general chair, program chair and steering committee member of numerous international technical conferences, workshops and symposiums.

胡玉衡畢業於國立台灣大學電機系。1982年獲得洛杉磯南加州大學電機博士學位後，即赴德州達拉斯南美以美大學(Southern Methodist University)任教職。自1987年起在威斯康辛大學麥迪生校區(University of Wisconsin – Madison)任教。現任電機及計算機工程系教授。

胡教授研究的領域很廣。包括多媒體信號處理，類神經網路，系統晶片設計方法和高速平行運算法則，以及設計奈米微處理器結構所用的電腦輔助工具。在這些領域裡，他發表了200篇技術論文，並編輯了兩本專題文獻。

胡教授是電子電機工程學會的會士(Fellow of Institute of Electrical and Electronic Engineers, IEEE)。他曾任IEEE訊號處理協會(Signal Processing Society)的秘書長，並代表該協會擔任IEEE類神經網路理事會(Neural Network Council)董事，以及擔任過類神經網路訊號處理技術委員會主席。胡教授現任該協會多媒體訊號處理技術委員會主席。他現任IEEE訊號處理雜誌專欄及論壇分項編輯，以及IEEE訊號處理簡訊(Signal Processing Letter)編輯。他曾擔任多項國際會議主席及論文審查主席職務。

Managing Committee Chair

Dr. Wei-Hsing Wang

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BIOGRAPHY



Dr. Wei-hsing Wang is the co-founder and president of NicheUSA, L.L.C., a thriving private company. The company's flagship product, ZoomerOne, based on patent pending technologies, offers freedom, savings, and power to both web site providers and web users. It is the only WIN-WIN solution on the market. The company is currently marketing ZoomerOne Study Propeller and Research Accelerator.

Before founding NicheUSA, L.L.C., Dr. Wang worked for BroadVision Inc. on Web sites personalization projects serving companies in the eastern region, such as Liberty Mutual, AIG, Merrill Lynch, and First Union Bank. Before joining BroadVision, he worked for AT&T Bell Laboratories in the areas of Network Database, Wireless Systems, and Internet Services at various locations in New Jersey.

Dr. Wang received his Ph.D. degree in computer science from Boston University, and B.S. and M.S. degrees in Computer Science and Information Engineering from National Taiwan University. He can be reached at Wang@NicheUSA.com or www.NicheUSA.com.

Managing Committee Vice Chair

Dr. Li-San Wang

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BIOGRAPHY



Li-San Wang received his B.S. (1994) and M.S. (1996) in Electrical Engineering from the National Taiwan University. He then received his M.S. (2000) and Ph.D. (2003) from the University of Texas at Austin, both in Computer Sciences. Currently he is a postdoctoral fellow at the Department of Biology, University of Pennsylvania. Starting January 2007, he will join the Department of Pathology and Laboratory Medicine, University of Pennsylvania as an assistant professor. Dr. Wang's research interests include phylogenetics, comparative genomics, and microarray analysis. He has authored more than twenty peer-reviewed book chapters and articles in international journals including PLoS Biology, SIAM Journal on Computing, and Journal of Molecular Evolution, and international conferences including Symposium of Theory on Computing (STOC), Symposium on Discrete Algorithms (SODA), and Conference on Intelligent Systems for Molecular Biology (ISMB). He has served in the program and organizing committees of several international workshops and conferences, including EITC 2004, RECOMB Satellite Workshop on Comparative Genomics 2005, and BioGrid 2006.

Day 1

Opening Speech

Dr. Da Hsuan Feng

Vice President
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BIOGRAPHY



Born in New Delhi, India, Dr. Feng moved to Singapore as a young boy. After completing his elementary, secondary education and two years in civil engineering from Singapore Polytechnic, Dr. Feng received his Bachelor and Doctorate degrees from Drew University and the University of Minnesota respectively. Prior to joining the Physics Department of Drexel University in 1976, where he eventually became the M. Russell Wehr Professor of Physics, he was a postdoctoral fellow at the University of Manchester and the University of Texas at Austin. During his tenure at Drexel University, he served for two years as Program Director of Theoretical Physics at the National Science Foundation and visiting Professor of the Niels Bohr Institute.. Feng has been a consultant to the theoretical physics groups of Los Alamos National Laboratory, Oak Ridge National Laboratory, Brookhaven National Laboratory and United Kingdom's Daresbury Laboratory. He is also an honorary/guest professor of eight distinguished Chinese university and Academia Sinica. In 1996, Feng was elected Fellow of the American Physical Society "For outstanding contributions to the understanding of nuclear structure physics, particularly for the applications of the coherent states to physics and nuclear physics"

In 1997-1998, Feng served as technical advisor to Congressman Curt Weldon, currently Vice Chair of the House Armed Services, regarding South Africa, Central Europe, (especially Hungary) and China. He accompanied two Congressional Delegations to East Asia (January and March of 1997) and Central Europe in December of 1999. From April of 1998 until December of 2000, he was on leave of absence from Drexel University to serve as Vice President and HUBS (Hospitals, Universities, Businesses and Schools) General Manager of Science Applications International Corporation (SAIC), a multinational, Fortune 500 company. At SAIC, Feng was responsible for developing the HUBS project, a project inspired by the political leadership of the "Four States" (Delaware, New Jersey, Maryland and Pennsylvania)

and is designed to be the catalyst and the integration of information systems in that region. From FY98 to FY03, the project received over \$60 million of federal funding.

On December 9, 2000, Feng resigned from both Drexel University and SAIC to assume the position of Vice President for Research and Graduate Education and Professor of Physics at the University of Texas at Dallas. Feng's objective at UT Dallas, as designated by the President and the Provost, is to rapidly build the UT Dallas' research breath and depth. As the first VP for Research and Graduate Education, Feng devised the following mission statement for his position: "The Office of the Vice President for Research and Graduate Education of the University of Texas at Dallas identifies areas of intellectual importance, promotes the university as an economic and innovation engine as well as further activates UT Dallas's development as a world class university. In addition, the office promotes the university's "knowledge" products and collaborates synergistically with local, regional, national and international corporations and governments to enhance the global vision and impact of science and technology." The goal is to drive the University to be a major international research University.

Feng has published more than 180 scientific papers, edited more than 20 books, supervised 5 Ph.D. students and 4 postdoctoral fellows, and served as editor of four scientific journals. Feng's other professional affiliations include: Special advisor to the Editor-in-chief of Korean American Science and Technology Network (which is read by 15,000 Koreans globally), a member of the Computer Science/Engineering Technical Evaluation Advisory Task Force (1998) of the University of South Carolina, a member of the United States Department of Education (2000) Field Initiated Studies Technology Panel, and currently a member of the National Defense Industrial Association (NDIA) Science and Engineering Technology (SET) Executive Committee and a Board Director of CellStar Corporation.

Opening Speech

Global Technology and Commercialization in the 21st Century

Henry Ross Perot

U.S. Presidential Candidate in 1992 and 1996
Founder of Reform Party
Founder of Electronics Data Systems (EDS) and Perot Systems

BIOGRAPHY



"**Made more money faster. Lost more money in one day. Led the biggest jailbreak in history. He died.** Footnote: The New York Times questioned whether he did the jailbreak or not." --answer Perot gave to the Dallas Morning News in 1981 when asked to write his own epitaph.

Best known for: Dallas computer billionaire, philanthropist, and independent (Reform Party) candidate for U.S. president in 1992 and 1996.

Born: June 27, 1930, in Texarkana, Texas

Family: Parents: Ross and Lulu May Perot; Sister: Bette; Wife: Margot Birmingham from Greensburg, Pennsylvania; Children: Ross, Jr., Nancy, Suzanne, Carolyn, and Katherine.

Education: Perot attended public schools and Texarkana Junior College. He entered the United States Naval Academy in 1949 and graduated in 1953. While there, he was class president, chairman of the honor committee, and battalion commander.

Profession: Founder of Electronic Data Systems (EDS) in Dallas.

Career: At age seven, Perot started working at various jobs throughout his childhood, including breaking horses, selling Christmas cards, magazines, and garden seeds, buying and selling bridles, saddles, horses and calves, delivering newspapers, and collecting for classified ads. After graduation from the Naval Academy, Perot served at sea for four years on a destroyer and an aircraft carrier.

In 1956, he married Margot, whom he met while at the Naval Academy. After being discharged from the Navy in 1957, Ross and Margot settled in Dallas where he went to work for IBM's data processing division as a salesman. By the early 1990s, the couple owned two homes in the

Dallas area, one on a twenty-two-acre estate in a posh neighborhood. Despite his wealth, Perot was known to drive a ten-year-old Oldsmobile. He bought a Jaguar for Margot, however. Margot taught school during the early years of their marriage. In 1962, she loaned Perot \$1,000 from her savings account to start EDS, a one-man data processing company. It cost at least that much to incorporate in Texas. Perot, at the time, had two regular paychecks and his wife had a third. The company ultimately became a multi-billion dollar corporation employing more than 70,000 people.

In 1969, Perot began to become more deeply involved with the "military-industrial complex," a term President Eisenhower coined nine years earlier while warning Americans about unwarranted influence in government. In what would become known in later decades as a hostile takeover, Perot attempted to take control, through a stock swap, of the Collins Radio Company, an Iowa-based CIA and military contractor with a division in the Richardson suburb of Dallas. A slump had hit the aerospace industry and Collins was having cash flow problems. In January, Perot approached Collins with merger plans that called for Perot assuming control of any combined company. Arthur Collins, the company's founder, was strangely determined that Perot not take over his company.

On March 24, EDS announced it was seeking at least 1.4 million Collins common shares to add to the 75,000 it already held. If successful, EDS would own fifty-one percent of the Collins outstanding shares. Perot was certain it would work with the consent of the ten institutional stockholders who controlled more than a million shares of Collins. Within weeks, Collins feared that the only way to prevent the takeover was by merging with, it seemed, any other company but Perot's. Exploratory talks were held with Harris-Intertype Corp., Burroughs Corp., Control Data, University Computing Co., and McDonnell Douglas. But a month after the EDS announcement the large stockholders, including Chase Manhattan Bank and Morgan Guaranty Trust, sided with Collins. Perot had no choice but to withdraw the tender offer.

Having avoided the only sure investment in his ailing company, Collins continued his apparent "anyone-but-Perot" merger search. In 1971, after talks with TRW fell through, North American Rockwell (which later became Rockwell International) finally stepped in with an investment offer that was finalized in September. Despite its initial promise to keep Collins management intact, Rockwell replaced Arthur Collins as president at the end of the first quarter of fiscal year 1972. Collins resigned January 14, 1972, and started a new company. In the end, he lost control of his thirty-nine-year-old company. After a three-year struggle, Collins succeeded only in saving it from Perot. Much might still be learned about Perot and CIA influence in Dallas business circles by further study of this largely forgotten, odd episode.

The same year Perot tried to take control of CIA contractor Collins Radio, he also became involved in activities that led to more direct covert operations. In 1969, the Nixon administration asked Perot to determine what action might be taken to improve the treatment U.S. prisoners of war (POWs) were receiving in Southeast Asia. Perot continued to work on ways to help the POWs until they were released at the end of the Vietnam War in 1972. According to Frank Snepp, a former CIA officer posted in Saigon, "Perot later acknowledged that the Vietnam mission was an insider deal from the start, conceived with the secret blessings of Richard Nixon and Henry Kissinger as a way of maintaining the appearance of action on the POW issue when, in fact, there hadn't been any."

Continuing such high-level, secret contacts in the early 1970s, Perot met a young Marine officer whose name would later become infamous in the minds of most Americans. Oliver North wanted to come to work for EDS, but Perot convinced him to stay in the Marines, which led to his later becoming the main villain in the Iran-Contra scandal. It would not be the last time Perot and North crossed paths, however.

In 1979, two EDS employees were taken hostage by the Iranian government. Perot directed a successful rescue mission composed of EDS employees and led by retired Green Beret Colonel Arthur "Bull" Simons. Perot himself went to Iran and entered the prison where his men were held. Ken Follett wrote a best selling novel, *On Wings of Eagles*, about the rescue. An NBC TV miniseries was later made from the book. Later in 1979, Governor William P. Clements, Jr. asked Perot to head Texas' War on Drugs Committee. The group proposed five laws to deter illegal drug operations, all of which were passed by the legislature and signed into law. In the next decade, Perot continued similar activities in both Texas and Washington D.C. In the early 1980s, Perot became a member of Ronald Reagan's President's Foreign Intelligence Advisory Board (PFIAB). The PFIAB is a little known, very powerful group of presidential appointees whose approval is required for all U.S. covert operations worldwide. Perot was not the first politically connected Texan to serve on this board. Anne Armstrong, who later became the mentor to Senator Kay Bailey Hutchison (R-Texas), served on Nixon's PFIAB. So did Bill Clements, who became Texas governor. It was while serving on the spooky PFIAB that Perot again met up with Lieutenant Colonel Oliver North, who by this time was on the National Security Council staff. North asked Perot to help finance the rescue of U.S. Brigadier General James Dozier, who had been kidnapped by the Red Brigade in Italy. The mission succeeded before Perot's \$500,000 was used, but it bought him favor with the Pentagon's new espionage team, the Intelligence Support Activity.

In 1983, Governor Mark White asked for Perot's assistance to improve the quality of public education in the state. His proposed reforms resulted in major legislative changes in Texas public schools. Meanwhile, Perot continued to established himself as someone who could bankroll Oliver North's off-the-shelf adventures. These involved more rescue attempts, many of which failed. They included the 1985 attempt that resulted in the murder of William Buckley, chief of the CIA station in Lebanon. Perot's money often ended up in the hands of foreign terrorists and drug dealers with nothing gained in return.

Perot sold EDS in 1984 to General Motors for \$2.5 billion. He retained ownership in the company, which made him GM's largest individual stockholder and a member of the board of directors. From the start, Perot and GM head Roger Smith quarreled, and Perot criticized the quality of GM automobiles. In 1986, GM bought out Perot's stock for \$700 million with the agreement that he could not compete with EDS for three years. Perot ignored the agreement. Two years later, he started a new computer service company, Perot Systems, which operates in the United States and Europe.

The Perot family is also known for more traditional philanthropy. They have given over \$100 million to charitable and civil causes. In 1984, Perot bought a copy of the Magna Carta. It was the only copy allowed to be taken out of Great Britain. Perot loaned the document to the National Archives in Washington, D.C., for display alongside the U.S. Constitution and the Bill of Rights.

Reportedly, Perot came to loath George Bush because he believed Bush did not do enough to search for POWs in Vietnam. Perot's hatred for President Reagan's vice president grew during Bush's run for president in 1988. Perot, a native Texan, learned that Bush, the son of a senator from Connecticut, was a resident of Texas only because he rented a hotel suite in Houston.

Four years later, Bush's popularity was temporarily high after Desert Storm and a second Bush term seemed inevitable. Then Perot appeared on Larry King's CNN TV talk show and said he would consider running against Bush if volunteers could get his name on all fifty state ballots. Millions of U.S. citizens responded by signing petitions which put Perot on the ballots of most of the states, but not all fifty. Perot began appearing on more talk shows and produced his own half-hour TV info-mercials to explain his positions on national issues, particularly on deficit reduction. Misperceived by the public as a refreshing Washington "outsider," Perot was

actually a consummate political insider who knew many of the U.S. government's dirtiest secrets.

Strangely, the news media also misperceived Perot, not as an outsider but as a declared presidential candidate. When he exposed a campaign dirty trick involving a fake nude photo of his daughter, journalists ridiculed him for believing anyone would do such a thing. Oddly, the media knew better than the public that Perot was very experienced in recognizing such covert activities. Perot claimed that if the photo had become public, it would have ruined his daughter's impending wedding. The dirty tactics of his would-be opponents and the biased treatment by the media caused him to reconsider whether he would run. Although he had not yet announced his candidacy, the news media accused him of abruptly withdrawing from the race after getting supporters' hopes up. When Perot later announced his candidacy, the media ridiculed him as a vacillator, conveniently forgetting his promise not to run until he was on every state ballot. As a result of the media's irresponsibility, Perot lost the support of confused voters. Nonetheless, on election day the \$57 million of his own money spent on the campaign got him nineteen percent of the vote, the highest percentage for a third party candidate since Theodore Roosevelt.

In 1995, Perot announced the formation of the Independence Party (now called the Reform Party) and said it will attempt to qualify candidates in every state. The next year, Perot won the Reform Party nomination for president, beating former Colorado Governor Richard Lamm by a two to one margin. This time, instead of financing his campaign himself, he accepted contributions and matching government funds. But strange things continued to happen to his campaign. Lamm, seemingly upset by his party's nominating process, refused to endorse Perot. Then he was refused a spot in the presidential debates because debate sponsors decided his low poll numbers disqualified him as a serious candidate. President Clinton wanted him in the debates, Republican opponent Bob Dole did not. In the election, Perot won eight percent of the vote.

Early in the 2000 presidential campaign the candidates, including the Republican frontrunner and namesake son of Perot's old nemesis, were watching for signs that Perot might make a third straight run for president. This time, Reform Party rivals for the nomination include former Republican candidate and Nixon administration staffer Pat Buchanan. Minnesota Governor Jesse Ventura, a former Navy Seal and trained covert operations specialist, also became a leader of anti-Perot sentiment within the party.

Ross Perot has written several books, including *United We Stand; Not for Sale at Any Price; Save Your Job, Save Our Country; Intensive Care; Preparing Our Country for the 21st Century;* and *The Dollar Crisis*, co-authored with Senator Paul Simon.

Awards and honors:

- The Winston Churchill Award (presented by Prince Charles in 1986; third recipient and first businessman to receive the award; given for exhibiting character similar to that of the late British prime minister).
- The Raoul Wallenberg Award (first recipient; given for lifetime service reminiscent of that of the Swedish diplomat who saved more than 100,000 Hungarian Jews from the Nazis during World War II).
- The Jefferson Award for Public Service.
- The Patrick Henry Award (first recipient; given to a U.S. citizen for outstanding service to his country).
- The National Business Hall of Fame Award.
- The Sarnoff Award (for contributions to the electronics industry).
- The Eisenhower Award (for support of U.S. Armed Forces).
- The Smithsonian Computerworld Award (first recipient; given for contributions to the computer industry).

- The Horatio Alger Award (given for overcoming obstacles to achieve significant career success).
- Medal for Distinguished Public Service (highest civilian award presented by the Department of Defense; given for his efforts supporting U.S. prisoners of war).

Sources: Doron P. Levin, *Irreconcilable Differences: Ross Perot Versus General Motors* (New York: Plume, 1990); Roger Simon, "See Ross Run," *Playboy* magazine, August 1992, pp. 72-74, 136-138; Frank Snepp, "The Company He Keeps," *Playboy* magazine, August 1992, p. 139; United States Information Service Stockholm <http://www.usis.usemb.se/election/perot.htm>; Ken C. Braband, *The First 50 Years: A History of Collins Radio Company and the Collins Divisions of Rockwell International*, (Cedar Rapids, Iowa: Rockwell International, 1983), pp. 14-15, 168-179; Charles Brooks, editor, *Best Editorial Cartoons of the Year - 1993* (Gretna, Louisiana: Pelican, 1993), p. 39, cited hereafter as Brooks-1993, p. 39; Brooks-1996, p. 35; Brooks-1997, p. 51;

K1 - Keynote Session 1

Agrienergy (Agriculture/Energy): What Does The Future Hold?

Nobel Laureate, Prof. Alan G. MacDiarmid

James Von Ehr Distinguished Chair in Science and Technology and
Professor of Chemistry and Physics at the University of Texas at Dallas,
Blanchard Chair in Chemistry at the University of Pennsylvania
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ABSTRACT

Alternative sources of energy (which do not add to atmospheric CO₂) to fossil fuel are urgently needed by all countries. One type of alternative energy involves the direct harvesting of solar energy. Solar energy may be harvested:

- (i) by conventional and non-conventional photovoltaic “solar cells” for direct electricity production.
- (ii) by conventional photosynthesis (use of leaves of growing trees, plants as “solar cells”) to produce energy stored in organic compounds. Conventional photosynthesis, of enormous growing importance today, is included in the popular term “Agrienergy” (agriculture/energy). This use of conventional photosynthesis falls into two chief categories: (a) bioethanol and (b) biodiesel. The former involves a fermentation step (to produce ethanol) as in the fermentation of sugar, corn, compounds made by the breakdown of cellulose as found plentifully in wood waste from the forestry industry, agricultural waste, etc. The second involves the extraction (no fermentation) of combustible oils from seeds, beans etc. (e.g. soybeans).

“The Hydrogen Economy” is of growing international importance. It involves the use of hydrogen as a fuel in automobiles, etc. The only exhaust emission from a vehicle is water vapor. Of chief concern at the moment is how can hydrogen be produced by a non-polluting method and how can hydrogen be stored and transported as a substitute for gasoline.

The above and related topics will be discussed.

BIOGRAPHY



Alan MacDiarmid was the chemist responsible in 1977 for the synthesis and chemical and electrochemical doping of polyacetylene, (CH)_x, the prototype conducting polymer, and for the “rediscovery” of polyaniline, now probably the foremost industrial conducting polymer.

In 1973, he began research on (SN)_x, an unusual covalent polymeric material with metallic conductivity. His interest in organic conducting polymers began in 1975 when he was introduced to a new form of polyacetylene by Dr. Hideki Shirakawa at the Tokyo Institute of Technology. The ensuing collaboration between MacDiarmid, Shirakawa and Alan Heeger (then at the Department of Physics at the University of Pennsylvania) led to the historic discovery of metallic conductivity in an organic polymer, thus introducing and establishing the field of conducting polymers (electronic polymers). In 2000 these three collaborators received the Nobel Prize in Chemistry for their pioneering research. That an organic polymer could be readily doped to the metallic regime introduced a phenomenon, completely new and unexpected to both the chemistry and physics communities.

MacDiarmid has recently discovered a new type of organic polymer which spontaneously forms hollow microspheres. His current scientific interests are also centered around the technologically important conducting polymer, polyaniline and its use in conducting polymer nanofibers (diameter <100 nm) and inexpensive, disposable plastic and paper electronic circuits. He has recently extended his activities to include carbon nanotubes as possible analogs of conducting polymers. MacDiarmid's most recent research has created electronic organic fibers with a diameter of ~ 4 nanometers. A nanomaterial is a material consisting of a substance or structure which has at least one dimension less than 100 nm (the diameter of a human hair is approximately 50,000 nm). His objective is to combine the fields of electronic organic polymers and electronic nanofibers to develop a new field of "nanoelectronics".

During the past few years, MacDiarmid has become actively involved in renewable energy of various types especial bio-ethanol and bio-diesel and in particular the use of cellulose-containing substances derived from wood, farm waste, etc. for the production of bio-ethanol. His studies also involve the potential use of bio-ethanol in fuel cells and the reaction of bio-ethanol with water to produce hydrogen by novel electrical means and the storage of hydrogen by electronic organic polymers.

He is also involved in the establishment of laboratories in his name in New Zealand, China, USA, Korea, Brazil, and India as well as a non-profit MacDiarmid Institute for Global Research Excellence.

MacDiarmid holds the James Von Ehr Distinguished Chair in Science & Technology, and also the position of Professor of Chemistry and Physics at the University of Texas at Dallas while maintaining his Blanchard Chair in Chemistry, at a reduced level of input, at the University of Pennsylvania.

MacDiarmid was born in New Zealand 79 years ago and after obtaining his higher education at the University of New Zealand, University of Wisconsin and Cambridge University he joined the faculty of the University of Pennsylvania in 1955. He is author/coauthor of over 600 research papers and approximately 25 patents. He is also the recipient of numerous awards and honorary degrees both nationally and internationally.

K1 – Keynote Session 1

NUCLEAR POWER DEVELOPMENT TOWARD A SUSTAINABLE ENERGY SOURCE

Professor Chin Pan

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ABSTRACT

The carbon dioxide in the Earth's atmosphere has increased by 16% over the past half century mainly due to the burning of fossil fuels.[1] The buildup of such greenhouse gas may cause global warming leading to possible climate change. The Kyoto Protocol constrains the carbon dioxide emission to the level of 1990. The increase use of renewables such as solar energy, wind power, biomass, hydroelectric energy, geothermal energy, ocean energy, etc, and the employment of hydrogen energy have been proposed as counter measures in addition to the more effective use of energy. Among the renewables, the solar energy has been assumed to be the ultimate energy source in the earth. However, it is limited by its intrinsic low energy density, though its total amount is huge. On the other hand, hydrogen itself is not an energy source but an energy carrier. It must be produced from other energy sources accompanied with certain degree of energy loss during the procedures of production. Nuclear power becomes an important option for the limitation or even reduction of carbon dioxide. Indeed, the use of nuclear power produces little carbon dioxide compared to the fossil energy. To generate one kW-hour of electricity, the combustion of coal release about 950 grams of carbon dioxide, while it produces only about 15 grams, one sixty-third of coal power and one thirty second of natural gases, if nuclear power is used instead.[2] Nuclear power has been developed for more than a half century and there are more than 430 nuclear power reactors under operation in the world. The employment of nuclear power has contributed significantly to the reduction of the increasing rate of carbon dioxide. Nuclear power may be a sustainable energy source.

Indeed, nuclear power is re-gaining attention recently for many significant reasons. The operation of four hundred and thirty more nuclear power reactors around the world has proved that nuclear power is relatively safe compared to the other energy sources. The annual core melt frequency of existing power reactor is generally below 10^{-5} . In fact, a core melt accident may not lead to casualties. For example, the Three Mile Island accident did not cause any death. The design of multiple barriers to retain the radioactive materials inside the containment was proved to be successful in that accident. Moreover, the depleting of oil resources, significantly increased oil demand due to, in particular, the fast economic growth of two most populated countries in the world: China and India, and the Kyoto Protocol constrain on the emission of carbon dioxide have led to the so-called "nuclear renaissance". Indeed, China has decided to develop nuclear power aggressively to meet their huge energy need, protect their environment, and reduce their transportation load of coal. The nuclear power capacity will increase from 9 GWe now to 40 GWe in 2020. USA is expected to have new order of nuclear power plants by 2010.

To develop nuclear power as a sustainable energy source, the design of next generation nuclear power plant must be safe and reliable, environmental friendly, proliferation resistant and economic. Indeed, the Department of Energy of the USA has been leading the Generation IV International Forum (GIF) to develop the next generation nuclear power plants with eight goals in the four broad areas of sustainability, proliferation resistance and physical protection, economics, and safety and reliability.[3] The Forum including USA, UK, France, Japan, Canada and other countries, has selected the following six candidate nuclear energy systems to develop: sodium cooled fast reactor (SFR), lead cooled fast reactor (LFR), gas cooled fast reactor, very high temperature gas cooled reactor (VHTR), supercritical water cooled reactor (SCWR), and molten salt reactor (MSR). The deployment of Generation IV reactor is planned to be in 2030. The annual core melt frequency of the next generation nuclear reactor would be very low, say, less than 10^{-6} . As for the spent fuels, the employment of closed fuel cycle with reprocessing will make full use of fissile and fertile nuclides and minimize the volume of the highly radioactive wastes. Moreover, technologies for the transmutation of minor actinides and long-lived fission products are now under developing in many institutes around the world.

Nuclear hydrogen is also an important part for the design of the next generation nuclear power plant. Hydrogen may be produced using the economic electricity from nuclear energy through electrolysis at high temperatures or using the very high temperature process heat from certain types of next generation nuclear reactors, e.g., VHTR, for thermal-chemical water splitting processes. The sulfur-iodine cycle is now considered to be the most promising cycle for the production of hydrogen from water splitting using heat from a very high temperature reactor. Bench scale tests had been conducted and a pilot test plan is now undergoing in Japan. The cost of hydrogen production from a thermochemical cycle coupled to a nuclear power source is estimated in the range of \$ 1.3 per kg of hydrogen, close to methane reforming (\$0.9/kg).[4] Nuclear hydrogen should play a crucial role in the era of hydrogen economy.

References

1. F.S. Hsu, 2005, "The Energy Problem at a Glance" Preface of *World will be More Beautiful with Nuclear Power*, by M. Lee and T.R. Linag, Nuclear Association of ROC, (in Chinese, Preface in both English and Chinese)
2. World Energy Council, 2001, A better Understanding of Greenhouse Gas Emission for Different Energy Vectors and Applications.
3. Y. SAGAYAMA, 2005, "Progress of the Generation IV Nuclear Energy System Development Project," Proceedings of GLOBAL 2005, Tsukuba, Japan, Oct 9-13, 2005, Paper No. 588.
4. X. VITART, P. CARLES, A. LE DUIGOU, 2005, "Thermochemical Production of Hydrogen Using Nuclear Heat: a Survey of Technical and Economical Issues," Proceedings of GLOBAL 2005, Tsukuba, Japan, Oct 9-13, 2005, Paper No. IL008

BIOGRAPHY



Dr. Chin Pan is a professor of the Department of Engineering and System Science and the Dean of the College of Nuclear Science at the National Tsing Hua University (NTHU). At which, he also serves as the director of the Center for Energy and Environmental Research. Dr. Pan received his BS degree in nuclear engineering from National Tsing Hua University in 1979, MS and Ph.D degrees in nuclear engineering from University of Illinois at Urbana-Champaign (UIUC) in 1983 and 1985, respectively. After receiving his doctoral degree, Dr. Pan served as a visiting research assistant professor at UIUC before joining NTHU as an associate professor in 1986 and was promoted to full professor in 1990. From the August 1992 to August 1993, Dr. Pan conducted research and served as a Visiting Professor of the Department of Nuclear Engineering at UIUC with a fellowship from the National Science Council of Taiwan, ROC. In the summer of 1998, he conducted microchannel boiling studies in the Department of Engineering Science at the University of Oxford as an academic visitor with a visiting fellowship from Engineering and Physical Sciences Research Council, UK. In the next summer, he conducted researches on multidimensional modeling of two-phase flow in the Rensselaer Polytechnic Institutes as a visiting scholar with a fellowship from the National Science Council of Taiwan, ROC. He served as the Chairman of the Department of Engineering and System Science at NTHU from February, 2001 to January, 2004.

Dr. Pan's research activities for the past twenty years have been in the areas of two-phase flow, boiling heat transfer and energy engineering with a special focus on transition boiling, nucleate boiling near CHF, nuclear reactor thermalhydraulics, two-phase flow instability with or without nuclear coupling, two-phase natural circulation loops, microchannel two-phase flow, microchannel boiling, microchannel heat sink, microchannel reactor, and thermal-fluid transport in fuel cell systems, especially micro direct methanol fuel cells. He published a book in Chinese entitled "Boiling Heat Transfer and Two-phase Flow" in 2001. He authored and co-authored more than fifty SCI journal papers and more than 60 conference papers. He received an outstanding research award in 1998 and three excellent research awards earlier from the National Science Council of Taiwan, ROC. He also received an outstanding industry – academy collaboration award from the Ministry of Education of Taiwan, ROC in 2003. He served as the chairman of the academic committee for joint projects of Atomic Energy Council and National Science Council from 2001 to 2005.

K1 – Keynote Session 1

Design for Manufacturing

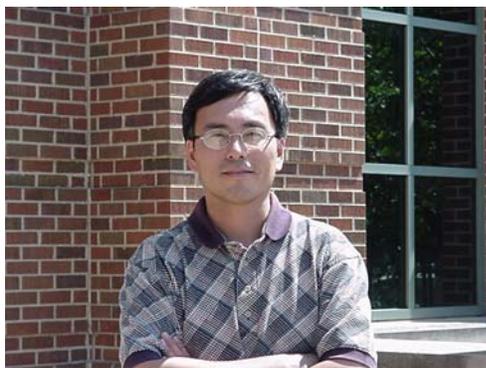
Professor Martin D. F. Wong

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ABSTRACT

With on-chip minimum feature size down to nanometer range, there are substantial challenges to the design and manufacturing of VLSI circuits and systems. In the current 65nm technology node, manufacturing process variations have become a major factor that affects circuit performance and could lead to excessive yield loss. This manufacturing problem will get significantly worse in future technology nodes of 45nm/32nm/22nm and beyond. In order to cope with manufacturing process variations, a major paradigm shift is required in the way we design VLSI circuits. To handle random variations, we need to develop a new generation of computer-aided design (CAD) software that manipulate statistical random variables rather than deterministic values. To handle systematic variations, we need to develop a new generation of CAD software that understand how these variations are compensated during the down-stream manufacturing steps (e.g., OPC for photo-lithography related printing problems, and dummy metal insertion for post-CMP topography variation). In this talk, we give an overview of our contributions in this emerging critical research area of design for manufacturing.

BIOGRAPHY



Martin D.F. Wong received the B.Sc. degree in mathematics from the University of Toronto and the M.S. degree in mathematics from the University of Illinois at Urbana-Champaign. He obtained the Ph.D. degree in computer science from the University of Illinois at Urbana-Champaign in 1987.

Dr. Wong is currently Professor of Electrical and Computer Engineering at the University of Illinois at Urbana-Champaign (UIUC). Before he joined UIUC, he was a Bruton Centennial Professor of Computer Sciences at the University of Texas at Austin (UT-Austin). Dr. Wong's

research interests are computer-aided design (CAD) of very large scaled integrated circuits (VLSI), design and analysis of algorithms, and combinatorial optimization. He has published 300 technical papers and has graduated 32 Ph.D. students.

Dr. Wong received the 2000 IEEE CAD Transactions Best Paper Award for his work on interconnect optimization. He also received best paper awards at DAC-86 and ICCD-95 for his work on floorplan design and routing, respectively. His ICCAD-94 paper on circuit partitioning has been included in the book "The Best of ICCAD - 20 Years of Excellence in Computer Aided Design" published in 2003.

Dr. Wong has served on numerous technical program committees of VLSI CAD conferences. He has served as an Associate Editor for IEEE Transactions on Computer-Aided Design and IEEE Transactions on Computers, and has served as a Guest Editor of four special issues for IEEE Transactions on CAD. He is currently on the Editorial Board of ACM Transactions on Design Automation of Electronic Systems. Dr. Wong is an IEEE Distinguished Lecturer. He is a Fellow of IEEE.

K2 - Keynote Session 2

Moore's Law and CMOS Technology

Professor Tso-Ping Ma (馬佐平)

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ABSTRACT

The world we live in has experienced dramatic changes brought about by the rapid advances in electronic technology. Many believe that the so called “electronics revolution” was launched with the invention of the transistor more than 50 years ago, and it really began to take off when the integrated circuit (IC) was first introduced over 4 decades ago. Since then, the tremendous progress in the electronics industry has been riding on the exponential growth of the IC technology, as characterized by the “Moore’s Law”, which basically says that the information storage capacity of a silicon chip, as well as its information processing power, doubles every 18 months. Since the cost of a silicon chip has remained more or less constant over the years, an average consumer now may possess more computing power than a supercomputer did in the early 80’s that cost a few million dollars then. The Internet and various smart appliances that so many of us take for granted today are all made possible because of the ever more powerful IC’s. If the Moore’s Law can be sustained for a few more decades, which many experts believe will, what lies ahead will make our current society look like the Stone Age in terms of technology sophistication. It’s been said that, had the automobile industry progressed at the same rate as that of the silicon chip in the last few decades, today we should have a car that can go around the world within minutes on a gallon of gas. And it should only cost a few dollars to make.

Surpassing the automobile industry in terms of annual sales worldwide a few years ago, the electronics industry is the largest industry of its kind in USA, which is also representative of many industrialized countries. Because of its critical importance to a country’s economic development and national defense capability, the information technology, rooted in electronics, will undoubtedly receive even more attention from all nations,

What makes the silicon chip tick? Why is the electronics industry growing so fast? This talk will give an overview of the silicon chip technology and its applications, with a preview of what’s to come in the future. The current state of the electronics industry and information technology in China, and how its future might look, will also be discussed in the context of China’s recent push toward modernization.

BIOGRAPHY



He is Raymond J. Wean Professor and chairman of Electrical Engineering at Yale University, where he has been a faculty member since 1977. He also serves as the Director of Yale Center for Microelectronics, and a Co-Director of the Yale-Peking Joint Center for Microelectronics and Nanotechnology. In 1974 he graduated from Yale University with a Ph.D. degree and went to IBM, where he did research work on advanced silicon device technology and ionizing radiation effects in MOS devices. His research and teaching at Yale have focused on semiconductors, MOS interface physics, ionizing radiation and hot electron effects, advanced gate dielectrics, flash memory device physics, and ferroelectric thin films for memory applications. He is a patent holder, co-editor of a book, has given numerous invited talks and contributed to several book chapters as well as over 180 research papers. He has been actively involved in organizing, chairing, or serving as committee members in numerous technical conferences, including the IEEE/SISC, IEEE/DRC, IEEE/NSREC, International VLSI-TSA, SSDM, EDMS, ECS, and MRS meetings. He has been selected to receive the 2006 SIA (Semiconductor Industry Association) University Researcher Award, has received the 2005 IEEE Andrew S. Grove Award and a 2005 Pan Wen-Yuan Award, a 1998 Paul Rappaport Award of the IEEE Electron Device Society, two B.F. Goodrich National Collegiate Inventor's Advisor Awards in 1993 and 1998, respectively, the 1991 Connecticut Yankee Ingenuity Award, and the 1975 Harding Bliss Prize at Yale University. He is an Honorary Professor of Tsinghua University, Tienjin University, and Chinese Academy of Sciences. He is a member of the US National Academy of Engineering (NAE), a Fellow of IEEE, a Member of the Connecticut Academy of Science and Engineering (CASE), a life member of the American Physical Society, and a member of the ECS, MRS, Sigma Xi, and Yale Science and Engineering Association (YSEA).

K2 - Keynote Session 2

New Technologies from UTD's NanoTech Institute: From High Performance Nanotube Yarns and Sheets to Fuel Powered Artificial Muscles

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BIOGRAPHY



Ray Baughman received a B.S. in Physics from Carnegie Mellon University and a Ph.D. in the Materials Science area from Harvard University. Upon graduation he went to Allied Chemical, which later became AlliedSignal and Honeywell. Until August 2001, he was a Corporate Fellow of Honeywell/AlliedSignal, where he received Technical Achievement Awards for developing new products in the areas of :

- Time-Temperature Indicators,
- Polyaniline Compositions and Applications, and
- Sonar Hydrophones.

He is a Fellow of the American Physical Society, and the World Innovation Foundation, an Academician of the Russian Academy of Natural Sciences, an Honorary Professor of three universities in China, and is on editorial and advisory boards of *Science*, *Synthetic Metals*, the *International Journal of Nanoscience*, and the *Encyclopedia of Nanoscience and Nanotechnology*.

Ray has 57 US patents and over 250 publications with over 10,500 citations. He has received the *Chemical Pioneer Award* of the American Institute of Chemists (1995), the *Cooperative Research Award in Polymer Science and Engineering* (1996), the *New Materials Innovation Prize* of the Avantex International Forum for Innovative Textiles (2005), a *Nano 50 Award* from *Nanotech Briefs Magazine* (2006), and the *NanoVic Prize* from Australia (2006).

In August 2001, Ray became the Robert A. Welch Professor of Chemistry and Director of the NanoTech Institute of the University of Texas at Dallas.

K2 - Keynote Session 2

Cyber Crimes and Terrorism: A Major Threat to Our Society

Professor Peter Pin-Shan Chen

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BIOGRAPHY



Prof. Peter Chen is the originator of the Entity-Relationship Model (ER Model), which serves as the foundation of many systems analysis and design methodologies, computer-aided software engineering (CASE) tools, and repository systems including IBM's Repository Manager/MVS and DEC's CDD/Plus. After years of efforts of many people in developing and implementing the entity and relationship concepts, now “Entity-Relationship Model (ER Model),” “Entity-Relationship Diagram (ER Diagram),” and “Peter Chen” have become commonly used terms in “online” dictionaries, books, articles, web pages, course syllabi, and commercial product brochures.

Dr. Peter Chen's original paper on the Entity-Relationship model (ER model) is one of the most cited papers in the computer software field. Recently, Prof. Peter Chen was honored by the selection of his original ER model paper as one of the 38 most influential papers in Computer Science according to a survey of 1,000 computer science college professors ([Table of Contents, Great Papers in Computer Science](#), edited by P. Laplante, West Publishing, 1996). Based on one particular citation database, Chen's paper is the [35th most cited article in Computer Science](#). It is the 4th most downloaded paper from the ACM Digital Library in January 2005 (*Communications of ACM*, March 2005) even though the paper was published 30 years ago.

The ER model was adopted as the meta model for the ANSI Standard in Information Resource Directory System (IRDS), and the ER approach has been ranked as the top methodology for database design and one of the top methodologies in systems development by several surveys of FORTUNE 500 companies.

Dr. Chen's work is a cornerstone of software engineering, in particular Computer-Aided Software Engineering (CASE). In the late 80's and early 90's, IBM's Application Development Cycle (AD/Cycle) framework and DB2 repository (RM/MVS) were based on the ER model. Other vendors' repository systems such as Digital's CDD+ were also based on the ER model.

Prof. Chen has made significant impact on the CASE industry by his research work and by his lecturing around the world on structured system development methodologies. Most of the major CASE tools including Computer Associates' ERWIN, Oracle's Designer/2000, and Sybase's PowerDesigner (and even a general drawing tool like Microsoft's VISIO) are influenced by the ER model.

The ER model also serves as the foundation of some of the recent work on Object-Oriented analysis and design methodologies and Semantic Web. The UML modeling language has its roots in the ER model.

The hypertext concept, which makes the World Wide Web extremely popular, is very similar to the main concept in the ER model. Dr. Peter Chen is currently investigating this linkage as an invited expert of several XML working groups of the World Wide Web Consortium (W3C).

Professor Peter Chen's work is cited heavily in a book published in 1993 for general public called *Software Challenges* published by Time-Life Books as a part of the series on "Understanding Computers".

Dr. Chen is a Fellow of the IEEE, the ACM, and the AAAS. He is a member of the [European Academy of Sciences](#). He has been listed in [Who's Who in America](#) and [Who's Who in the World](#) for more than 15 years.

He is the recipient of prestigious awards in several fields of Information Technology (IT): data management, information management, software engineering, and general information science/technology:

- The Data Resource Management Technology Award from the Data Administration Management Association (NYC) in 1990.
- The Achievement Award in Information Management in 2000 from DAMA International, an international professional organization of data management professionals, managers, and Chief Information Officers (CIO's). Dr. E. F. Codd (the inventor of the Relational data model) is the winner of the same award in 2001.
- Inductee, the Data Management Hall of Fame in 2000.
- The Stevens Award in Software Method Innovation in 2001, and the award was presented at [IEEE International Conference on Software Maintenance](#) in Florence, Italy on November 8, 2001.
- The IEEE Harry Goode Award at the IEEE-CS Board of Governors meeting in San Diego, February 2003. The [previous winners of the Harry Goode Award](#) include the inventors of computers, core memory, and semiconductors.
- The [ACM/AAAI Allen Newell Award](#) at the ACM Award Banquet in San Diego, June 2003 (see the [photo with ACM President Maria Klawe](#), Dean of Engineering, Princeton Univ.). He was introduced at the opening ceremony at the [2003 International Joint Conference on Artificial Intelligence \(IJACI-03\)](#) on August 11, 2003 in Acapulco, Mexico. The [previous 7 winners of the Allen Newell Award](#) include a Nobel Prize and National Medal of Science winner, 2 National Medal of Technology winners (one of them is also an ACM Turing Award winner), and other very distinguished scientists who either have made significant contributions to several disciplines in computer science or have bridged computer science with other disciplines.
- The Pan Wen-Yuan Outstanding Research Award in 2004. Starting 1997, the awards have been given to usually three individuals each year (one in Taiwan, one in Mainland China, and one in "overseas" – outside of Taiwan and mainland China) in the high-tech fields (including electronics, semiconductors, telecommunications, computer science, computer hardware/software, IT, and IS). In 2003, the overseas winner was Prof.

Andrew C. C. Yao of Princeton University, who is also a winner of the ACM Turing Award.

Prof. Chen is also listed in several “online dictionaries” such as:

- He (“Peter Chen”) is one of approximately 80 persons in the computer and applied math fields (living or deceased, including John von Neumann, A.K. Erlang, Alan Turing, and Bill Gates) listed in probably the most popular dictionary of computer words/terms: [The Free Online Dictionary of Computing](#), edited by [Denis Howe](#) since 1985.
- He is listed in *Who’s Who in Internet and Computer Technology* together with founders of major computer and Internet companies in [Webopedia.com](#).
- He is listed in the popular free encyclopedia: [Wikipedia.com](#).
- He is listed in the popular “general dictionary” for all fields: [dictionary.com](#).
- His entries in the above dictionaries can also be found at: [OneLook.com](#).

Dr. Peter Chen was recognized as a “software pioneer” in the "Software Pioneers" Conference, Bonn, Germany, June 27-28, 2001, together with a group of very distinguished scientists including winners of President’s Medals of Technology, ACM Turing Awards, ACM/AAAI Allen Newell Awards, or IEEE distinguished awards such as Harry Goode Awards. The streamed video and slides of the talks in the “Pioneers” Conference may be available at the [conference website](#). All the speeches in the conference are documented in a book (with 4 DVD’s) published by Springer-Verlag, and how to order the book can be found in the section on [Papers-Online](#). The Entity-Relationship model is described in most textbooks on databases, software engineering, and information systems analysis. It is included as a fundamental topic in the ACM/IEEE recommended curriculum on computer science and information systems. Today, it is very likely to find at least one chapter on the ER model when a person randomly picks up a college textbook on information system design or databases. It is also very likely to walk into a college classroom to attend a class on information management and see that the ER modeling is being taught there. For example, at LSU, the ER model is being taught in 3 different colleges: the Computer Science department in College of Basic Sciences, the Information Systems and Decision Sciences Department in College of Business, and the Industrial Engineering and Manufacturing Systems Department in the College of Engineering. In other universities, the ER model is also taught in a variety of departments and colleges. For example, at Berkeley, the ER model is being taught in 2 or 3 courses at the School of Information Management. As another example, the ER model is being taught in the Computational-Biology/bioinformatics programs at University of Pennsylvania, Drexel, University of Virginia, and Hong Kong University. There are [more examples of college courses covering the ER model](#).

Professor Peter Chen is a member of the Advisory Committee of the Computer and Information Science and Engineering (CISE) Directorate of the [National Science Foundation \(NSF\)](#). He is also a member of the [Air Force Scientific Advisory Board](#). Dr. Peter Chen was a member of the Airlie Software Council, which consists of software visionaries/gurus and very-high-level software organization executives, organized by U.S. Department of Defense (DoD). He was an advisor to the President of Taiwan’s largest R&D organization, [Industrial Technology Research Institute \(ITRI\)](#), with over 6,000 employees, which has been the driving force of Taiwan’s high-tech growth in the past 3 decades.

Dr. Peter Chen was one of 5 main US delegates to participate in the 1st IEEE USA-China International Conference, which was held in Beijing, in 1984 and to meet with PRC leaders and government officers in the Science and Technology fields and the Education area.

Prof. Peter Chen is also the Editor-in-Chief of [Data & Knowledge Engineering](#), the Associate Editor for the *Journal of Intelligent Robotic Systems*, *Electronic Government*, and other journals.

In the past, he was the *Associate Editor* for *IEEE Computer*, *Information Sciences*, and other journals.

At MIT, UCLA and Harvard, Prof. Peter Chen taught various courses in Information Systems and Computer Science. At LSU, he has been doing research and teaching on *Information Modeling, Software Engineering, Data/knowledge Engineering, Object-Oriented Programming, Internet/Web, Java, XML, Data Warehousing, E-commerce (B2B and B2C), Homeland Security, Identity Theft, System Architecture, Digital Library, and Intelligent Systems for Networking (Sensors Networks, Wi-Fi, and Cellular)*.

Professor Peter Chen is the Principal Investigator of a large NSF-funded multi-disciplined project on [profiling of terrorists and malicious cyber transactions for counter terrorisms and crimes](#). Dr. Peter Chen is also active in Digital library research and construction. He is assisting Dr. Raj Reddy of Carnegie-Mellon University (CMU) to create a large digital library of over one million books. He has been the principal investigator of various research projects in system architecture, information/knowledge management, software engineering, and performance analysis sponsored by many government agencies and commercial companies.

More details of various honors and awards received by Prof. Peter Chen can be found in the section on [Honors & Professional Activities](#).

T1 – Technical Session 1: Nanotechnology (I)

Silicon nanoclusters embedded in silicon nitride matrix

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ABSTRACT

The silicon nanoclusters embedded in silicon nitride matrix was deposited at room temperature by a novel designed laser-assisted plasma enhanced chemical vapor deposition (LAPECVD) system and without post-annealing process. The photoluminescence (PL) peak of the silicon nitride matrix grown with CO₂ laser assistance could be controlled from 1.8 to 2.4 eV by adjusting the ammonia gas flow rate. From the PL and Fourier transform infrared spectroscopy (FTIR) measurements, we deduce that the enhancement of PL intensity can be attributed from hydrogen introduced into the silicon nitride matrix. From the temporal evolution of PL intensity at the PL peak energy, the carrier lifetime increased with NH₃ flow rate.

1. Introduction

Silicon nanoclusters embedded in silicon nitride matrix have been widely studied [1, 2]. However, those films must be grown or annealed at high temperature. Silicon nanoclusters embedded in silicon oxide matrix was deposited in our previous study [3]. In this work, we used a novel designed LAPECVD system to grow silicon nanostructure embedded in silicon nitride films at room temperature and without post-annealing process.

2. Experimental details

The LAPECVD system was constructed using an external CO₂ laser beam guided into the chamber of a conventional PECVD system through a ZnSe window. In the experiment, the flow rate of argon-diluted SiH₄ (4%) was fixed at 250 sccm and the flow rate of NH₃ was varied from 15 sccm to 50 sccm. The films were deposited on (100) p-type silicon substrates at room temperature. The thickness of the films is about 300 nm. During the deposition process, the CO₂ laser power, total pressure and RF power were maintained at 50W, 500 mTorr and 100 W, respectively. The PL spectra were measured using the excitation with 325 nm line of a He-Cd laser at varied temperature. The bonding configurations of the films can be realized from the measurements of a Fourier transformation infrared (FTIR) spectrometry. Furthermore, a frequency-doubled, femtosecond pulsed Ti:sapphire laser system and a timecorrelated single-photon counting system were used to perform time-resolved PL measurements.

3. Results and Discussion

The PL peak position of the silicon nitride films could be controlled in the energy range from 1.8 to 2.4 eV by adjusting the ammonia gas flow rate, as shown in figure 1(a). Figure 1(b) shows the PL intensity and energy of the silicon nitride films grown by varying the NH₃ flow rate from 15 to 50 sccm. The PL intensity is enhanced and peak position is shift toward the higher-energy side by increasing the NH₃ flow rate. According to the quantum confinement effect, this phenomenon indicates that the size of the silicon nanoclusters was reduced by increasing the NH₃ flow rate.

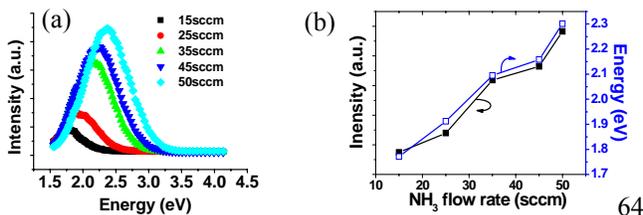


Fig.1(a) PL spectra of samples grown by varying the NH₃ gas flow rate. (b) PL intensity and energy of the silicon nitride films grown by varying the NH₃ flow rate.

The constitution of silicon nanoclusters embedded in the silicon nitride matrix was further studied by FTIR measurements. Figure 2(a) shows the chemical bonding configurations about the silicon nitride films grown by adjusting NH₃ flow rate. The band at 821~847cm⁻¹ corresponds to the Si-N stretching mode, 1156~1174 cm⁻¹ corresponds to the N-H rocking mode, 2151~2171cm⁻¹ corresponds to the Si-H stretching mode and 3351~3357 cm⁻¹ corresponds to the N-H stretching mode. Figure 2 (b) shows the peak intensity of Si-H stretching mode for the absorption peaks shown in Fig. 2(a), in which the peak intensity is normalized with respect to the peak intensity values at a NH₃ flow rate of 15 sccm. The increase in NH₃ flow rate can promote the dissociation of Si-H bonds, resulting in an increase in silicon atoms having dangling bonds. The increase in dangling bonds of silicon atoms can assist the creation of nucleation sites and can assist the formation of silicon nanoclusters in the silicon nitride matrix during growth process [1]. Because the formation of silicon clusters is increased, the size of the silicon nanoclusters decreased as increasing the NH₃ flow rate. Therefore, the size of the silicon nanoclusters decreases with the NH₃ flow rate. This phenomenon can also be understood from the origin of the PL emission comes from quantum confinement effect.

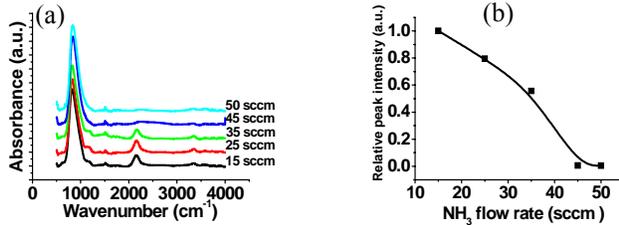


Fig.2 (a) FTIR spectra of the silicon nitride films grown as a function of NH₃ flow rate. (b) The Si-H stretching mode peak intensities of the absorption peaks.

Figure 3(a) shows the temporal evolution of PL intensity at the peak energy as a function of NH₃ flow rate for the *α*-Si quantum dot samples. Fig. 3(b) shows the carrier lifetime ($\tau_{1/e}$) relevant to 1/e of the time-resolved PL maximum intensity as a function of varying NH₃ flow rate. The total carrier lifetime (τ_t) can be expressed as :

$$1/\tau_t = 1/\tau_{nr} + 1/\tau_r, \quad (1)$$

Where, τ_{nr} and τ_r are the nonradiative carrier lifetime and the radiative carrier lifetime, respectively. From figure 3(b), carrier lifetime increased with the NH₃ flow rate. It is caused by introducing hydrogen into the films. τ_t has been increased due to hydrogen passivation of the nonradiative defect centers within the film.

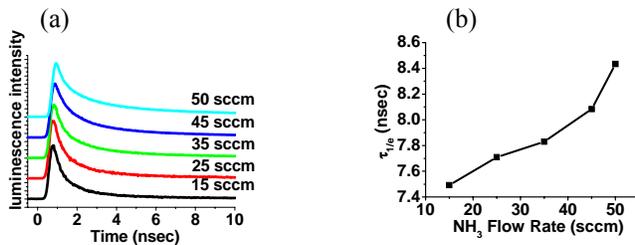


Fig.3 (a) The temporal evolution of PL intensity at the peak energy as a function of NH₃ flow rate for the *α*-Si QD samples, (b) Carrier lifetime relevant to 1/e of the time-resolved PL maximum intensity as a function of NH₃ flow rate.

Figure 4 shows transmission electron microscope (TEM) images of the silicon nanoclusters embedded in the silicon nitride matrix. The average size of silicon nanoclusters is about 3.2 nm.

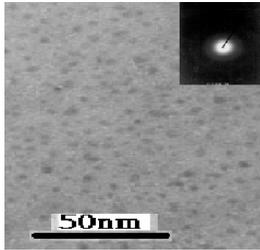


Fig.4. TEM image of a silicon in silicon nitride films grown with NH_3 flow rate is 35 sccm.

4. Conclusion

We designed a LAPECVD system to grow silicon nanoclusters embedded in a silicon nitride matrix at room temperature. The PL peak could be controlled by adjusting the ammonia gas flow rate. The PL intensity can be enhanced by hydrogen species introduced into the silicon nitride films. The carrier lifetime can be increased by increasing NH_3 flow rate.

Acknowledgement

This work was supported by National Science Council, Taiwan, R.O.C and the center of micro-nano technology of the National Cheng Kung University.

References

- N. M. Park, C. J. Choi, T. Y. Seong, and S. J. Park, “Quantum Confinement in Amorphous Silicon Quantum Dots Embedded in Silicon Nitride”, *Phys. Rev. Lett.*, vol. 86, pp. 1355-1357 (2001).
- Z. Pei and H.L. Hwang, “Formation of silicon nano-dots in luminescent silicon nitride”, *Appl. Surf. Sci.*, vol. 212-213, pp. 760-764 (2003).
- C. T. Lee and C. H. Lin, “Si Nanocrystals Embedded in Si Suboxide Matrix Grown by Laser-Assisted Chemical Vapor Deposition at Room Temperature”, *Jpn. J. Appl. Phys.*, vol. 43,

BIOGRAPHY



Ching-Ting Lee was born in Taoyuan, Taiwan, R.O.C., on November 1, 1949. He received his B.S. and M.S. in Electrical Engineering Department of the National Cheng-Kung University, Taiwan, in 1972 and 1974, respectively. He received Ph.D. degree in Electrical Engineering Department from the Carnegie-Mellon University, Pittsburgh, PA, in 1982.

He worked on Chung Shan Institute of Science and Technology, before he joined the Institute of Optical Sciences, National Central University, Chung-Li, Taiwan, as a Professor in 1990. He

works on National Cheng-Kung University as the dean of Electrical Engineering and Computer Science and the professor of the Institute of Microelectronics, Department of Electrical Engineering in 2003. His current research interests include theory, design, and application of guided-wave structures and devices for integrated optics and waveguide lasers. His research activities have also involved in the research concerning semiconductor lasers, photodetectors and high-speed electronic devices, and their associated integration for electrooptical integrated circuits. He received the outstanding Research Professor Fellowship from the National Science Council (NSC), R.O.C. in 2000 and 2002. He also received the Optical Engineering Medal from Optical Engineering Society and Distinguish Electrical Engineering professor award from Chinese Institute of Electrical Engineering Society in 2003.

T1 - Technical Session 1: Nanotechnology (I)

Towards Integrated Heterogeneous Nanosystems

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BIOGRAPHY



Kang L. Wang received the B.S.E.E. from the National Cheng Kung University, Taiwan, in 1964. He earned both the M.S.E.E. and the Ph.D. in electrical engineering from M.I.T., in 1966 and 1970, respectively.

Prof. Wang has been with the Electrical Engineering Department at UCLA since 1979. He was Chair of the department from 1993 to 1996. He is a Fellow of the IEEE, and a member of the American Physical Society, the Materials Research Society, the Eta Kappa Nu Society, the Sigma Xi Society and the Phi Tau Phi Honor Society. He has chaired many international conferences and symposia.

For more information about Prof. Wang and his research, please visit the [Device Research Laboratory](#) website.

Research Interests

Professor Wang's research focuses on nanoelectronics and optoelectronics, MBE and superlattices, micro-wave and millimeter electronics/optoelectronics, and quantum computing.

Recent Publications

1. [Cellular Nonlinear Network Based on Semiconductor Tunneling Nanostructure.](#)
A. Khitun and K.L. Wang.
IEEE Transactions on Electron Devices, vol. 52, no. 2, pp. 183-189, February 2005.
2. [Complimentary Single-electron/hole Action of Nanoscale SOI CMOS Transistors.](#)
Y. Zhang, F.A. Baron, K.L. Wang, and Z. Krivokapic.

IEEE Electron Device Letters, vol. 25, no. 7, pp.492-494, July 2004.

3. **Tunable Normal Incidence Ge Quantum Dot Mid-infrared Detectors.**
S. Tong, F. Liu, A.Khitun , K.L. Wang, and J.L. Liu.
Journal of Applied Physics, vol. 96, no. 1, pp.773-776, 1 July 2004.
4. **On the Modeling of Lattice Thermal Conductivity in Semiconductor Quantum Dot Superlattices.**
A. Khitun, J.L. Liu, and K.L. Wang.
Applied Physics Letters, vol. 84, no. 10, pp.1762-1764, 8 March 2004.
5. **Interwell Exciton Dispersion Engineering, Coherent Phonons Generation and Optical Detection of Exciton Condensate.** [Editor's Choice]
Y.E. Lozovik, I.v. Ovchinnikov, R.P. Ostroumov, and K.L. Wang.
Physica Status Solidi B-Basic Research, vol. 241, no. 1, pp. 85-100, Jan. 2004.

Awards

2003 Director of FENA Focus Center

Professor K.L. Wang was named Director of a new multimillion dollar research center to be led by UCLA. The Functional Engineered Nano Architectronics (FENA) Focus Center is part of an initiative by the Semiconductor Industry Association (SIA), the industry's largest trade association, and the U.S. Department of Defense to expand semiconductor research at universities.

Semiconductor Research Corporation Inventor Award

Awarded to Prof. Wang every year between 1989-1994 and 1996-1998

1996 Semiconductor Research Corporation Technical Excellency Award

Prof. Kang L. Wang, along with Dr. Xinyu Zheng, Dr. Timothy K. Carns, Mr. Martin O. Tanner and Mr. Shawn G. Thomas, received the SRC Technical Excellence Award for 1995 (awarded in June 1996) for their research as documented in the paper, "Properties and Device Applications of Si-based Quantum Structures".

1991 J.H. Ahlers Achievement Award

1987-88 Guggenheim Fellow Award

from the Max Planck Institute in Stuttgart, Germany

T1 - Technical Session 1: Nanotechnology (I)

Carbon Nanotube p-n Junction Diodes

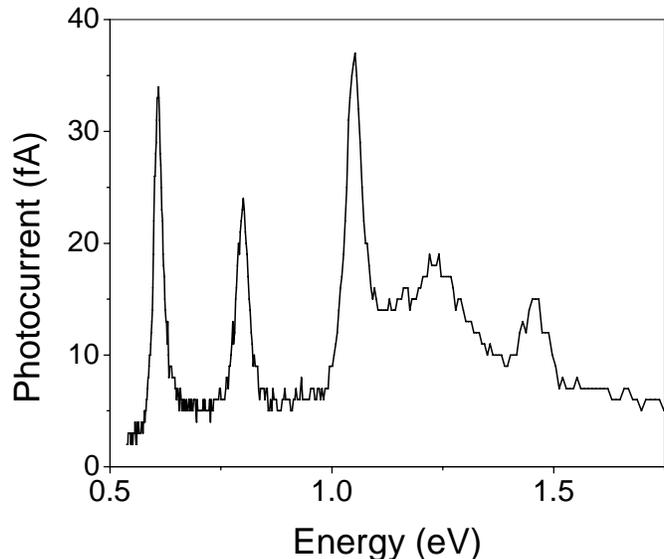
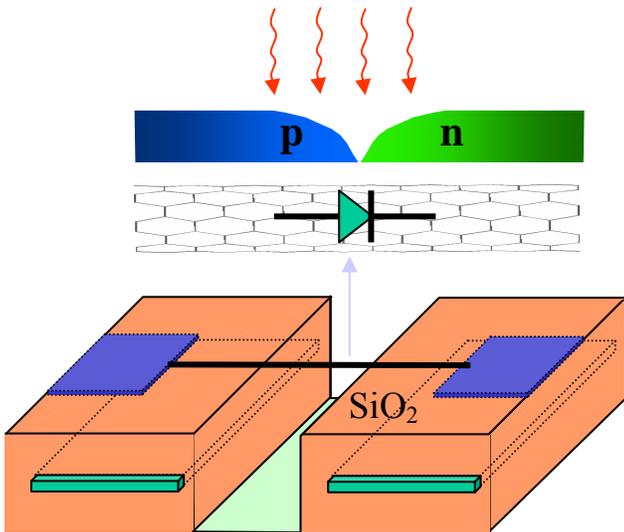
Dr. Ji-Ung Lee

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ABSTRACT

The *p-n* junction diode forms the basis for nearly all-modern semiconductor electronics. It is the basis for most transistors and optical devices. Therefore, for any new material system, a proper characterization of the *p-n* junction is crucial for their development into electronic devices. In this talk, we demonstrate the formation of *p-n* junction diodes along individual single-walled carbon nanotubes (SWNTs). The *p-n* junction is formed using electrostatic doping technique using a pair of split gate electrodes. The diode current-voltage characteristics show forward conduction and reverse blocking characteristics, i.e. rectification. When SWNTs are suspended, the diodes exhibit *ideal* diode behavior, the theoretical limit of performance for any diode.

The low background leakage currents coupled with a built-in electric field region to transport the quasi particles also makes these diodes ideal for studying the optical characteristics of SWNTs. In the photocurrent spectra, a series of narrow resonance peaks is observed consistent with optical absorption in a 1D semiconductor. I will describe the origin of these peaks, quantum efficiency, and photovoltaic effects of these diodes.



BIOGRAPHY



Ji Ung Lee earned his Ph.D. in Electrical Engineering from University of Wisconsin-Madison in 1996. He was at Argonne National Laboratory from 1996-1997 as a post-doc. He has been with General Electric Global Research Center since 1999 after a brief period at a start-up company following his post-doctoral work. Since graduate school, he has had a broad exposure to many different areas of scientific discipline ranging from superconductivity, vacuum microelectronics to amorphous Si devices for medical imagers. His current interest is in the design and characterization of carbon nanotube electronic and optical devices. For his recent work in carbon nanotube device research, he has received the 2004 GE Global Research Hull Award, the highest individual honor for young scientist, and the 2005 NASA Nanotech Briefs Nano50 Technology Award.

T2 - Technical Session 2: System-on-Chip (SoC) (I)

The Challenges of Low Power SoC Design

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ABSTRACT

The growing complexity of system-on-chip (SoC) continues to advance the concept of low power technology/device/circuit/architecture/software/system co-design. This requires the close interaction among various disciplines to involve in the development of low power computer, communication and consumer SoC applications. The design of low power wireless mobile SoC products now must equally concern itself with digital and analog mixed-signal devices and circuits, interconnection wires and nano-scale CMOS technology. The suppression of the power consumption in low voltage circuits is necessary to reduce the leakage power in both active and standby modes of operation. The reduction in leakage current in design has to be achieved using multiple or variable V_{DD} and V_{th} . This talk will first consider SoC technology development trends, then discuss the low power design implementation and power management. Other issues such as the low power EDA Tools requirements will also be presented.

T2 - Technical Session 2: System-on-Chip (SoC) (I)

Behavioral Transformations for Efficient High-level Synthesis of Distributed Logic-memory Architectures

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ABSTRACT

The stringent performance and energy requirements of modern embedded systems are leading to the adoption of innovative architectures by application-specific hardware designers. For memory-intensive applications, partitioned or distributed logic-memory architectures have been shown to be efficient in comparison with conventional monolithic architectures. Recent advances in high-level synthesis (HLS) promise to automatically map a behavior to a distributed fabric of logic-memory tiles. However, this is a challenging problem for HLS, since the behaviors are not necessarily written to expose related sets of computations and data that can be clustered into a single logic-memory tile. This paper proposes transformations that can facilitate efficient HLS of distributed logic-memory architectures. The proposed transformations tailor a behavior to exhibit increased correlation between locality of data and locality of computations – a fundamental requirement for distributed logic-memory implementations. We provide systematic methods for applying the transformations and analyze the associated trade-offs. Our experiments show that the proposed transformations facilitate the synthesis of circuits that have up-to 2.7X speed-up over conventional HLS-generated circuits and 1.6X speed-up over distributed logic-memory architectures that do not exploit behavioral transformations.

BIOGRAPHY



Chao Huang is an assistant professor in the Bradley Department of Electrical and Computer Engineering at Virginia Tech. He received the B.S. degree in Electrical Engineering from Tsinghua University, Beijing, China in 2000, and the M.A. and Ph.D. degrees in Electrical Engineering from Princeton University, Princeton, NJ, in 2002 and 2005, respectively. His research interests include computer-aided design of application-specific integrated circuits,

distributed architectures for memory-intensive applications, low power systems, and VLSI circuit design.

Xinping Zhu is an assistant professor in the Department of Electrical and Computer Engineering of Northeastern University. He received his Ph.D. in Electrical Engineering from Princeton University in 2005. He obtained his B.S.E. degree in Automation from Tsinghua University, Beijing, in 1999. His research focuses on developing modeling and simulation tools for advanced multiprocessing general purpose and embedded processors, with emphasis on the on-chip communication architectures.

T2 - Technical Session 2: System-on-Chip (SoC) (I)

Frequency Synthesis in a Digital RF Processor (DRP™) for Mobile Phones

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BIOGRAPHY



Robert Bogdan Staszewski received the BSEE (*summa cum laude*), MSEE and PhD degrees from the University of Texas at Dallas in 1991, 1992 and 2002, respectively. From 1991 to 1995 he was with Alcatel Network Systems in Richardson, TX, working on Sonnet cross-connect systems for fiber optics communications. He joined Texas Instruments in Dallas, TX, in 1995 where he is currently a Distinguished Member of Technical Staff. Between 1995 and 1999, he has been engaged in advanced CMOS read channel development for hard disk drives. In 1999 he co-started a Digital RF Processor (DRP™) group within Texas Instruments with a mission to invent new digitally-intensive approaches to traditional RF functions for integrated radios in deep-submicron CMOS processes. Dr. Staszewski currently leads the DRP system and design development for transmitters and frequency synthesizers. He has authored and co-authored 50 journal and conference publications and holds 25 issued and 35 pending US patents. His research interests include deep-submicron CMOS architectures and circuits for frequency synthesizers, transmitters and receivers.

BIOGRAPHY

Chih-Ming Hung received his B.S. degree in Electrical Engineering from the National Central University, Chung-Li, Taiwan in 1993, and M.S. and Ph.D. degrees in Electrical and Computer Engineering from the University of Florida, Gainesville in 1997 and 2000, respectively. He received several research grants and fellowship between 1996 and 2000 working on high-performance fully-integrated CMOS PLLs and VCOs between 900 MHz and 30 GHz frequency range as well as developing on-chip passive components in CMOS processes suitable for RF front ends at these frequencies. In November 1999 and February 2000, he and his colleague received the Semiconductor Research Corporation Copper Design Contest phase-I and phase-II winner awards, respectively with a 15-GHz fully-integrated on-chip wireless clock distribution

system. He has received 2004 Outstanding Engineer Award from IEEE and TSPE, and Outstanding Academic Achievement Honor from the University of Florida in 2000.

In July 2000 Dr. Hung joined Texas Instruments, Dallas, TX. He has focused on R&D of advanced CMOS RF IC for wireless cellular applications. Since 2002, he has been a design manager responsible of RF and analog integration for Digital RF Processor (DRP™), and since 2005, he has been a senior member, group technical staff. Dr. Hung has authored and co-authored 46 journal and conference publications. He has 2 granted patents and 15 patents pending. His interests include CMOS RF IC design, integrated passive components, and SoC integration.

T3 - Technical Session 3: Bioinformatics (I)

Session Chair

Professor Hsuen-Fen Juan

National Taiwan University
Taipei, Republic of China
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BIOGRAPHY



Hsueh-Fen Juan received her BS and MS degree in Botany and PhD in Biochemical Sciences from National Taiwan University (NTU) in 1999. After working as a research scientist in the Japan International Research Center for Agricultural Sciences, Tsukuba, Japan and a postdoctoral research fellow in the Institute of Biological Chemistry, Academia Sinica, Taipei, Taiwan, she started her academic career in the Department of Chemical Engineering, National Taipei University of Technology as an assistant professor and in the Department of Computer Science and Information Engineering at NTU as an adjunct assistant professor in 2002. She moved to NTU in 2004 as an assistant professor in the Department of Life Science and the Institute of Molecular and Cellular Biology. Currently she is also the deputy director of the Research Center for Systems Biology and Bioinformatics at NTU. Dr. Juan is a pioneer in the field of proteomics. She is currently working on cancer systems biology, integrating transcriptomics, proteomics and bioinformatics for biomarker and drug discovery. She serves as a reviewer of various journals like *Molecular and Cellular Proteomics* (ASBMB) and *Proteomics* (Wiley-VCH) and has organized several systems biology and bioinformatics symposiums.

T3 - Technical Session 3: Bioinformatics (I)

Text Extraction and Mining of DNA Methylation Information

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ABSTRACT

DNA methylation is an important epigenetic feature associated with various physiological functions, such as cell cycle and DNA repair. Aberrant DNA methylation is linked to numerous human cancers. The purpose of this study is to develop a system, called MeInfoText (MIT), for the extraction and mining of DNA methylation information in the text, particularly for discovering the relationships between genes and cancers. The preliminary results reveal that our system can successfully extract the fact that abnormally methylated gene may contribute to cancers and analyze the associations between each gene and specific cancers.

I. INTRODUCTION

DNA methylation, occurring predominantly in CpG islands, is an important epigenetic modification of the genome involved in mediating various cellular processes [1]. DNA methylation has a wide range of biological functions, including an essential developmental role in the reprogramming of germ cells and early embryos, the genomic imprinting, the X chromosome inactivation, the repression of endogenous retrotransposons and the generalized role in gene expression [2]. Abnormal methylation of DNA may result in increased transcription of oncogenes or silencing of tumor suppressor genes and is common in a variety of human cancer cells. Recent studies indicate that histone modifications, such as deacetylation, phosphorylation, ubiquitination and methylation, might contribute to the establishment of DNA methylation patterns and work with DNA methylation to repress transcription [3]. Therefore, if the contribution of each candidate gene to tumorigenesis can be proved, the exact methylation profiles of tumors are available and the molecular events that initiate and maintain epigenetic gene silencing are understood clearly, then the prevention and treatment of cancer could have come more focused and rational.

Text mining in biology is a deeper analysis of the literature to automatically extract specific information about genes, proteins and their functional associations, such as protein-protein interactions [4]. As more biological literature is published electronically, there is a necessity in developing methods for automatic extraction of relevant information from any source of biology data, especially sources such as literature written in human language. Over the past few years, a considerable number of studies have been made on mining and extraction of information from biomedical literature such as disease candidate genes, protein functions and protein-protein interactions. Many different approaches such as named-entity recognition (NER) based on a dictionary, template or ontology; statistics of word co-occurrence and natural language processing (NLP) have been adopted or invented by various researchers to achieve the goal. In general, abstracts of scientific publications are the most widely used sources of information because they contain a concise description of the most important information carried by a paper. However, current retrieval systems for the scientific literature are based on keyword searches and results usually take the form of long and not always informative lists of abstracts

[5]. Furthermore, so far no attempt has been made to analyze the available DNA methylation information from a vast amount of literature.

In this paper, we present a system for the extraction and mining of DNA methylation information in the text, particularly for discovering the relationships between genes and cancers. The system attempts to extract the fact that aberrantly methylated gene may result in cancer and analyze the association between gene methylation and cancer. Our system is based on pre-specific rules on document categorization, gene name recognition, fact extraction and analysis of association.

II. RESULTS

We tested our system for genes that undergo abnormal methylation in human cancers. The preliminary results show that our system can successfully report the associations between methylated genes and specific cancers and the average precision is 97%. TABLE I shows the partial associations between genes and cancers extracted by our system. The asterisk before the name of tumor site stands for that cancer is present in the test set. The name of tumor site with boldface means that cancer is both reported by our system and present in the test set. The remaining names of tumor site mean other cancers reported by our system with high confidence.

Since MethDB [6] is the only public database developed to store information concerning the origin of the investigated sample, including experimental procedure and DNA methylation data, it could be anticipated that our system is able to act complementarily to the existing databases, filling a gap in the already available DNA methylation resources and facilitating the research on epigenetics.

TABLE I
THE PARTIAL ASSOCIATIONS BETWEEN METHYLATED GENES AND CANCERS REPORTED BY OUR SYSTEM

Gene	Site of Tumor
APC	* breast ; * lung ; * esophageal ; colon; gastric
BRCA1	* breast ; * ovarian ; colon
CDKN2 B	* leukemia ; * lymphoma ; * lung
VHL	* renal ; kidney

REFERENCES

- [1] K. D. Robertson, "DNA methylation and human disease," *Nat Rev Genet*, vol. 6, pp. 597-610, 2005.
- [2] M. I. Scarano, M. Strazzullo, M. R. Matarazzo, and M. D'Esposito, "DNA methylation 40 years later: Its role in human health and disease," *J Cell Physiol*, vol. 204, pp. 21-35, 2005.
- [3] F. Fuks, "DNA methylation and histone modifications: teaming up to silence genes," *Curr Opin Genet Dev*, vol. 15, pp. 490-5, 2005.
- [4] M. Krallinger and A. Valencia, "Text-mining and information-retrieval services for molecular biology," *Genome Biol*, vol. 6, pp. 224, 2005.
- [5] R. Hoffmann and A. Valencia, "Implementing the iHOP concept for navigation of biomedical literature," *Bioinformatics*, vol. 21 Suppl 2, pp. ii252-ii258, 2005.
- [6] C. Grunau, E. Renault, A. Rosenthal, and G. Roizes, "MethDB--a public database for DNA methylation data," *Nucleic Acids Res*, vol. 29, pp. 270-4, 2001.

BIOGRAPHY



Yu-Ching Fang is a first year Ph.D. student in the Institute of Molecular and Cellular Biology, National Taiwan University, Taipei, Taiwan. He joined Professor Hsueh-Fen Juan's laboratory since September, 2005. His primary research interests are bioinformatics and molecular systems biology. Before that, he developed an integrated database for G protein-coupled receptors and regulator of G protein signaling proteins. Currently, he uses the text mining and biological literature retrieval approach to build up a DNA methylation database system. This system can help biologists facilitating the research on epigenetics.

T3 - Technical Session 3: Bioinformatics (I)

Remote Blood Pressure Monitoring Using a Wireless Sensor Network

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ABSTRACT

Advances in wireless sensor network (WSN) technology and the overall miniaturization of their associated hardware are leading to several potential applications in the medical industry. In particular, the ability to remotely monitor patient vital signs in real time from a centralized location is a growing area of interest. This interest in WSNs is fueled by the fact that wireless sensor nodes are cost effective, compact and can be energy efficient. Alternatives include WiFi and Bluetooth, which are focused on applications that normally require higher bandwidth. Wireless nodes using these two communication protocols are normally much more expensive and power hungry, and in the case of Bluetooth, allow a limited number of nodes to communicate at any given time. These issues make WiFi and Bluetooth nodes unsuitable for widespread remote monitoring of patient vital sign data. Additionally, the capability to do this without installing an expensive wired infrastructure is highly desirable. In this paper, a system to remotely monitor a patient's blood pressure (BP) is described. The data is transferred to a central monitoring station using a wireless sensor network for display and storage. Crossbow MICAz motes were programmed to serve as the network nodes. One mote was interfaced to the BP monitor for data acquisition and the others were utilized to route the BP data to the monitoring station. A user-friendly graphical user interface was designed for storing and displaying current and past measurements for all patients being monitored. Test results indicated high accuracy in BP measurements. Power consumption by the BP monitor interfaced mote was minimized by forcing it into a low power sleep mode when not in use.

BIOGRAPHY



William Walker is a Research Assistant in the electrical engineering department at the University of Texas at Dallas. He is a member of the Embedded and Adaptive Computing group at UTD. He received his B.S. in Computer Science from the University of Texas at Dallas

in 2005 and has received the Get Doc Fellowship to pursue Graduate studies at UTD. He is currently in the Masters program for Computer Engineering at UTD and intends to pursue a PhD upon completion. His current research interests include Bio-Medical applications for wireless sensor networks and automated automobile applications. In the Bio-Medical arena, he is investigating methods of energy harvesting for the wireless nodes and methods for the display and storage of the Bio-Medical information. In the automated automobile arena, he is doing preliminary research on methods to provide an automated traffic system that includes on-vehicle sensors and inter-vehicle communications.

BSIP – A Web Server for Biological Network Structure Identification

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ABSTRACT

BSIP is a PHP-based website we built for solving reverse engineering problems of biological networks. By providing the numerical information, BSIP can build S-system equations, compared the concordance, and infer the interaction networks.

I. INTRODUCTION

In the past, experimental biology was often focused on single elements of biology. Biologists have been examining single proteins, constructing single pathways, and rarely observing the combined network. However, modern experimental biology is moving away from analyses of single elements to whole-organism measurements. Such measured time-course data contain a wealth of information about the structure and dynamic of the biological pathway or network. Building a mathematical model comprises mainly two aspects: identifying the model structure and estimating the involved parameter values. By giving structure of a model, we can estimate parameters using approximating methods. From wealth of mathematical models for biological and biochemistry systems, we choose Synergistic-System (S-system) modeling formalism, as in

$$\dot{X}_i = \alpha_i \prod_{j=1}^n X_j^{g_{ij}} - \beta_i \prod_{j=1}^n X_j^{h_{ij}}, \quad (1)$$

which is one of the rising stars from biochemical systems theory [1-3].

II. RESULTS

Systems-Biology Structure Identification Program Development System (BSIP) (Fig. 1) offers services for structure recognition and network reconstruction based on the S-system modeling formalism and an evolutionary optimization method with data collocation for reverse engineering of biological networks [4]. BSIP is a PHP-based web server, which calls back-end programs to achieve parameter estimation, network reconstruction and model validation comparing simulation data and experimental measurements. By supporting several approximating algorithms [5-7], dynamical profiles [3,4,8], objective function and error criterions, BSIP can provide different ways to do the estimations. BSIP can build an S-system model for genetic networks, metabolic networks and signal transduction cascades from time-course experimental data.

BSIP contains two program components: the input data file builder, which can convert the user experimental data to the required format and integrate all the necessary input parameters, and the parameter estimation program, which generates the reverse-engineering program codes and finds the optimized model structure fit to the experimental data. Since the parameter estimation process is highly CPU-intensive and time-consuming, the generated program source code in Fortran language or the compiled Windows-executable file can be downloaded by users and run by their own computer. Or results will be sent to users by e-mail

after the task is done in BSIP server. BSIP not only can approach the parameters, but also mark the small value for item elimination and further estimation. By the way, BSIP will graph experiment data and the simulating one from the newly generated model, so user can compare these two and conclude they are concordance or not. Finally, BSIP will sum up the information and infer the gene-network, which user can design further experiments to verify them.

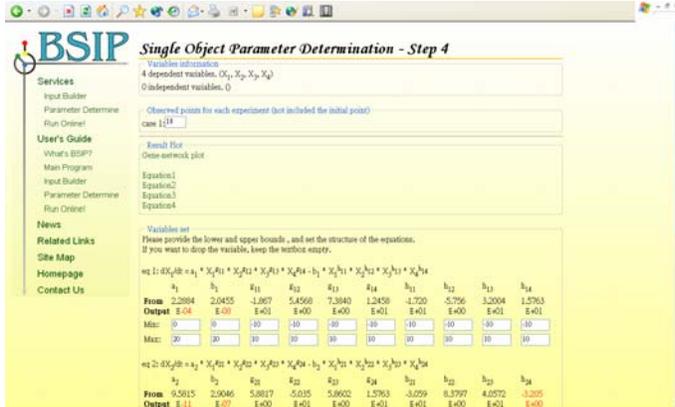


Fig. 1. A screenshot of BSIP web page

REFERENCES

- [1] Savageau, M. A. Biochemical systems analysis. *J. Theor. Biol.* 25, 365-379 (1969).
- [2] Savageau, M. A. *Biochemical Systems Analysis. A study of Function and Design in Molecular Biology* (Addison-Wesley, Reading, Massachusetts, 1976).
- [3] Voit E. O. *Computational Analysis of Biochemical Systems. A Practical Guide for Biochemists and Molecular Biologists.* (Cambridge Univ. Press, Cambridge, 2000).
- [4] Tsai KY and Wang FS. Evolutionary optimization with data collocation for reverse engineering of biological networks. *Bioinformatics.* 121, 1180-8. (2005)
- [5] Chiou, J.P. and Wang, F.S. Hybrid method of evolution algorithms for static and dynamic optimization problems with application to a fedbatch fermentation process. *Comput. Chem. Eng.*, 23, 1277-1291. (1999)
- [6] Byrd R. H., Lu P. and Nocedal J., L-BFGS-B: FORTRAN subroutines for large-scale bound constrained optimization, *ACM Trans. Math. Software* 23, no. 4, 550-560. (1997)
- [7] IMSL Inc., BCPOL, 1984.
- [8] Voit, E.O. and Almeida, J. Decoupling dynamical systems for pathway identification from metabolic profiles. *Bioinformatics*, 20, 1670-1681. (2004)

BIOGRAPHY



Chern-Han Ou is a senior student in National Taiwan University, and double major in electronic engineering and life science. He joined Professor Hsueh-Fen Juan's laboratory since February 2005. His primary research interests are bioinformatics, biodynamics and systems biology. Currently, he applied the algorithm set up by Dr. Wang to build up Systems-Biology Structure Identification Program Development (BSIP), which can help users construct gene-network or interaction pathways by experimental data.

T4 - Technical Session 4: RFID Applications (I)

Session Chair

George Wan

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BIOGRAPHY



George Wan is a senior member of TI SC technical staff and works for TI Wireless Analog Technology Center on a special assignment to develop mobility and infrastructure strategy for the 6 month design cycle time and 80% IP re-use deployment. He has held several EDA management positions in Wireless Analog Technology Center and Mixed Signal Product group inside Texas Instruments from digital flow development to wireless analog and RF flow deployment. Since joining TI in 1983, he has been worked for TI MOS fab, US and European Telecom Product teams, Process Automation Center and Design Automation Division. He is currently a member of TI EDA Execution Team and also focuses on mixed signal SOC methodology development and deployment. Mr. Wan is an advisor of Hong Kong Applied Science and Technology Research Institute and a member of the Councils of Advisors, GLG. He has consulted over 150 investment companies and governmental organizations worldwide. He was a licensed Series 6 and 63 securities professional with First American National Securities, Inc.

George Wan is the current chairman of the Chinese American Semiconductor Professional Association (CASPA) Dallas chapter. In addition to EDA, semiconductor and telecom industry, Mr. Wan is also working closely with medical technology and RFID industry to become a bridge among Texas and Asian Pacific regions.

T4 - Technical Session 4: RFID Applications (I)

The Texas RF Innovation & Technology Center: A Collaboration of North Texas Universities

Professor Richard Billo

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BIOGRAPHY



Dr. Richard E. Billo was appointed Associate Dean of Engineering for Research. Dr. Billo was formerly the Intel Faculty Fellow and chair of the Department of Industrial and Manufacturing Engineering at Oregon State University. While at Oregon State, Dr. Billo directed a \$20 million fundraising campaign for nanoscience and microtechnology programs and secured more than \$16 million in new research grants and gifts.

Research Interests

Dr. Billo's research interests are in wireless technology, bioengineering, nanotechnology, and manufacturing modernization, and curriculum development.

Expertise

Dr. Billo is a known innovator in engineering education, receiving a commendation from the Accreditation Board for Engineering and Technology for his leadership in curriculum development. At Oregon State, he developed a new bachelor's degree program in manufacturing engineering, created undergraduate options in information systems and business engineering, and modernized the graduate curriculum to include information systems, nanotechnology, management systems and manufacturing systems.

Also at Oregon State, Dr. Billo directed a \$20 million fundraising campaign for nanoscience and microtechnology programs and secured more than \$16 million in new research grants and gifts. Research expenditures tripled during his four years of leadership of the Department of Industrial and Manufacturing Engineering.

T4 - Technical Session 4: RFID Applications (I)

RFID Essentials

Himanshu Bhatt

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BIOGRAPHY



Himanshu specializes in bringing innovative technologies and solutions to markets. Presently, he heads Sun's US RFID and Sensor Solutions Practice for United States. Himanshu's responsibilities include developing go-to-market strategies and execution plans, partnerships, and all aspects of RFID and Sensor related business development and solution delivery for the US market. Himanshu is co-author of the book RFID Essentials published by O'Reilly Publications.

Prior to leading the charge for the RFID practice, Himanshu managed the Technical Sales and Consulting practice for Java and related Enterprise Software products for Sun. Himanshu joined Sun Microsystems as an Enterprise Java Architect and has assisted Fortune 500 customers with their web facing application and infrastructure strategies, methodologies and implementations. Himanshu has spoken at industry conferences including: RFID World and JavaOne and has published articles on Java/J2EE. Himanshu has an MS in Computer Science from Michigan State University, BE in Electronics from Bombay University and an MBA in Finance and Business Strategy from University of Texas at Dallas. Himanshu is a Certified Information Systems Security Professional (CISSP).

T4 - Technical Session 4: RFID Applications (I)

The Commercial Vehicle Operation's Service Technique and Application in Taiwan's Market

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ABSTRACT

In this paper, a new designed general platform for customer's need is provided by ChungHwa Telecom Lab (CHTTL) to be used in CVO for different professions. It provides a totally different operational model for intelligent transportation system (ITS). To small and medium enterprises, it is a good business model to enhance their competences in the markets without spending too much money. The intelligent dispatching rule is based on open platform to provide different fleet services. It is implemented by open software: Linux, MySQL, JBOSS and text to speech (TTS) for Chinese language. The business model of Application Service Provider (ASP) is service on lease. Two major prize awards in Taiwan and China are obtained.

BIOGRAPHY



Shing Tenqchen (鄧陳興) was born in Chai-Yi, Taiwan, R.O.C. in 1955. He received the Bachelor Science (B.S.) degree in from Tamkang University, Tamsui, Taiwan, R.O.C. in 1977 and Master Science (M.S.) degree from Tennessee Technology University (TTU), Cookeville, Tennessee, USA in 1983, all in Mechanical Engineering. He came into the department of Electrical Engineering of National Taiwan University (NTU) on the August of 1997. He continued his study in the area of computer-aided-design (CAD), which is one part of the group of integrated-circuit system (ICS) in the graduate school of Electronics of NTU.

From 1983 to 1989, and from 1989 to 1994, he served as an assistant researcher and associate researcher, at Chunghwa Telecom Telecommunication Laboratories (CHTTL),

respectively. From 1994 to 2000, he became a researcher, and now is a senior researcher in the same research labs.

Dr. Tenqchen was a recipient a Best paper award of 7th International Conference Exhibition on Multichip Modulus and High Density Packaging in 1998 (MCM). He also became a member of National Society of Professional Engineering (NSPE) in Tennessee State in the area of Mechanical Engineering since 2000. He has been a director of VLSI/ATE center in 1989 to 1997 at CHTTL. He also joined the testing program of Electronic Toll Collection in Taiwan as a quality representor from 1997 to 2002. Right now, he joins the Intelligent Transportation System project and is a member in the customer service solution lab in TL.

His research interest includes OFDM UWB, wireless communication, RFID system's application, practical signal processing algorithms for smart antennas with applications in wireless communications and radar. His specialties are in VLSI architecture, algorithms, and chip design for digital signal processing (DSP), wireless broadband communication systems. It includes the robust control design, H_{∞} (Hinfinity) Control, nonlinear system design, and digital filter design.

T5 – Technical Session 5: Emerging Energy Technology

Session Chair

Dr. Stephen S. Kuo (郭世興)

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BIOGRAPHY



Stephen S. Kuo (郭世興) is an Engineering Advisor with BP plc, an integrated international oil and gas company. He is currently on a foreign assignment in BP Vietnam with responsibility for development of two offshore gas fields. Stephen's expertise includes oil and gas field development, reservoir management, reserves certification, LNG development, and new business development. His twenty-six year career with BP has taken him around the globe to work on BP's upstream assets in Alaska, Gulf of Mexico, Venezuela, Colombia, UK, Russia, Angola, Malaysia, China, and Vietnam. Being based in BP's upstream headquarters in Houston, Stephen has been on international assignments in UK, China and now in Vietnam. He holds a BS degree in Chemical Engineering from National Taiwan University and both MS and PhD degrees in Chemical Engineering from the University of Wisconsin. Stephen has been a very active member of the Society of Petroleum Engineers (SPE) in which he served as Technical program Chairman as well as Session Chairman for SPE's Annual Conference and Asia Pacific Technical Conference. Currently, he serves as the Program Chairman for the SPE Vietnam Section.

T5 - Technical Session 5: Emerging Energy Technology

CFD Analysis for Wind Turbine Airfoils

Professor Ching-Chang Chieng

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ABSTRACT

Aerodynamic characteristics of airfoils is critical in wind turbine design and present work proposes a CFD methodology to predict the detailed characteristics for horizontal-axis wind-turbine airfoils as S809 with angle of attack ranging from 0° to 20° degrees and chord based Reynolds number of 2000000.

The computations are performed by self-developed CFD code xFlow. xFlow code solves full Navier-Stokse equations with Spallare-Allmras one equation turbulence model by the algorithm embodied in a fully coupled, implicit, large block structure. Numerical schemes include Yee and Harten's symmetric TVD scheme for inviscid terms, the central differencing for viscous terms in the explicit operators and Weiss-Smith preconditioned scheme in a finite volume framework. The large block-structure and diagonal dominate matrix equations.for mean flow are solved by Yoon's LU-SSOR schemes and solved implicitly. The Bi-Conjugate Gradient Stable (Bi-CGSTAB) method with a preconditioner of incomplete LU-factorization (ILU) are applied for solving turbulent variable equation. Furthermore, the multigrid algorithm with 3 grid level Saw-tooth multigrid cycle is adopted. Fast convergent rate can be achieved by present solver in terms of convergence histories of the mean flow variables as well as lift coefficients.

To a large extent, flows in wind-turbine applications are in the range of transition turbulence and the flow transition is strongly affected by the pressure gradients in the wind-turbine blade passage. Earlier methodology switches on the turbulent eddy viscosity at transition location predetermined by experiments and the transition physics is ignored by this ad hoc approach.. Present work applies Eppler's boundary layer analysis, which is an extended application for many NREL sponsored airfoils, to obtain the transition point on the upper/lower surface of the airfoil. Then, the computations are performed in laminar and turbulent blocks for both upper and lower surfaces, respectively. When the angle of attack increased from 0 to 20.15°, the transition point at upper surface is moved from 50% chord to leading edge, but the transition point at lower surface is only moved downstream slightly,i.e. 50% chord to 60% chord).

For the cases of low angle of attack (0°, 1.02°, 5.13°), the discrepancies are -12 to -21% for C_L and -17 to -24% for C_m if the flowfield is fully turbulent, the discrepancies are -2 to -5% for C_L and -1 to -9% for C_m if the Eppler's transition model is applied. But the discrepancies of C_D is not improved by Eppler's transition model. For the cases of high angle of attack conditions(9.22°, 14.24°, 20.15°), no apparent improvements of C_L , C_m and C_D are obtained

when Eppler's model is applied It is resulted from that the transtion point at upper surface is very adjacent to leading edge for high angle of attack cases(9.22°, 14.24°, 20.15°).

BIOGRAPHY



Professor Ching-Chang Chieng obtained her Ph.D in Aerospace and Ocean Engineering from Virginia Polytechnic Institute and State University. Since then, she has worked for Institute of Nuclear Energy Research, University of California at Davis, Chung-Yuan Christian University, and joined Department of Nuclear Engineering/Engineering and System Science, National Tsing Hua University, Hsinchu, Taiwan, ROC from 1981. She has also worked for Department of Army and IBM Almaden Research Center in U.S.A. during her sabbatical years 1987 and 1995, respectively. Her major emphasis of research has covered advanced nuclear reactor design, turbulence modeling for various applications (airfoils, missiles, etc) in earlier years. Although she has switched the focus to microscale heat transfer and fluid flow after her sabbatical year from IBM, she is still involved the studies of energy researches. She acts as a chief PI of two integrated projects: Multi-purposes Protein Microarray Chip Development and Application of MEMS in Continuous Monitoring of Brain Functions and a PI for several independent projects including micro fuel cell system development. Her specialties include numerical scheme developments and applications for fluid flow simulations, from macro- and micro-scales to molecular levels.

T5 - Technical Session 5: Emerging Energy Technology

A Performance Study for a Fuel Cell Micro-Channel Reformer

Professor Ru Yang and Song-Yih Lin

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ABSTRACT

The performance for a micro-channel reformer of a fuel cell is studied numerically. Methane with water flows into a micro-channel with catalyst layer and is reformed to provide hydrogen for the fuel cell. The channel length is 1000 μm . The channel height varies from 50 to 400 μm . The inlet flow velocity varies from 0.00001 to 0.002 m/s. The density (area fraction on the wall) of catalyst varies from 25 to 100 %. A reference case is chosen to have 100 μm channel height, 0.0001 m/s inlet velocity, and 100 % catalyst density.

The results indicate that the higher the inlet velocity, the lower the methane conversion mass fraction. However, the variation of the conversion efficiency is small, from 58.05 % to 57.5 %. Therefore, hydrogen production capacity can be controlled by controlling flow velocity without degrading the conversion efficiency.

As expected, the higher the catalyst fraction, the higher the conversion efficiency. Also, the conversion efficiency decreases with the increase of the channel height, and increases with the increase of the inlet temperature.

The present results can provide design reference for fuel cells with a micro-channel reformer.

BIOGRAPHY



Ru Yang received his B.S. in Mechanical Engineering from National Chung-Hsing University in 1979 and his Ph.D. in Mechanical Engineering from Arizona State University in 1987. He was a graduate research assistant of Solar Research Lab, Arizona State University. After received PhD degree, he became an Associate Professor in the Department of Mechanical Engineering, National Sun Yat-Sen University, Taiwan. He is now a Full Professor in Mechanical and

Electro-Mechanical Engineering Department, National Sun Yat-Sen University. He is a member of ASME, ISES (International Solar Energy Society), CSME (Chinese Society of Mechanical Engineers), and CRES (Chinese Renewable Energy Society).

Ru Yang's current research interests include numerical modeling of heat and mass transfer in micro structures, experimental heat transfer studies for manufacturing processes of semi-conductors, and simulation study of solar energy systems. His research activities have been supported by National Science Council, Taiwan. He has authored and coauthored over 20 reviewed scientific papers, and 50 conference proceedings.

Song-Yih Lin is a PhD Graduate Student in Mechanical and Electro-Mechanical Engineering Department, National Sun Yat-Sen University. He also is a Lecturer in Mechanical Engineering Department, Far-East Technological Institute at Tainan, Taiwan.

T5 - Technical Session 5: Emerging Energy Technology

A Bibliometric Analysis of Hydrogen Energy Literature, 1965-2006

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ABSTRACT

To enter the era of hydrogen economy, research and development of hydrogen energy has grown very rapidly in recent decades. As a reflection, the hydrogen energy literature has also grown dramatically. The present study explores the characteristics of hydrogen energy literature from 1965 to May 2006 based on the database of Science Citation Index Expanded (SCIE) and its implication using the bibliometric techniques. Since fuel cells are the main vehicle for the application of hydrogen energy, in this study, the search command “hydrogen energy” or “fuel cell” or “fuel cells” are used in the topic field to retrieve most of the papers which embodied these three key words in article title or abstract. Care has been exercised to examine the data collected to assure their identity. For this time span, the SCIE contains 15,210 items on hydrogen energy. Subsequently, the data were analyzed by Visual Fox Pro and Excel. By employing bibliometric techniques, especially literature growth model, Bradford’s law and citation counting, the results of this study are analyzed and discussed.

The objective of this study are: (1) to explore the growth of hydrogen energy literature published; (2) to determine the core journals that contain a substantial portion of journal literature on hydrogen energy; (3) to find the productivity distribution of institutions on this subject; (4) to identify major contributing countries that published hydrogen energy articles most; (5) to find the dispersion of kinds of language and document types of the literature on hydrogen energy; (6) to reveal the characteristic of citation for the hydrogen energy literature.

The results of this work reveal that the literature on hydrogen energy grows exponentially for the last 4 decades (see Figure 1). The fuel cell was invented by Sir William Grove in 1839. In 1960s, it was applied mainly for space power. Before 1980, the number of SCIE papers on hydrogen energy published each year was from 24 to 76. From 1981 to 1991, the number rose to from 44 to 135. The year 1992 was the year of significant publication on hydrogen energy based on the SCIE. It contained 240 items, about twice of that for 1991. It was increased to 536 items for 1996 and sharply increased to 1264 in 2002. Since then, extensive studies on hydrogen energy have been conducted all over the world. The number reached 2449 in 2005. For 2006, the papers published for the first quarter have been 761. One may expect a higher record for 2006. Figure 1 demonstrates that the cumulative literature on hydrogen energy may

be fitted relatively well by an exponential fit as $y = 482 + 12e^{0.176(x-1965)}$. The annual growth rate is around 18%. This suggests that hydrogen energy is indeed a fast developing subject.

Most of document type is in the form of journal articles or meeting abstracts, constituting 90.40% of the total literature and English is the predominant language (94.75%). USA, Japan and China are the three biggest contributing countries on hydrogen energy literature publishing, 25.5%, 14.8%, 8.2%, respectively. Taiwan contributes 1.5% hydrogen energy papers, ranked thirteenth in the world. The Chinese Academy of Sciences in China is the largest contributor having published 352 papers.

The journal literature on hydrogen energy does not confirm the typical S-shape for the Bradford-Zipf plot, but five core journals contributing about 40.6% of journal literature on hydrogen energy can be identified. These five core journals are *International Journal of Hydrogen Energy*, *Journal of Power Source*, *Journal of the Electrochemical Society*, *Solid State Ionics*, and *Electrochimica Acta*. There are 20 journals with at least one article cited more than 100 times. On the other hand, *Journal of the Electrochemical Society* has 29 articles cited more than 100 times. *Solid State Ionics*, comes next and followed by *Nature*, *Electrochimica Acta*, and *Journal of Membrane Science* with 15, 8, 7 highly-cited articles, respectively. The most highly cited article is entitled “Storage of hydrogen in single-walled carbon nanotubes”, authored by Dillon et al. and published in *Nature*. The times cited for this particular paper is as high as 1078 until the first quarter of 2006. The second most highly cited paper with cited number of 963 was published as a review article, published in *Journal of the American Ceramic Society* entitled “Ceramic full-cells” authored by N.Q. Minh. Among the 15 most highly cited articles, 11 are original research articles and four are review papers.

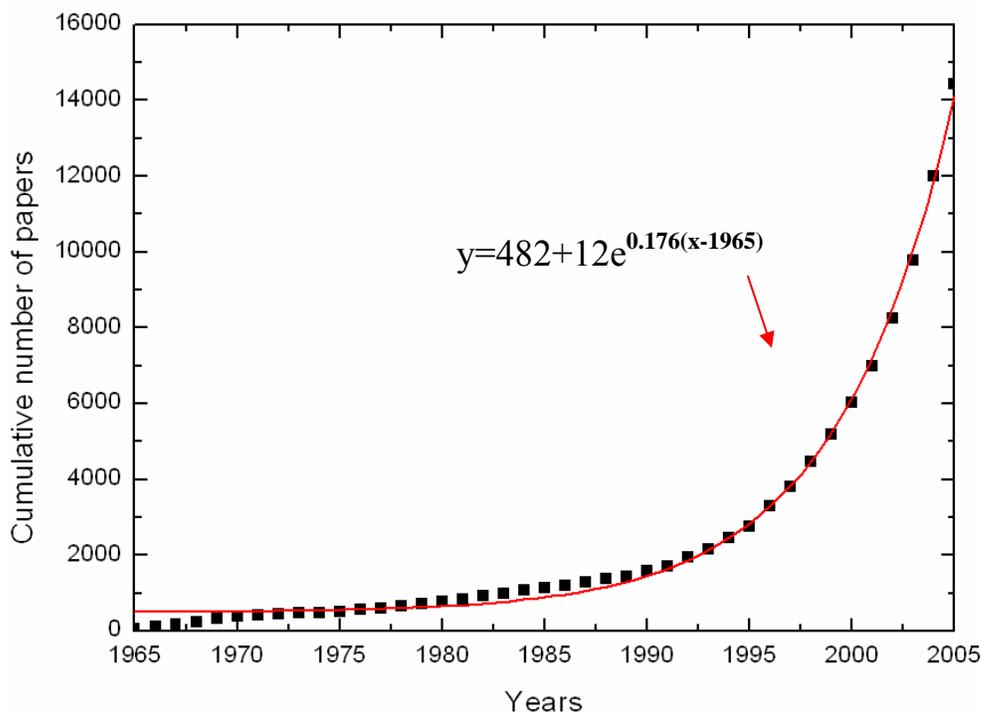


Figure 1 Growth of the hydrogen energy literature, 1965-May 2006

BIOGRAPHY

Dr. Ming-yueh Tsay is a professor of the Graduate Institute of Library, Information and Archival Studies at National Chengchi University (NCU), Taipei, Taiwan. Before joining NCU in August 2004, Dr. Tsay had been a faculty member of the Department of Information and Library Science at Tamkang University, Taiwan for 15 years serving as lecturer, associate professor and professor. She served as the Chairperson of the Department from August 2003 to July 2004. Dr. Tsay was an associate researcher in the libraries of Industry Technology Research Institutes from July 1986 to July 1989. Dr. Tsay earned her MS, CAS and PhD degrees in Library and Information Science from University of Illinois at Urbana-Champaign in 1983, 1986 and 1996, respectively. Dr. Tsay's research activities for the past twenty years have been in the areas of library science and bibliometrics.

T6 - Technical Session 6: Nanotechnology (II)

New Forms of Carbon for Advanced Functionality in Devices

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BIOGRAPHY



Date of birth - April 23, 1951, the Russian Federation.

Russian, candidate of science (physics, mathematics) – 1981, Doctor of science (physics, mathematics) – 1989, professor, director of Federal State Institute “Technological Institute for Super hard and Novel Carbon Materials” of the Ministry of education and science of the Russian Federation.

Vladimir Blank entered in the Moscow Institute of steels and alloys in 1969. In 1974 he began to work in the Institute for High Pressure Physics of the Academy of Sciences, where in 1981 he supported the candidate thesis, in 1989 - the doctor thesis. He offered and developed a new field in solid-state physics – investigations of phase transitions in no hydrostatic compressed (shear deformation) processes, developed and investigated methods of synthesis of new carbon materials including super hard materials, investigated and created the phase diagram C₆₀ at high pressure. He has some patents – methods of synthesis of amorphous polymerized fullerite C₆₀, new type of high-pressure cells, development and production of indenter for atomic force microscopy etc.

From 1995 to the present time Vladimir Blank is the director of the Federal State Institute “Technological Institute for Super hard and Novel Carbon Materials”. From year 2001 Vladimir Blank is professor of the Department of semiconductors Material Science of the Moscow Institute of Steels and Alloys (Technological University).

T6 - Technical Session 6: Nanotechnology (II)

Charge-to-Spin Conversion of Entanglement States and Free-Spin Solid-State Quantum

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ABSTRACT

To implement controlled-operations, a spin-spin coupling is, apparently, necessary for universal quantum computation with electron spins as qubits. Practically, natural or optically generated spin-spin couplings are, however, difficult to be manipulated in experiments because of its weakness (about 10^{-3} weaker than the Coulomb interaction). In this work, taking the excess electron spin in a unit cell of multiple quantum-dot structure as a qubit, we can implement scalable quantum computation without resorting to spin-spin couplings. The technique of single electron tunnelings and the structure of quantum-dot cellular automata (QDCA) are used to create a charge entangled state of two electrons which is then converted into spin entanglement states by using single spin rotations. Deterministic two-qubit quantum gates can also be manipulated using only single spin rotations with the help of QDCA. A single-short read-out of spin states can be realized by coupling the unit cell to a quantum point contact. As a result, implementation of free spin quantum computation is proposed in solid-state systems for the first time.

BIOGRAPHY



Wei-Min Zhang received the B.S. and M.S. degrees in physics from the Suzhou University, Suzhou, PRC, in 1982 and 1985 respectively, and the Ph.D. degree in physics from the Drexel University, Philadelphia, USA, in 1989. From 1990 to 1993, he was a postdoctoral fellow in the University of Washington at Seattle and The Ohio-State University at Columbus, USA, respectively, and became a visiting associate professor in Academia Sinica, Taipei, ROC from 1994 to 1998.

Since 1999, he has been a full professor in the Department of Physics, National Cheng Kung University, and awarded the distinguished professor in 2004. From 2003, he has also become

the first director of the Center for Quantum Information Science, National Cheng Kung University. His current research interests include: Nano-technology and quantum computing, quantum devices and decoherence controls, high T_c superconductivity, nonlinear dynamics and strong interaction particle physics.

T6 - Technical Session 6: Nanotechnology (II)

The 18mm² Classroom

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ABSTRACT

We describe our three semester MEMS curriculum that takes students with little or no prior MEMS knowledge to the point of producing MEMS for cutting-edge research applications. This program, although geared towards MEMS, offers important lessons that are generally applicable to any fabrication system that relies on virtual design and testing to expedite the development process. In order to accomplish our education goals, we are utilizing Sandia National Laboratories' (SNL) SUMMiT V™ MEMS fabrication process. SNL has developed an extensive program for designing and fabricating MEMS devices that allows outside users to use their foundry service with confidence that the fabricated devices will closely match the design. The main design tool is a customized AutoCAD-based MEMS layout system. This software accurately models the capabilities and limitations of the SUMMiT process, and includes a pre-defined library of useful and instructive components. Devices designed with this software and validated by an on-line SNL design checker may be manufactured at SNL's Albuquerque, NM, facility. We report on the results of the first two years of a MEMS curriculum based on this mode of operation. Texas Tech student teams have developed a number of functional, complex electromechanical systems in the space of a standard 18 mm² (2.82 x 6.34 mm) SUMMiT V module. These devices include a micro X-Y stage; a microclock; a microchain, tensioner, and drive system; and two types of micromirrors. Features of the curriculum include immersion in MEMS design and fabrication, familiarization with layout software and process and device simulation, and experience with working in tight interdisciplinary teams. A SNL sponsored design competition has been incorporated as an integral part of our curriculum. It motivates the class, imposes hard deadlines, builds confidence and team spirit, and provides powerful positive reinforcement.

BIOGRAPHY



Tim Dallas is an Associate Professor of Electrical and Computer Engineering at Texas Tech University. He conducts research in the Nano Tech Center, an interdisciplinary laboratory facility housed in the J. F Maddox Laboratory, which includes research in MEMS, nanotechnology, advanced CMOS materials, and optoelectronic devices. Dr. Dallas' research is focused on Microelectromechanical Systems (MEMS). He conducts research on packaging issues with an emphasis on stiction. Dr. Dallas is the principal contact with Sandia National Laboratory's MEMS design and fabrication division. Texas Tech University is a member of the University Alliance Program which provides access to MEMS design and visualization software tools for the SUMMiT V polysilicon process sequence. Dr. Dallas is one of the principal developers of a three course sequence in Microelectromechanical Systems at TTU. Originally supported by a National Science Foundation CRCD grant, the courses are in their seventh year of being offered. Since 2000, Dr. Dallas has been on the governing board of the annual TEXMEMS conference and hosted the event in 2002. He served as co-chair for SEMATECH's technical working group in MEMS, part of Texas' State Strategy on Advanced Technologies.

As an undergraduate physics major at the University of Chicago, Dr. Dallas studied solar energy collection efficiency using of non-imaging parabolic concentrators. His doctoral studies in physics at Texas Tech University focused on structural and optical properties of disordered carbon materials using the optical spectroscopy techniques of Raman and photoluminescence. After graduate school, Dr. Dallas was employed as a Technology and Applications Engineer for ISI Lithography in Austin, TX, makers of semiconductor manufacturing tools. After a one-year stint there, he took a post-doctoral research position in Chemical Engineering at the University of Texas where he worked on developing photoresist materials and processes for lithography applications. He has been a professor at Texas Tech University since 1999

T7 - Technical Session 7: System-on-Chip (II)

**Recent Advances and Future Trends in Advanced Embedded Prognostics
for Smart Machines and Product Service Systems –
*Innovation for System-on-Chip***

Professor Jay Lee

Ohio Eminent Scholar and L.W. Scott Alter Chair Professor in
Advanced Manufacturing

&

Director

NSF Industry/University Cooperative Research Center on
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ABSTRACT

As more software and embedded intelligence are integrated in industrial products and systems, performance degradation information can be easily obtained for predictive service and closed-loop product life cycle management. The presentation introduces recent advances on embedded prognostics for system-on-Chip applications. Technical approach to transform multi-sensor data to precision information through the use of intertwined embedded informatics and pervasive computing in a networked and tether-free environment will be discussed. In addition, a novel system called Watchdog Agent™ will be presented to enable products and systems to intelligently monitor, predict, and optimize its performance and ultimately perform self-maintenance activities autonomously. Finally, future trends in smart service business will be addressed.

IMS Center is a NSF Multi-campus Industry/University Cooperative Research Center among the Univ. of Cincinnati, the Univ. of Michigan, and the Univ. Missouri-Rolla. It focuses on advanced prognostics tools and predictive maintenance monitoring technologies to enable products and systems to achieve zero-breakdown performance. Since its inception in 2000, the Center has been supported by over 40 companies and sponsors, including Toyota, GM, Ford, DaimlerChrysler, Intel, Harley-Davidson, USPS, Rockwell Automation, United Technologies, Mitsubishi Heavy Industry, Omron, Komatsu, Caterpillar, Boeing, GE Aircraft Engine, Festo, Chevron, Samsung, Toshiba, ITRI-Taiwan, and PMC-Taiwan, Tongtai Machines, Advantech, National Instruments, P&G, etc. Its web site is www.imscenter.net

BIOGRAPHY



Dr. Jay Lee is Ohio Eminent Scholar and L.W. Scott Alter Chair Professor in Advanced Manufacturing at the Univ. of Cincinnati and is founding director of National Science Foundation (NSF) Industry/University Cooperative Research Center (I/UCRC) on Intelligent Maintenance Systems (IMS www.imscenter.net) which is a multi-campus NSF Center of Excellence between the Univ. of Cincinnati (lead institution), the Univ. of Michigan, and the Univ. of Missouri-Rolla. In addition, he serves as director for Advanced Gerontics Engineering (AGE) Innovation Collaboratory at the Univ. of Cincinnati as well as a Changjiang Chair Professor and a Co-Director of Industrial Innovation Center (IIC) at Shanghai Jiao Tong Univ. (www.iicsjtu.com).

Previously, he held a position as Wisconsin Distinguished Professor and Rockwell Automation Professor at the Univ. of Wisconsin-Milwaukee. Prior to joining UWM, he served as R&D Director for Product Development and Manufacturing Department at United Technologies Research Center (UTRC), E. Hartford, CT, and was responsible for the strategic direction and R&D activities for next-generation products and manufacturing, and service technologies. Prior to joining UTRC, he served as Program Directors for a number of programs at NSF during 1991-1998, including the Engineering Research Centers (ERCs) Program, the Industry/University Cooperative Research Centers (I/UCRCs) Program, and the Materials Processing and Manufacturing Program (MPM). In addition, he had served as an adjunct professor for a number of academic institutions, including Johns Hopkins University, where he was an adjunct faculty member for the School of Engineering and Applied Science as well as for the Hopkins Technical Management Program during 1992-1998. He conducted research work at the Mechanical Engineering Lab. of the Ministry of International Trades and Industry (MITI) as a Japan Science and Technology Agency (STA) Fellow in 1995, a Japan Society for Promotion of Science (JSPS) Fellow at the Univ. of Tokyo as in 1997, and a visiting professor at Swiss Institute of Technology (EPFL), Lausanne, Switzerland in July 2004..

His current research focuses on autonomous computing and System-on-Chip technologies (including smart prognostics technologies for predictive maintenance and self-maintenance systems), advanced gerontics engineering and smart healthtronics systems, and innovative service business model studies.

He has been an advisor to the Mechanical and Systems Lab (formerly MIRL) and ITRI since 1988 and is currently a member of Technical Advisory Committee (TAC) to ITRI. Previously, he had served on Board on Manufacturing and Engineering Design (BMAED) of National Research Council, a member of Board of Directors for the National Center for Manufacturing Science (NCMS), Chairman of the Manufacturing Engineering Div. and Materials Handling Engineering Div. of ASME, etc. He has authored/co-authored over 100 technical publications, edited two books, contributed numerous book chapters, three U.S. patents, 2 trademarks, and had delivered numerous invited lectures and speeches, including over 100 invited keynote and plenary speeches at major international conferences.

He received Milwaukee Mayor Technology Award in 2003 and was a recipient of SME Outstanding Young Manufacturing Engineering Award in 1992. He is also a Fellow of ASME and SME.

T7 - Technical Session 7: System-on-Chip (II)

The Emerging Secure Processor Designs

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ABSTRACT

Due to the large economic losses and potential terror threats caused by widespread computer attacks, building secure systems has become one of the highest nation's priorities. The recent advances in secure processor designs tackle the challenges through integrating novel onchip security enhancement units. The secure computing goal to be achieved by such designs include the strong protection of confidentiality and integrity of the software, as well as the runtime data on a complicated computer system. The talk focuses on several recent designs for protecting uni- and multi-processor architectures. We will discuss encountered problems in designing such security enhancement units, elaborate the designs and discuss their security strength and execution efficiency.

BIOGRAPHY



Youtao Zhang is an assistant professor in the Computer Science Department, University of Pittsburgh. He completed his PhD in Computer Science at the University of Arizona in 2002. His research interests are in the area of the computer security, compiler optimization, and computer architecture. He is the recipient of US NSF Career Award in 2005, the distinguished paper award of the IEEE/ACM International Conference on Software Engineering (ICSE) conference in 2003, the most original paper award of the International Conference on Parallel Processing (ICPP) conference in 2003. He is a member of the ACM and the IEEE.

T7 - Technical Session 7: System-on-Chip (II)

New Attacks on Randomized ECC Algorithms

Professor Zhijie Jerry Shi and Fan Zhang

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ABSTRACT

Elliptic curve cryptography (ECC) has attracted a lot of attentions because it requires much shorter keys than the multiple-precision integer arithmetic in finite fields, which has been widely used in many public-key and key-exchange algorithms. Small key sizes are especially important to resource constrained devices as shorter keys require less storage space and consume less power to transmit and compute. However, ECC algorithms are vulnerable to power analysis attacks, which exploit the instantaneous power consumptions of computing devices to retrieve secret values. Many countermeasures have been proposed to make ECC implementations secure against power analysis. One of the approaches is to use randomized algorithms, which generate different power traces even if the input of the algorithm is the same. For example, the randomized scalar point multiplication algorithm proposed by Oswald et al. combines two algorithms and uses random variables to decide which algorithm to follow at different stages of the execution. The randomized algorithm can thwart traditional power analysis attacks. However, in this paper, we propose an effective attack on the randomized algorithm. Our attack does not require a large number of power traces and has a very high success rate.

BIOGRAPHY



Zhijie J. Shi is an assistant professor of Computer Science and Engineering at the University of Connecticut. He is the director of the Security and Architecture Laboratory at the University of Connecticut (SALUC). His current research interests are in the areas of computer architecture and computer security. He is interested in the security of computer systems including embedded systems and general-purpose processors. Specifically, he has been investigating the essential hardware that not only accelerates cryptographic algorithms but also provides efficient mechanisms for upper system layers such as operating systems and applications to achieve security goals. He is also interested in the design and application of new cryptographic algorithms that utilize novel operations to achieve the same level of security as existing ciphers but have higher performance and lower power consumption. In addition, he has been working

on several projects in computer architecture, such as high-performance and low-power processor for multimedia information processing and sensor node and system designs for underwater wireless sensor networks. He is a member of Association for Computing Machinery (ACM) and Institute of Electrical and Electronics Engineering (IEEE). He received his Ph.D. degree in Electrical Engineering from Princeton University in 2004 and the M.S. and B.S. degrees in Computer Science from Tsinghua University, Beijing, China, in 1996 and 1992, respectively.

Fan Zhang is a Ph.D. student in the Department of Computer Science and Engineering at the University of Connecticut. His research areas include cryptography, computer security, and computer architecture. He currently focuses on side channel attacks and countermeasures in embedded systems. He received his B.E. degree in 2001 from the Department of Computer Science and Technology at Xi'an Jiaotong University, Xi'an, China, and an M.E. degree in 2004 from the School of Information Security and Engineering at Shanghai Jiaotong University, Shanghai, China.

T7 - Technical Session 7: System-on-Chip (II)

Mobile System Design for Digital Health Diaries

Professor Lin Zhong and Ahmad Rahmati

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ABSTRACT

A health diary is a continual record of information pertinent to one's health. Mobile systems, such as mobile phones and PDAs, are a natural computing platform to collect a digital health diary. Digital health diaries can not only provide invaluable data for early diagnosis of diseases, but also help identify unhealthy lifestyles. We have set out to build Orbit, a three-level mobile computing platform, for collecting digital health diaries. The first level consists of wireless body-worn sensors and auxiliary user interfaces; the second level is a wireless Internet-capable mobile system, which also manages the wireless body-area network; the third level is an Internet server that provides superior computing and medical knowledge and bridges the user and his/her health care professionals. However, such a platform faces a grave energy crisis in the first two levels for collecting the digital health diary. This talk highlights this crisis and presents our solutions. Beyond passively collecting a digital health diary, the Orbit platform can also be used to deliver health-promoting information based user activities and context, especially for chronic illness care. The talk will present our effort in design energy-efficient and ambient user interfaces for this purpose.

BIOGRAPHY



Lin Zhong is an assistant professor with the Dept. of Electrical & Computer Engineering, Rice University. He leads the Rice Efficient Computing Group, which is devoted to efficient computing, communication, and interaction. Lin received his B.S and M.S. from Tsinghua University in 1998 and 2000, respectively. He received his Ph.D. from Princeton University in September, 2005. He was with NEC Labs, America, for the summer of 2003 and with Microsoft Research for the summers of 2004 and 2005. He joined the Dept. of ECE, Rice University as an assistant professor in September, 2005. He received the AT&T Asian-Pacific Leadership Award

in 2001 and the Harold W. Dodds Princeton University Honorific Fellowship for 2004-2005. His research interests include mobile & embedded system design, power analysis & optimization of IC & systems, CAD for nanotechnologies-based computing, and human-computer interaction. He is a member of IEEE and the Society for Information Display.

Ahmad Rahmati is a Computer Engineering Ph.D. Student in the Dept. of Electrical & Computer Engineering, Rice University. He is currently working with Professor Lin Zhong in the Efficient Computing Group, ECG, focusing on the challenges of mobile, low-power embedded computing. He received his B.S. in Computer Engineering from Sharif University of Technology in 2004.

T8 - Technical Session 8: Bioinformatics (II)

Session Chair

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BIOGRAPHY



Hsuan-Cheng Huang received his B.S. and Ph.D. degrees in physics from National Taiwan University in 1994 and 1998, respectively. He was a postdoctoral research fellow in the Department of Physics, National Taiwan University, Taipei, Taiwan, and in the High Energy Accelerator Research Organization, KEK, Japan, where he was engaged in experimental high energy physics research, from 1999 to 2002. He was then awarded as an NSC Distinguished Postdoctoral Fellow in 2003. Encouraged by the emerging of systems biology, he rapidly became interested in applying computational methods to the understanding of biological systems. Dr. Huang is currently an assistant professor in the Institute of Bioinformatics, National Yang-Ming University. He has published more than a hundred research papers. His research interests include bioinformatics, systems biology, and network biology. Currently, he endeavors his research efforts to unravel molecular mechanism of cancer cells and essential genes in microorganisms using systems biology approaches, integrating the enormous amount of data from transcriptomics, proteomics, interactomics, and metabolomics and developing computational models of biological networks.

T8 - Technical Session 8: Bioinformatics (II)

An Interaction-dependent model for transcription factor binding

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ABSTRACT

Transcriptional regulation is accomplished by several transcription factor proteins that bind to specific DNA elements in the relative vicinity of the gene, and interact with each other and with Polymerase enzyme. Thus the determination of transcription factor-DNA binding is an important step toward understanding transcriptional regulation. An effective way to experimentally determine the genomic regions bound by a transcription factor is by a ChIP-on-chip assay. Then, given the putative genomic regions, computational motif finding algorithms are applied to estimate the DNA binding motif or positional weight matrix for the TF. The a priori expectation is that the presence or absence of the estimated motif in a promoter should be a good indicator of the binding of the TF to that promoter. This association between the presence of the transcription factor motif and its binding is however weak in a majority of cases where the whole genome ChIP experiments have been performed. One possible reason for this is that the DNA binding of a particular transcription factor depends not only on its own motif, but also on synergistic or antagonistic action of neighbouring motifs for other transcription factors. We believe that modelling this interaction-dependent binding with linear regression can better explain the observed binding data. We assess this hypothesis based on the whole genome ChIP-on-chip data for Yeast. The derived interactions are largely consistent with previous results that combine ChIP-on-chip data with expression data. We additionally apply our method to determine interacting partners for CREB and validate our findings based on published experimental results.

BIOGRAPHY



Li-San Wang received his B.S. (1994) and M.S. (1996) in Electrical Engineering from the National Taiwan

University. He then received his M.S. (2000) and Ph.D. (2003) from the University of Texas at Austin, both in Computer Sciences. Currently he is a postdoctoral fellow at the Department of Biology, University of Pennsylvania. Starting January 2007, he will join the Department of Pathology and Laboratory Medicine, University of Pennsylvania as an assistant professor. Dr. Wang's research interests include phylogenetics, comparative genomics, and microarray analysis. He has authored more than twenty peer-reviewed book chapters and articles in international journals including PLoS Biology, SIAM Journal on Computing, and Journal of Molecular Evolution, and international conferences including Symposium of Theory on Computing (STOC), Symposium on Discrete Algorithms (SODA), and Conference on Intelligent Systems for Molecular Biology (ISMB). He has served in the program and organizing committees of several international workshops and conferences, including EITC 2004, RECOMB Satellite Workshop on Comparative Genomics 2005, and BioGrid 2006.

T8 - Technical Session 8: Bioinformatics (II)

Knowledge Base for Biological Experiments

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ABSTRACT

This paper describes the development of a knowledge base for biological experiments that uses a class-based ontology for capturing the details of experiments and employs a reasoning engine on this ontology. The ontology was developed using Protégé ontology development system and used the JESS (Java Expert Shell System) reasoning engine to computationally generate answers to questions on experiments such as “If the FEV1/FVC is a certain value then what are the possible diseases one can have?”. Validation of the knowledge base was done by applying it to several experiments on the pathogenesis of *Pseudomonas aeruginosa* infection. This work is a joint research project with Prof. Nary Subramanian and Prof. Ali Azghani.

BIOGRAPHY



Pooja Sachar received her B.E. in Computer Engineering from Pune University, India in 2003 and her Masters in Computer Science from University of Texas in 2006. Upon graduating from Pune University she worked at Atharva Technologies, Pune to further develop the final year project that involved the design of software for a CNC Molding Machine. During the course of doing her Masters she worked as a Graduate Teaching and Research Assistant in the Computer Science department at the University of Texas at Tyler.

As a Teaching Assistant she taught C programming language to undergraduate students in the computer science laboratory, debugged student programming problems, and implemented new

laboratory experiments. As a Research Assistant she researched and wrote code for an algorithm in the field of Content Based Image Retrieval Systems.

Pooja Sachar's current research interests include bioinformatics. As part of her Masters Research work she worked on this Bioinformatics project. At the University of Texas at Tyler she has also been a student representative for the Graduate Council and also the finance secretary for the Indian student association at the University.

T8 - Technical Session 8: Bioinformatics (II)

Outlined-based Clustering and Visualization of Time Series Gene Expression

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ABSTRACT

We propose a highly efficient approach to identifying and visualizing time series gene expression patterns. The identification of expression patterns is based on selected meaningful time points so that pattern outlines can be quickly extracted. The proposed approach is applied to two real expression datasets and experimental results show that the proposed approach is able to produce meaningful groups of genes that correspond to groups of genes discovered by previous approaches while the running time can be dramatically shorten.

BIOGRAPHY



Yu Qian received his B.S. and M.E. degrees in Computer Science from Nanjing University, China, in 1998 and 2001 respectively. He was trained in software testing at PCTEL, Inc., San Jose, California from 1999-2000. He joined the University of Texas at Dallas in fall 2001 and received his Ph.D. in Computer Science in 2006. He won the first place award in the graduate-level student research review and competition of the Erik Jonsson school of Engineering and Computer Science in 2005 at UTD. He is a member of ACM and program committee member of ACM's Annual Symposium on Applied Computing '06. He is also an external reviewer for multiple journals and conferences in computer science. He is currently a postdoctoral senior research associate in the Department of Pathology at the University of Texas Southwestern Medical Center.

Yu Qian's research focuses on designing and integrating novel data mining techniques and visualization models to extract knowledge from image, spatial, and biological databases. He has devised and implemented novel approaches to data compression, noise removal, data clustering, image analysis, and information visualization. The approaches have been applied to

remote sensing image classification, microarray gene expression analysis, protein sequence and structure analysis, and high-dimensional flow cytometry data analysis.

T9 - Technical Session 9: RFID Applications (II)

Dr. Daniel Engels

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BIOGRAPHY



Daniel Engels is the director of research of the Auto-ID Labs at the Massachusetts Institute of Technology. The Auto-ID Labs evolved from the Auto-ID Center, initially founded in 1999 to develop an open standard architecture for creating a seamless global network of physical objects. Engels is one of the principal architects of the Networked Physical World EPC System, the foundation of the Internet of Things developed under the MIT Auto-ID Center and licensed to EPCglobal. Prior to his current position, he served as the director of protocols of the center. Engels received his Ph.D. degree from MIT and is the author of more than 25 publications in the areas of RFID, RFID applications, security, embedded computing and computer-aided design.

T9 - Technical Session 9: RFID Applications (II)

RFID Trends in Pharmacy and Transportation

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BIOGRAPHY



T9 - Technical Session 9: RFID Applications (II)

The RFID Revolution

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BIOGRAPHY



Enu Waktola is a Livestock Business Development Manager at Texas Instruments RFid Systems. In this role, she is responsible for global RFID business development in the growing animal identification market.

Enu joined the RFID group as a product marketing engineer in 1998. She has since served in several product marketing positions supporting TI's development of ISO/IEC 15693, ISO/IEC 14443, and ISO/IEC 18000-6 compliant technologies. Enu launched TI's Team Tag-it™ program, what has now become a network of more than 125 RFID hardware and software suppliers, printer, reader and antenna manufacturers and systems integrators.

Prior to her current position, Enu served as TI's marketing manager for EPC and UHF RFID applications in the retail supply chain sector. Enu actively supports the development of globally accepted, interoperable standards, and has co-authored an EPC-related standard through her participation in EPCglobal Inc™.

Enu earned B.S. degree in chemical engineering from Rensselaer Polytechnic Institute (RPI) in Troy, New York, and B.A. in chemistry from Lawrence University in Appleton, Wisconsin. Enu received her M.B.A. from Southern Methodist University in Dallas, Texas.

T9 - Technical Session 9: RFID Applications (II)

Using Radio Frequency Identification (RFID) Tags and Readers Implemented on Urban-buses to assist Collecting Traffic Data for ITS Applications

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ABSTRACT

In this paper, we propose a straddling cooperated project covering from transportation, communication, electronic, and information flow website to monitor and control traffic data in a big city. A website to exhibit the traffic information for every 5 minutes at certain places of street is designed and measured by three RFID readers for 262 tags installed on 131 buses belonged to two different urban-bus companies and transmit that information via GPRS modem, and public IP from testing point to control center. Currently, RFID is generally used in static or sluggish motional environments. This project can be used in higher mobility condition with semi-active tag for the dynamic applications on intelligent transportation system (ITS). Some measuring results for reader in static and dynamic conditions are obtained to support for the best height of 1.65 ~ 1.7 m for installation a tag on urban-bus. The result shows that the application of RFID tag and reader maybe is an alternative technology to collect traffic data instead of traditional loop detector. However, two major problems exist here for local government. Firstly, the cost of semi-active tag is not cost-effective at this moment. Secondly, the maintenance of loop detector is difficult. If one wants to use it in large volume, he/she still needs to consider more accurately. Nevertheless, if the semi-active RFID is combined with electronic-plate or the technique of electronic-toll-collection (ETC), it will be a new technology trend in the future and need a further research.

BIOGRAPHY



Shing Tenqchen (鄧陳興) He received the Bachelor Science (B.S.) degree in from Tamkang University, Tamsui, Taiwan, R.O.C. in 1977 and Master Science (M.S.) degree from Tennessee Technology University (TTU), Cookeville, Tennessee, USA in 1983, all in Mechanical Engineering. He came into the department of Electrical Engineering of National Taiwan University (NTU) on the August of 1997 and graduated in electrical engineering on January, 2006. Dr. Tenqchen was a recipient a Best paper award of 7th International Conference Exhibition on Multichip Modulus and High Density Packaging in 1998 (MCM). He became a member of National Society of Professional Engineering (NSPE) in Tennessee State in the area of Mechanical Engineering since 2000. From 1983 to 1989, and from 1989 to 1994, he served as an assistant researcher and associate researcher, at Chunghwa Telecom Telecommunication Laboratories (CHTTL), respectively. He has been a director of VLSI/ATE center in 1989 to 1997 at CHTTL. He also joined the testing program of Electronic Toll Collection in Taiwan as a quality representor from 1997 to 2002. From 1994 to 2000, he became a researcher, and now is a senior researcher in the same research labs. He now is a senior member in IEEE and a member of IEICE. Right now, he joins the project of Intelligent Transportation System and is a member in the customer service solution department in TL.

His research interest includes OFDM UWB, wireless communication, RFID system's application, practical signal processing algorithms for smart antennas with applications in wireless communications and radar. His specialties are in VLSI architecture, algorithms, and chip design for digital signal processing (DSP), wireless broadband communication systems. It includes the robust control design, H_{∞} (Hinfinity) Control, nonlinear system design, and digital filter design.

T10 - Technical Session 10: Electrical Energy Technology

Challenges in Coal-to-Hydrogen and Hybrid-Fuel-Cell Clean Power Generation Systems

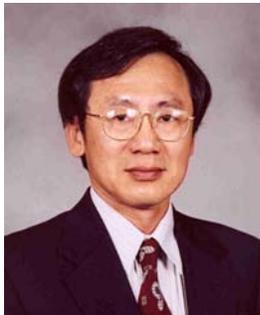
Minking K. Chyu

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ABSTRACT

FutureGen, announced by President Bush in 2003, is an initiative to build the world's first coal-based, nearly zero-emission electricity and hydrogen power plant. This project is a direct response to the Climate Change and Hydrogen Initiatives with intent to stabilizing greenhouse concentrations in the atmosphere. With a \$1 billion dollar investment and 10-year demonstration period, the FutureGen will be a 275-MW research power plant featuring integrated coal-to-hydrogen production, fuel cells, and carbon sequestration. When operational, the prototype will be the cleanest fossil fuel fired power plant in the world. The realization of FutureGen will require substantial research to further develop several key technologies, such as coal gasification, fuel cells, turbines, hydrogen production, and CO₂ sequestration. Instead of using traditional coal combustion technology, FutureGen plant will be based on coal gasification which produces a synthesis gas in which coal's carbon is converted to a "synthesis gas" (syngas or oxyfuel) made up primarily hydrogen and carbon monoxide. Syngas will then react with steam to produce additional hydrogen and a concentrated stream of CO₂. Primary use of hydrogen in the system will be as a clean fuel for electric power generation either in turbines, fuel cells, or hybrid combinations of both. Hydrogen could also be supplied as a feedstock for refineries or fueling hydrogen-powered automobiles. Effective capture of CO₂ is a critical component of FutureGen. The captured CO₂ will be separated from the hydrogen perhaps by novel membranes technologies. This presentation will begin with introduction of important energy technologies relevant to FutureGen. This will be followed by examining issues pertaining to transport phenomena in various constituting components of a potential FutureGen system. Emphasis will be directed to exploring the technical insight as well as practical significance in coal gasifier, oxyfuel turbines, solid oxide fuel cells, and carbon capturing processes. Ongoing research activities and updated developments relevant to these important technologies will be elaborated.

BIOGRAPHY



Dr. Minking K. Chyu is presently the Leighton Orr Professor and Chairman of Mechanical Engineering Department at the University of Pittsburgh. He received his Ph.D. degree from the University of Minnesota in 1986. He was a faculty member at Carnegie Mellon University for 14 years before joining the University of Pittsburgh in 2000. His primary research area lies in thermal issues relating to power and propulsion systems. He has conducted research projects sponsored by a number of government agencies and industry. Since he joined Pitt, he has initiated a number of collaborative research programs in micro- and nanotechnology, fuel cells, and biomechanics. Professor Chyu is a recipient of four NASA Certificates of Recognition for his contribution on space shuttle program, Air Force Summer Research Fellow, Department of Energy Oak Ridge Research Fellow, and DOE Advanced-Turbine-System Faculty Fellow. He is a Fellow of the American Society of Mechanical Engineers (ASME), Associate Fellow of American Institute of Aerospace and Aeronautics (AIAA), and a US delegate to the Scientific Council of the International Centre of Heat and Mass Transfer (ICHMT). He was named the Engineer of The Year by the ASME Pittsburgh Chapter in 2002. He serves as an Associate Editor for the Journal of Heat Transfer, ASME and a Foreign Editor for the Journal of Chinese Society of Mechanical Engineers. He is a Technical Advisor for the Institute of Nuclear Energy Research (INER), Taiwan.

T10 - Technical Session 10: Electrical Energy Technology

Electrodeposition of platinum-ruthenium nanoparticles on carbon nanotubes directly grown on carbon cloths and passive microfluidics for the anode of a direct methanol fuel cell

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ABSTRACT

Platinum-ruthenium (Pt-Ru) nanoparticles were successfully electrodeposited on dense carbon nanotubes (CNTs) directly grown on carbon cloths in ethylene glycol (EG) containing sulfuric acid solutions. EG enhanced dechlorination of the Pt and Ru precursor salts to form the respective nanoparticles and acted as a stabilizing surfactant to prevent the particles from agglomeration during the electrodeposition processes. Relatively well dispersed Pt-Ru nanoparticles (2 to 5 nm) on CNTs (Pt-Ru/CNTs) were verified by transmission electron microscopy. The electrochemical characteristics of methanol oxidation on the prepared specimens were analyzed by cyclic voltammetry in mixed methanol and sulfuric acid solutions. The physical chemistry performance of the Pt-Ru/CNTs electrode in the aspects of mass activity (normalized current density of methanol oxidation vs. Pt loading), 542.6 A/g·cm², and i_f/i_b value (the ratio of forward peak current density to reverse peak current density), 13.36, was superior to that of the commercial Pt-Ru/C one with a mass activity of 168.3 A/g·cm² and an i_f/i_b value of 10.66. Furthermore, the power density of a direct methanol fuel cell (DMFC) using Pt-Ru/CNTs as the anode was ~65% greater than that of another DMFC with a commercial Pt-Ru/C anode, clearly indicating a significantly improved catalytic activity of the new Pt-Ru/CNTs electrode.

On the other hand, passive microfluidic systems using the capillary force for liquid fuel delivering to the reaction area are also developed. Fundamental studies on the removal of CO₂ bubbles produced due to the oxidation of methanol in the anode area will also be reported.

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BIOGRAPHY



Dr. Chin Pan is a professor of the Department of Engineering and System Science and the Dean of the College of Nuclear Science at the National Tsing Hua University (NTHU). At which, he also serves as the director of the Center for Energy and Environmental Research. Dr. Pan received his BS degree in nuclear engineering from National Tsing Hua University in 1979, MS and Ph.D degrees in nuclear engineering from University of Illinois at Urbana-Champaign (UIUC) in 1983 and 1985, respectively. After receiving his doctoral degree, Dr. Pan served as a visiting research assistant professor at UIUC before joining NTHU as an associate professor in 1986 and was promoted to full professor in 1990. From the August 1992 to August 1993, Dr. Pan conducted research and served as a Visiting Professor of the Department of Nuclear Engineering at UIUC with a fellowship from the National Science Council of Taiwan, ROC. In the summer of 1998, he conducted microchannel boiling studies in the Department of Engineering Science at the University of Oxford as an academic visitor with a visiting fellowship from Engineering and Physical Sciences Research Council, UK. In the next summer, he conducted researches on multidimensional modeling of two-phase flow in the Rensselaer Polytechnic Institutes as a visiting scholar with a fellowship from the National Science Council of Taiwan, ROC. He served as the Chairman of the Department of Engineering and System Science at NTHU from February, 2001 to January, 2004.

Dr. Pan's research activities for the past twenty years have been in the areas of two-phase flow, boiling heat transfer and energy engineering with a special focus on transition boiling, nucleate boiling near CHF, nuclear reactor thermalhydraulics, two-phase flow instability with or without nuclear coupling, two-phase natural circulation loops, microchannel two-phase flow, microchannel boiling, microchannel heat sink, microchannel reactor, and thermal-fluid transport in fuel cell systems, especially micro direct methanol fuel cells. He published a book in Chinese entitled "Boiling Heat Transfer and Two-phase Flow" in 2001. He authored and co-authored more than fifty SCI journal papers and more than 60 conference papers. He received an outstanding research award in 1998 and three excellent research awards earlier from the National Science Council of Taiwan, ROC. He also received an outstanding industry – academy collaboration award from the Ministry of Education of Taiwan, ROC in 2003. He served as the chairman of the academic committee for joint projects of Atomic Energy Council and National Science Council from 2001 to 2005.

T10 - Technical Session 10: Electrical Energy Technology

Emerging Photovoltaic Technologies

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ABSTRACT

After a brief introduction of the physics involved in photovoltaics, an overview will be presented on the current status of the photovoltaic technology and its role in meeting our future energy needs. The focus will be on next-generation solar cells, or the so-called “third-generation” solar cells. The difficulty in developing third-generation solar cells is to reduce the cost by over 10-fold while tripling the efficiency. These cost and efficiency targets are needed if solar energy is to be economically competitive with fossil fuels. The situation is further complicated by the many requirements set forward by the expectation that these solar cells will go into every household. Both organic and inorganic approaches to third-generation solar cells will be discussed, which leads to the conclusion that wet-chemically fabricated metal oxide multiple-junction solar cells have the best chance to meet the various requirements for third-generation solar cells. For this purpose, the speaker has proposed metal oxide heterovalence multijunction solar cells, which promises over 50% efficiency by wet-chemical fabrication. An analysis will be presented on the technical challenges in utilizing metal oxides for third-generation solar cells. Approaches to address these technical challenges will be discussed and preliminary experimental results will be presented. Specific metal oxides for third-generation solar cells will be identified.

BIOGRAPHY



Dr. Meng Tao received his PhD in Materials Science and Engineering from the University of Illinois at Urbana-Champaign, MS in Semiconductor Materials from Zhejiang University, and BS in Metallurgy from Southern Institute of Metallurgy. He is currently an associate professor in the Department of Electrical Engineering at the University of Texas at Arlington. His research focuses on semiconductor surfaces, interfaces, and thin films for photovoltaics and nanoelectronics. He has over 100 publications in scientific journals and conferences and 1 US patent with 3 more pending. His research has been funded by NSF, SRC, SEMATECH, ONR,

Petroleum Research Fund, and the State of Texas. He has received several awards and recognitions, including the South Central Bell Professorship in 2001, Outstanding Young Faculty Award in 2004, and Research Excellence Awards in 2005 and 2006.

T10 - Technical Session 10: Electrical Energy Technology

Wind Generation and Its Impact on the System Operation

Professor Wei-Jen Lee

Professor and Director of the Energy Systems Research Center
Department of Electrical Engineering
The University of Texas at Arlington
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BIOGRAPHY



Ph.D. UT Arlington 1985
M.S. National Taiwan University 1980
B.S. National Taiwan University 1978

Areas of Expertise: Power system transient stability analysis, power system dynamic stability analysis and control, power system load flow analysis, power system operations, numerical methods in power system simulations, low voltage surge protection, and power electronics.

Background: Dr. Lee is conducting research at the Energy Systems Research Center, UT Arlington. He has been involved in research on the power system phenomena under steady state, stressed, and emergency conditions and the advanced microcomputer-based equipment for power system monitoring, measurement, protection, and control. He is also involved in the design and development of a new power system simulation laboratory.

Day 2

K3 - Keynote Session 3

Dr. Robert Jih-Chang Yang

CEO

Hong Kong Applied Science and Technology Research Institute

BIOGRAPHY



Dr. Yang is the CEO of the Hong Kong Applied Science and Technology Research Institute Company Ltd. (ASTRI), an applied research institution focused on the development and dissemination of next generation information and communications technologies for the growing technology industries of Hong Kong, Pearl River Delta and Greater China. Prior to joining ASTRI in May 2004, he was the Executive Vice President of the Industrial Technology Research Institute (ITRI) of Taiwan.

Dr. Yang is an R&D manager who is well-recognized for his exemplary track records in getting results out of research. In 2002, he spearheaded Taiwan's six-year, US\$ 620 million Nanotechnology Program, by far the largest R&D program ever launched by Taiwan, and served as its founding Executive Director. His strategy on industry-focus resulted in the transfer of 59 technologies to Taiwan's industry per year in just the program's second year. Earlier, he planned and directed ITRI's now well-known Open Laboratory Program which incubated over a hundred new technology companies with a total capitalization of over 1.2 billion US dollars in the program's first seven years of operation. Prior to that, as the overall manager of ITRI's environmental technology programs, he led a team of researchers who developed a wide range of application-driven environmental technologies that were implemented at over 1,000 sites in Taiwan. As the Vice President and General Director of ITRI's Energy and Resources Laboratories (ERL) in the late 1980's, he built ERL from a conventional research laboratory into a market-driven technology center and grew its R&D output from zero to 43 technologies transferred to industry per year in his seven years tenure there.

Dr. Yang is an Honorary Professor of Chiao Tung University of Taiwan, and a founder of the APEC R&D Leaders Forum. He earned his PhD degree at the University of Washington in the United States.

K3 - Keynote Session 3

The Prospects of New Energy Technologies in Taiwan

Dr. Sean Shao-Hwa Wang

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Dr. Hsin-Sen Chu

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ABSTRACT

In addressing the growing problems of world's energy supply disruptions and greenhouse warming, Taiwan is now looking for ways to improve its current energy mix with a more sustainable system. Under consideration are new energy sources and technologies including efficiency improvements, renewable energy, fossil energy with carbon sequestration, etc. The government has set a target of installed renewable power comprising at least 12% share of total power generating capacity by year 2020, and offered incentives for adding new supplies and conservation practices.

Many policies and measures are made to accelerate the development of new energy industries. LED lighting, PV and fuel cell are considered the most promising. Sustained and focused efforts in R&D are in progress. Some significant results on high-efficiency LED lighting, dye-sensitized solar cells and PEMFC are discussed here. The future of these industries in Taiwan looks bright through continued R&D and increased scale of production.

The availability of new energy technologies will be crucial. Increasing use of such technologies can assist Taiwan meeting a wide range of goals: secure energy supply, efficient use of energy, reduced pollution, and a flourishing energy industrial sector.

BIOGRAPHY



Dr. Wang has over 20 years of experience in technical and business consulting. He joined ITRI as the General Director of IEK in July 2004. IEK, with about 200 staff, is the market research, policy research, and consulting arm of ITRI. In June 2005, Dr. Wang became the president of ITRI International Inc., ITRI's presence in North America. The business practices of ITRI International include early-stage incubation, IP business, technology sourcing, and recruiting and training.

Before joining ITRI, for about 15 years, Dr. Wang was with SRI International/SRI Consulting, where he developed and implemented international projects on technology evaluation, feasibility study, strategic planning, identification of new business opportunities, licensing strategy, buy-or-build issue, and new plant investment analysis. He was the managing editor of *PEP Yearbook*, which contains production economics for 900+ processes to produce more than 550 chemical products in the U.S., Germany, Japan, and China. He also authored 32 proprietary reports on the evaluation of technologies in the areas of energy, petrochemicals, and electronics chemicals and materials. Earlier, Dr. Wang was with M.W. Kellogg (now KBR), Morgantown Energy Technology Center (now the National Energy Technology Laboratory) of U.S. Department of Energy, and the Energy Research Lab of ITRI.

Dr. Wang received his BS from National Taiwan University and his MS and PhD from West Virginia University, all in chemical engineering.

BIOGRAPHY



Dr. Hsin-Sen Chu is the Executive Vice President of the Industrial Technology Research Institute (ITRI) in Taiwan, a non-profit R&D organization engaging in applied research and technical service. ITRI is widely recognized as a key factor in Taiwan's remarkable economical growth in the past thirty years.

Dr. Chu came to ITRI in 2001 and held the position of General Director of Energy and Resource Laboratories for three years (2001-2004) before moving to the current post. He is a specialist in heat transfer. He was the project leader to develop the first kilowatt-level PEM fuel cell co-generation system in Taiwan in 2002. He has worked to establish fuel cell R&D framework by founding a Testing Center, organizing Taiwan Fuel Cells Partnership and PEM Fuel Cell Technology Forum, etc., while also helping government with related policies on regulations, education and industrial incentives. He has been an active advocate on environmental issues, many of which are related to energy use.

Prior to ITRI, Dr. Chu was for seventeen years at the nearby National Chiao Tung University, where he taught and held various positions including Vice Dean of the Engineering School, Director of the High Efficiency Energy Technology Research Center and Director of Mechanical Manufacturing & Heat Flow Research Center. He was a five-time recipient of National Science Council (NSC) research award and winner of the prestigious TECO Science & Technology Award in 2004.

Dr. Chu received B.S., M.S. and Ph.D. degrees from National Chengkung University. He was a visiting scholar at the University of California (Berkeley) during 1985-86.

K3 - Keynote Session 3

Challenges Related to Reliability in Nano Electronics

Professor Way Kuo

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BIOGRAPHY



Way Kuo is University Distinguished Professor and Dean of Engineering at the University of Tennessee, Knoxville.

Previously, Kuo held the Royce E. Wisenbaker Chair of Engineering in Innovation and was the Executive Associate Dean of Engineering at Texas A&M University. From 1993 to 2000, he was head of the department of industrial engineering at TAMU. The National Research Council (NRC)-Research Doctoral Programs and the U.S. News and World Report both ranked the department under his direction as among the nation's best. Kuo has held appointments as an NRC senior research associate and a senior Fulbright Scholar. He has also worked for Bell Laboratories.

Kuo is an elected member of the U.S. National Academy of Engineering, Academia Sinica (National Academy of Sciences), Taiwan, and the International Academy for Quality. He is a Fellow of IEEE, IIE, ASQ, and INFORMS. He is an Honorary Professor of the National Jiao Tung University in Taiwan.

Kuo is widely recognized for his work in nano-electronics and for developing methods to reduce infant mortality. Sponsors of his research include National Science Foundation, U.S. Department of Energy, IBM, Motorola, AT&T, and Intel. A co-author of five engineering texts, Kuo has been invited to speak at more than 100 conferences and symposiums. Kuo is also known widely for his strong support of engineering curricula that have direct relevance to contemporary societal needs and of problem-oriented research.

He received his Ph.D. degree in engineering from Kansas State University and a B.S. degree in nuclear engineering from National Tsing-Hua University in Taiwan.

K3 - Keynote Session 3

Text Data Mining and Searching for Biomedical Discovery

Dr. Harold R. (Skip) Garner

The University of Texas Southwestern Medical Center at Dallas

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BIOGRAPHY



Harold Ray (Skip) Garner, Jr. was born in St. Louis, Missouri, and raised in the bayous of Louisiana. His parents are Harold and Adele Garner, a marine diesel mechanic and an artist, respectively. His brother, Erick is a computer scientist working at EDS, stationed in St. Louis.

Skip received his BS in Nuclear Engineering (minor in computer science) at the University of Missouri - Rolla in 1976. He worked as a disk jockey through college. Skip received a Ph.D. in plasma/high temperature matter physics from the University of Wisconsin, Madison in 1982. He also holds an honorary professional engineering degree.

Skip worked for 12 years at General Atomics in La Jolla, California, where he conducted experimental and theoretical research for the Department of Energy at international fusion research facilities, principally in Japan (5 years) and the Soviet Union. In the last 6 years at General Atomics, he was a founding member of The Institute for Development and Application of Advanced Technologies, an internal think tank group, where he developed artificial intelligence/expert systems, new particle accelerators, high temperature superconductors, stealth technologies and biology software and instrumentation. His work led to the formation of a new biology division and two spin-off companies to manufacture and market his inventions.

While at General Atomics, Skip began working on the human genome project with Dr. Glen Evans of the Salk Institute and they subsequently won one of the first major NIH genome center grants. They were recruited to the University of Texas, Southwestern Medical Center, where they initiated the genome center. His work at UT Southwestern as Assistant Director of the NIH funded human genome center was to develop hardware and software for high-throughput DNA mapping and sequencing. The hardware and software he and his group created have been commercialized (or committed to the public domain) and are in use in genome centers and other laboratories around the country. In 1997, upon realizing that the human genome project was ahead of schedule, he redirected his research away from DNA sequencing automation to capitalize on the abundance of emerging data by developing applied

computational biology tools and instrumentation technologies to take advantage of these computer findings. Skip's group is a major computational biology/informatics resource on campus. His group works collaboratively with many faculty on campus, including John Minna/Richard Gaynor (cancer), Sandy Williams/Ralph Shoet (heart disease), Stephen Johnston (vaccine development), Ron Butow (yeast genetics), Helen Hobbs/Jonathan Cohen (cholesterol metabolism), Roger Schultz (cytogenetics and imaging), to name a few. He also works with and is supported by a number of commercial entities; Texas Instruments (biological manipulation using light), Affymetrix (custom oligonucleotide chips and software to design them), Beckman Instruments (capillary sequencers, operations and analysis software).

Skip currently holds the P. O'B. Montgomery, M.D., Distinguished Chair, is a Professor of Biochemistry and Internal Medicine, is a member of the McDermott Center for Human Growth and Development (Human Genetics Center) and a founding member of the Center for Biomedical Inventions (CBI). He also serves as chair of the Biomedical Engineering Graduate Program and on several Information Technologies and Intellectual Property committees. Dr. Garner also co-directs the Microarray core facility, which grew from an NIH/R01 grant (with Dr. Ron Butow) and this facility has been in full production for since 1998. Now, his laboratories in the Center for Biomedical Inventions and McDermott Center for Human Growth and Development at UTSW span computational biology, instrumentation development and production and interpretation of DNA sequence and expression profile data. His laboratories currently occupy a suite of labs the currently active projects include: 1) Genomic analysis software for gene discovery (polymorphism prediction, genomics features extraction/correlation), 2) Expression and proteomics software (structure/function/variation correlation and structural databases), 3) Text data mining (hypothesis generation, grammar induction, advanced searching) on terabyte-sized biomedical text datasets, 4) Computational modeling and experimental verification of quantitative traits in association with repeat polymorphisms in various species, repeat polymorphisms in human disease, 5) Digital Optical Chemistry - a new method to produce oligonucleotide arrays photolithographically, and the exploitation of this in-house capability for a number of research projects, 6) Spotted array technology and new methodologies, such as global DNA packing monitoring at a gene resolution, 7) A very high performance hyperspectral imaging microscope for cytogenetics, especially for early cancer diagnosis, 8) Advances in sequencing technology including a capillary sequencer (with Beckman Instruments), now focused on identification of SNPs and microsatellite polymorphisms involved in cancer and cardiac disease, 9) Construction of a variable light synthesizer to study melanoma, immune system modulation and tissue engineering using specific light spectra, 10) The development of phase controlled digital imaging with applications to megachannel switching and communications, information encryption and Holographic TV, 11) MerMade - adaptation of a high throughput DNA synthesizer as a PNA synthesizer, 12) Drug development, especially the re-purposing of existing drugs for new indications, based on suggestions from a text data mining code, followed by pre-clinical experimental validation. with ~7,000 square feet of space.

K4 – Keynote Session 4: University Administrator Forum – Global Responsibilities of Research Universities in the Flat World

Session Chair

Dr. David E. Daniel

President
The University of Texas at Dallas
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BIOGRAPHY



He received his bachelors, masters, and Ph.D. degrees in engineering from The University of Texas at Austin <<http://www.utexas.edu/>> , and served on the faculty at U. T. Austin from 1980 to 1996. In 1996, he moved to the University of Illinois, finishing his service there as Dean of Engineering before joining UTD as its president in 2005.

While serving as Dean, Illinois' College of Engineering rose in national rankings to No. 4, trailing only MIT, Stanford, and California-Berkeley, and also opened a new \$80M computer science center in addition to launching a new Department of Bioengineering.

Dr. Daniel's professional work has focused on environmental controls for contaminated land and groundwater. He has published over 100 technical articles and authored or edited five books.

His work has been recognized by the American Society of Civil Engineers <<http://www.asce.org/>> , which awarded him its highest award for papers published in its journals (the Norman Medal) and on two separate occasions awarded him its second highest award, the Croes Medal.

He has taught more than 125 continuing education and training courses on environmental controls, which have been attended by more than 15,000 engineers and scientists. In 2000, he was elected to the National Academy of Engineering, the nation's highest recognition for engineering achievement.

In 2005 and 2006, he served as Chair of the External Review Panel of the American Society of Civil Engineers, which was charged by Secretary of Defense Donald Rumsfeld with review of

the government's work in identifying facts surrounding the performance of New Orleans' levees during Hurricane Katrina, and to advise on the causes of failure and the adequacy of the levees to resist flooding from future hurricanes.

As President of UTD, Daniel has initiated a broadly inclusive strategic planning process, scaled up UTD's development and communications programs, reconfigured several key leadership positions, overseen continued growth of the institution's academic and research programs, launched a campus beautification project, and worked with the DFW community to build new partnerships.

K4– Keynote Session 4: University Administrator Forum – Global Responsibilities of Research Universities in the Flat World

Dr. Paul Ching-Wu Chu

President
Hong Kong University of Science and Technology
Hong Kong

BIOGRAPHY



Professor **Paul Chu (Ching-Wu Chu, 朱經武; pinyin: Zhū Jīngwǔ)**, born in [Hunan, China](#) in [1941](#), received his [Bachelor of Science](#) degree from [Cheng-Kung University](#) in [Taiwan](#) in 1962. He earned his [Master of Science](#) degree from [Fordham University, New York](#) in 1965, and completed his PhD degree at the [University of California at San Diego](#) in 1968. All of his three degrees are in [physics](#).

After two years' industrial research with [Bell Laboratories](#) at [Murray Hill, New Jersey](#), Prof. Chu was appointed [Assistant Professor](#) of Physics at [Cleveland State University](#) in 1970. He was subsequently promoted to [Associate Professor](#) and [Professor](#) of Physics in 1973 and 1975, respectively.

He took up an appointment as Professor of Physics at the [University of Houston](#) in 1979 and became Director of the Texas Center for [Superconductivity](#). He has served as the T. L. L. Temple Chair of Science at the same university since 1987. He also served as a consultant and visiting staff member at [Bell Laboratories](#), [Los Alamos Scientific Laboratory](#), the [Marshall Space Flight Center](#), [Argonne National Laboratory](#), and Dupont at various time.

Prof. Chu has received numerous awards and honors for his outstanding work in superconductivity, including the US National Medal of Science and the International Prize for New Materials. He was an invited contributor to the White House National Millennium Time Capsule at the National Archives in 2000 and was selected the Best Researcher in the US by [US News and World Report](#) in 1990. He is a member of the US [National Academy of Sciences](#), [American Academy of Arts and Sciences](#), [Chinese Academy of Sciences](#) (foreign member), [Academia Sinica](#) and the [Third World Academy of Sciences](#). His research activities extend beyond superconductivity to [magnetism](#) and [dielectrics](#).

He succeeded Professor [Chia-Wei Woo](#) as the President of [The Hong Kong University of Science and Technology](#) on [1st July, 2001](#).

K4 – Keynote Session 4: University Administrator Forum – Global Responsibilities of Research Universities in the Flat World

Dr. Wei Hwang

Acting President and NCTU Chair Professor
National Chiao-Tung University
Hsin-Chu, Taiwan, Republic of China
Email: hwang@mail.nctu.edu.tw

BIOGRAPHY



Professor Wei Hwang is the Acting President of National Chiao-Tung University (NCTU) in Hsinchu, Taiwan. He also serves as Director of Microelectronics and Information Systems research Center, Director of System-on-Chip (SoC) Research Center and Chair Professor of Electronics Engineering at NCTU since Aug. 2002. Prior to this, he was a Research Staff Member at the IBM Thomas J. Watson Research Center, Yorktown Heights, NY from 1984 to 2002. He also served as an Adjunct Professor of Electrical Engineering at Columbia University in New York, NY from 1993 to 2002. He was Associate Professor of Electrical Engineering Department at Columbia University in New York from 1979 to 1984. He was Assistant Professor of Electrical Engineering at Concordia University in Montreal from 1975 to 1978. He received his M.S. and Ph.D. degrees from the University of Manitoba, his M.S. degree from National Chiao-Tung University, and his B.S. degree from National Cheng-Kung University.

His current research interests are in low power nano-scale circuits and systems, low power System-on-Chip (SoC) design, wireless mobile communications and e-home applications. He has received several IBM Awards, including sixteen IBM Invention Plateau Invention Achievement Awards, four IBM Research Division Technical Awards, has been elected an IBM Master Inventor. He has also received the CIEE Outstanding Electrical Engineering Professor Award in 2004 and Outstanding Scholar Award from the Foundation for the advancement of Outstanding Scholarship in 2005. Dr. Hwang is the coauthor of the book "Electrical Transports in Solids-with particular reference to organic semiconductors", which has been translated into Russian and Chinese. He has authored or coauthored over 140 technical papers in journals and conferences, and holds 123 international patents (including 57 U.S. patents).

Dr. Hwang was President, Board Director and Chairman of the Boards of Directors of the Chinese American Academic and Professional Society (CAAPS) from 1986 to 1999. He is member of the New York Academy of Science, Sigma Xi and Phi Tau Phi Society. He has served several times in the Technical Program Committee of the IEEE International ASIC/SoC

Conference and the IEEE/ACM International Symposium on Low Power Electronics and Design (ISLPED). Currently, he also serves as Co-Principal Investigator of National System-on-Chip Program (NSoC) in Taiwan. He also servers as Director of Center for Advanced Information Systems and Electronics Research (CAISER) of University System of Taiwan, UST. Dr. Hwang is the Chairman of IC industry committee of Chinese Institute of Electrical Engineering (CIEE) and a Fellow of the Institute of Electrical and Electronics Engineers (IEEE).

K4 – Keynote Session 4: University Administrator Forum – Global Responsibilities of Research Universities in the Flat World

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BIOGRAPHY



Current Positions

- 2001-present Dean and Professor of Medicine
College of Medicine
Vice President
National Cheng Kung University
Tainan, Taiwan, Republic of China
- 2001-present Professor of Medicine, Emeritus
Division of Cardiovascular Medicine
Department of Medicine
Stanford University School of Medicine
Stanford, California

Past Appointments

- 1991-2002 Director of Cardiac Electrophysiology and Arrhythmia Service
Stanford University Medical Center
- 1991-2001 Professor of Medicine
Stanford University School of Medicine
- 1985-1991 Professor of Medicine
University of California at San Francisco

Society Memberships

- 1976-present Fellow, American College of Cardiology
- 1977-present Fellow, American College of Physicians
- 1977-present Fellow, Council on Clinical Cardiology
American Heart Association

2006-present Fellow and Founder, Heart Rhythm Society

Recent Publications

1. Sung RJ, Lauer MR. Sudden cardiac death syndrome: Diagnosis and management. *Journal of Formosan Medical Association*, 99:809-822, 2000.
2. Wang SH, Han J, Hou C, Sung RJ. Electrophysiologic characteristics of ventricular extrastimulation-induced dissipation of functional bundle branch block associated with supraventricular tachycardia. *Journal of Cardiovascular Electrophysiology*, 12:928-934, 2001.
3. Matsushita T, Chun S, Sung RJ. Influence of isoproterenol on the accelerated junctional rhythm observed during radiofrequency catheter ablation of atrioventricular nodal slow pathway conduction. *American Heart Journal*, 142:664-668, 2001.
4. Qian YW, Clusin WT, Lin SF, Han J, Sung RJ. Spatial heterogeneity of calcium transient alternans during the early phase of myocardial ischemia in the blood perfused rabbit heart. *Circulation*, 104:2082-2087, 2001.
5. Ehlert FA, Cannom DS, Renfroe EG, Breene HL, Ledingham R, Mitchell LB, Anderson JL, Halperin BD, Herre JM, Luceri RM, Marinchak RA, Steinberg JS, and the AVID Investigators. Comparison of dilated cardiomyopathy and coronary artery disease in patients with life-threatening ventricular arrhythmias: Differences in presentation and outcome in the AVID registry. *American Heart Journal*, 142:816-822, 2001.
6. Wyse DG, Friedman PL, Brodsky MA, Beckman KJ, Carlson MD, Curtis AB, Hallstrom AP, Raitt MH, Wilkoff BL, Greene HL, for the AVID Investigators. Life-threatening ventricular arrhythmias due to transient or correctable causes: High risk for death in follow-up. *Journal of the American College of Cardiology*, 38:1718-1724, 2001.
7. Akiyama T, Powell JL, Mitchell LB, Ehlert FA, and Baessler C, for the AVID Investigators. Resumption of driving after life-threatening ventricular tachyarrhythmia. *The New England Journal of Medicine*, 345:391-397, 2001.
8. Hallstrom AP, Greene HL, Wilkoff BL, Zipes DP, Schron E, Ledingham RB, and the AVID Investigators. Relationship between rehospitalization and future death in patients treated for potentially lethal arrhythmia. *Journal of Cardiovascular Electrophysiology*, 12:990-995, 2001.
9. Marcus G, Sung RJ. Antiarrhythmic agents in facilitating electrical cardioversion of atrial fibrillation and promoting maintenance of sinus rhythm. *Cardiology*, 95:1-8, 2001.
10. Matsushita T, Chun S, Chan NY, Glatzer K, Sung RJ. Importance of using standard rather than torso surface electrocardiographic leads for pace-mapping at the right ventricular outflow tract. *Pacing and Cardiac Electrophysiology*, 25:776-784, 2002.
11. Schron EB, Exner DV, Yao Q, Jenkins LS, Steinberg JS, Cook JR, Kutalek SP, Friedman PL, Bubien RS, Page RL, Powell J, and the AVID Investigators. Quality of life in the antiarrhythmics versus implantable defibrillators trial: Impact of therapy and influence of adverse symptoms and defibrillator shocks. *Circulation*, 105:589-594, 2002.
12. Larsen G, Hallstrom A, McAnulty J, Pinski S, Olarte A, Sullivan S, Brodsky M, Powell J, Marchant C, Jennings C, Akiyama T, and the AVID Investigators. Cost-effectiveness of the implantable cardioverter-defibrillator versus antiarrhythmic drugs in survivors of serious ventricular tachyarrhythmias: Results of the antiarrhythmics versus implantable defibrillators (AVID) economic analysis substudy. *Circulation*, 105:2049-2057, 2002.
13. Matsushita T, Chun S, Liem LB, Friday KJ, Sung RJ. Unidirectional conduction block at cavotricuspid isthmus created by radiofrequency catheter ablation in patients with typical atrial flutter. *Journal of Cardiovascular Electrophysiology*, 13:1098-1102, 2002.
14. Matsushita T, Chun S, Chan NY, Glatzer K, Sung RJ. Importance of using standard rather than torso surface electrocardiographic leads for pace-mapping at the right ventricular outflow tract. *Pacing and Cardiac Electrophysiology*, 25:776-784, 2002.

15. Matsushita T, Chun S, Liem LB, Friday KJ, Sung RJ. Unidirectional conduction block at carotricuspid isthmus created by radiofrequency catheter ablation in patients with typical atrial flutter. *Journal of Cardiovasc Electrophysiol*, 13:1098-1102, 2002.
16. Matsushita T, Chun S, Liem LB, Friday KJ, Sung RJ. Limited predictive value of inducible sustained ventricular tachycardia for future occurrence of spontaneous ventricular tachycardia in patients with coronary artery disease and relatively preserved cardiac function. *Journal of Electrocardiology*, 36(3):205-211, 2003.
17. Qian YW, Sung RJ, Lin SF, Province R, Clusin WT. Spatial heterogeneity of action potential alternans during global ischemia in the rabbit hearts. *Am J Physiol Heart Circ Physiol*, 285:H2722-H2733, 2003.
18. Sung, RJ. Facilitating electrical cardioversion of persistent atrial fibrillation by antiarrhythmias drugs: Update on clinical trial results. *Cardiac Electrophysiology Review*, 7:299-302, 2003.
19. Matsushita T, Chun S, Liem LB, Friday KJ, Sung RJ. Significance of inducible ventricular flutter/fibrillation in risk stratification for prophylactic implantation of cardioverter-defibrillators in patients with coronary artery disease. *Int J Cardiol*, 94:67-71, 2004.
20. Page RL, Zipes DP, Powell JL, Luceri RM, Gold MR, Peter R, Russo AM, Bigger Jr. MJ, Sung RJ, McBurnie MA, and the AVID Investigators. Seasonal Variation of Mortality in the Antiarrhythmics versus Implantable Defibrillators (AVID) Study Registry. *Heart Rhythm*, 1: 435-440, 2004.
21. Hsu JT, Lin KH, Luqman N, Sung RJ, Kuo CT. Unusual Features of an Idiopathic Ventricular Tachycardia Arising from the Left Ventricular Outflow Tract. *Pacing and Cardiac Electrophysiology*, 28: 160-163, 2005.
22. Sung RJ, Lauer MR. Atrial fibrillation: Can we cure it if we can't explain it? *Journal of Cardiovascular Electrophysiology*, 16: 1-3, 2005.
23. Wu SN, Chang HD, Sung RJ. Cocaine-induced inhibition of ATP-sensitive K⁺ channels in rat ventricular myocytes and in heart-derived H9c2 cells. *Basic Clin Pharmacol Toxicol*, 98:510-517, 2006.
24. Sung RJ, Lauer MR. Is Electrode Catheter Ablation-induced Phrenic Nerve Injury Really a Benign Condition? *Journal of Cardiovasc Electrophysiol*. (in press)
25. Sung RJ, Wu SN. Electrophysiological Mechanisms of Ventricular Arrhythmias in Relation to Adersen-Tawil Syndrome Under Conditions of Reduced IK1: A Simulation Study. *Am J Physiol Heart Circ Physiol*. (in press)
26. Qian YW, Han J, Province R, Lin SF, Sung RJ. Effects of azimilide on the ventricular vulnerability to ventricular fibrillation in isolated rabbit hearts: An optical imaging study. (submitted)

Books Published

Sung RJ, Lauer MR: *Fundamental Approaches to the Management of Cardiac Arrhythmias*. Kluwer Academic Publishers, Dordrecht, the Netherlands (780 pages, October, 2000)

K4 – Keynote Session 4: University Administrator Forum – Global Responsibilities of Research Universities in the Flat World

Dr. Ching-Hua Lo

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BIOGRAPHY



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EDUCATION

1985-1990: Ph.D., Dept. Geological and Geophysical Sciences, Princeton University

1978-1981: M. Sc., Department of Geology, National Taiwan University

1974-1978: B. Sc., Department of Geology, National Taiwan University

EMPLOYMENT

2005-Present: Dean, College of Science, National Taiwan University

2002-2005: Chairman, Department of Geosciences, National Taiwan University

2000-2002: Program Coordinator, Natural Science Division, National Science Council, Taiwan

1995-Present: Professor, Department of Geosciences, Institute of Astrophysics, National Taiwan University.

RESEARCH INTEREST

Application of radiogenic isotope (^{40}Ar - ^{39}Ar) geochronology, mass spectrometry, and principles of mathematics, physics, and chemistry to fundamental problems in geology. Numerical modelling of diffusion and mass transport in open systems. Application of petrology and geochronology to problems in tectonic processes.

ACADEMIC AWARDS AND DISTINCTIONS

- 2003-2005 National Chair Professor, Ministry of Education, Taiwan
2003 Academic Award in Natural Sciences, Ministry of Education, Taiwan
2002 Elected Fellow of the Mineralogical Society of America, USA
2001 Elected Fellow of the Geological Society of America, USA
1998-1999, 2000-2001, 2003-2006 Outstanding Researcher Award, National Science Council, Taiwan

Representative Publications:

- Chung, S.-L., Chu, M.-F., Zhang, T.-Q., Xie, Y.-W., Lo, C.-H., Lee, T.-Y., Lan, C.-Y., Li, X.-H., Zhang, Q., and Wang, Y.-Z. (2005) Tibetan plateau evolution inferred from spatial and temporal variations in post-collisional magmatism. *Earth Sci. Rev.* 68, 173-196.
- Zhu, R, Lo, C.-H., Shi, R., Shi, G., Pan, Y. and Shao, J. (2004) Is there a precursor to the Cretaceous normal superchron? New paleointensity and age determination from Liaoning province, northeastern China. *Physics of the Earth and Planetary Interiors* 147, 117-126.
- Wu, F.Y., Jahn, B.M., Wilde, S.A., Lo, C.H., Yui, T.Z., Lin, Q., Ge, W.C. and Sun, D.Y. (2003) Highly fractionated I-type granites in NE China: geochronology and petrogenesis. *Lithos* 66, 241-273.
- Lo C. H., Chung S. L., Lee T. Y., Wu G. (2002) Age of the Emeishan flood magmatism and relations to Permian Triassic boundary events. *Earth Planetary Science Letter* 198, 449-458.
- Lo, C.-H., Howard, K.T., Chung, S.-L. and Meffre, S. (2002) Laser-fusion $^{40}\text{Ar}/^{39}\text{Ar}$ ages of Darwin impact glass. *Meteoritics & Planetary Sciences* 37, 1555-1562.
- Lo, C.H., Lee, J.K.W. and Onstott, T.C. (2000) Argon Release Mechanisms of Biotite in vacuo and the role of short-circuit diffusion and recoil. *Chemical Geology* 165, 135-166.
- Lo, C. H. and Knittel, U. eds. (2000) Lithosphere Dynamics and Natural Resources in East Indochina and adjacent areas: Special issue of *Journal of Asian Earth Sciences*, vol. 18.
- Chung, S. L., Lo, C. H, Lee, T. Y., Zhang, Y., Xie, X., Li, X., Wang, K. L. and Wang, P. L. (1998) Diachronous uplift of the Tibetan plateau starting 40 Myr ago. *Nature* 394, 723-725.
- Flower, M. F., Lee, T. Y., Chung, S. L. and Lo, C. H. eds. (1998) *Mantle Dynamics and Plate Interactions in East Asia: AGU Geodynamic Series*, 27.
- Lo, C.H. and Onstott, T.C. (1995) Rejuvenation of K-Ar isotope systems for minerals in the Taiwan Mountain Belt. *Earth Planet. Sci. Lett.* 131, 71-98.
- Lo, C.H. and Onstott, T.C. (1989) ^{39}Ar recoil artifacts in chloritized biotite. *Geochimica Cosmochimica Acta* 53, 2697-2711.

T11 - Technical Session 11: Nanotechnology (III)

Bionanomaterials and Nanobiomedicine

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ABSTRACT

Nanotechnology and Biotechnology are converging to bring up novel applications in human life. Biomolecules with their compatible size range and diverse chemistry were able to modify nanosynthesis for the desired functions. On the other hand, nanotechnology also transformed biotechnology and their applications in medicine such as diagnosis and therapy or even theranostics – the two in one approach. In this paper, the integration of nanotechnology for molecular imaging and targeted delivery were implemented. Nanorods with different aspect ratio were able to perform gene expression selective photoacoustic imaging and thermal therapy by tuning their surface plasmon resonance frequency. Iron oxide nanorods were able to perform MRI contrast and carrying anti-cancer drug to the target through functional ligands. In summary, biotechnology combined with nanotechnology showed synergistic power for the future biomedical applications.

BIOGRAPHY



Dar-Bin Shieh received the D.D.S. degree from National Yang Ming University, Taipei, Taiwan, ROC, in 1988. After three years of clinical training in Taipei Veterans General Hospital he went for the Doctor of Medical Sciences (D.M.Sc.) program at Harvard and got the degree in Oral Biology and certificate in Oral Diagnosis and Pathology in 1997. After graduation, he did additional two years of post-doctoral training in the Department of Experimental Medicine in Harvard Medical School.

Dr. Shieh was appointed as Assistant Professor in the department of Dentistry in National Cheng Kung University (NCKU) in 1999 and soon in charge the session of Oral Diagnosis and General Dentistry. He was co-appointed as joint faculty in the Institute of Molecular Medicine since 2000 and Institute of basic Medicine Sciences in 2003. His research in oral cancer was awarded “Best Basic Science Award” in the 10th International Congress of Oral Cancer in 2005. He was then invited as the fellow of IAEO (the International Academy of Oral Oncology). Prof. Shieh has joined nanobiomedicine research teamwork dedicated to bring up a translational clinical application toward improved cancer diagnosis and therapy. The team was awarded National Science and Technology Program Project. He is also the Principle Investigator of a Taiwan (National Science Council and ITRI)-Canada (National Research Council) International Collaborative Research Program focusing on the molecular imaging of cancer through nanotechnology. Prof. Shieh is now the Assistant Director of the Center for Micro/Nano Science and Technology in NCKU in charge for the education and research activities.

Selected Publications:

- **J. Dental Research** 84(5):468-473, 2005.
- **Biomaterials** 26(34), 7183-7191, 2005.
- **Biomaterials** 26(7),729-738, 2005.
- **Journal of Physical Chemistry B**, 110(1), 205-110, 2006.
- **J. Biomedical Nanotechnology** 1(2), 196-201, 2005.
- **Nano Letters** 4,7,1209-1212, 2004.

T11 - Technical Session 11 : Nanotechnology (III)

What is L5, a recently discovered biological nanoparticle, and how does it affect your health?

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ABSTRACT

Low-density lipoprotein (LDL) is generally known as “bad cholesterol”, an infamous nickname it earns for causing vascular diseases. The truth is, LDL is only bad when there is too much of it and especially when it is oxidatively modified. In fact, LDL is a heterogeneous group of lipoproteins and not all LDL particles are the same. By subjecting LDL to a process called fast protein liquid chromatography, we are able to divide into many 5 subfractions according to their electrical charge. L5 is the 5th and last eluted group and is most electronegative among all subfractions. It is also mildly oxidized in nature. L5 is only present in patients with elevated LDL cholesterol in their blood, patients with diabetes, or people who smoke but may be healthy otherwise. In healthy subjects who do not have elevated LDL cholesterol, diabetes, or a smoking habit, L5 is not present. L5 is a biological nanoparticle with a diameter of 20-30 nm. Endothelial cells are the type of cells that form in innermost lining of all blood vessels in our body. When added to the endothelial cell cultures, L5 can induce apoptosis, or programmed cell death, which means dying from inside, in these cells. Apoptosis of endothelial cells will make the endothelial lining leaky, leading to eventual atherosclerosis, or hardening of blood vessel. At a later phase, it also contributes to formation of blood clots on the surface of the atherosclerotic plaque. This will lead to complete blockage of the blood vessel and result in a heart attack, a stroke, or inadequate blood supply to the legs. During normal growth, the growing tissue needs new blood vessels for nutrition and oxygen supply. Formation of new capillaries or small arterioles is called angiogenesis. In adult life, when the main artery is blocked, angiogenesis often takes place to form a part of the collateral network to help maintain sufficient blood supply to the region. This is called compensatory angiogenesis. To carry out this mission, a special kind of cells is often called to duty and this is the endothelial progenitor cells. In our studies, L5 inhibits normal differentiation of endothelial progenitor cells from monocytes. It also inhibits the formation of capillaries from mature endothelial cells. Thus, L5 not only induces endothelial cell apoptosis, but also inhibits angiogenesis. This suggests that in patients with elevated LDL cholesterol, diabetes, or in those who smoke, the L5 circulating in their blood will not only increases their chances of having a heart attack, stroke, and bad circulation to their legs, but also prevent the compensatory angiogenesis from happening. How does L5 do it? It exerts all these bad effects by first entering the cell through a specific receptor called LOX-1. By labeling the L5 nanoparticle with a dye called DiI, we can observe the internalization of DiI-L5 under the microscope. After entering the cell, L5 may have close contact with important cellular compartments, including the mitochondria, endoplasmic reticulum, and, eventually, the

nucleus. L5 may or may enter these compartments, and they may or may not have been metabolized before they or their active components induce a cascade of biological reactions in these compartments. The eventual outcome is, by modulating the expression of many genes and the subsequent biological activities regulated by these genes, the DNAs in the nucleus become condensed and fragmented; leading to apoptotic death. At low concentrations, L5 does not cause apoptosis of the differentiating cells, but stop their differentiation so that endothelial progenitor cells needed for angiogenesis will not be formed. By tagging L5 with other nonbiological nanoparticles, such as Fe_3O_4 and quantum dots, we may follow the passage of L5 inside the cells. Combined with the molecular and biochemical findings, real time tracing of L5 may provides insights into new targets of treatment for L5-associated vascular diseases.

BIOGRAPHY



Chu-Huang (Mendel) Chen received his M.D. degree from Kaohsiung Medical University (then Kaohsiung Medical College) in 1978. He was Chief Resident of Pathology at Chang-Gung Memorial Hospital when he enrolled in the Ph.D. program in Physiology at Texas Tech University at Lubbock, Texas in 1981. After completing the graduate program in 1986, he received residency training in Internal Medicine at Maryland General Hospital and University of Maryland. In 1989, he continued his clinical training as a Cardiology Fellow at Baylor College of Medicine in Houston, Texas. In 1992, he accepted a position of Instructor at Baylor and is now an Associate Professor of Medicine, in the Section of Atherosclerosis at the same institution. Clinically, Dr. Chen is an attending physician, who rounds with medical teams at Baylor affiliated hospitals, and is also Clinical Director of the Behavioral Medicine Research Center, who supervises patient management for obesity and other related clinical studies. In basic science, Dr. Chen's expertise is in vascular biology. Their current focus is on chemical and functional characterization of L5 isolated from the plasma of patients with hypercholesterolemia (elevated LDL cholesterol), diabetes, or the smoking subjects. They have identified several novel signaling pathways and are aiming at identifying new therapeutic targets for these diseases. Dr. Chen has been rewarded several grants for the studies of L5 and one of his postdoctoral fellows also recently won an American Heart Association Fellowship for a studying specific gene branched our from the main theme of the general goal of his laboratory.

T11 - Technical Session 11: Nanotechnology (III)

Application of Micro/Nano Scale Magnetostrictive Particle Biosensors in Food Safety

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ABSTRACT

Since the 9-11 terrorist attack, the threat from anthrax contamination, and the close international trade, biosafety issues have become prominent. Pathogens have the potential to become lethal weapons in the hands of terrorists. Food safety, especially with regard to foodborne pathogens and toxins, is one of the most important issues today. In addition, each year, as many as 76 million Americans become ill due to foodborne pathogens and toxins. The top-six illness-causing pathogens alone account for \$6.9 billion in medical costs, productivity losses from missed work, and an estimated value of premature deaths. Therefore, important control strategies from public health agencies or food industry include developing and maintaining timely and effective disease surveillance programs. Based on this standpoint, the real-time detection of pathogens in foods becomes very important in preventing or reducing the incidence or outbreaks of disease. A novel biosensor based on magnetostrictive particles has been developed and is able to detect a few bacteria in minutes. The use of micro/nano magnetostrictive biosensors has a great potential to fit this purpose. This biosensor is operated wirelessly and can easily be manufactured into a handheld unit for real-time field testing. As a result, it can prevent contaminated foods from reaching processing plants, shipping containers, retailer and consumers.

BIOGRAPHY



Tung-Shi Huang received his B.S. and M.S. degrees in plant pathology from Chung-Hsing National University, Taichung, Taiwan, ROC, in 1978 and 1980 respectively, and his Ph.D. degree in Food Science and Human Nutrition from University of Florida, Gainesville, Florida, USA, in 1993.

After two years military service, he began his career at the Agricultural Improvement Station, Taoyuan, Taiwan in 1982. Five years later he came to the USA to pursue his Ph.D. degree after which he worked as postdoctorate fellow for 3 years. In 1996 he left the academic world and worked in the private sector developing plant tissue culture protocols for growing lilies for the cut flower industry. In 1999, he came to Auburn University as a research associate working in the area of food safety; he became a faculty member in the department of Nutrition and Food Science at Auburn University in 2002. His research interest is in food safety focusing on detection and prevention of foodborne pathogen in foods.

Dr. Huang is a member of the Institute of Food Technologists and International Association of Food Protection.

T12 – Technical Session 12: System-on-Chip (III)

Session Chair

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BIOGRAPHY



Chih-Ming Hung received his B.S. degree in Electrical Engineering from the National Central University, Chung-Li, Taiwan in 1993, and M.S. and Ph.D. degrees in Electrical and Computer Engineering from the University of Florida, Gainesville in 1997 and 2000, respectively. He received several research grants and fellowship between 1996 and 2000 working on high-performance fully-integrated CMOS PLLs and VCOs between 900 MHz and 30 GHz frequency range as well as developing on-chip passive components in CMOS processes suitable for RF front ends at these frequencies. In November 1999 and February 2000, he and his colleague received the Semiconductor Research Corporation Copper Design Contest phase-I and phase-II winner awards, respectively with a 15-GHz fully-integrated on-chip wireless clock distribution system. He has received 2004 Outstanding Engineer Award from IEEE and TSPE, and Outstanding Academic Achievement Honor from the University of Florida in 2000.

In July 2000 Dr. Hung joined Texas Instruments, Dallas, TX. He has focused on R&D of advanced CMOS RF IC for wireless cellular applications. Since 2002, he has been a design manager responsible of RF and analog integration for Digital RF Processor (DRP™), and since 2005, he has been a senior member, group technical staff. Dr. Hung has authored and co-authored 46 journal and conference publications. He has 2 granted patents and 15 patents pending. His interests include CMOS RF IC design, integrated passive components, and SoC integration.

T12 - Technical Session 12: System-on-Chip (III)

Dual-Cores SOC Simplifies Digital Video Systems

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ABSTRACT

Texas Instruments' DaVinci™ technology leverages a tightly integrated set of multimedia codecs, application programming interfaces (APIs), frameworks and development tools, all of which are optimized for the TMS320DM644x system-on-chips (SoC) to simplify innovation for digital video systems. The foundation of the DaVinci technology's flexibility comes from its programmable architecture, with the first processors, the DM644x, featuring a dual-core ARM plus DSP architecture. This presentation will include a detailed overview of the architecture that allows for this flexibility. It will also evaluate how the integrated peripherals such as video encoder, hardware video accelerators, video port subsystem and audio interfaces simplify the implementation of digital video systems. Finally, it will address how the combination of the processors, APIs and the availability of production-ready codecs simplifies digital video innovation like never before.

BIOGRAPHY



Dr. Thanh Tran has over 21 years of experience in audio, video, computer and communication systems design and is a Hardware Productization Manager at Texas Instruments Incorporated. At TI, he is leading a hardware systems team to develop reference designs and frameworks for high speed SOC systems. He has held other senior design positions at Compaq Computer, ReplayTV, Eagle Wireless Incorporated, Bose Corporation and Zenith Electronics Corporation. Tran is an IEEE Senior member and currently serves on the IEEE System-On-Chip Organizing Committee and the International Conference in Consumer Electronics Technical Program Committee. He has published over 14 technical papers and holds 18 issued patents related to designs of computer, video, audio and communication systems. Tran's doctoral research, gated direct sequence spread spectrum clock distribution system, led to three patents pending and a startup company, X-EMI, in Texas. He is currently an adjunct faculty member at Rice

University where he is teaching a graduate electrical engineering course in digital audio and video systems design. Tran received a bachelor's of science in electrical engineering from the University of Illinois at Urbana-Champaign, Illinois and master's of electrical engineering and a doctorate in electrical engineering from the University of Houston, Houston, Texas.

T12 - Technical Session 12: System-on-Chip (III)

Integrated Circuits for 6.4Gbps Per-Pin Chip-to-Chip Interconnection

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ABSTRACT

Nowadays, high-performance consumer electronic and computing applications are driving the demand for high bandwidth and high operation speed. Accordingly, the speed of I/O interface between chips has to speed up to accommodate this demand. In this paper, we present the design and implementation of a spread-spectrum clock generator (SSCG) and a delay-locked loop (DLL) integrated circuits that can be applied in a 6.4Gbps per-pin high-speed I/O interface environment. All the circuits are developed in TSMC 0.18 μ m 1P6M process and operate at 1.8V

BIOGRAPHY



BIOGRAPHY



Sao-Jie Chen received the B.S. and M.S. degrees in electrical engineering from the National Taiwan University, Taipei, Taiwan, ROC, in 1977 and 1982 respectively, and the Ph.D. degree in electrical engineering from the Southern Methodist University, Dallas, USA, in 1988.

Since 1982, he has been a member of the faculty in the Department of Electrical Engineering, National Taiwan University, where he is currently a full professor. During the fall of 1999, he was a visiting professor in the Department of Computer Science and Engineering, University of California, San Diego, USA. During the fall of 2003, he held an academic visitor position in the Department of System Level Design, IBM Thomas J. Watson Research Center, Yorktown Heights, New York, USA. During the falls of 2004 and 2005, he was a visiting professor in the Department of Electrical and Computer Engineering, University of Wisconsin, Madison, USA. His current research interests include: VLSI physical design, SOC hardware/software co-design, and Wireless LAN and Bluetooth IC design.

Dr. Chen is a member of the Chinese Institute of Engineers, the Chinese Institute of Electrical Engineering, the Institute of Taiwanese IC Design, the Association for Computing Machinery, a senior member of the IEEE Circuits and Systems and the IEEE Computer Societies.

T12 - Technical Session 12: System-on-Chip (III)

Improving Performance of Off-Chip Memory Bandwidth: A Survey

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ABSTRACT

Increasing levels of device integration and die area have resulted in an exponential trend for raw computation system performance enhancement. Architectural advancements to exploit this raw performance potential have been made in the form of increasing levels of bit-level, instruction-level, thread-level, and processor-level parallelism. Thus, there may be multiple processors on a chip, each of which may execute multiple threads simultaneously, and each thread may be executed by a deeply pipelined, superscalar core clocked at a high frequency. Due to such dramatic increases in computation system performance, there is an enormous pressure on the memory system to store increasing amounts of information and communicate this information at a high enough bandwidth and low enough latency to avoid performance bottlenecks. This paper presents a survey on various proposed techniques to improve memory system performance by either *directly* or *indirectly* increasing the off-chip bandwidth: Direct off-chip bandwidth improvement approaches increase hardware communication bandwidth while indirect approaches utilize various architectures and techniques to reduce number of off-chip accesses so that available bandwidth is optimally utilized.

BIOGRAPHY



Dr. Jiangjiang (Jane) Liu received the B.Eng. degree in [Computer Engineering](#) from the [Beijing University of Posts and Telecommunications](#), Beijing, P.R. China, in 1997 and the M.S. and then the Ph.D. degree in [Computer Science and Engineering](#), from the [University at Buffalo, The State University of New York](#), in 2004. She is currently an Assistant Professor of Computer Science at Lamar University. Her research interests are in computer architecture with an emphasis on: high-performance, low-power, and cost-effective memory system design for CMP,

embedded systems, and SoC. Her research activities have been supported by the Lamar University and ExxonMobil. She has authored and coauthored over 10 refereed papers.

T13 - Technical Session 13: Bioinformatics (III)

Fast Knowledge Integration in Gene Expression Database Using High-Performance Parallel Computing

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ABSTRACT

The healthcare burden and suffering due to life-threatening diseases such as cancer would be significantly reduced by the design and refinement of computational interpretation of micro-molecular data collected by bioinformaticians. Rapid technological advancements in the field of microarray analysis, an important component in the design of in-silico molecular medicine methods, have generated enormous amounts of such data, a trend that has been increasing exponentially over the last few years. However, the analysis and handling of these data has become one of the major bottlenecks in the utilization of the technology. In this paper we present a novel framework [1] to achieve fast, robust, and accurate (biologically-significant) multi-class classification of gene expression data using distributed knowledge discovery and integration computational routines, specifically for cancer genomics applications. The proposed paradigm consists of the following key computational steps: (a) preprocess, normalize the gene expression data; (b) discretize the data for knowledge mining application; (c) partition the data using three proposed methods; (d) perform knowledge discovery on the partitioned data-spaces for association rule discovery; (e) integrate association rules from partitioned data and knowledge spaces on distributed processor nodes using a novel knowledge integration algorithm; and (f) post-analysis and functional elucidation of the discovered gene rule sets. The framework is implemented on a shared-memory multiprocessor supercomputing environment, and several experimental results are demonstrated to evaluate the *algorithms*.

BIOGRAPHY



Dr. Chokchai “Box” Leangsuksun is an associate professor in computer science and the Center for Entrepreneurship and Information Technology (CEnIT) at Louisiana Tech University. He received the Ph.D. and M.S. in computer science from Kent State University, Kent, Ohio in 1989 and 1995 respectively.

Prior joining Louisiana Tech University in early 2002, Box was a member of Technical Staff, Lucent Technologies-Bell Labs Innovation, from 1995-2002 and was responsible in many key research and development roles in various strategic products. Box has established his name and research recognitions by founding and co-chairing a high availability and performance workshop, serving as chair and program committee member in various conferences/workshops (e.g. IEEE Cluster, Grid Computing Education), releasing open source software, writing articles featured in major technical journals/magazines, and giving presentations in highly-regarded conferences. He has also collaborated with various research groups and national and industrial labs, which include Oak Ridge National Lab, NCSA, Dell, Intel, and Ericsson etc.

He released the HA-OSCAR to open source community which was considered as the first field-grade High Availability and Performance Beowulf cluster with transparent recovery. The release has attracted considerable interest from the HPC research and industry community. In September 2003, he received an outstanding teaching award from the college of Engineering and Science, Louisiana Tech University.

T13 - Technical Session 13: Bioinformatics (III)

Topological Similarity of Protein Interaction Network and its Correlation with Gene Expression Profiles

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ABSTRACT

Search of functional genes among the whole genome and their annotation is one of the most challenging problems in the post-genomic era. In this context, the search for meaningful bioinformatics methods of assigning protein functions is important. Many approaches are available for assigning putative functions to un-annotated proteins using information from sequences, gene expression profiles, or protein-protein interaction data. Most approaches in predicting protein function from protein-protein interaction data utilize the observation that a protein often shares functions with proteins that interacts with it. However, not only the two interacting partner proteins may share same biological functions, but also the proteins in a local network cluster or with a similar network structure in the entire interaction network may share similar functions. Herein, we propose that the proteins with similar topological roles in a protein interaction network may share similar biological functions and demonstrate methods of measuring the topological similarity between two proteins in the entire network and their correlation with gene expression profiles.

In order to measure the topological similarity between two proteins in an interaction network, we propose two scoring methods, one is called first neighbor comparison and the other is topological similarity score. The first neighbor comparison method is to compare the interacting profile of two proteins with any other third protein and calculate their correlation coefficients based on Pearson, Spearman, and Kendall methods. The topological similarity score is calculated based on a measure of similarity between graph vertices in graph theory. These methods are able to provide us with a numerical value to each pair of proteins in the network, whether interactive or not, assigning statistical evaluation weights to them. In order to find the correlation between protein interaction network and gene expression profiles, we have collected a large amount of publicly accessible gene expression microarray data and calculated the correlation coefficients of expression profiles between all pairs of genes based on Pearson, Spearman, and Kendall methods. The correlation coefficients of gene expression profiles are regarded as a measure of the expression similarity between a pair of genes. With the matrices representing the topological similarity of protein interaction and the gene expression similarity between each pair of genes and their corresponding proteins, both matrix algebra and statistical methods are combined to obtain the correlation coefficient between gene expression profiles and protein-protein interactions within the proteomes of *E. coli*, yeast, mouse, human, and *Helicobacter pylori*.

Results reveal a strong positive relationship between the topological similarity scores of protein interaction networks and the correlation coefficients of gene expression profiles. This indicates that the topological similarity can represent the functional association between proteins. And there are some important applications of this novel approach when used in function annotation and clustering.

T13 - Technical Session 13: Bioinformatics (III)

Fusion for Semi-automatic Indexing of Scientific Articles

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BIOGRAPHY



D. Frank Hsu is the Clavius Distinguished Professor of Science and a professor of computer and information science at Fordham University in New York. He received his PhD from the University of Michigan (1979). He has served as visitor and on visiting faculty at Boston University, JAIST (Kanazawa, Japan) (as Komatsu endowed chair professor), Keio University (Tokyo, Japan) (as IBM endowed chair professor), MIT, Taiwan University, Tsing Hua University (Hsin-Chu, Taiwan), and University of Paris-Sud (and CNRS). Dr. Hsu's research interests are in combinatorics, algorithms and optimization; network interconnection and communication; informatics and intelligent systems; and information and telecommunications technology and infrastructure. He is interested in both microinformatics and macroinformatics with applications to a variety of domains such as information retrieval, target recognition and tracking, biomedical informatics, and virtual screening. Dr. Hsu has served on editorial boards of several journals including *IEEE Transactions on Computers, Networks, Inter. J. of Foundation of Computer Science, Monograph on Combinatorial Optimization*, and *Journal of Interconnection Networks (JOIN)*. He is currently editor-in-chief of *JOIN*. Dr. Hsu has served on program committees of several conferences including I-SPAN, DIMACS workshop series, AINA conferences, and IETC series. He is a senior member of IEEE, a foundation fellow of the Institute of Combinatorics and Applications, and a fellow of the New York Academy of Sciences. Dr. Hsu can be contacted by e-mail at hsu@cis.fordham.edu.

T14 - Technical Session 14: C4I (III)

The Response to IT Complexity: Autonomic Computing

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ABSTRACT

The concept of autonomic computing was introduced in 2001, aimed at shifting the burden of managing systems from people to technologies. Based on an analogy to the human autonomic nervous system, autonomic computing suggests that systems can be much better at managing themselves. Through defined open standards and evolving autonomic technologies, IT resources can work together and manage themselves for more effective and efficient delivery of IT services. Collaboration in the industry and in academia has made self-managing autonomic technologies and self-management capabilities a reality. This presentation will not only cover the concepts of autonomic computing but give some real examples of autonomic computing as a way to combat IT complexity.

BIOGRAPHY



Ric Telford's professional business career highlights 23 years of software development experience and is noted for bringing innovative approaches to the design and development of key software technologies. Ric's IBM career started in Dallas, where, prior to the acquisition of Lotus, Telford led much of the office systems development for IBM, including distributed calendaring and groupware products. During his tenure at IBM, Telford has played a number of key roles in various software initiatives for IBM, including the imaging products unit, networking and security software, and software mobility products.

Ric tends to be at the forefront of emerging technologies at IBM. He served as Director of Technology for the IBM CIO, responsible for the development, implementation and adoption of technologies that hastened the transformation of IBM into an e-business. Ric was the Director of Technology for Intelligent Infrastructure, the precursor in IBM to "e-business on demand". Ric was responsible for defining and delivering software solutions for the service provider market, also known as "xSPs." Ric worked across the IBM software group to both leverage

IBM's e-business infrastructure software for service provider needs, as well as to develop solutions which address the unique requirements of the service provider.

In his current assignment as VP of Architecture and Development, Autonomic Computing, Ric is responsible for defining and delivering the architecture, technology and standards for "Autonomic Computing." Autonomic Computing is the set of capabilities required to make a computing system more self-managing, much like the human autonomic system. Ric works across the IBM Corporation, including servers, software and storage, to develop an end-to-end, open architecture solution for self-managing systems, as well as across the industry and the academic community.

Ric holds a Bachelor of Science degree in Computer Science from Trinity University in San Antonio, Texas, graduating magna cum laude and Phi Beta Kappa. Ric resides in Morrisville, NC and has two sons. Ric enjoys mountain biking, swimming and golf.

T14 - Technical Session 14: C4I (III)

Software as a Service: A Best Practices Perspective

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ABSTRACT

Software as a Service is an emerging business model based on the service-computing paradigm. This model promises to lower the total cost of software ownership by removing the burden of setup and support of an IT infrastructure from the users and providing the access and utilization of the software application as a 24x7 service to them. Service providers offer this value proposition based on the principle of economies of scale. The success of their business therefore relies largely on the capability to effectively execute economies of scale.

There are many components that can affect this execution. These components encompass such system aspects as network infrastructure, hardware configuration, software architecture, and people aspects such as account management and customer support. All these components, however, do possess common factors for evaluation and optimization. The key factors include availability, scalability, and responsiveness. In this talk, we'll discuss challenges associated with the implementation and optimization of these key factors, and share some of the best practices principles based on our experience as an early adaptor of the Software as a Service business model, who has successfully taken a startup company public.

BIOGRAPHY



Dr. Jeane Chen is currently Executive VP of Engineering at Kintera, Inc, a leading Software-as-a-Service provider. A member of Kintera's founding team, she has been responsible for building the technology organization and a comprehensive web-based software suite, which led to the company's successful IPO in Dec. 2003.

Prior to joining Kintera in 2000, Dr. Chen was with IBM since 1982, where she held various technology and management positions in the areas of research, technical marketing, and software development. She last held the position of Program Director of Interactive Media in the IBM Software Group and where she was responsible for software development for the Internet and for digital television applications. Dr, Chen was stationed in Beijing, China from 1995 to 1997, where she first served as the Program Manager for IBM's Broadband Networking initiative, and then served as the Assistant Director for the then newly established IBM China Research Lab.

Dr. Chen has published 30 technical articles and has over 30 issued and pending patents. She received her Ph.D. in Electrical Engineering from Columbia University.

T14 - Technical Session 14: C4I (III)

Next Generation Web Search Technologies

Dr. Hsiao-Wuen Hon

General Manager
Microsoft Research Asia
Email: hon@microsoft.com

ABSTRACT

Today search engines have become one of the most critical applications on the Web, driving many important online businesses that connect people to information. As the Web continues to grow its size with a variety of new data and penetrate into every aspect of our life, the need for developing a more intelligent search engine is increasing. Current Web search engines can be considered page-level general search engines with the main function of ranking web pages according to the relevance of given queries. However, we see an opportunity of further improving Web search by developing structured search for important vertical domain on the Web. With our developed techniques for structured data extraction and information aggregation and integration, we can provide more precise and intelligent search results by data-mining the associations and relations within data. In this talk, I will introduce recent research progress at Microsoft and show how we are applying the developed technologies to build more advanced vertical structured search engines for such areas as shopping, academic search, and multimedia.

BIOGRAPHY



Dr. Hsiao-Wuen Hon is the General Manager of MSR Asia. He oversees the lab's research work in speech, natural language processing, Web search and data mining areas. Before joining MSR Asia, he was the Architect in Speech.Net at Microsoft Corporation, overseeing all architectural and technical aspects of the award winning Microsoft® Speech Server product, Dr. Hon is also responsible for managing and delivering statistical learning technologies for Natural Interactive Service Division (NISD). Dr. Hon joined Microsoft Research in Redmond as a senior researcher at 1995 and has been a key contributor of Microsoft's SAPI and speech engine technologies. Before joining Microsoft, Dr. Hon worked at Apple Computer, Inc., where he was a principal researcher and technology supervisor at Apple-ISS research center.

Dr. Hon received the B.S. in Electrical Engineering from National Taiwan University; and M.S. & PhD degrees in Computer Science from Carnegie Mellon University. Dr. Hon is the co-inventor of CMU SPHINX system on which many commercial speech recognition systems are based on, including Microsoft and Apple. Dr. Hon is an international recognized speech technologist and has published more than 90 technical papers in various international journals and conferences. He is currently an Associated Editor for IEEE Transaction of Speech and Audio Processing. Dr. Hon holds 25 US patents and currently has 10 pending patent applications.

T15 - Technical Session 15: MEMS (I)

Vibrating RF MEMS in Electronic Systems

Dr. Wan-Thai Hsu

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ABSTRACT

Over the past several years, researchers have been using Microelectromechanical Systems (MEMS) technologies to develop miniaturized, integratable, high quality factor (Q) frequency selection devices to replace those currently large, off-chip, and CMOS incompatible components in wireless communication systems or consumer electronic systems. This paper starts with the reviews on vibrating RF MEMS with the focus on various resonator designs for oscillator and filter applications. Then current commercialization of silicon resonator oscillators is presented from performance and reliability point of view. From all the aspects, the MEMS oscillators no doubt show promising future in multiple large volume applications due to their advantages of small size, easy integration with circuits, good reliability, and low manufacturing cost. Moreover, in order to permeate vibrating MEMS into more electronic systems, future research directions are provided in the last section.

BIOGRAPHY



Dr. Wan-Thai Hsu received his Ph.D. from University of Michigan. He is one of the pioneer researchers and inventors in the area of RF MEMS. Part of his doctoral work led to the birth of Discera Inc. in 2001. At Discera, he has built a strong technical team focusing on making RF MEMS from research lab to commercial products. The efforts include robust resonator design, manufacturing process development, technology transfer to foundries, unique products development for MEMS resonators, and IP development. He published 20+ technical papers and spoke in several international conferences. He is now leading Discera's R&D team on resonator and packaging development and also serves as a PI for multiple government supported research programs on MEMS filters, system integration and MEMS reliability. Dr.

Hsu is a member of IEEE. He received inventor recognitions from University of Michigan in 2001 and 2003.

T15 - Technical Session 15: MEMS (I)

Core Technologies for III-Nitride Integrated Microsensors

Professor Kevin Jing Chen

(香港科技大學 陳敬 教授)

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ABSTRACT

The development of core technologies for III-nitride integrated microsensors will be reported. A novel GaN-on-patterned-silicon (GPS) technique has been developed for the fabrication of GaN-based MEMS structures. An active device (HEMT) is fabricated on the AlGaN/GaN cantilevers and tested, the experiment shows that the HEMT on cantilevers can effectively sense the change in the stress induced by deflections applied to the cantilevers. We have also developed the monolithic integration of E/D-mode HEMTs, which can provide seamless incorporation of data acquisition and wireless transmission circuitry. The III-nitride digital ICs are proved to function properly at 415 °C.

BIOGRAPHY



Prof. Chen received a B.S. degree in Department of Electronics, Peking University in 1988 and obtained the PhD degree in Physics from University of Maryland, College Park, USA in 1993. From Jan. 1994 to Dec. 1995, he was a research fellow in NTT LSI laboratories, Atsugi, Japan, engaging in the research and development of functional quantum effect devices and heterojunction FET's (HFET's). From 1996 to 1998, he was an assistant professor in the Department of Electronic Engineering, City University of Hong Kong, carrying out research on high-speed device and circuit simulations. Dr. Chen then joined the wireless semiconductor division of Agilent Technologies, Inc. (formerly Hewlett-Packard Co.), Santa Clara, California, USA, in 1999 working on enhancement-mode PHEMT RF power amplifiers used in dual-band GSM/DCS wireless handsets. In November 2000, he joined the Department of Electronic and Computer Engineering, Hong Kong University of Science and Technology, where he currently is an associate professor. He has authored or co-authored over 130 publications in international journals and conference proceedings. At HKUST, his group has been carrying out research on III-nitride integrated circuit technologies, silicon-based RF/microwave passive components, III-

nitride and silicon-based MEMS (micro-electromechanical systems), RF packing technology and microwave filter design.

T15 - Technical Session 15: MEMS (I)

"In-situ Stiction Characterization of a MEMS"

T. Dallas, R. Ranganathan, G. Sivakumar, and R. Gale

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Lubbock, TX USA

ABSTRACT

The micro and nano world can be dominated by forces that are usually insignificant at the macroscale. Stiction, the usually unwanted adhesion between contacting surfaces, can be a limiting factor in the performance and lifetime of Micro/Nano ElectroMechanical Systems (MEMS/NEMS). When actuation forces are unable to overcome these interfacial forces, the device fails. Complex and expensive packaging is typically required to allow long-term use.

We have developed an *in-situ* method for quantifying the stiction force in a MEMS as a function of environmental conditions, surface treatment, and actuation time. This is allowing us to identify the combination of critical parameters that lead to degradation of device performance and ultimately failure. Custom electronics, optical detection, and environmental control were constructed to quantify in-use stiction over many actuation cycles. The competition for surface binding sites between an anti-stiction coating and water is the primary determination of stiction force level. Thousands of actuators are evaluated simultaneously allowing statistically significant results to be reliably generated. AFM analysis is being used to correlate *in-situ* determined force values with nanoscale surface roughness (asperities) and surface energy.

BIOGRAPHY



Tim Dallas is an Associate Professor of Electrical and Computer Engineering at Texas Tech University. He conducts research in the Nano Tech Center, an interdisciplinary laboratory facility housed in the J. F Maddox Laboratory, which includes research in MEMS, nanotechnology, advanced CMOS materials, and optoelectronic devices. Dr. Dallas' research is focused on Microelectromechanical Systems (MEMS). He conducts research on packaging issues with an emphasis on stiction. Dr. Dallas is the principal contact with Sandia National Laboratory's MEMS design and fabrication division. Texas Tech University is a member of the University Alliance Program which provides access to MEMS design and visualization software

tools for the SUMMiT V polysilicon process sequence. Dr. Dallas is one of the principal developers of a three course sequence in Microelectromechanical Systems at TTU. Originally supported by a National Science Foundation CRCD grant, the courses are in their seventh year of being offered. Since 2000, Dr. Dallas has been on the governing board of the annual TEXMEMS conference and hosted the event in 2002. He served as co-chair for SEMATECH's technical working group in MEMS, part of Texas' State Strategy on Advanced Technologies.

As an undergraduate physics major at the University of Chicago, Dr. Dallas studied solar energy collection efficiency using of non-imaging parabolic concentrators. His doctoral studies in physics at Texas Tech University focused on structural and optical properties of disordered carbon materials using the optical spectroscopy techniques of Raman and photoluminescence. After graduate school, Dr. Dallas was employed as a Technology and Applications Engineer for ISI Lithography in Austin, TX, makers of semiconductor manufacturing tools. After a one-year stint there, he took a post-doctoral research position in Chemical Engineering at the University of Texas where he worked on developing photoresist materials and processes for lithography applications. He has been a professor at Texas Tech University since 1999.

T16 - Technical Session 16: Nanotechnology (IV)

Nanoimprint for Next Generation Nanoelectronics and More

Professor Yonhua Tzeng

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BIOGRAPHY



Personal Information

Yonhua Tzeng, Ph.D.
B.S. in Electrical Engineering, 1977, National Taiwan University
MS. & Ph.D. in Electrical Engineering, 1981 & 1983, Texas Tech University, Lubbock, Texas
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Positions

2005-present Acting Director
 Institute of Nanotechnology and Microsystems Engineering
 Director
 Center for Micro/Nano Science and Technology
 National Cheng Kung University
 Tainan, Taiwan, Republic of China
1983-present Alumni Professor/Professor/Associate Professor/Assistant Professor
 Alabama Microelectronics Science and Technology Center
 Department of Electrical and Computer Engineering
 Auburn University
 Auburn, Alabama 36849 USA

Society Activities

2005-present Fellow, IEEE
2005-present Vice President, Technical Activities, IEEE Nanotechnology Council

- 2004-present Chair, Technical Committee on Nanotechnology, IEEE Industrial Electronics Society.
- 1991-present Executive Committee Member, Applied Diamond Conference/ Nanocarbon Conference (New name of the conference “New Diamond and Nano Carbon” effective 2007)

T16 - Technical Session 16: Nanotechnology (IV)

Magnetic Nanoparticles and Nanocomposite Magnets

Professor J. Ping Liu

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BIOGRAPHY



Education

PhD in Applied Physics, April 1994
University of Amsterdam, the Netherlands

Master of Science, July 1987
Materials Science and Engineering
Central-South University, China

Bachelor of Science, July 1982
Materials Science and Engineering
Central-South University, China

Experience

Feb. 2004 - present, **Associate Professor**, Department of Physics, University of Texas at Arlington.

Oct. 2002 - Feb. 2004, **Assistant Professor**, Department of Physics, University of Texas at Arlington.

Oct. 1999 - Oct. 2002, **Assistant Professor**, Institute for Micromanufacturing, Louisiana Tech University and Department of Physics, Grambling State University; Working on nanostructured magnetic materials and magnetic MEMS.

*Oct. 1999 - present, **Adjunct Assistant Professor**, the Center for Materials Research and Analysis, University of Nebraska.*

*Jan. 1997 - Oct. 1999, **Research Assistant Professor**, at the Center for Materials Research and Analysis and the Department of Physics, University of Nebraska, U.S.A.. Experiments on magnetic thin films and nanocomposites.*

*July 1995 - Dec. 1996, **Postdoctoral Research Associate**, at the Center for Materials Research and Analysis, University of Nebraska, U.S.A.. Experiments on magnetic properties of sputtered thin films.*

*May 1994 - Jun. 1995, **Postdoctoral Researcher**, at the Van der Waals-Zeeman Laboratory, University of Amsterdam, the Netherlands. Experiments on magnetic properties of nanoscale particles and construction of the Opposed-Targets Sputtering system.*

*Jan. 1988 - Apr. 1990, **Research Assistant**, at the Institute of Metal Research, Academia Sinica, Shenyang, China. Experiments on synthesis of the magnetic rare-earth oxides.*

*July 1987 - Dec. 1987, **Teacher**, in Mechanical-Engineering Department of Xiangtan University, China.*

*Sep. 1982 - Sep. 1983, **Associate Engineer**, at Zhuzhou Cermet Plant, China, in charge of reduction and carbonation of WO₃ to WC powder, and the particle size control.*

*- Oct. 1978, **Manual Worker**, in agriculture, Yueyang, China.*

Research Interests

Nanostructured bulk magnetic materials have wide applications. However, conventional compaction and condensation techniques often lead to grain growth and therefore a destruction of the nanostructures. We are working to fabricate fully dense bulk magnets with controlled nanostructure and improved magnetic properties.

Ultra-thin magnetic films and their micro- and nano-processed magnets are systems of great contemporary interest because of their advanced applications in MEMS, spintronics and magnetic recording media. We are working to deposit ultra-thin hard magnetic thin films with desired morphology to achieve optimal magnetic hardening by a variety of processing techniques including rapid thermal processing.

Magnetic nanoparticles are important not only for fabricating nanostructured bulk and thin film materials but also for biological and medical applications. We are working to synthesize by chemical methods various hard and soft magnetic nanoparticles (including rare-earth compounds) and apply them in drug delivery. We also study the preparation and characterization of **magnetic nanorods and nanowires**.

T16 - Technical Session 16: Nanotechnology (IV)

Novel Photonic Crystal Structures for Active Nanophotonic Devices

Professor Weidong Zhou, Li Chen, Geetha Thiruvengadam, Hongjun Yang,
Zexuan Qiang

Department of Electrical Engineering,
The University of Texas at Arlington
Email: wzhou@uta.edu

BIOGRAPHY



Areas of Expertise

Optoelectronic materials and active photonic devices
Photonic crystals and nanophotonics

Background

Dr. Weidong Zhou joined the faculty of the University of Texas at Arlington in 2004. Prior to that he was a lead engineer at CIENA Corporation, working on active photonic components and subsystems for WDM telecommunication systems.

Dr. Zhou graduated from the University of Michigan, Ann Arbor in 2001, with a Ph.D. degree in Electrical Engineering. His research experience includes areas of semiconductor lasers, receiver and transceiver based OEICs, spans from design and fabrication to characterization. His thesis focus was on novel transmitter research involving microcavity, quantum dot, and photonic crystal devices, which led to over 35 peer reviewed journal publications, conference presentations and invited/plenary talks.

Dr. Zhou's major awards include *Outstanding Student of Beijing City* (Beijing, 1992), *Outstanding Graduates Award* (Tsinghua Univ., Gold medal, 1993); *Rackham Predoctoral Fellow* (Univ. of Michigan, 2000-2001); and *2nd IEEE/LEOS Graduate Student Fellowship award* (IEEE/LEOS, 2000).

Dr. Zhou's current research interest includes photonic crystal based semiconductor lasers and detectors, OEIC, nanophotonic and nanoelectronic based photonic IC.

Dr. Zhou is a member of IEEE, member of Tau Beta Pi.

T16 - Technical Session 16: Nanotechnology (IV)

Modeling of Gain Threshold Condition in Photonic Crystal Defect-Mode Lasers

Dr. Zexuan Qiang and Weidong Zhou

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BIOGRAPHY



Dr. Zexuan Qiang received his Ph.D. degree from the department of optical engineering in Zhejiang University in 2004. In the same year, he joined Institute of Optical Communication Engineering, Nanjing University. He is currently a postdoctoral scholar at the university of Texas at Arlington. His current research interests are in the area of photonic crystal and integrated optical circuits.

T17 - Technical Session 17: System-on-Chip (IV)

Session Chair

Chen Ding

Texas Instruments
Email: cding@ti.com

BIOGRAPHY



Chen Ding is currently a Member, Group Technical Staff in DLP™ Technology Development group of Texas Instruments where he works on video processor SoC projects. His work has focused on system bandwidth architecture and clock design. From 1995 to 2003, he worked as designer and design manager in Connectivity group of Texas Instruments Inc. He involved and leaded over 20 projects from concept to mass production. Prior to joining Texas Instruments Inc, He was a test engineer in Cirrus Logic. He graduated from University of North Carolina at Charlotte in 1994 with a Master's degree in Electrical Engineering. He obtained Bachelor of Science in Physics from Shanghai University of Science and Technology in 1990.

T17 - Technical Session 17: System-on-Chip (IV)

Physical Design and Manufacturability Closure Issues for Nanometer VLSI/SOC

Prof. David Z. Pan (潘志刚)

Department of Electrical and Computer Engineering
The University of Texas at Austin, TX 78712
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ABSTRACT

As VLSI technology continues to scale down to nanometer dimension, the semiconductor industry is greatly challenged not only by many entangled *deep submicron physical effects* (such as interconnect, noise and leakage) to reach *design closure*, but also by deep *sub-wavelength* bottlenecks to reach *manufacturing closure*. The resulting product yield has seen a drastic reduction roughly from 90% at 250nm technology to 50% at 90nm (based on IBS). The design-dependent yield loss significantly outweighs the random-defect one (e.g., by a factor of 5x for 90nm). To bridge the gap between design and manufacturing, it is crucial to be able to model and feed proper downstream physical effects and manufacturing metrics upstream, especially at the key physical design stages for the *holistic* design and manufacturing closure. In this talk, I will review several key challenges and present some recent results to address the physical design and manufacturing closure in nanometer designs.

BIOGRAPHY



Dr. David Z. Pan is an Assistant Professor at ECE Department of the University of Texas at Austin, where he leads the [VLSI Design Automation \(UTDA\) group](#). Prior to that, he was a Research Staff Member at IBM T. J. Watson Research Center from 2000 to 2003. He received his Ph.D. in Computer Science (with honor) from UCLA in 2000. His research is focused on physical CAD with nanometer effects such as manufacturability, performance, low power, and signal integrity. He is also interested in design/CAD for emerging technologies. He has published over 50 papers and has 6 U.S. patents issued/pending. He is an Associate Editor for *IEEE Transactions on CAD* and *IEEE Transactions on CAS-II*. He has served in the program committees of major conferences in VLSI/EDA including ICCAD, ASPDAC, DATE, ISPD, ISQED, and ISCAS. He is the Program Committee Chair for ISPD 2007 and the CAD track Co-Chair for ISCAS 2006/2007. He is on the DFM committee of the *International Technology Roadmap for Semiconductor (ITRS)*. He is on the Technical Advisory Board of Pyxis Technology, Inc. He has received many awards for his research contributions, including SRC Inventor Recognition

Award (2000), IBM Faculty Award (2004-2006), ACM/SIGDA Outstanding New Faculty Award (2005), and Best Paper Award nominations at ASPDAC'06 and DAC'06.

T17 - Technical Session 17: System-on-Chip (IV)

A CMOS Direct Conversion Receiver RF Front-End for TD-SCDMA Application

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ABSTRACT

A CMOS direct conversion receiver (DCR) RF front-end for TD-SCDMA Application is presented, it includes a low-noise amplifier (LNA), a direct conversion mixer and a phase adjustable local oscillator (LO) buffer. The LNA uses inductive source degeneration architecture, and its noise figure is optimized with parasitic effects of bonding wire and electronic static discharge taken into account. The direct conversion mixer proposed in this paper has achieved some key specification improvements by making modifications to traditional Gilbert mixer, such as flicker noise corner frequency and IIP₂. The LO buffer uses a variable gain-delay cell, it enhances image rejection ratio (IRR) of DCR by adjusting the phase of LO signal. The direct conversion receiver RF front-end is integrated in a 1.8V 0.18 μ m RF CMOS process, and simulation results show that it has 30dB voltage gain, 2.6dB NF, -10dBm IIP₃ and -24dBm input -1dB compression point. The LO buffer has a 0~ \pm 4 $^\circ$ phase tuning range with tuning step varying within 0.8 $^\circ$ ~1.6 $^\circ$.

BIOGRAPHY



Chinese name: 罗可欣

Kexin Luo received his B.S. in Electronic Engineering from Beijing Institute of Technology in 2002, and became a candidate for M.S. in Electronic Engineering from Tsinghua University since 2002. Kexin Luo's current research interests include mixer, LNA, modulator and transceiver architecture.

BIOGRAPHY



Chinese name: 罗嵘

Rong Luo received her double B.S. in Engineering Physical and Electronic Engineering from Tsinghua University in 1992 and her Ph.D. from Tsinghua University in 1997. Currently, she is an associate Professor in the Department of Electronic Engineering, Tsinghua University, Beijing. Now, her research work is mainly on SoC Design Technology, VLSI Design and Embedded System Design Technology.

T17 - Technical Session 17: System-on-Chip (IV)

Parallel Correction and Adaptation Engines for I/Q Mismatch Compensation

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ABSTRACT

We present a low-area implementation of I/Q mismatch compensation (IQMC) circuit that comprises a correction engine and a parallel adaptation engine. The correction engine performs I/Q mismatch compensation in the data path using a filter whose coefficients are updated after a programmable amount of time by a parallel adaptation engine that performs sample-by-sample off-line adaptation. This scheme allows very fast online adaptation while protecting the receiver data path from the degradations caused by a fast converging algorithm. The proposed scheme has been successfully implemented in 90-nm digital CMOS process for a low-IF quadband GSM transceiver SoC. A single multiplier is used to perform complex multiplications for both correction and adaptation engines, resulting in a 0.025 mm² circuit. Image Rejection Ratio in excess of 50 dB is reported that is sufficient for IF frequencies as high as 200 kHz for GSM application.

BIOGRAPHY



Imtinan Elahi received B.Sc. (Hons.) degree from the University of Engineering and Technology, Lahore, Pakistan, in 1990, M.S.E. degree from the University of Michigan, Ann Arbor, MI, in 1992, and Ph.D. degree from the University of Texas at Dallas in 2005, all in Electrical Engineering.

From 1990 to 1991 and from 1992 to 2000, he worked in R&D organizations in Pakistan on design and development of various electronic sub-systems for telecommunication and industrial applications. From 2000 to 2002, he worked with Avaz Networks, Irvine, CA, where he developed various signal processing algorithms for Voice over Packet applications. He also worked on the development of in-house EDA tools for communication systems. Since September 2002, he is with Wireless Terminal Business Unit (WTBU) of Texas Instruments Inc. where he is a member of the Digital Radio Processor System Design Group. His responsibilities

include receiver modeling and validation and development of digital techniques for compensating RF/analog impairments in the receiver data path.

T18 - Technical Session 18: C4I (IV)

Towards the Semantic Web: Collaborative Tag Suggestions

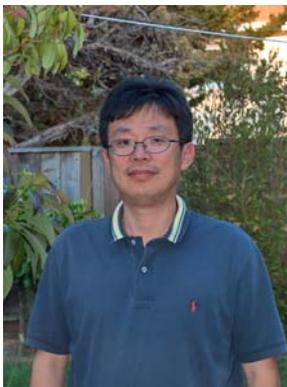
Dr. Zhichen Xu

Principal Engineer and Technical Lead of Social Search Advanced Development
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ABSTRACT

Content organization over the Internet went through several interesting phases of evolution: from structured directories to unstructured Web search engines and more recently, to tagging as a way for aggregating information, a step towards the semantic web vision. Tagging allows ranking and data organization to directly utilize inputs from end users, enabling machine processing of Web content. Since tags are created by individual users in a free form, one important problem facing tagging is to identify most appropriate tags, while eliminating noise and spam. For this purpose, we define a set of general criteria for a good tagging system. These criteria include high coverage of multiple facets to ensure good recall, least effort to reduce the cost involved in browsing, and high popularity to ensure tag quality. We propose a collaborative tag suggestion algorithm using these criteria to spot high-quality tags. The proposed algorithm employs a goodness measure for tags derived from collective user authorities to combat spam. The goodness measure is iteratively adjusted by a reward-penalty algorithm, which also incorporates other sources of tags, e.g., content-based auto-generated tags. Our experiments based on My Web 2.0 show that the algorithm is effective.

BIOGRAPHY



Zhichen is a principal member of technical staff at Yahoo! Search. He is currently the technical lead of advanced development in social search. He is one of the main contributors to Yahoo's social search product My Web 2.0. Before joining Yahoo!, he was a researcher at Hewlett-Packard Laboratories. He has initiated a number of projects include a semantic-aware file store; distributed search on a P2P architecture; and overlay for scalable Internet Services. His is among the first to look into P2P information retrieval.

Zhichen holds a Ph.D. degree in Computer Sciences from UW-Madison. He has co-authored over 30 papers in the areas of social tagging, computer networks, distributed systems,

programming languages, program safety, peer-to-peer (P2P) computing, information retrieval. Some appear in top conferences such as PLDI, SIGCOMM, SIGIR, HotOS, HotNets. He has over 40 patent applications pending. Zhichen is a program co-chair of AEPP'05. He has served in program committees of ICDCS'[03,04,05,06], ISADS'05, IPTPS'04, INFOSCALE'06, ICPP'04, and NSF ITR panelist.

T18 - Technical Session 18: C4I (IV)

Mining and Searching Opinions in User-Generated Content on the Web

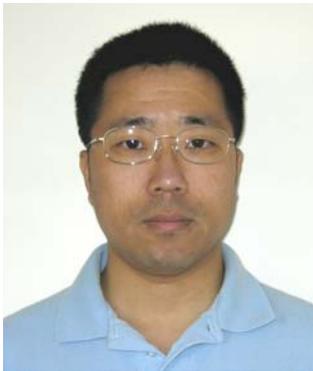
Professor Bing Liu

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ABSTRACT

The Web has dramatically changed the way that people express their opinions. They can now post reviews of products at merchant sites and express their views on almost anything in Internet forums, discussion groups, and blogs, which are collectively called the user-generated content. This online word-of-mouth behavior represents a major source of information, which is useful to both individuals and organizations. For example, when one wants to purchase a product, one always wants to know the opinions of those who have used the product. Similarly, an organization is interested in knowing consumer opinions about its products and services. In this talk, I will discuss some recent research on opinion mining, i.e., discovering what people liked and disliked about a product or service, including comparisons made with other competing products and services. I will also discuss the application of such information in search.

BIOGRAPHY



Bing Liu is an associate professor of Computer Science at the University of Illinois at Chicago (UIC). He received his PhD degree in Artificial Intelligence from the University of Edinburgh. Before joining UIC in 2002, he was with National University of Singapore. His research interests include data mining, Web mining and search, and text mining. He has published extensively in these areas. His recent works are mainly in the areas of Web data extraction and opinion mining. His recent professional activities include serving as a program chair of ACM CIKM-2006 conference, and also as a program chair of SDM-2007 (SIAM Data Mining conference). He has served or serves on numerous conference program committees related to data mining, Web mining, and natural language processing, and is (was) on the editorial boards of several journals, including IEEE TKDE. Apart from research, Liu also has extensive application experiences. Recently, his group built a unique data mining system for Motorola Inc., which has been deployed and is in daily use there for finding interesting and actionable knowledge from Motorola's engineering and service data sets. More information about him can be found at <http://www.cs.uic.edu/~liub>.

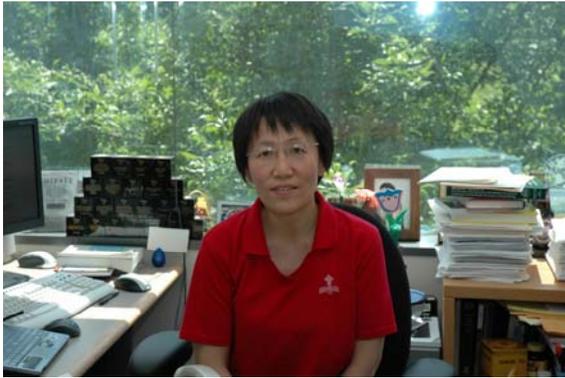
T18 - Technical Session 18: C4I (IV)

Web Advertising and Mining

Ying Li

General Manager of Research and Mining, Microsoft adCenter
Email: yingli@microsoft.com

BIOGRAPHY



Ying Li is General Manager of Applied Research and Data Mining at Microsoft adCenter. For more than eight years at Microsoft, Dr. Li has been leading two missions: providing data mining services to MSN businesses worldwide, and providing algorithmic engines and solutions to the Microsoft digital advertising business. In partnership with Microsoft Research groups, her team creates intelligent engines utilizing large user bases, rich business intelligence assets, and advanced data and text mining technologies. These intelligent engines have been transferred into Microsoft advertising products that have greatly improved end user online experience and increased return on investment for advertisers.

Prior to Microsoft, Ying Li was a technical director at Computer Research Institute of Montreal, Canada, leading large research projects in the areas of knowledge modeling and management, image data base, map and document understanding, and real time natural scene object recognition systems. Ying Li holds B.S. and M.S. degrees in Mathematics from Peking University, Beijing China, and a Ph.D. degree in Computer Science from University of British Columbia, Canada.

T19 - Technical Session 19: MEMS (II)

MICROFLUIDIC SIGNAL PROCESSING FOR BIOMEDICAL APPLICATIONS

Prof. C. H. Mastrangelo

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Electrical Engineering and Computer Science Department
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ABSTRACT

Fueled by powerful recent developments in genomics and proteomics, the utilization of molecular biology assays for fundamental medical research, drug discovery and clinical diagnostics has dramatically increased in the past decade. At the macroscopic level, these assays require a combination of unit steps such as sample transport, mixing with reagents, thermal cycling, separation and detection implemented in a conventional laboratory setting. Scaling of these assays to micro- and nano-scale “lab-on-a-chip” fluidic systems offers many benefits. Orders of magnitude reduction in reagent consumption, substantial increases in assay speed, and implementation of inexpensive disposable devices are all potentially achievable.

The practical realization of these micro- and nano-scale systems poses broad, interdisciplinary technological challenges requiring non-conventional solutions. All of these challenges involve schemes for the efficient processing of microfluidic signals and the realization of microfluidic signal processing circuits. In this talk I will discuss the implementation of a basic microfluidic circuit block, the microfluidic digital-to-analog converter which generates digitized analyte concentration signals for on-chip processing.

BIOGRAPHY



Carlos H. Mastrangelo (S'84-M'90) was born in Buenos Aires, Argentina in 1960. He received the B.S., M.S., and Ph.D. degrees in electrical engineering and computer science from the University of California, Berkeley, in 1985, 1988, and 1991, respectively. His graduate work concentrated on the applications of microbridges in microsensor technology. From 1991 through 1992, he was at the Scientific Research Laboratory, Ford Motor Company, Dearborn MI, developing microsensors for automotive applications. From 1993-2002, he was an Associate

Professor of Electrical Engineering and Computer Science at the Center for Integrated Microsystems, University of Michigan, Ann Arbor. From 2000-2005 he was Vice President of Engineering at Corning-Intellisense, Wilmington MA and a Director at the Biochemical Technologies research group, Corning NY. He is now an Associate Professor of Electrical Engineering and Computer Science at Case Western Reserve University, Cleveland OH. His research focuses on microelectromechanical system applications and technology, microfluidic systems, and integration, design, and modeling of MEMS fabrication processes. Dr. Mastrangelo's group is credited for being the first group to detect DNA separations on a microfluidic chip integrated with an on-chip detector. He is also widely credited for developing the first model for stiction phenomena in MEMS.

Dr. Mastrangelo received the 1991 Counsel of Graduate Schools/University Microfilms Distinguished Dissertation Award for the best technical dissertation in the United States and Canada. He also received a 1994 NSF Young Investigator Award. In 2000 his group received the best paper of the year award at the Transactions of Semiconductor Manufacturing for work on synthesis of microfabrication process flows for MEMS structures. He is now on the editorial boards of Sensors and Actuators and the IEEE/ASME *Journal of Microelectromechanical Systems*, and he has participated in technical and organizing committees of numerous SPIE and IEEE conferences in the MEMS area.

T19 - Technical Session 19: MEMS (II)

Electrically Actuated Microfluidics for Micro-Optical Imaging

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ABSTRACT

Miniaturized optical imaging systems for applications of mobile phone camera, biometrical identification, automobile surveillance, etc. require (tunable) focus lens, lens set, microlens array (MLA) and optical sensors. In this paper, we demonstrated a new type of liquid lens as tunable focus lens and a new type of MLA based on microball lenses. Both micro-optical devices are electrically actuated in microfluidics. A dielectric liquid lens, not driven by electrowetting, was demonstrated and its focal length was tuned by electric forces. The tuning range of the focal length varied from 1.6mm to 2.6mm and the maximum tuning ratio was about 60% in the range of 0-200V at 1 kHz. The power consumption was about 0.1mW and its response time was measured to be about 150ms. The liquid lens could potentially replace mechanically tuning focus lens. The new MLA was fabricated using self-assembly of microball lenses. The microballs were manipulated by dielectrophoretic forces in water and each microball was trapped into energy wells that were induced by microstructures. The demonstrated MLA had 40 × 40 microball lenses (i.e. 1.8mm×1.8mm) and its transmission was about 90%. Each microball lens had a high numerical aperture of 0.78 and its F-number was 0.34, indicating the high capability of light gathering. The MLA could be applied to enhance light collection of CCD sensors, promising a high S/N for images.

BIOGRAPHY



J. Andrew Yeh is an associate professor at the institute of Micro-Electro-Mechanical Systems at National Tsing Hua University in Taiwan where his interests are optical microsystems, nanophotonics and sensors. He is currently a member of the steering committee in the IEEE/LEOS Optical MEMS conference. In early 2000, he co-founded an optical MEMS company, AIP Networks, Inc. In 1999, he was a post-doctoral associate at Cornell University, NY, USA. He received a B.S. degree in mechanical engineering from National Taiwan

University, Taiwan in 1992, and Master degrees in mechanical engineering and in electrical engineering from Cornell University in 1996 and 1997, respectively. He received a Ph.D. degree in electrical engineering from Cornell University in 1999.

T19 - Technical Session 19: MEMS (II)

Microsystem Technology for Fully Implantable Cochlear Prosthesis

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ABSTRACT

The current trend in cochlear prosthesis technology is system miniaturization and steady progress towards a fully implantable prosthetic system. To achieve this objective the external microphone of present implants needs to be implantable. A miniature accelerometer placed on the ossicular chain in the middle ear can accomplish the objective by detecting and converting bone vibrations in response to incident sounds into an electrical signal for further processing and stimulating cochlear implant electrodes. This presentation describes the optical characterization of human temporal bones for optimum sensor placement and reports the results of attaching a MEMS accelerometer on the umbo for sound detection. The vibration acceleration frequency response in the direction perpendicular to the tympanic membrane increases with a slope of 40 dB per decade below 1 kHz and with a slope of about 20 dB per decade from 1 kHz to 4 kHz. Above 4 kHz the acceleration signal remains relatively flat. Throughout the measurement frequency range the vibration acceleration exhibits a linear function of the input sound pressure level (SPL) with a slope of 20 dB per decade. The accelerometer employed for the initial testing is able to detect pure tone inputs with a minimum detectable signal of approximately 80 dB SPL at 500 Hz and 55 dB SPL at 2.4 kHz, which is the sensor bandwidth. The development of an improved MEMS accelerometer with reduced package mass and improved performance, achieving a sensitivity of $50 \mu\text{g}/\sqrt{\text{Hz}}$ and bandwidth of 10 kHz, required for normal conversation detection will also be discussed.

BIOGRAPHY



Dr. Darrin Young received his BS with honors, MS, and PhD degrees from the Department of Electrical Engineering and Computer Sciences at University of California at Berkeley in 1991, 1993, and 1999, respectively. He pioneered the research work in MEMS-based, high-Q,

tunable capacitors and on-chip 3-D coil inductors in low-phase noise RF voltage-controlled oscillator (VCO) design for wireless communications applications. His doctoral thesis work demonstrated the first RF-CMOS VCO employing on-chip high-Q passive devices achieving the stringent GSM phase noise requirements. Between 1991 and 1993, he worked at Hewlett-Packard Laboratories in Palo Alto, California, where he designed a shared memory system for a DSP-based multiprocessor architecture. During the summer of 1997, he worked at Rockwell Semiconductor Systems in Newport Beach, California, where he designed silicon bipolar RF analog circuits for cellular telephony applications. Between 1997 and 1998, he was also at Lawrence Livermore National Laboratory, working on the design and fabrication of three-dimensional RF MEMS coil inductors for wireless communications. Dr. Young joined the Department of Electrical Engineering and Computer Science at Case Western Reserve University in 1999, where he is currently an Associate Professor. His research interests include MEMS and nano-electro-mechanical device design, fabrication, and integrated circuit design for biomedical implants, wireless sensing, powering, communications, and general industrial applications. He has published many technical papers in journals and conferences. His research has been supported by U.S. Army Research Office, NSF, NIH, NASA, and U.S. Department of Veterans Affairs.

Day 3

K5 - Keynote Session 5: Venture Capital

What a Technologist Should Know About VC

Mr. Wu-Fu Chen

Co-founder
Acorn Campus, Genesis Campus, iD SoftCapital

BIOGRAPHY



Wu-Fu Chen, managing member and co-founder, is a renowned networking and serial entrepreneur who has since 1989 invested successfully in communications companies. Mr. Chen founded more than a dozen high tech companies including Cascade Communications where he was the founder and vice president of engineering. In 1994 he steered Cascade through its IPO, being instrumental in the company's acquiring over \$10 billion in capitalization. Most recently, he was a vice president at Cisco Systems (NASDAQ:CSCO) where he led their integrated voice, data, and video access product development. Mr. Chen has served as chairman and CEO of leading edge start-ups such as Ardent Communications (acquired by Cisco Systems) and Arris Networks (acquired by Ascend Communications) (NASDAQ:ASND). He has been featured on the front page of the *Wall Street Journal* and chosen one of the top ten entrepreneurs of 2000 by *Red Herring*. *Light Reading* once called Wu-Fu Chen the "most influential person" in optical networking. Mr. Chen received an MSEE from the University of Florida in 1976 and a BSEE from National Taiwan University in 1972. From 1976 to 1977 he was in the doctoral program in computer science at UC Berkeley. Mr. Chen is actively involved in the development of portfolio companies and plays an important role in attracting deals as well as top talent to Acorn Campus and its portfolio companies.

K5 – Keynote Session 5: Venture Capital

Venture Capital and the Growth of China’s New Techpreneurs Economy

Howard Chen, Esq.

Preston, Gates and Ellis, LLP
Email: hchen@prestongates.com

BIOGRAPHY



Howard Chen has an electrical engineering degree, and, before dedicating himself to the law, had a career in the semiconductor industry, working for several industry leaders, including AMD and Motorola. Howard has gained a reputation as a practical attorney who understands the culture and business-objectives of technology companies. He has developed a practice focused on representing Asian technology leaders, servicing their legal needs in the United States. He represents blue-chip technology clients as well as small, aggressive technology startups. His current clients include Asian companies in the vanguard of the technology industry, including several multibillion-dollar companies in the semiconductor, display and telecommunications sectors.

Howard advises his clients on IP strategies, procurement, licensing negotiation and IP litigation arising from patent, trade secret, copyright, trademark, unfair competition and licensing disputes. He also routinely advises clients on the international aspects of the technology business, including securing IP protections worldwide and establishing joint ventures with overseas partners.

Howard is the chair of the Asia industry group at Preston Gates and frequently visits Asia. Moreover, he is well recognized in several overseas markets as a leading international attorney for the technology industry. He is frequently invited to speak on numerous topics in Asia, especially at high-tech events. Most recently, for example, he was invited to be the VIP guest speaker at the China High Tech Fair in ShenZhen. He was also recently invited by the China State Intellectual Property Office to be the key lecturer and the only U.S.-based IP practitioner for the first national intellectual property training seminar in HangZhou.

Before bringing his practice to the San Francisco office of Preston Gates, Howard practiced in Dallas, TX, where he was actively involved in the local technology community. He is a cofounder of MetroChips and the Technology Alliance of Dallas. Howard also continues to

devote a significant portion of his time to community service. He recently helped Nobel Laureate Dr. Alan MacDiarmid initiate the MacDiarmid Institute for Global Research Excellence, an international nonprofit organization dedicated to promoting research excellence and the international collaboration of scientists.

K5 – Keynote Session 5: Venture Capital

Global Business-Academic Platforms to Translate Research Discovery into Medical Products

Professor Ziwei Huang

Founder and Chairman of Raylight Corporation, LA Jolla, CA
Director of Medical Medicinal Chemistry, Burnham Institute for Medical Research
Email: ziweihuang@burnham.org

BIOGRAPHY



Dr. Ziwei Huang received a Ph.D. in chemistry from the University of California at San Diego in 1993, working with Dr. Murray Goodman on biologically active peptides and peptide mimics. From 1993-1995, he undertook a two-year postdoctoral research at the University of California at San Francisco, working with Drs. Stanley Prusiner (1997 Nobel Laureate in Medicine) and Fred Cohen on structure of Prion protein and mechanism of α -Synuclein aggregation. In 1995, he became an Assistant Professor at the Kimmel Cancer Center of Jefferson Medical College in Philadelphia. In 2000, he joined the faculty at the University of Illinois at Urbana-Champaign as an Associate Professor with tenure, and in 2004 Dr. Huang was recruited by the Burnham Institute.

Research Summary

My research focuses on both understanding the chemical basis of molecular recognition in protein-protein and protein-ligand complexes and translating such basic knowledge into the discovery of new drugs. By integrating the tools of structure-based drug design, synthetic chemistry, biophysical and biochemical analysis, and molecular and cellular biology, my primary interest is to generate novel chemical modulators of protein biological function and use them as small molecular probes to explore the structure-function relationship and molecular mechanism of biological processes involved in immunology and cancer cell biology. The second goal of my research is to further develop these molecular probes into new therapeutic agents for the treatment of cancer. One example is our focus on Bcl-2. Bcl-2 family proteins are key regulators of apoptosis or programmed cell death which is implicated in many human diseases including cancer and neurodegenerative disorder. My lab has shown that synthetic cell permeable Bcl-2 binding peptides can induce apoptosis of tumor cells and suppress the growth of tumor in mice. In addition, my group discovered, using computer screening techniques, organic compounds that mimic the tumor-killing effect of Bcl-2 binding

peptides. These findings have demonstrated a novel approach of using chemical modulation of Bcl-2 function as an anti-cancer strategy. Our laboratory is planning further studies to advance these Bcl-2 inhibitors to human clinical trials as a new class of anti-cancer drugs.

K5 - Keynote Session 5: Venture Capital

How to Start a High Tech Company

Matthew S. Blanton

CEO
STARTech Early Ventures

BIOGRAPHY



Matthew Blanton has over 25 years of experience as a business executive in the computer and telecommunications industries. As chief executive officer of STARTech, he is responsible for managing the firm's overall corporate strategy. Prior to joining STARTech in 1997, Matt directed research and development as a lab manager for Hewlett Packard, and served as vice president of engineering at Convex Computer Corporation. He was also president of Vadis, Inc., a venture capital-backed telecommunications start-up company. Additionally, Matt has held various positions in product management, marketing and engineering at Siemens, IBM, Rolm, Data General and the NASA manned Spacecraft Center in Houston. Blanton holds a Master of Science degree in electrical engineering from Southern Methodist University and a Bachelor of Science degree in electrical engineering from Texas A&M University.