The Second Young Investigator Conference (EITC-YIC 2012)

"Leadership, Innovation, Growth"

Conference Proceedings

The Sheraton Palo Alto Hotel
Palo Alto, California, U.S.A.

Thursday - Friday, July 26th - 27th, 2012

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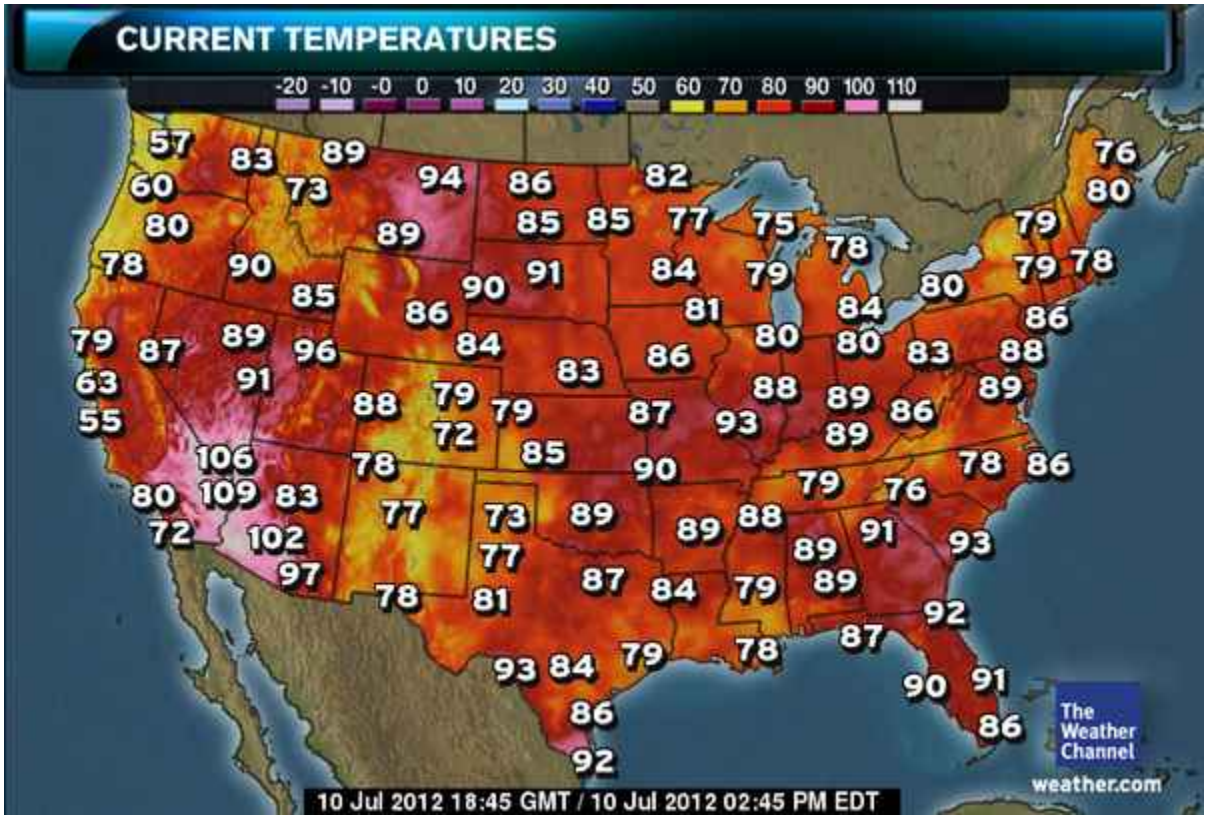
Welcome Message

Welcome to the second EITA Young Investigator Conference (YIC) in Palo Alto, California! The city of Palo Alto is in the heart of Silicon Valley (35 miles south of San Francisco) and is the home of Stanford University, Facebook, Google, Yahoo, Hewlett-Packard, and many other cutting-edge companies that are leaders in technology and innovation. This location perfectly illustrates the theme of EITA-YIC 2012: Leadership, Innovation, and Growth. The EITA YIC conference brings together both young and senior researchers in various emerging fields to foster productive communication, collaboration, and networking. The first day of the conference will be devoted to Emerging Science and Technology, which includes the evolving fields in engineering, medicine and green technology. The second day will be focused on New Media and Creative Industries, including digital media, service, technology, and cloud computing. The program will therefore be a fruitful integration of science, technology, and industry.

On behalf of the planning committee, I would like to thank the organizers and sponsors that have made this conference possible and welcome our visitors from all over the world. Enjoy the conference and the cool mid-summer weather in the San Francisco Bay Area!

Sincerely,

Ching-Pin Chang Conference Co-Chair Stanford University



Conference Themes

The EITC-YIC-2012 consists of following workshops:

Emerging Science & Technology:

- Workshop 1 (W1): Earth and Atmospheric Sciences, Aerospace and Ocean Engineering
- Workshop 2 (W2): Public Health, Biomedical Science and Engineering
- Workshop 3 (W3): New Materials Science and Engineering, Nanotechnology and New Green Energy

New Media & Creative Industries:

- Workshop 1 (W1): Cloud Computing, Cyber Security, and Data Center
- Workshop 2 (W2): New Media, Web, and Entertainment Technology

Planning Committee

Conference General Chair

Liang-Gee Chen	陳良基	National Taiwan University & National Applied Research Laboratories

Conference Chairs

Ching-Pin Chang	張景濱	Stanford University
Jia-Yu (Tim) Pan	潘家煜	Google Inc.

Conference Organizers

Wen-Chieh (Steve) Lin	林文杰	National Chiao Tung University
Ya-Yunn (Jodie) Su	蘇雅韻	National Taiwan University
Yu-Bin Chen	陳玉彬	National Cheng-Kung University
Yunung Nina Lin	林玉儂	California Institute of Technology
Howard Chen	陳　浩	IBM T.J. Watson Research Center
Chih-Chiang Wei	魏志強	Stanford University
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Michael Tsai	蔡明傑	Stanford University.
Yu-Hung Li	黎昱宏	Stanford University

Project Manager

Ya-Yunn (Jodie) Su	蘇雅韻	National Taiwan University

Program Steering Committee

C.-C. Jay Kuo	郭宗杰	University of Southern California
Tom I-P. Shih	石怡平	Purdue University
Fu-Kuo Chang	張福國	Stanford University

Program Committee

Workshop Track Co-Chairs

Day 1 (Thursday, 7/26/12): Emerging Science and Technology:

Workshop 1: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering:

Shu-Hua Chen	陳淑華	University of California, Davis
Wen-Wen Tung	董文文	Purdue University
Shau-Shiun (James) Jan	詹劭勳	National Cheng Kung University
Fang-Cheng Chan	詹方正	Illinois Institute of Technology

Workshop 2: Medicine, Public Health, Biomedical Science and Engineering:

Ching-Pin Chang	張景濱	Stanford University

Workshop 3: New Materials Science and Engineering, Nanotechnology and New Green Energy:

Pei-Cheng Ku	古培正	University of Michigan at Ann Arbor
Jung-Tsung Shen	沈榮聰	Washington University in St. Louis

Day 2 (Friday, 7/27/12): New Media & Creative Industries:

Workshop 1: Cloud Computing, Cyber Security, and Data Center:

Jia-Yu (Tim) Pan	潘家煜	Google Inc.
Ching-Chih Weng	翁竟智	Facebook, Inc.

Workshop 2: New Media, Web and Entertainment Technology:

Jia-Yu (Tim) Pan	潘家煜	Google Inc.

Conference Manager

Yu-Hung Li	黎昱宏	Stanford University

Publication

Conference Program:

Ya-Yunn (Jodie) Su	蘇雅韻	National Taiwan University

Conference Proceedings:

Yu-Bin Chen	陳玉彬	National Cheng-Kung University

Local Management (Student Volunteers)

Conference Treasurer

Chinese Institute of Engineers– USA, GNYC (CIE-USA/GNYC)
美洲中國工程師學會大紐約分會

On-Site Registration

Stanford Taiwanese Student Association

Web Development

Hwa-Han Wang 王華漢 EBMedia LLC

Co-organizing Associations

Stanford Taiwanese Student Association

Taiwan Trade Center, San Francisco

Chinese Institute of Engineers - GNYC

Co-Sponsors

Taipei Economic and Cultural Office in San Francisco (TECO in San Francisco)
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Commercial Division, TECO in Los Angeles
駐洛杉磯台北經濟文化辦事處商務組

Conference Program

Thursday, July 26th, 2012 : Emerging Science & Technology

July 26th (Thursday) 8:30 am - 5:00 pm : Registration (Room:)

July 26th (Thursday) 9:00 am - 9:50 am : Opening Speech (Room: Spruce)
Chair: **Dr. Liang-Gee Chen**, National Taiwan University
陳良基博士
Dr. Ching-Pin Chang (張景濱), Stanford University
張景濱博士

Opening Keynote:

Parallel Sessions:

August 18th (Thursday) 9:50 am - 11:20 am : Technical Session D1-W1-T1: (Room: Juniper)
Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (1)
Chair: **Professor Shu-Hua Chen**, University of California, Davis
陳淑華教授

Dr. Hung-Chi Kuo
Associate Dean, College of Science
Professor of Atmospheric Sciences
National Taiwan University
臺灣大學理學院副院長郭鴻基教授

"Representation of Storm Weather in Numerical Climate Models"
Dr. Guang Jun Zhang
Research Meteorologist
Division of Climate, Atmospheric Science, Physical Oceanography
Scripps Institution of Oceanography
斯克里普斯海洋研究所張廣俊博士

"On the Limit of Predicting the Madden-Julian Oscillation"
Dr. Wen-Wen Tung
Associate Professor, Department of Earth and Atmospheric Sciences
Purdue University
普渡大學地球與大氣科學系董文文教授

July 26th (Thursday) 9:50 am - 11:20 am : Technical Session D1-W2-T1: (Room: Spruce)
Medicine, Public Health, Biomedical Science and Engineering (1)
Chair: **Dr. Cleo Yi-Fang Lee,** Stanford University
李怡芳博士

"How Cells Respond to Their Mechanical Environment: from Substrate to Nucleus"
Dr. Julie Ying Hui Ji

Assistant Professor, Department of Biomedical Engineering
Purdue School of Engineering and Technology
Indiana University-Purdue University Indianapolis
印第安納大学与普渡大學印第安**纳**波里斯聯合分校生物醫学工程學系季英慧教授

"Fingerprinting Ion Channel Dysfunction for Treating Cardiac Arrhythmias"
Dr. Ye Chen-Izu
Assistant Professor of Biomedical Engineering, Pharmacology, Medicine/ Cardiology
University of California, Davis
加州大学戴**维**斯分校生物医学工程学,**药**理学,心**脏**学学系**陈晔**教授

"Toward an Imaging-Based Atlas of the Mouse Myocardial Fiber Structure"
Dr. Edward W. Hsu
Associate Professor, Department of Bioengineering
University of Utah

"Development of Nanoparticle-based Brain Tumor Therapeutic System"
Dr. Chiung-Yin Huang
Postdoctoral Fellow, Department of Neurosurgery
Chang Gung Memorial Hospital
長庚醫院神經外科**黃**瓊瑩博士

July 26th (Thursday) 9:50 am - 11:20 am : Technical Session D1-W2-T1: (Room: Maple)
New Materials Science and Engineering, Nanotechnology and New Green Energy (1)
Chair: **Professor Pei-Cheng Ku**, University of Michigan at Ann Arbor
古培正教授

"3D Bioactive Microspheres for Stem Cell Culture and Encapsulation"
Dr. Jiashing Yu
Assistant Professor, Department of Chemical Engineering
National Taiwan University
臺灣大學化學工程學系游佳欣教授

"Biomimetic Strategies for Engineering Protein- and Lipid-Based Biomaterials"
Dr. Xiaoyi Wu
Associate Professor, Department of Aerospace and Mechanical Engineering
The University of Arizona
亚利桑**纳**大学机械和航天工程系吴筱益教授

"Nanobiology: Investigating Biological Processes at the Nanoscale"
Dr. Andrew Yu-Jen Wang
Postdoctoral Researcher, Department of Pediatrics
Stanford University
史丹佛大學醫學院小兒科系王禹真博士

"Enhanced Transfection Efficiency of PEGylated Cation Lipid-DNA Complexes Prepared with an Acid-Labile PEG-Lipid"
Dr. Chia-Ling Chan

Postdoctoral Research Associate, Materials Research Laboratory
University of California, Santa Barbara
加州大學聖塔芭芭拉分校材料研究實驗室詹佳玲博士

july 26th (Thursday) 11:20 am - 11:35 am: Break

Parallel Sessions:

July 26th (Thursday) 11:35 am – 1:05 pm: Technical Session D1-W1-T2: (Room: Juniper)
Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (2)
Chair: **Professor Shau-Shiun (James) Jan**, National Cheng Kung University
詹劭勳教授

"Decision Making under Uncertainty with Application to Air Traffic Management"
Dr. Yan Wan
Assistant Professor, Department of Electrical Engineering
University of North Texas
北德克薩斯大学電机工程学系万妍教授

"Robust Alternative Position Navigation and Time (APNT) Systems for Aviation"
Dr. Sherman Lo
Senior Research Engineer, Global Positioning System (GPS) Lab
Stanford University

"Modeling and Computation for Large-scale Air Traffic Flow Optimization"
Dr. Dengfeng Sun
Assistant Professor, School of Aeronautics and Astronautics
Purdue University
普渡大学航空航天工程系孫登峰教授

July 26th (Thursday) 11:35 am – 1:05 pm: Technical Session D1-W2-T2: (Room: Spruce)
Medicine, Public Health, Biomedical Science and Engineering (2)
Chair: **Dr. Pao-Yang Chen**, University of California, Los Angeles
陳柏仰博士

"Engineering Proteins for Sensing and Controlling Cellular Signals"
Dr. Michael Z. Lin
Assistant Professor, Departments of Pediatrics and Bioengineering
Stanford University

"Using Ultrasound Standing Wave Fields to Enhance Gene Delivery Efficiency – For Both Viral and Non-Viral DNA Vectors"
Dr. Yu-Hsiang Lee
Assistant Professor, Graduate Institute of Biomedical Engineering
National Central University
中央大學生物醫學工程研究所李宇翔教授

"Active DNA Demethylation during Plant Gametogenesis"
Dr. Tzung-Fu Hsieh
Associate Research Specialist, Department of Plant and Microbial Biology

University of California, Berkeley

July 26th (Thursday)11:35 am – 1:05 pm: Technical Session D1-W3-T2: (Room: maple)
New Materials Science and Engineering, Nanotechnology and New Green Energy (2)
Chair: **Professor Jung-Tsung Shen**, Washington University in St. Louis
沈榮聰教授

Dr. Hong Shen
Assistant Professor, Department of Chemical Engineering
University of Washington

"Development of a M2M-based Agroecological Monitoring System –
Making the M2M Technology to Large-Scale Practices and Beyond"
Dr. Richard (Cheng-Long) Chuang
Postdoctoral Research Fellow Intel-NTU Connected Context Computing Center Department of Bio-Industrial Mechatronics Engineering
National Taiwan University
臺大創新研究中心,臺灣大學生物產業機電工程學系莊欽龍博士

"Transparent Photovoltaics"
Dr. Pei-Cheng Ku
Assistant Professor, Department of Electrical Engineering & Computer Science
The University of Michigan at Ann Arbor
密歇根大學安娜堡分校電機系古培正教授

July 26th (Thursday) 1:05 pm - 2:35 pm: Lunch

Parallel Sessions:

July 26th (Thursday) 2:35 pm – 4:05 pm: Technical Session D1-W1-T3: (Room: Juniper)
Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (3)
Chair: **Professor Wen-Wen Tung**, Purdue University
董文文教授

"Harvesting Ocean Thermal Energy for Unmanned Underwater Explorations"
Dr. Yi Chao
Principal Scientist
Remote Sensing Solutions, Inc.
遥感技术与应用公司趙曄博士

Dr. Shiliang Wu
Assistant Professor, Atmospheric Sciences Program
Department of Geological and Mining Engineering and Sciences &
Department of Civil and Environmental Engineering
Michigan Technological University

"Modification of Hurricane Helene (2006) Development by Dust-Radiation-Cloud Interactions"
Dr. Shu-Hua Chen
Associate Professor, Department of Land, Air, and Water Resources

University of California, Davis
加州大學戴維斯分校陳淑華教授

July 26th (Thursday) 2:35 pm – 4:05 pm: Technical Session D1-W2-T3: (Room: Spruce)
Medicine, Public Health, Biomedical Science and Engineering (3)
Chair: **Dr. Leslie Chen,** Institute for Systems Biology
陳彥瑜博士

"Road to Innovation: Burgeoning Technology that will Change Neurosurgery"
Dr. Abel Po-Hao Huang
Neurosurgeon, National Taiwan University Hospital, Yun-Lin branch
Clinical lecturer, College of Medicine, National Taiwan University Hospital
台大醫院神經外科**黃**博浩醫師

"Finding Immune Mechanisms of Airway Inflammation in Pulmonary Diseases: the Role of Surfactant Protein D and Biomedical Informatics Applications"
Dr. Ko-Wei Lin
Postdoctoral Fellow, Division of BioMedical Informatics
School of Medicine
University of California, San Diego
加州大學聖地牙哥分校醫學院林可薇博士

"Erythroid/Myeloid Progenitors and Hematopoietic Stem Cells Originate from Distinct Populations of Endothelial Cells"
Dr. Michael Jin-Feng Chen
Post-doctoral Scientist, Stem Cell Program
Children's Hospital Boston
波士頓兒童醫院陳錦峰博士

"Intra-Uterine Calorie Restriction Regulates the Placental DNA Methylation Profile Influencing Fetal Development and Adult-type Chronic Diseases"
Dr. Pao-Yang Chen
Postdoctoral Fellow, Department of Molecular Cell and Developmental Biology
University of California, Los Angeles
加州大學洛杉磯分校陳柏仰博士

July 26th (Thursday) 2:35 pm – 4:05 pm: Technical Session D1-W3-T3: (Room: Maple)
New Materials Science and Engineering, Nanotechnology and New Green Energy (3)
Chair: **Professor Jung-Tsung Shen** , Washington University in St. Louis
沈榮聰 教授

"Exchange Interactions in Perovskite Oxide Nanostructures"
Dr. Yayoi Takamura Associate Professor, Department of Chemical Engineering and Materials Science
University of California, Davis
加州大學戴維斯分校化學工程與材料科學學系高村教授

Dr. Gyeong S. Hwang
Professor & Lyondell Corp. Endowed Faculty Fellow in Engineering
Department of Chemical Engineering

The University of Texas at Austin

Dr. Sindy K.Y. Tang
Assistant Professor, Department of Mechanical Engineering
Stanford University

"Thermal Conductivity of a Single Nylon-6 Nanofiber"
Dr. Ming-Chang Lu
Assistant Professor, Department of Mechanical Engineering
National Chiao Tung University
交通大學機械工程學系呂明璋教授

July 26th (Thursday) 4:05 pm – 4:20 pm: Break

Parallel Sessions:

July 26th (Thursday) 4:20 pm – 5:50 pm: Technical Session D1-W1-T4: (Room: Juniper)
Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (4)
Chair: **Dr. Fang-Cheng Chan**, Illinois Institute of Technology
詹方正博士

"On The Forefront of a New Generation of Aviation System Performance"
Dr. Seth Young
Associate Professor and Chair, Dept. of Aviation
Director, Center for Aviation Studies
The Ohio State University

"Global Navigation Satellite System Interference Monitoring System at Airport Environment"
Dr. Shau-Shiun (James) Jan
Associate Professor, Department of Aeronautics and Astronautics 7
National Cheng Kung University
成功大學航空太空工程學系詹劭勳教授

"Local Area Augmentation System (LAAS) Ground Receiver Interference Analysis and Mitigation"
Dr. Fang-Cheng Chan
Senior Research Associate, Department of Mechanical and Aerospace Engineering
Illinois Institute of Technology
伊利諾理工大學機械和航天工程系詹方正博士

July 26th (Thursday) 4:20 pm – 5:50 pm: Technical Session D1-W2-T4: (Room: Spruce)
Medicine, Public Health, Biomedical Science and Engineering (4)
Chair: **Professor Ching-Pin Chang**, Stanford University
張景濱教授

"Targeting Her2 in Tumor-initiating Cells in Non-Her2 Amplified Breast Cancer"
Dr. Cleo Yi-Fang Lee
Postdoctoral Research Fellow, Stanford Cancer Institute
Stanford University
史丹佛大學醫學院癌症研究所李怡芳博士

"Systems Biology and Medicine"
Dr. Leslie Chen
Research Scientist, Institute for Systems Biology
系統生物研究所陳彥瑜博士

Dr. Pin Yuan Chen
Visiting Scientist, University of California, San Francisco
Attending Physician and Assistant Professor
Department of Neurological Surgery
Chang Gung Memorial Hospital Linkou Medical Center

Dr. Ching-Pin Chang
Associate Professor, Department of Medicine
Stanford University
史丹佛大學醫學院醫學系張景濱教授

July 26th (Thursday) 4:20 pm – 5:50 pm: Technical Session D1-W3-T4: (Room: Maple)
New Materials Science and Engineering, Nanotechnology and New Green Energy (4)
Chair: **Professor Pei-Cheng Ku**, University of Michigan at Ann Arbor
古培正 教授

"Emerging Charge Trapping Nonvolatile Memories"
Dr. Jianlin Liu
Professor, Department of Electrical Engineering
University of California, Riverside
加州大学河滨分校电机工程学系刘建林教授

"Plasmonic Metamaterials and Their Applications in Super Resolution Imaging"
Dr. Zhaowei Liu
Assistant Professor, Department of Electrical and Computer Engineering University of California, San Diego
加州大学圣地亚哥分校电子及计算机工程系刘照伟教授

"Nanostructured Thermoelectric Materials for Waste Heat Recovery"
Dr. Zhixi Bian
Assistant Adjunct Professor, Department of Electrical Engineering
University of California, Santa Cruz
加州大学圣克鲁兹分校电机工程学系邊志喜教授

Dr. Jung-Tsung Shen
Assistant Professor, Department of Electrical & Systems Engineering
Washington University in St. Louis
聖路易華盛頓大學電機暨系統工程學系沈榮聰教授

Friday, July 27th, 2012 : New Media & Creative Industries

July 27th (Friday) 8:30 am - 5:00 pm : Registration (Room:)

July 27th (Friday) 9:30 am - 10:30 am: Opening Speech (Room: Spruce)
Chair: **Dr. Liang-Gee Chen**, National Taiwan University
陳良基博士
Dr. Jia-Yu (Tim) Pan, Google Inc.
潘家煜博士

Opening Keynote:

Dr. Jane Yung-Jen Hsu
Chairman and Professor
Department of Computer Science and Information Engineering
National Taiwan University
台灣大學資訊工程學系系主任許永真教授

July 27th (Friday) 10:30 am - 11:20 am: Plenary Session 1: (Room: Spruce)
Chair: **Dr. Jia-Yu (Tim) Pan**, Google Inc.
潘家煜博士

Ms. Chun-Huan Ho
Managing Director, Museum Shops & Restaurants
National Palace Museum
故宮的博物館商店與餐飲服務何春寰總經理

July 27th (Friday) 11:20 am - 11:35 am: Break

Parallel Sessions:

July 27th (Friday) 11:35 am - 1:05 pm: Technical Session D2-W1-T1: (Room: Spruce)
Cloud Computing, Cyber Security, and Data Center
Chair: **Dr. Ching-Chih Weng**, Facebook, Inc.
翁竟智博士

"Security Challenges of the Internet of Things (IoT)"
Dr. Meiyuan Zhao
Senior Research Scientist
Intel Labs
英特尔研究院赵玫瑗博士

Dr. S. (Shyhtsun) Felix Wu
Professor, Department of Computer Science
University of California, Davis
加州大学戴维斯分校计算机科学系吴士駿教授

"Combating Click Fraud: Challenges and Approaches"
Dr. Jia-Yu (Tim) Pan

Software Engineer
Google Inc.
美國谷歌公司潘家煜博士

July 27th (Friday) 11:35 am - 1:05 pm: Technical Session D2-W2-T1: (Room: Maple)
New Media, Web, and Entertainment Technology
Chair: **Dr. Jia-Yu (Tim) Pan (潘家煜), Google Inc.**
潘家煜博士

"Challenges and Opportunities of Machine Learning Research"
Dr. Chih-Jen Lin
Distinguished Professor
Department of Computer Science and Information Engineering
National Taiwan University
台灣大學資訊工程學系林智仁特聘教授

"Video Aware Wireless Networks (VAWN) - Research Program Overview"
Dr. Douglas S. Chan
Senior Wireless Systems Engineer
Cisco Systems

"Life of a Data Miner at Google"
Dr. Yu-To Chen
Quantitative Analyst, Google Inc.
美國谷歌公司陳毓鐸博士

Dr. Edward Yi-Hao Kao
Information Systems Lab
Department of Electrical Engineering
Stanford University

July 27th (Friday) 1:05 pm - 2:35 pm: Lunch

Parallel Sessions:

July 27th (Friday) 2:35 pm - 4:05 pm: Technical Session D2-W1-T2: (Room: Spruce)
Cloud Computing, Cyber Security, and Data Center
Chair: **Dr. Ching-Chih Weng**, Facebook, Inc.
翁竟智博士

"Responding to Attacks in Cloud Computing Environment"
Dr. Yu-Sung (Hank) Wu
Assistant Professor, Department of Computer Science
National Chiao-Tung University
交通大學資訊工程系**吳**育松教授

"Cloud Data Protection for the Masses"
Dr. Elaine (Runting) Shi
Research Scientist, AMP Lab

University of California, Berkeley
加州大学伯克利分校石**润**婷博士

"Erasure Coding and Data Storage at Facebook"
Dr. Scott Chun-Yang Chen
Facebook, Inc.
Facebook陳俊仰博士

July 27th (Friday) 2:35 pm - 4:05 pm: Technical Session D2-W2-T2: (Room: Maple)
New Media, Web, and Entertainment Technology
Chair: **Dr. Yu-To Chen (),** Google Inc.
陳毓鐸博士

Dr. Hao-Hua (Hao) Chu
Professor, Department of Computer Science and Information Engineering
Graduate Institute of Networking and Multimedia
National Taiwan University
台灣大學資訊工程學系朱浩華教授

"Which Tweets Will Be Headlines? Hierarchical Bayesian Models for Bridging Social Media and Traditional Media"
Dr. Yan Liu
Assistant Professor, Department of Computer Science
University of Southern California
南加州大学计算机科学系刘燕教授

"DBLOG: an Open Universe Probabilistic Programming Language for Relational Modeling"
Dr. Lei Li
Postdoctoral Fellow, Department of Electrical Engineering and Computer Science
University of California, Berkeley
加州大学伯克利分校李磊博士

July 27th (Friday) 4:05 pm – 4:20 pm: Break

Parallel Sessions:

July 27th (Friday) 4:20 am - 5:50 pm: Technical Session D2-W1-T3: (Room: Spruce)
Cloud Computing, Cyber Security, and Data Center
Chair: **Dr. Jia-Yu (Tim) Pan (**潘家煜**)**, Google Inc.
潘家煜博士

"Cloud-based Speech Recognition for Mobile Applications"
Dr. Yun-Hsuan Sung
Senior Research Scientist
Google Inc.
美國谷歌公司宋雲軒博士

"Development of New Gerontechnologies and Gerontechnologists in a Rapidly Aging World"
Dr. Hen-I Yang

Smart Home Laboratory
Department of Computer Science
Iowa State University
愛荷華州立大學計算機科學系楊恆毅博士

"Facebook Recommendation System for Heterogeneous Content in Social Networks"
Dr. Ching-Chih Weng
Software Engineer
Facebook, Inc.
Facebook翁竟智博士

July 27th (Friday) 4:20 am - 5:50 pm: Technical Session D2-W2-T3: (Room: Maple)
New Media, Web, and Entertainment Technology
Chair: **Dr. Scott Chun-Yang Chen**, Facebook, Inc.
陳俊仰博士

"Mobile Sensing for Behavior-ware Mobile Computing: a Language Approach"
Professor Joy Ying Zhang
Research Assistant Professor, Department of Electrical and Computer Engineering
Carnegie Mellon University Silicon Valley
卡内基梅隆大学硅谷校区电子与计算机工程系张盈教授

"Taiwan's Representative Industrial Developments in Computer Graphics"
Professor Yu-Chi Lai
Assistant Professor, Department of Computer Science and Information Engineering
National Taiwan University of Science and Technology
台灣科技大學資訊工程系賴祐吉教授

Dr. Jack M. Wang
Postdoctoral Scholar
Computer Graphics Lab and Neuromuscular Biomechanics Lab
Stanford University
史丹佛大學王孟傑博士

Abstracts and Biographies

Thursday July 26th Opening Speech

Session : Session Title

Session Organizer & Chair

Prof. Liang-Gee Chen
Deputy Dean
College of Electrical Engineering and Computer Science,
National Taiwan University
EE Building 2, No. 1, Sec. 4, Roosevelt Rd., Taipei, Taiwan
Tel: +886-3366-3634, Fax: +886-3366-3718
Email: lgchen@cc.ee.ntu.edu.tw

BIOGRAPHY

Prof. Liang-Gee Chen was born in Taiwan on September 23, 1956.He received the B.S., M.S., and Ph.D. degrees in electrical engineering from National Cheng Kung University, Tainan, Taiwan, R.O.C. in 1979, 1981, and 1986, respectively.

He joined the Department of Electrical Engineering, National Taiwan University. During 1993–1994, he was a Visiting Consultant in the DSP Research Department, AT&T Bell Labs, Murray Hill, NJ. In 1997, he was a Visiting Scholar of the Department of Electrical Engineering, University of Washington, Seattle. During 2004-2006, he was the Vice President and General Director of the Electronics Research and Service Organization (ERSO) of the Industrial Technology Research Institute (ITRI), Taiwan. Since 2007, he has been serving as a Co-Director General of National SoC Program. Currently, he is the Deputy Dean of college of EECS and a Distinguished Professor of Department of Electrical Engineering at National Taiwan University. He is the IEEE Fellow from 2001. His research interests include DSP architecture design, video processor design, and video coding systems. He has over 420 publications and 15 US patents. He is a member of Phi Tau Phi.

Dr. Chen has served as an Associate Editor of IEEE Transactions on Circuits and Systems for Video Technology in 1996-2008, as Associate Editor of the IEEE Transactions on VLSI Systems in 1999-2001, and as Associate Editor of IEEE Transactions Circuits and Systems II in 2000-2001. He has been the Associate Editor of the Journal of Circuits, Systems, and Signal Processing (CSSP) in 1999-2008, and a Guest Editor for the Journal of Video Signal Processing Systems. He has been an Associate Editor for the Journal of Information Science and Engineering (JISE) from 2002. Since 2007, he has served as an Associate Editor of Research Letter in Signal Processing and for EURASIP Journal on Advances in Signal Processing. During 2001 -2004, he was also the Associate Editor of the Proceedings of the IEEE. He was the General Chair of 7th VLSI Design/CAD Symposium in 1995 and of the 1999 IEEE Workshop on Signal Processing Systems: Design and Implementation. He was Chair of Taipei Chapter of IEEE Circuits and Systems (CAS) Society, and is a member of IEEE CAS Technical Committee of VLSI Systems and Applications, the Technical Committee of Visual Signal Processing and Communications, and the IEEE Signal Processing Technical Committee of Design and Implementation of SP Systems. He was the Chair of the IEEE CAS Technical Committee on Multimedia Systems and Applications. During 2001–2002, he served as a Distinguished Lecturer of IEEE CAS Society. He has been the program committee member of IEEE ISSCC in 2004 - 2007. He is the TPC chair of 2009 IEEE ICASSP and ISCAS 2012. He received the Best Paper Award from the R.O.C. Computer Society in 1990 and 1994. In 1990 to 2005, he received Long-Term (Acer) Paper Awards annually. In 1992, he received the Best Paper Award of the 1992 Asia-Pacific Conference on circuits and systems in the VLSI design track. In 1993, he received the Annual Paper Award of Chinese Engineer Society. In 1996, 2000 and 2002, he received the Outstanding Research Award from the National Science Council, and in 2000, the Dragon Excellence Award from Acer. He guides students won the DAC/ISSCC Student Design Contest for ten times since 2004, and had the honor of Student Paper Contest at ICASSP 2006. In 2011, he received the Best paper award of CICC 2010's paper.

Thursday July 26th Opening Speech

Epigenetic mechanism of heart muscle development and disease

Ching-Pin Chang, MD, PhD

BIOGRAPHY

A. Academic history:

Colleges and universities attended, degrees received, dates.

9/1983-6/1990	MD	National Taiwan University Taipei, Taiwan
9/1992-6/1997	PhD	Stanford University - Cancer Biology Stanford, California

Scholarships and honors:

1982	Mathematic Olympics Competition, Taiwan, Silver Medal [youngest awardee]
1983	Thomas Alva Edison Award, 27th International Science Symposium for Edison Science and Engineering Youth Day Program, Thomas Alva Edison Foundation, USA [only student from Taiwan selected to attend]
1983-1990	National Taiwan University, Dean's Lists & Dean's Awards
1989	Harvard Medical School, Exchange Student selection [funded by Harvard Medical School and Ministry of Education, Taiwan]
1990	Best Intern Award (top of class, 160 interns), College of Medicine, National Taiwan University
2001-2004	Physician-Scientist Fellowship Award, Howard Hughes Medical Institute
2004	Weinstein Award, Weinstein Cardiovascular Development Conference, Leiden, Netherlands
2004	Keystone Symposia Scholarship Award, Keystone Symposia, Molecular Biology of Heart Disease, Cardiac Development and Congenital Heart Disease, Colorado, USA
2005	National Scientist Development Award, American Heart Association
2006	Faculty Scholar Award, Donald E. and Delia B. Baxter Foundation
2007	Medical Research Grant Award, Children's Heart Foundation
2007	Research Grant Award, March of Dimes Birth Defects Foundation
2008	New Faculty Award, California Institute of Regenerative Medicine
2011	Junior Faculty Award, Keystone Symposia, Mechanisms of Cardiac Growth, Death and Regeneration, Colorado, USA
2011	Elected member, American Society for Clinical Investigation
2012	National Established Investigator Award, American Heart Association

Post-doctoral and residency training:

7/1/97-6/30/99	Internship and Residency, Internal Medicine Massachusetts General Hospital, Boston, Massachusetts
7/1/99-6/30/01	Clinical Cardiology Fellowship Stanford University School of Medicine, Stanford, California
7/1/01-6/30/04	HHMI Physician-Scientist Fellowship Stanford University School of Medicine, Stanford, California
7/1/99-6/30/04	Fellowship, Clinical Investigator Pathway, Cardiovascular Medicine Stanford University School of Medicine, Stanford, California

Medical Board

2000	A.B.I.M. Certification, Internal Medicine	Certificate No.: 197361
2004	A.B.I.M. Certification, Cardiovascular Disease	Certificate No.: 197361

Licensure

7/1999	California Medical License #A69033

B. Employment history:

Academic positions:

2/1/05-11/01/11	Assistant Professor of Medicine, Cardiovascular Medicine Stanford University School of Medicine, Stanford, CA
11/01/11-pres	Associate Professor of Medicine, with tenure, Cardiovascular Medicine Stanford University School of Medicine, Stanford, CA

C. Public and professional service.

National committees:

8/06	Moderator, Undergraduate Research Roundtable Faculty, Undergraduate Research Training Program American Heart Association (AHA), CA
11/06	American Heart Association (AHA), Western Review Consortium, Peer Review Committee 2B Integrative Cardiology & Physiology
10/07	AHA, National Center, Peer Review Committee BASIC 3 Basic Science & Molecular Biology 3 Study Group
11/07	AHA, Western Review Consortium, Peer Review Committee 3B (Cardiovascular Development Group)
2010-11	Medical Research Council Grant Review, England (declined because of conflicts of schedule)

2008-pres University Grant Committee Grant Review, Hong Kong

National and international speeches:

1. Tissue Interactions during Heart Valve Morphogenesis. Research in Innovative Tissue Engineering Meeting, National Heart, Lung and Blood Institute, National Institute of Health, Washington, DC. 2004
2. Repression of VEGF Expression by NFAT Underlies Initiation of Heart Valve Morphogenesis. Molecular Biology of Heart Disease, Cardiac Development and Congenital Heart Disease, Keystone Symposia, Keystone, Colorado. 2004
3. Sequential Myocardial-Endocardial NFAT Signaling Defines a Morphogenetic Field Essential for Heart Valve Development. FASEB 2004 Summer Research Conference, Calcium and Cell Function, Snowmass, Colorado. 2005
4. Sequential Myocardial-Endocardial NFAT Signaling Defines a Morphogenetic Field Essential for Heart Valve Development. Research in Innovative Tissue Engineering Meeting, National Heart, Lung and Blood Institute, National Institute of Health, Washington DC. 2005
5. Tissue Interactions during Heart Valve Morphogenesis. American Heart Association Western Affiliate Young Investigators Forum. 2005
6. Pbx Mutant Mice Provide a Multigenetic Model for Congenital Heart Disease Weinstein Cardiovascular Conference, Tuscon, Arizona. 2005
7. Calcineurin-NFAT Signaling and Heart Valve Development. FASEB Summer Research Conference, Protein Kinase and Phosphorylation, Snowmass Colorado. 2005
8. A Field of Myocardial-Endocardial NFAT Signaling Directs Heart Valve Morphogenesis. FASEB Summer Research Conference, Receptors and Signal Transduction, Snowmass, Colorado. 2006
9. Endocardial Brg1 Represses Adamts1 to Maintain the Microenvironment for Myocardial Morphogenesis. Weinstein Cardiovascular Conference, Indianapolis, Indiana. 2007
10. Epigenetic Control of Cardiac Myogenesis. Western Society of Pediatric Cardiology, CA 2008
11. Epigenetic Control of Myocardial Morphogenesis. SCBA Northern California Chapter, CA 2008
12. Chromatin and Transcriptional Regulation of Heart Development. Workshop, Weinstein Cardiovascular Conference, Dallas, Texas. 2008
13. NFAT Signaling in Heart Development, American Heart Association Research Symposium, New Orleans, Louisiana. 10/2008
14. Chromatin regulation of cardiac growth, differentiation and morphogenesis, Weill Medical College, Cardiology Grand Round, Cornell University, New York 2/2009
15. Control of Cardiac Growth, Differentiation and Hypertrophy by the BAF complex, Keystone symposium, Plenary Section, North Carolina. 3/2009
16. Multigenetic Interactions in the Pathogenesis of Congenital Heart Disease, Western Society of Pediatric Cardiology, Yosemite, CA. 5/2009

17. From Heart Development to Heart Disease, Keynote speech, Developmental Biology Retreat, Academia Sinica, Taiwan
    8/2009
18. Chromatin Regulation of Cardiac Differentiation and Morphogenesis. Institute of Molecular Biology, Academia Sinica, Taiwan
    8/2009
19. Control of Cardiac Growth, Differentiation and Hypertrophy by the BAF complex, Weinstein Cardiovascular Conference, San Francisco, CA
    5/2009
20. Sculpting heart valves with NFAT and VEGF, Oak Foundation Symposium
    8/2009
21. Mechanism of cardiac hypertrophy and failure, Amgen Inc., San Francisco
    2009
22. Control of cardiac growth, differentiation and hypertrophy by chromatin remodeling, Krannert Institute of Cardiology, Division of Cardiology Indiana University School of Medicine, Indiana 5/2010
23. Control of cardiac growth, differentiation and hypertrophy by a chromatin remodeling complex. Birth, Life and Death of the Cardiac Myocyte Conference, Napa Valley, CA
    6/2010
24. Chromatin regulation in heart development and disease, Cardiology grand round, Krannert Institute of Cardiology, Division of Cardiology Indiana University School of Medicine, Indiana 7/2010
25. Epigenetic control of heart development and disease, Cardiology grand round, National Taiwan University Hospital, National Taiwan University, Taiwan
    8/2010
26. Heart development and disease, Research Seminar, Institute of Biochemistry and Molecular Biology, Yang-Ming University, Taiwan
    8/2010
27. Chromatin remodeling in cardiomyopathy, Department of Genetics, Albert Einstein College of Medicine, New York
    10/2010
28. Chromatin remodeling in cardiovascular development and physiology, Department of Systems Biology and Translational Medicine, Texas A&M University, Texas
    11/2010
29. Chromatin remodeling in the heart, Workshop, American Heart Association, Chicago
11/2010
30. Chromatin regulation in heart development and disease, Zing Conference, Cardiovascular Remodeling, Cancun, Mexico
    12/2010
31. Chromatin remodeling in cardiomyopathy, Cardiology research seminar, UCSD, San Diego, CA 1/2011
32. Chromatin regulation of heart development and disease, Frontiers of cardiovascular science seminar, Stanford University, Stanford, CA
    2/2011
33. Chromatin regulation by Brg1 controls cardiac growth, differentiation, and hypertrophy, Joint Keystone symposia on Mechanisms of Cardiac Growth, Death, and Regeneration; Molecular Cardiology, Keystone, Colorado
    2/2011
34. Mechanisms of heart development and disease, Distinguished Cardiovascular Lectureship, UCLA, Los Angeles, CA
    2/2011

35. Mechanisms of heart development, disease, and regeneration, Japanese Circulation Society and University of Tokyo, Yocohama, Japan (cancelled because of earthquake) 3/2011
36. Mechanism of heart development and disease, Gilead, Palo Alto, CA 4/2011
37. Chromatin regulation in heart development and disease. Translational Medicine Seminar, Proteomics Society, Taiwan 4/2011
38. Chromatin regulation in cardiac pathophysiology. Institute of Biomedical Sciences, Academia Sinica, Taipei, Taiwan 4/2011
39. Mechanism of cardiovascular development and disease, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China 5/2011
40. Epigenetic control of cardiac pathophysiology, Biomolecular Engineering Seminar, Hong Kong University of Science and Technology, Hong Kong, China 5/2011
41. Chromatin regulation in development and disease, Department of Molecular and Cellular Biology, Program in Developmental Biology, Baylor College of Medicine, Houston, Texas 5/2011
42. Chromatin remodeling in cardiac pathophysiology, Cardiovascular Institute, University of Pennsylvania, Philadelphia, Pennsylvania 6/2011
43. Heart development and disease (Section Chair), SCBA symposium, Guangzhou, China 7/2011
44. Chromatin remodeling in heart development and disease, TaiGen Inc., Taipei, Taiwan 11/2011
45. Epigenetic regulation of cardiomyopathy and heart failure, Keynote speech, 104th Annual Meeting, Formosan Medical Association, Taipei, Taiwan 11/2011
46. Epigenetic regulation of the spatial and temporal development of mammalian heart, Cardiovascular Science Seminar, Education Section, American Heart Association, Orlando, Florida 11/2011
47. Unraveling the genetic etiologies of congenital heart disease, 3rd International Conference on Innovations and Engineering, Palo Alto, California 4/2012
48. Epigenetics, heart development, and heart failure. Institute of Clinical Medicine, Veterans General Hospital, Yang-Ming University, Taiwan 7/2012
49. Epigenetic mechanism of heart muscle development and disease (section chair), "Leadership, Innovation, Growth", 2nd Young Investigator Conference, Palo Alto, CA 7/2012
50. Therapy for cardiac hypertrophy and failure, Gilead Sciences Inc., Foster City, CA 8/2012
51. Chromatin remodeling in cardiovascular physiology and pathology, Cardiovascular Science Seminar, Education Section, American Heart Association, Los Angeles, CA 11/2012
52. Molecular mechanism of cardiac pathophysiology, Cardiology, Weill Medical College, Cornell University, New York TBD, 2012

Local committees & task forces:

2005-pres. Admissions Committee, Cardiovascular Medicine Fellowship
Stanford University School of Medicine

2005-pres. Admissions Committee, Clinical Investigator Pathway and Residency
Stanford University School of Medicine

2005-pres. Career Advisor for Medical Students in the Clinical Investigator Pathway
Stanford University School of Medicine

9/2005-pres. Faculty, Medical Scientist Training Program
Stanford University School of Medicine

9/2005-pres. Faculty, Cancer Biology Training Program
Stanford University School of Medicine

9/2005-pres. Faculty, BioX Training Program
Stanford University School of Medicine

9/2005-pres. Faculty, Molecular Medicine Training Program
Stanford University School of Medicine

9/2005-pres. Faculty, Cardiopulmonary Concentrates Training Program
Stanford University School of Medicine

3/2007-pres. Steering Committee Member, Stanford Cardiovascular Institute
Stanford University

Stanford Intramural Teaching

Courses

10/05 DBIO 201, Medical Student Developmental Biology
Current: *Early Heart and Vascular Development*
Stanford University School of Medicine

1/06 MED 223, Cardiovascular and Pulmonary Sciences Seminar
Current: *Epicardial cells as multi-potential cardiac cells*
Stanford University School of Medicine

5/06 DBIO 156, Heart Development - Undergraduate
Stanford University School of Medicine

6/06 MED 221, Human Health and Disease – Medical Students
Current: Clinical Pathologic Conference
Coronary artery disease, cardiomyopathy and peripheral vascular disease
Stanford University School of Medicine

4/08 DBIO/Path 296, Stem Cell Biology & Regenerative Medicine – Graduate/Medical Students
Stanford University School of Medicine

10/12 DBIO 201, Medical Student Developmental Biology
Current: *Heart Development*
Stanford University School of Medicine

Seminars

1. The Pbx gene family regulates cardiac outflow tract development. Developmental Biology Retreat, Developmental Biology, Stanford
2. Calcineurin/NFAT signaling in cardiovascular development. Angiogenesis Forum, Cardiovascular Medicine/Hematology, Stanford
3. Regulation of great artery patterning. Donald W. Reynolds Cardiovascular Clinical Research Center
4. Patterning of the cardiovascular development. Cardiovascular Medicine Division Research Conference
5. Regulation of cardiac morphogenesis Cardiopulmonary Research-in-Progress Seminar. Wall Cardiopulmonary Research Center, Department of Pediatrics, Stanford
6. Reciprocal exchange of calcineurin/NFAT signals between myocardium and endocardium in heart valve morphogenesis. Angiogenesis Forum, Cardiovascular Medicine/Hematology, Stanford
7. Sequential myocardial-endocardial calcineurin/NFAT signaling directs heart valve morphogenesis. Developmental Biology Retreat, Developmental Biology, Stanford
8. A field of myocardial-endocardial NFAT signaling underlies heart valve morphogenesis. Wall Cardiopulmonary Research Center, Department of Pediatrics, Stanford
9. NFAT signaling in heart valve development. 3D Seminar, Department of Developmental Biology
10. Multi-genetic Model for Congenital Heart Disease. Pediatric Cardiology Journal Club. Lucile Packward Children's Hospital, Stanford
11. Mechanism of heart valve morphogenesis. Developmental Biology, Stanford University, Stanford
12. Repression of VEGF by NFAT is essential for heart valve formation. Vascular Biology Seminar
13. Mechanisms of Cardiovascular Development. MSTP Program, Stanford
14. Cell-cell Signaling during development. Cancer Biology Program, Stanford
15. Mechanisms of Renal Development. Seminars in Nephrology, Medicine, Stanford
16. Epicardial cells as multi-potential cardiac cells. Cardiovascular and Pulmonary Sciences Seminar
17. Sculpting heart valves with NFAT and VEGF. Regenerative Medicine Seminar, Stanford.
18. Tissue-tissue interactions during heart development. Research talk for Interns and Residents
19. Transcriptional regulation of cardiac outflow tract and great artery patterning, Cardiopulmonary research in progress conference, Stanford
20. Heart specification, development, ES embryonic cardiogenesis. Stem Cell Biology and Regenerative Medicine
21. Heart Development, BioX undergraduate research program, Stanford.
22. Chromatin regulation of cardiac growth, differentiation and morphogenesis. Regenerative Medicine Seminar, Stanford
23. Chromatin regulation of cardiac growth, differentiation and hypertrophy, Cardiovascular Institute
24. Adventitial stem cell signaling and vascular repair, Cardiovascular Institute symposium, Stanford

25. Cardiomyopathy caused by calcineurin-NFAT dysregulation, Cardiomyopathy seminar, Stanford
26. Epigenetic regulation of heart development and disease, Cardiopulmonary research in progress seminar 27. Mechanisms of cardiac hypertrophy, Cardiovascular Institute (CVI), Stanford
28. Heart Development, Cardiology Fellow Seminar

29. Cardiomyopathy and heart failure. Fellow, Myocardial Training Program

30. Mechanisms of pathological vascular remodeling, CVI workshop, Stanford

31. Are there cells to control pathological vascular remodeling? Stem Cells and Regenerative Medicine Seminar, Stanford

Review for scientific journals

Development
Developmental Biology
Developmental Cell
Cell Research
Circulation
Circulation Research
Circulation: Cardiovascular Genetics
FASEB
Pediatric Research
PLos
Proceedings of National Academy of Sciences
Nature
Nature Genetics

Community Service:

7/90-8/92 Medical Officer, Second Lieutenant, National Army, Taiwan

D. Publications

D.1. Peer-reviewed articles [37 total: 1 in press]

D.1.A. *Original research contributions* (30 total)

1. **Chang CP**, Shen WF, Rozenfeld S, Lawrence HJ, Largman C, Cleary ML. Pbx proteins display hexapeptide-dependent cooperative DNA binding with a subset of Hox proteins. *Genes Dev* 1995;9(6):663-674.

2. Shen WF, **Chang CP**, Rozenfeld S, Sauvageau G, Humphries RK, Lu M, Lawrence HJ, Cleary ML, Largman C. Hox homeodomain proteins exhibit selective complex stabilities with Pbx and DNA. *Nucleic Acids Res* 1996;24(5):898-906.

3. **Chang CP**, Brocchieri L, Shen WF, Largman C, Cleary ML. Pbx modulation of Hox homeodomain amino-terminal arms establishes different DNA-binding specificities across the Hox locus. *Mol Cell Biol* 1996;16(4):1734-1745.

4. **Chang CP**, de Vivo I, Cleary ML. The Hox cooperativity motif of chimeric oncoprotein E2a-Pbx1 is necessary and sufficient for oncogenesis. *Mol Cell Biol* 1997;17(1):81-88.

5. Smith KS, Jacobs Y, **Chang CP**, Cleary ML. Chimeric oncoprotein E2a-Pbx1 induces apoptosis of hematopoietic cells by a p53-independent mechanism that is suppressed by Bcl-2. *Oncogene* 1997;14(24):2917-2926.

6. **Chang CP**, Jacobs Y, Nakamura T, Jenkins NA, Copeland NG, Cleary ML. Meis proteins are major *in vivo* DNA binding partners for wild-type but not chimeric Pbx proteins. *Mol Cell Biol* 1997;17(10):5679-5687.

7. Piper DE, Batchelor AH, **Chang CP**, Cleary ML, Wolberger C. Structure of a HoxB1-Pbx1 heterodimer bound to DNA: role of the hexapeptide and a fourth homeodomain helix in complex formation. *Cell* 1999;96(4)587-597.

8. Pelletier MP, **Chang CP**, Vagelos R, Robbins RC. Alternative approach for use of a left ventricular assist device with a thrombosed prosthetic valve. *J Heart Lung Transplant* 2002; 21(3):402-404.

9. Rugolotto M, **Chang CP**, Hu B, Schnittger I, Liang DH. Clinical use of cardiac ultrasound performed with a hand-carried device in patients admitted for acute cardiac care. *Am J Cardiol* 2002;90(9):1040-1042.

10. **Chang CP**, Chen L, Crabtree GR. Sonographic staging of the developmental status of mouse embryos *in utero. Genesis* 2003;36(1):7-11.

11. **Chang CP**, McDill BW, Neilson JR, Joist HE, Epstein JA, Crabtree GR, Chen F. Calcineurin is required in the urinary tract mesenchyme for the development of the pyeloureteral peri-staltic machinery. *J Clin Invest* 2004;113(7):1051-1058. Editorial commentary: Mendelsohn C. Functional obstruction: the renal pelvis rules. *J Clin Invest* 2004;113(7):957-959.

12. **Chang CP**, Neilson JR, Bayle JH, Gestwicki JE, Kuo A, Graef IA, Crabtree GR. A field of myocardial-endocardial NFAT signaling underlies heart valve morphogenesis. *Cell* 2004; 118(5):649-663. [Cover] Editorial commentary: Lambrechts D, Carmeliet P. Sculpting heart valves with NFAT and VEGF. *Cell* 2004;118(5):532-534.

13. Kofidis T, de Bruin JL, Hoyt G, Lebl DR, Tanaka M, Yamane T, **Chang CP**, Robbins RC. Injectable bioartificial myocardial tissue for large-scale intramural cell transfer and functional recovery of injured heart muscle. *J Thorac Cardiovasc Surg* 2004;128(4):571-578.

14. Kofidis T, de Bruin JL, Hoyt G, Ho Y, Tanaka M, Yamane T, Lebl DR, Swijnenburg RJ, **Chang CP**, Quertermous T, Robbins RC. Myocardial restoration with embryonic stem cell bioartificial tissue transplantation. *J Heart Lung Transplant* 2005;24(6):737-744.

15. Aaron JR, Winslow MM, Polleiri A, **Chang CP**, Wu H, Gao X, Neilson JR, Chen L, Heit JJ, Kim SK, Yamasaki N, Miyakawa T, Francke U, Graef IA, Crabtree GR. NFAT dysregulation by increased dosage of DSCR1 and DYRK1A on chromosome 21. *Nature* 2006;441(7093):595-600. [Article]

16. Sheikh AY, Lin SA, Cao F, Cao YA, van der Bogt KE, Chu P, **Chang CP**, Contag CH, Robbins RC, Wu JC. Molecular imaging of bone marrow mononuclear cell homing and engraftment in ischemic myocardium. *Stem Cells*. 2007 Oct;25(10):2677-2684.

17. Wu H, Kao SC, Barrientos T, Baldwin SH, Olson EN, Crabtree GR, Zhou B, **Chang CP**. Down syndrome critical region-1 is a transcriptional target of nuclear factor of activated T cells-c1 within the endocardium during heart development. *J Biol Chem* 2007;282(42): 30673-30679.

18. Jia Q, McDill BW, Li SZ, Deng C, **Chang CP**, Chen F. Smad signaling in the neural crest regulates cardiac outflow tract remodeling through cell autonomous and non-cell autonomous effects. *Dev Biol* 2007;311(1):172-184.

19. Stankunas K, Hang CT, Tsun ZY, Chen H, Lee NV, Wu JI, Shang C, Bayle JH, Shou W, Iruela-Arispe ML, **Chang CP**. Endocardial Brg1 represses ADAMTS1 to maintain the microenvironment for myocardial morphogenesis. *Dev Cell* 2008 Feb;14(2):298-311.

20. El-Bizri N, Guignabert C, Wang L, Cheng A, Stankunas K, **Chang CP**, Mishina Y, Rabinovitch M. SM22α-targeted deletion of bone morphogenetic protein receptor 1A in mice impairs cardiac and vascular development, and influences organogenesis. *Development* 2008;135(17):2981-2991.

21. Stankunas K, Shang C, Twu KY, Kao SC, Jenkins NA, Copeland NG, Sanyal M, Selleri L, Cleary ML, **Chang CP**. Pbx/Meis deficiencies demonstrate multigenetic origins of congenital heart disease. *Circ Res* 2008;103:702-709. [Cover]

22. **Chang CP***, Stankunas K, Shang C, Kao SC, Twu KY, Cleary ML. Pbx1 functions in distinct regulatory networks to pattern the great arteries and cardiac outflow tract**.** *Development* 2008 Nov;135(21):3577-3586. *Corresponding author.

23. Kao SC, Wu H, Xie J, **Chang CP**, Ranish JA, Graef IA, Crabtree GR. Calcineurin/NFAT signaling is required for neuregulin-regulated Schwann cell differentiation. *Science* 2009 Jan; 323(5914);651-654.

24. Zeini M, Hang CT, Lehrer-Graiwer J, Dao T, Zhou B, **Chang CP**. Spatial and temporal regulation of coronary vessel formation by calcineurin-NFAT signaling. *Development* 2009 Oct;136(19):3335-3345.

25. Wu B, Zhou B, Wang Y, Cheng HL, Hang CT, Pu WT, **Chang CP**, Zhou B. Inducible cardiomyocyte-specific gene disruption directed by the rat Tnnt2 promoter in the mouse. *Genesis* 2010 Jan;48(1):63-72.

26. Bajpai R, Chen DA, Rada-Iglesias A, Zhang J, Xiong Y, Helms J, **Chang CP**, Zhao Y, Swigut T, Wysocka J. CHD7 cooperates with PBAF to control multipotent neural crest formation. *Nature* 2010 Feb;463(7283):958-962.

27. Hang CT, Yang J, Han P, Cheng HL, Shang C, Ashley E, Zhou B, **Chang CP**. Chromatin regulation by Brg1 underlies heart muscle development and disease. *Nature* 2010 Jul; 466(7302):62-67. [Article, Press-released by *Nature*]

28. Stankunas K, Ma GK, Kuhnert FJ, Kuo CJ, **Chang CP**. VEGF signaling has distinct spatiotemporal roles during heart valve development. *Dev Biol* 2010 Nov;347(2):325-336.

29. Lin CY, Lin CJ, Chen CH, Chen RM, Zhou B, **Chang CP**. The secondary heart field is a new site of calcineurin/Nfatc1 signaling for semilunar valve development. *J Mol Cell Cardiology*. 2012; 52(5): 1096-102

30. Koss M, Bolze A, Brendolan A, Saggese M, Capellini TD, Bojilova E, Boisson B, Prall OW, Elliott DA, Solloway M, Lenti E, Hidaka C, **Chang** CP, Mahlaoui N, Harvey RP, Casanova JL, Selleri L. Congenital asplenia in mice and humans with mutations in a Pbx/Nkx2-5/p15 Module. *Dev Cell.* 2012;22(5):913-26

D.1.B. *Reviews* (4 total, 1 in press)

1. Lieber MR, **Chang CP**, Gallo M, Gauss G, Gerstein R, Islas A. The mechanism of V(D)J recombination: site-specificity, reaction fidelity, and immunologic diversity. *Semin Immunol* 1994;6(3):143-153.
2. Han P, Hang CT, Yang J, **Chang CP**. Chromatin remodeling in cardiovascular development and physiology. *Circ Res* 2011 Feb;108(3):378-396.
3. **Chang CP**, Bruneau BG. Epigenetics and cardiovascular development. *Annu Rev Physiol* 2012 Feb;74: 13.1–13.28.
4. Lin CJ, Lin CY, Chen CH, Zhou B, **Chang CP**. Partitioning of the heart: mechanism of cardiac septation and valve development. *Development* 2012 in press

D.3. Book Chapters [3]

1. Xiong Y, Zhou B, Chang **CP**. Analysis of the endocardial-to-mesenchymal transformation of heart valve development by a collagen gel culture assay. *Methods in Molecular Biology: Cardiovascular Development* 2012; 843:21-8
2. Hang C, **Chang CP**. Whole embryo culture for heart development studies. *Methods in Molecular Biology: Cardiovascular Development* 2012; 843:3-9
3. **Chang CP**. Analysis of the patterning of great arteries with angiography and vascular casting. *Methods in Molecular Biology: Cardiovascular Development* 2012; 843:101-9

D.4. Abstracts [3 published]

1. Rugolotto M, Liang DH, Hu BS, **Chang CP**, Schnittger I. Bedside point-of-care echocardiography performed with a new generation hand-carried device: impact on the management of patients hospitalized for acute cardiac care. *Eur Heart J* 2001;22 (Suppl S):707.
2. **Chang CP**, Neilson JR, Bayle JH, Gestwicki, Graef I, Crabtree GR. Sequential myocardial-endocardial NFAT signaling initiates and perpetuates heart valve morphogenesis. *Dev Biol* 2004;271(2):612.
3. El-Bizri N, Wang L, **Chang CP**, Helms JA, Mishina Y, Rabinovitch M. Vascular, cardiac, and craniofacial defects in mice with vascular smooth muscle cell-specific deletion of bone morphogenetic protein type IA receptor (BMPR-IA). *Circulation* 2006;114(18 Suppl II): II-141.

Thursday July 26th Opening Keynote

Technical Session D1-W1-T1: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (1)

Session Organizer & Chair

Modification of Hurricane Helene (2006) Development by Dust-Radiation-Cloud Interactions

Shu-Hua Chen

Associate Professor, University of California, Davis
One Shields Avenue, Davis, CA 95616
Tel: +1-530-752-1822, Fax: +1-530-752-1793
Email: shachen@ucdavis.edu

BIOGRAPHY

Professor Shu-Hua Chen was born in Nantou, Taiwan. She received her B.S. degree in Atmospheric Science in 1993 from National Taiwan University in Taipei, Taiwan, and her M.S. (1995) and Ph.D. (1999) degrees in Atmospheric Science from Purdue University, West Lafayette, IN.

Shu-Hua was a postdoctoral researcher at National Center for Atmospheric Research in Boulder, CO for 2 years. She was there to help develop the Weather Research and Forecasting model, a current community mesoscale model. Shu-Hua taught one year in the Department of Atmospheric Science at National Central University, Taiwan in 2006-2007. She is now an Associate Professor in the Department of Land Air and Water Resources at University of California, Davis. Her major research interests are in regional climate change, cloud physics, orographic rainfall, data assimilation, and hurricanes using numerical modeling tools. Below are her recent publications:

Chen, S.-H., J.-Y. Chen, W.-Y. Chang, P.-L. Lin, P.-H. Lin, and W.-Y. Sun,2011: Observing System Simulation Experiment: Development of the system and preliminary results, J. Geophys. Res., 116, D13202, doi:10.1029/2010JD015103.

Chen, S.-H, S.-H. Wang, and M. Waylonis, 2010: Modification of Saharan air layer and environmental shear over the eastern Atlantic Ocean by dust-radiation effects, J. Geophys. Res., 115, D21202, doi:10.1029/2010JD014158.

Chen, S.-H. and Y.-C. Siao, 2010: Evaluation of an explicit one-dimensional time dependent tilting cloud model: sensitivity to relative humidity. J. Meteor. Soc. Japan, DOI:10.2151/jmsj.2010-201, 88, 95-121.

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Technical Session D1-W1-T1: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (1)

Mathematical Modeling and Scientific Research

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ABSTRACT

A model is a simplification or abstraction of reality, separating the important from the irrelevant. As Turning once had said "This model will be a simplification and an idealization, and consequently a falsification. It is to be hoped that the features retained for discussion are those of greatest importance in the present stage of knowledge." Mathematical model is a representation and analysis of reality through mathematical symbols and concepts. We obtain our knowledge from models, and we make our predictions on the basis of models. We will show how simple mathematics can help formulate, solve, and interpret real problems of interest in atmospheric sciences. Classical modeling topics such as predator-prey interaction, disease control, harvesting and wars of attrition are also included. Moreover, the dimensional analysis and scale analysis of scientific problem will be discussed. It is hoped that the usage of mathematical model help distilling theories from empirical data and quantifying the theories with a set of governing mathematical equations.

BIOGRAPHY

Hung-Chi Kuo received the B.S. degree from department of atmospheric Sciences, National Taiwan, Taipei, Taiwan in 1979, both the M.S. degree the Ph.D. degree from department of atmospheric science, Colorado State University in 1983 and in 1987 respectively.

He worked at Naval Research Laboratory from 1988 to 1990. He is currently the Chair Professor with the Department of Atmospheric Science, National Taiwan University. He is also the associate Dean in College of Science, National Taiwan University. His research interest lies in atmospheric dynamics, tropical cyclone dynamics, and mathematical modeling and computation.

Dr. Kuo is a member of American Meteorology Society. He is the author and co-author of more than 40 publications. He is the 2006 recipient of the National Chair Professor from Taiwan Ministry of Education. He is the 2012 recipient of the prestigious Naval Research Laboratory Alan Berman Research Publication Award.

Technical Session D1-W1-T1: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (1)

Representation of Storm Weather in Numerical Climate Models.

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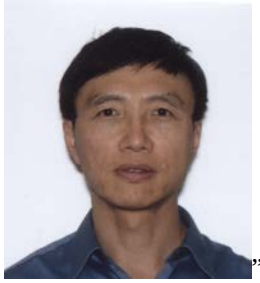
ABSTRACT

Thunderstorms, known in technical terms as deep convection to atmospheric scientists, have spatial scales of a few kilometers to a few tens of kilometers. They are often associated with severe weather, such as hailstorms, tornadoes, and flash floods, and can have large socioeconomic tolls. These phenomena are among the most difficult to predict or simulate in numerical weather prediction and climate models, particularly the latter. Global climate models (GCMs), used for projecting future climate changes, divide the Earth's surface into meshes of certain shapes (e.g. rectangular), each having a typical size of 100 km x 100 km, or larger. Thus each GCM gridbox can contain a number of deep convective cells, and representing thunderstorms in GCMs requires "parameterization", that is, using model-resolved variables (i.e. parameters) to represent subgrid-scale phenomena, such as convection, in numerical models.

This work describes the parameterization of convection in GCMs, and its effect on climate simulation in a major national climate model. Although of subgrid scale in physical size, atmospheric convection is a dominant energy source in global circulation through latent heat release from condensation of water vapor to liquid and ice. The liquid water and ice formed by microphysical processes inside convection are detrained near the top of convection to form massive anvil clouds, which can block a large amount of sunlight from reaching the earth's surface. It will be shown that the representation of these thermodynamic and radiative effects of convection can have tremendous impacts on the simulation of inter-tropical convergence zone, El Nino, and sub-seasonal variability. Representation of microphysical processes in convection also makes it possible to understand how air pollution interacts with convection to affect climate.

BIOGRAPHY


")

Guang Jun Zhang

Born in Jiangsu Province, China, 1960.

Education:

B. Sc., Meteorology, Nanjing Institute of Meteorology, Nanjing, Jiangsu, China, 1982.
M. Sc., Atmospheric Physics, University of Toronto, Ontario, Canada, 1985.
Ph. D., Atmospheric Physics, University of Toronto, Ontario, Canada, 1989.

He started his scientific career as a POSTDOCTORAL FELLOW at the Canadian Climate Centre, on Visiting Fellowship to Government Laboratories from the Natural Sciences and Engineering Research Council of Canada (1989-1991). He became a RESEARCH SCIENTIST I at the same place (1991-1992) for a year. Since 1992 he has been an ASSISTANT RESEARCH METEOROLOGIST (1992-1998), ASSOCIATE RESEARCH METEOROLOGIST (1998-2002), and RESEARCH METEOROLOGIST (2002-PRESENT) at Scripps Institution of Oceanography, University of California, San Diego. His research interests include convective parameterization, convective momentum transport, global and regional climate modeling, cloud and condensation parameterization, and tropical air-sea interaction.

Dr. Zhang is a member of American Geophysical Union (AGU), American Meteorological Society (AMS), and Chinese-American Oceanic and Atmospheric Association (COAA). He reviewed numerous funding proposals on behalf of funding agencies in the US, Canada and UK by serving as either review panel member of mail reviewer. He also reviewed journal manuscripts for Science, Nature and all major technical journals in atmospheric and climate sciences in North America, Europe, and Asia. He is one of the world's renowned expert in convection parameterization. His convection parameterization scheme (the well-know Zhang-McFarlane scheme) has been used in the US National Center for Atmospheric Research global climate model for the last 17 years, and in the Canadian Centre for Climate Modeling and Analysis global climate model for the last 20 years.

Technical Session D1-W1-T1: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (1)

On the limit of predicting the Madden-Julian Oscillation

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ABSTRACT
The 20–90-day Madden-Julian oscillation (MJO) dominates the tropical atmospheric intraseasonal variability while interacting with tropical and extra-tropical weather and climate systems. It exhibits multiscale characters in space and time as a result of nonlinear and stochastic interactions among its component cloud systems and hierarchical regulations imposed by the atmospheric and oceanic environment. In this work, a nonlinear filter was used to bandpass a set of MJO indices. A complexity measure called the scale-dependent Lyapunov exponent and a pseudo-ensemble approach were applied to characterize the dynamics underlying the bandpassed indices. Two distinct scaling behaviors were found. One suggested stochastic forcing, where predictability was rapidly lost in a time span of about 25 days. The other suggested a weakly chaotic behavior, also with a prediction time scale of about 25 days. Thus, the MJO appears to be a stochastically driven chaotic oscillator.

A further temporal-spatial analysis of the stochastic forcing was conducted with emphasis on the persistent correlations in the synoptic range of 1—7-days using the fractal theory, first with the ~10-year rain rates based on the Tropical Rainfall Measuring Mission (TRMM), then with the ERA-Interim global gridded reanalysis in the comparable time period. Heat and moisture budgets based on the thermodynamics and the mass conservation laws were computed and analyzed. The findings impose fundamental constraints on the simulation and prediction of the MJO, in the meantime, set the parameter space for the observation-driven parsimonious modeling of the MJO.

This is a joint work with Dr. Jianbo Gao, research professor at the Wright State University, OH, and the CEO/CSO of PMB InTelliGence, LLC, IN.

BIOGRAPHY
Wen-wen Tung was born in Taiwan on October 8, 1974. She graduated from the National Taiwan University with a B.S. degree in atmospheric sciences in 1996. In 2002, she received her Ph.D. in atmospheric sciences from the Department of Atmospheric and Oceanic Sciences at the University of California, Los Angeles, USA.

She has since worked in the United States as a postdoctoral researcher in the Advanced Study Program at the National Center for Atmospheric Research (2002-2004). In 2005, she was hired as an assistant professor in the Department of Earth and Atmospheric Sciences at Purdue University, and became an associate professor in 2011. She has conducted teaching, research, and committee services, in random order. Currently she is on sabbatical leave, doing research at the Courant Institute of Mathematical Sciences at New York University. Her specialties are physical, dynamical, and stochastic characterizations of multiscale tropical convective systems. Her method of inquisition has resulted in collaborative multidisciplinary research.

Prof. Tung is a member of the American Meteorological Society, the American Geophysical Union, the Society for Industrial and Applied Mathematics, and the Sigma Xi. She was awarded the 2002-2004 Advanced Study Program Postdoctoral Fellowship at the National Center for Atmospheric Research and 2011 College of Science Graduate Mentor Award at Purdue University. She has authored and coauthored more than thirty referred journal publications and one textbook.

Technical Session D1-W2-T1: Medicine, Public Health, Biomedical Science and Engineering (1)

Session Organizer & Chair

Targeting Her2 in tumor-initiating cells in non-Her2 amplified breast cancer

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BIOGRAPHY

Place of Birth: Taiwan **Date of Birth**: 03/14/1981 **Citizenship:** Canadian

Education
B.Sc. Honors Biochemistry & Molecular Biology, University of British Columbia, Vancouver, British Columbia, 2003

Ph.D. Pathology & Laboratory Medicine, University of British Columbia, Vancouver, British Columbia, 2009
Research Experience
UUSUMMER RESEARCH STUDENT Division of Infectious Disease, Vancouver General Hospital, May-Aug, 2003

PH.D. STUDENT University of British Columbia, Sept. 2003 – Aug. 2009
Published articles:
1. **Lee CY**, Rennie PS, Jia WW. MicroRNA regulation of oncolytic herpes simplex virus type 1 for selective killing of prostate cancer cells. *Clinical Cancer Research* 2009.
2. **Lee CY**, Bu LX, DeBenedetti A, Williams BJ, Rennie PS, Jia WW. Transcriptional and Translational Dual-regulated Oncolytic Herpes Simplex Virus Type 1 for Targeting Prostate Tumors. *Mol Ther* 2010.

POSTDOCTORAL RESEARCH FELLOW, Stanford University (current position)
Book Chapter: **Lee C**, Diehn M. "Mechanisms of Radioresistance in Cancer Stem Cells" in Cancer Stem Cells in Solid Tumors. Ed: Allan A. 2011, Part 5, 345-360.

During her predoctoral training period, she worked on designing targeted oncolytic viruses for prostate cancer treatment. Her dedication to and aptitude for cancer research is evidenced by her three first-author papers in Cancer Gene Therapy (2007), Clinical Cancer Research (2009), and Molecular Therapy (2010). She is now a postdoctoral

research fellow at Stanford University and her research interest is to identify genes involved in the proliferation and self-renewal of breast cancer stem cells (CSC) and to evaluate the effects of targeting self-renewal-associated genes or pathways in CSC. The ultimate goal is to eventually design targeted therapies to eliminate breast tumor-initiating cells and the remaining tumor cells for the treatment of breast cancer.

Awards and Distinctions

1. The Canadian Student Health Research Forum (CSHRF) Travel Award CIHR – Institute of Cancer Research Silver Poster Award, 2007
2. US Army DOD pre-doctoral award (3 years), 2008
3. AACR-Qiagen Scholar-in-Training Award, 2009
4. The Prostate Cancer Research Foundation of Canada (PCRFC) Research Grant $60,000 for one year (Co-Investigator, Dr. William Jia is PI), Oncolytic HSV-1 with a 3'UTR regulatory element for prostate cancer specific virotherapy, 2007-2008.

Publications

Refereed Article

1. Jung C*, **Lee CY***, Grigg ME. The SRS superfamily of Toxoplasma surface proteins. UU*International Journal for ParasitologyUU* 2004; 34: 285-296. *CJ and CYL contributed equally to this work.
2. **Lee CY**, Bu LX, Rennie PS, Jia WW. An HSV-1 amplicon system for prostate-specific expression of ICP4 to complement oncolytic viral replication for *in vitro* and *in vivo* treatment of prostate cancer cells. *Cancer Gene Therapy* 2007; 14(7): 652-660.
3. **Lee CY**, Rennie PS, Jia WW. MicroRNA regulation of oncolytic herpes simplex virus type 1 for selective killing of prostate cancer cells. *Clinical Cancer Research* 2009; 15(16): 5126-5135.
4. Zhang KX, Matsui Y, Hadaschik BA, **Lee C**, Jia W, Bell JC, Fazli L, So AI, Rennie PS. Down-regulation of type I interferon receptor sensitizes bladder cancer cells to vesicular stomatitis virus-induced cell death. *Int J Cancer* 2009; 127(4): 830-838.
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6. Wong J, **Lee C**, Zhang K, Rennie PS, Jia W. Targeted Oncolytic Herpes Simplex Viruses for Aggressive Cancers. *Curr Pharm Biotechnol.* 2011. [Epub ahead of print].

Book Chapter

1. **Lee C**, Diehn M. "Mechanisms of Radioresistance in Cancer Stem Cells" in Cancer Stem Cells in Solid Tumors. Ed: Allan A. 2011, Part 5, 345-360.

Technical Session D1-W2-T1: Medicine, Public Health, Biomedical Science and Engineering (1)

How cells respond to their mechanical environment: from substrate to nucleus

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ABSTRACT

Cells in a body constantly sense and respond to their mechanical as well as their biochemical environment as they maintain proper functions such as cell differentiation, metabolism, growth, and death. Transduction of forces in cells involves membrane and cytoplasm receptors, cytoskeleton filaments, and the nuclear envelope. These signals work in unison to produce subsequent changes in gene transcription, protein regulation, and overall cell physiology. Lack of proper mechanical signals and/or impaired cellular responses are implicated in many human disease mechanisms. The endothelium, for example, provides an interface between blood flow and the vascular wall, and regions exposed to disturbed flow conditions are prone to the development of atherosclerotic lesions. On the other hand, force transduction on the nuclear surface can influence phenotypes that affect the entire body. A wide range of human diseases, including Emery-Dreifuss muscular dystrophy and Hutchinson-Gilford progeria syndrome, are caused by mutations of the nuclear lamina, a filamentous meshwork that supports nuclear structure. Impaired nuclear lamina may lead to increased susceptibility to cellular damage under mechanical stress. Thus, the ability for cells to sense and respond to their physical environment through proper mechanotransduction pathways is critical to maintaining normal cellular functions.

We are investigating the effect of multiple mechanical cues such as fluid shear stress and substrate properties on endothelial cell responses. More specifically, we are interested in examining how death associated protein kinase, which plays an important role in cell apoptosis; and the glucocorticoid receptor, a nuclear transcription regulator, respond to the overall mechanical environment of the cells. To achieve our goals, we utilize advanced fluorescence imaging systems, image processing algorithms, as well as genetic, molecular, and cell biology based analytical techniques

BIOGRAPHY

Place of Birth: Wuhan, Hubei Province, China
Education:
B.S in chemical engineering from the Massachusetts Institute of Technology, Cambridge, MA, USA

Ph.D. in bioengineering from the University of Pennsylvania, Philadelphia, PA, USA

She completed her Post-Doctoral training at Brigham's and Women's Hospital in Boston, MA, USA. She is currently Assistant Professor in the Department of Biomedical Engineering, Purdue School of Engineering and Technology, at Indiana University Purdue University Indianapolis. Her research interests are cellular biomechanics of the cardiovascular system. In particular, her laboratory is working on understainding the comprehensive molecular and physiological responses of endothelial cells to mechanical stimuli of their micro-environment.

Dr. Ji is a member of the Biomedical Engineering Society, American Heart Association, and a lifetime member of the World Association for Chinese Biomedical Engineers.

Select Publication:

- Nayebosadri A, Ji JY. Bayesian Image Analysis of Dexamethasone and Shear Stress-Induced Glucocorticoid Receptor Intracellular Movement. *Ann Biomed Eng*. 2012 (Epub DOI: 10.1007/s10439-011-0499-7).
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- Woldt E, Matz RL, Terrand J, Mlih M, Gracia C, Foppolo S, Martin S, Bruban V, Ji J, Velot E, Herz J, Boucher P. Differential signaling by adaptor molecules LRP1 and ShcA regulates adipogenesis by the insulin-like growth factor-1 receptor. *J Biol Chem*. 286(19):16775-82, 2011

Ji JY, Verstraeten VL, Cummings KS, Lee RT, and Lammerding J. Increased mechanosensitivity and nuclear stiffness in Hutchinson-Gilford progeria cells: Effects of farnesyltransferase inhibitors. *Aging Cell* 7(3):383-93, 2008..

Technical Session D1-W2-T1: Medicine, Public Health, Biomedical Science and Engineering (1)

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Fingerprinting ion channel dysfunction for treating cardiac arrhythmias

ABSTRACT

Cardiovascular disease is the No.1 killer in the developed world, and 50% of heart disease patients die of cardiac arrhythmias. Implantable devices such as pace maker and defibrillator have prolonged life span of many patients. However, anti-arrhythmia drug therapies are urgently needed to treat tissue and cell level deteriorations to alleviate the need for using more devices and heart transplants. Yet the history of anti-arrhythmia drug therapies in the past decades has been dismal. Previous drug designs often used specific ion channel blockers, but some of those drugs turned out to be pro-arrhythmic. We reasoned that in a complex nonlinear system such as the heart, it is very difficult to predict the effect that blocking one channel may have on the other currents and the integrated system. Further compounding the difficulty are the multiple changes in channels/transporters and Ca^{2+} handling molecules that occur in heart diseases, which work concertedly to cause arrhythmogenic action potentials. Hence, to understand the arrhythmia mechanisms we need to know the *balancing act* of many ion channels (analogous to the ying-yang concept in Chinese philosophy). I will present our work on developing an innovative electrophysiology technique to measure many ionic currents in the single cardiac cell, which provides a powerful tool for understanding how diferent ion channels interact to shape the cardiac action potential under physiological & pathological conditions. New knowledge gained from these studies will be used to design effective anti-arrhythmias drug therapies.

BIOGRAPHY

Dr. Ye Chen-Izu (陈晔) was born and received K-12 education in Nanjing, China. She earned a B.S. degree in physics and a M.S. degree in bioengineering at the Tsinghua (or Qinghua) University, Beijing, China in 1988. She came to the United State and obtained a Ph.D. degree in biophysics under the direction of Dr. Frederick Sachs at the State University of New York at Buffalo in 1994. Then she decided to use her quantitative science background to conduct interdisciplinary research in cardiac muscle electrophysiology and heart disease mechanisms. To bridge the 'hardcore' biophysics with the 'soft cell' physiology, she obtained post-doctoral training in the molecular and cellular physiology in 1995 and did a Staff Fellowship in the Cardiovascular Sciences at the National Institute on Aging in 1996-1999. After then, she entered the Interdisciplinary Muscle Biology Program at the University of Maryland, and conducted research in the Cardiology Division.

In 2003, she received an American Heart Association National Center Scientist Development Award to study the mechanism of hypertension-induced heart diseases. In 2005, she joined the faculty of the Department of Medicine at the University of Kentucky. In 2009, she became an Assistant Professor (tenure track step IV) with joint appointment in the Departments of Bioengineering, Pharmacology, and Internal Medicine/Cardiology at the University of California, Davis, USA. She has an established track record on interdisciplinary research in the areas of ion channel biophysics, cardiac excitation–contraction

coupling and heart disease mechanisms. She has published 30 original research articles in scientific journals and books.

Dr. Chen-Izu is a premier professional member of the American Heart Association/American Stroke Association and a long time member of the Biophysical Society. She also serves on the grant review panels of the National Science Foundation and the American Heart Association. Listed below are her selected publications:

1. Sham JSK*, Song L-S, **Chen Y**, Deng L-H, Stern MD, Lakatta EG, and Cheng H*. Termination of Ca^{2+} release by a local inactivation of ryanodine receptors in cardiac myocytes. *Proceedings of National Academy of Sciences USA* 95:15096-15101 (1998).
2. **Chen-Izu Y**, Xiao R-P*, Izu LT, Cheng H, Kuschul M, Spurgeon H, and Lakatta EG. G_i-dependent localization of -adrenergic receptor signaling to L-type Ca^{2+} channels. *Biophysical Journal* 79:2547-2556 (2000).
3. **Chen-Izu Y**, Sha Q, Shorofsky SR, Robinson SW, Wier WG, Goldman L, and Balke CW*. $I_{Ca(TTX)}$ channels are distinct from those generating the classical cardiac Na^+ current. *Biophysical Journal* 81:2647-2659 (2001).
4. **Chen-Izu Y**, Moreno AP, Spangler RA. Opposing gates model for voltage gating of gap junction channels. *American Journal of Physiology* 281:C1604-C1613 (2001).
5. Kirk MM, Izu LT, **Chen-Izu Y**, McCulle SL, Wier WG, Balke CW, and Shorofsky SR*. Role of the transverse-axial tubule system in generating calcium sparks and calcium transients in rat atrial myocytes. *Journal of Physiology* 547(2):441-451 (2003).
6. Leighton T Izu, Shawn Means, John Shadid, **Y. Chen-Izu**, C. William Balke. Interplay of Ryanodine Receptor Distribution and Calcium dynamics. *Biophysical Journal* 91:95-112 (2006)
7. **Chen-Izu Y,** Stacey L. McCulle, Chris W. Ward, Christian Soeller, Bryan M Allen, Cal Rabang, Mark B Cannell, C William Balke, Leighton T. Izu*. Three-dimensional Distribution of Ryanodine Receptor Clusters in Cardiac Myocytes. *Biophysical Journal* 91:1-13 (2006)
8. Banyasz T[&], **Chen-Izu Y[&],** Balke CW, Izu L. A New Approach to the Detection and Classification of Ca^{2+} Sparks. *Biophysical Journal* 92:4458-4465 (2007) [& equal contribution]
9. **Chen-Izu Y**, Chris W. Ward, Wayne Stark Jr., Marius P. Sumandea, C. William Balke, Leighton T. Izu. Xander H.T. Wehrens. Phosphorylation of RyR2 and shortening of RyR2 cluster spacing in spontaneously hypertensive rat with heart failure. *Am J Physiol* . 293(4):H2409-17 (2007)
10. Izu LT, Banyasz T, Balke CW and **Chen-Izu Y.** Eavesdropping on the Social Lives of Ca^{2+} Sparks. Biophysical J 93:3408-3420 (2007)
11. **Chen-Izu Y**, Ling Chen, Tamás Bányász, Stacey L. McCulle, Steven M. Scharf, Leighton T. Izu, C. William Balke. Hypertension-induced remodeling of cardiac excitation-contraction coupling in ventricular myocytes occurs prior to hypertrophy development. *Am J Physiol*. 293:H3301-3310 (2007)
12. Leighton T Izu, Támás Bányász, **Chen-Izu Y.** Ca^{2+} dynamics, Ca^{2+} waves and the topography of the Ca^{2+} control system. *UNESCO Encyclopedia* (2009)
13. **Chen-Izu Y.** Multiple levels of the single L-type Ca^{2+} channel conductance in adult mammalian ventricular myocytes. *Biochem. Biophys. Res. Comm.* 391(1):604-608 (2009). PMC2818605
14. Tamas Banyasz, Balazs Horvath, Zhong Jian, Leighton T. Izu and **Chen-Izu Y**. Sequential dissection of multiple ionic currents in single cardiac myocytes under action potential-clamp. *Journal of Molecular and Cellular Cardiology*. 2011; 50:578-581. PMC3047417

15. Bányász T, Szentandrássy N, Tóth A, Nánási PP, Magyar J, **Chen-Izu Y**. Cardiac calmodulin kinase: a potential target for drug design. *Curr Med Chem.* 2011; 18(24):3707-13.

Tamas Banyasz, Balazs Horvath, Zhong Jian, Leighton T. Izu, **Chen-Izu Y**. Profile of L-type Ca^{2+} current and Na^{+}/Ca^{2+} exchange current during a cardiac action potential in ventricular myocytes. *Heart Rhythm.* 2012;9(1):134-42.

Technical Session D1-W2-T1: Medicine, Public Health, Biomedical Science and Engineering (1)

Toward an Imaging-Based Atlas of the Mouse Myocardial Fiber Structure

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ABSTRACT

Material and functional properties of the myocardium are highly dependent on the complex but highly organized structures of the tissue. Consequently, imaging-based models or atlases of the fiber structure of the heart are highly desirable for computational analyses of its electrophysiological and biomechanical activities. Despite that the mouse species has become a preferred platform for studying cardiac diseases, to date, few computational models and no atlas exist for even the normal mouse heart. Construction of a myocardial structural atlas necessitates advances in both methods for efficient and accurate fiber orientation measurement, and since fiber orientations are vector rather than scalar quantities, appropriate techniques for computational anatomical and statistical analyses.

By characterizing the anisotropy of tissue water diffusion exerted by the molecular environment, the so-called magnetic resonance diffusion tensor imaging (MR-DTI, or DTI for short) has emerged as a preferred alternative to conventional histology for quantifying the structures of ordered tissues including the myocardium. However, practical applications of DTI are hampered by its inherently low SNR, large dataset size (i.e., long scan times), and by tradeoff, relatively low spatial resolution. To accelerate the DTI data acquisition, we have introduced a novel approach that combines reduced sampling and constrained reconstruction, and showed it to significantly improve the data acquisition-time efficiency (i.e., measurement accuracy versus scan time). The methodology was successfully applied to DTI of the fixed mouse heart to demonstrate the practical feasibility of 3D, non-destructive mapping the myocardial fiber orientation with ~5° accuracy at 100 μm spatial resolution, allowing orders of magnitude more measurement points than that achievable by histology.

Preliminary computational anatomical analysis of the DTI-derived myocardial fiber structure, which includes creation of an unbiased atlas of the gross anatomy, warping of the fiber structure represented by the fiber helix angles, and principal component analysis (PCA) of the results, reveals that the fiber orientation of the left ventricle can be sufficiently modeled as a linear function of the transmural distance. Moreover, the structural variability across different heart specimens is comparable to that among different regions within individual specimens. And the variability largely exist in the offset, and to a lesser degree, the slope of the transmural helix angle profile.

Combined, these developments and findings are extremely encouraging, and pave the way for the construction of imaging-based fiber structural atlas of the mouse heart.

BIOGRAPHY

Edward W. Hsu (徐偉傑) was born in Kaohsiung, Taiwan, in 1966. He received a B. A. Sc. degree with honors in engineering physics from the University of British Columbia, Vancouver, Canada, in 1990, and Ph. D. in biomedical engineering for high-resolution magnetic resonance imaging (MRI) of a single cell model of brain ischemia from Johns Hopkins University, Baltimore, Maryland.

He received post-doctoral training at the Center for In Vivo Microscopy at Duke University, where he also received faculty appointment in Biomedical Engineering. He is currently an Associate Professor of Bioengineering and Director of Small Animal Imaging Core Facility at the University of Utah in Salt Lake City, Utah. His main research interests are in developing advanced imaging techniques such as MR diffusion tensor imaging and applying them to studying the structure-function relationships of tissues.

Dr. Hsu is a member of the International Society of Magnetic Resonance in Medicine (ISMRM), IEEE and Biomedical Engineering Society (BMES), has to date over 45 peer-reviewed journal article publication, 90 conference abstracts and 4 book chapters, and regularly serve as a reviewer for leading scientific journals and national and international research agencies

Technical Session D1-W2-T1: New Materials Science and Engineering, Nanotechnology (1)

Development of nanoparticle-based brain tumor therapeutic system

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ABSTRACT
Malignant glioma is a common and severe primary brain tumor with a high recurrence rate and a poor prognosis. Because of the infiltrative nature of malignant brain tumor, tissues surrounding the tumor that remain after surgery might contribute to recurrence. Intravenously administered chemotherapeutic drugs have limited use because of their adverse systemic effects and poor blood – brain barrier penetration. Thus, development of an effective new therapeutic system against malignant brain tumor is in urgent need. In this study, we combine two methods to increase drug delivery to brain tumors: focused ultrasound transiently permeabilizes the blood – brain barrier, and magnetic force concentrates magnetic nano-particle drug carriers in target area. The physicochemical properties of the nano-particles also permit the distribution of the particles in the brain to be monitored by magnetic resonance imaging. By using this system for treatment of brain tumor animals, it reveals the tumor size is significantly shrunken and the survival time is prolonged. Our preliminary data demonstrated the great potential of this system for treatment of brain tumor. Such innovative applications of emerging technologies promise to provide more effective means of tumor treatment, with lower therapeutic doses and potentially fewer side effects.

BIOGRAPHY
Dr. Chiungyin Huang received her received his Ph.D. degree in tropical medicine from the National Yang-Ming University, Taipei, Taiwan. Her Ph.D. dissertation was focused on the molecular engineering of innate immunity related genes of infection carrier mosquito. She received his B.Sc. and M.Sc. degrees in pharmacy from Kaohsiung Medical University in Kaohsiung city, Taiwan.

She has more than ten-year professional work experiences in academia. Since she has great interest in medicine, she joined the department of Endocrinology, Kaohsiung Medical University Hospital, as a RESEARCH ASSISTANT in studying diabetic nephropathy. Where she was trained well in translation medicine study. In 2006, she worked as a POSTDOCTORAL RESEARCH FELLOW at Department of Neurosurgery, Chang Gung Memorial Hospital at Dr. Kuochen Wei's laboratory. She works on discovery of biomarkers for malignant brain tumor, and development of novel brain tumor therapeutic system.

Dr. Huang is a member of the Society for NeuroOncology. Recently, she and her colleague are working on development of a novel brain tumor therapeutic system. They use nanoparticle to carry chemotherapeutic agents, and transiently open blood brain barrier by focused ultrasound for enhancement of drug delivery. Their works were published on PNAS, Biomaterials and NeuroOncology.

Technical Session D1-W3-T1: New Materials Science and Engineering, Nanotechnology and New Green Energy (1)

Session Organizer & Chair

Transparent Photovoltaics

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BIOGRAPHY

P.C. Ku received his BS degree from National Taiwan University in 1995 and PhD degree from University of California at Berkeley in 2003, both in Electrical Engineering. During PhD study, he was a recipient of the Berkeley Fellowship. From 2003-4, he was a postdoctoral researcher in DARPA Center for Optoelectronic Nanostructured Semiconductor Technology. From 2004-5, he was with Intel Corporation, working on advanced lithography and phase-change memory. He joined the University of Michigan as an assistant professor in 2006. His current research focuses on nanoscale materials and structures for energy efficient photonic applications. He has received Ross Tucker Memorial Award in 2004 and DARPA Young Faculty Award in 2010.

Technical Session D1-W3-T1: New Materials Science and Engineering, Nanotechnology and New Green Energy (1)

3D Bioactive Microspheres for Stem Cell Culture and Encapsulation

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ABSTRACT

The finite amount of cells that can be extracted from an individual might be an impediment in doing experiment. Monolayer cell expansion on cultivating plate is a general way to proliferate cells. Though it is easy to operate, it has the problem of maintaining the phenotype and causing the loss in cell-extracellular (ECM) interactions by proteolytic enzyme treatment. To improve cell the ability of proliferation and to maintain cell phenotype at the same time, we use 3T3 fibroblast, HeLa (cervical cancer cell) and, hASC(human adipose-derived stem cell) as our research model. By tuning parameters of 3D cell expansion using BioLevitator with these three cell types, the cell proliferation profile/curves by means of both 2D and 3D cell expansion methods will be obtained and compared.

Besides developing the protocol for the selected cell types, we focus on the characterization and application of stem cell (hASCs). We hypothesize that the microcarrier expansion strategies can not only increase the stem cell numbers in short time but also receive the goal of anti-stem cell aging by comparing various in vitro properties of two culture systems. It is also hypothesized that the stemness of hASCs can be maintained by reducing the passage number during expansion and the three dimensional surface and material stiffness which is more relevant to the physiological environment.

The hASCs obtained via microcarrier culture BioLevitator system (uniform magnetic field and rotating culture bioreactor) will be encapsulated in the RGD modified alginate microspheres by air pressure driven device. Microspheres surface crosslinked with oligopeptides can serves as the biomimetic three dimensional porous construct for cells to reside in. In addition, the microspheres will also serve as a cell delivery vehicle to improve transplantation efficiency for the future in vivo experiment.

BIOGRAPHY

Jiashing Yu, female, obtained her Ph.D. degree from UC Berkeley/UC San Francisco joint Bioengineering program in summer, 2008. She performed my graduate student research at Prof. Randall J. Lee's Lab of Cardiac Tissue Engineering. During the Ph.D. career, Jiashing explored multiple biomaterial and stem cell approaches toward the repair of myocardial infarction in a rat animal model.
During 2008-2010 Jiashing was a postdoctoral research fellow at the Cardiovascular Research Institute at UCSF's Department of Medicine. She learned the electrospinning technique for vascular graft application. Meanwhile, she also learned the differentiation of a government-approved human embryonic stem cell line (hESC) to cardiomyocytes (CM) toward cardiac tissue repair application.

She relocated back to Taiwan and in July 2010 and is currently an Assistant Professor at Department of Chemical Engineering, National Taiwan University. Her current research interests include cell and protein drug encapsulation in the biological derived materials, cell expansion on the 3D microcarriers and microfluidic. Several specific topics are:

-Cell encapsulation and culture in alginate-based microspheres using air pressure driven device
-Controlled drug release of microcapsules made of Biological derived materials
-Validation of 3D culture system and its application in hASCs(human adipose-derived stem cell) expansion.

-Biological microbubbles for Cardiomyocyte

Technical Session D1-W3-T1: New Materials Science and Engineering, Nanotechnology and New Green Energy (1)

Biomimetic Strategies for Engineering Protein- and Lipid-Based Biomaterials

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ABSTRACT

Nature has been a source of inspiration in engineering complex yet elegant and functional materials. For instance, structural proteins can self-assemble into nanostructured fibers, constituting intra/extracellular matrices. Likewise, lipid bilayers define the boundaries of cells, regulate intra/extracellular trafficking of matters, and provide a dynamic yet stable template for various membranes proteins to function properly. By mimicking nature, new biomaterials may be engineered for a variety of applications. In this talk, two examples of using biomimetic strategies for biomaterials design are discussed.

First, using genetic engineering and recombinant protein techniques, a series of silk-elastinlike proteins (SELPs) consisting of polypeptides sequences derived from silkworm silk and mammalian elastin has been produced. Consequently, a new set of physical, optical, self-assembly, controlled release properties that are unattainable from the parent proteins alone have been obtained. Potential applications of various SLEP structures in tissue engineering, ocular drug delivery, and three-dimensional cell culture are explored.

Second, a new class of organic-inorganic hybrid lipids has been designed and synthesized, leading to the engineering of various, highly stable lipid structures, such as lipid nanovesicles, nanofibers, and patterned structures. The potential of these lipid structures for controlled and targeted drug delivery and functional antibody immobilization are examined.

BIOGRAPHY

Xiaoyi Wu was born in Tongcheng, Anhui, People's Republic of China. He received his BS in mechanics from University of Science and Technology of China and MS in mechanical engineering from Tsinghua University, respectively. After receiving his PhD degree in mechanical engineering from the Johns Hopkins University in 2003, he completed his postdoctoral training in the fields of biomaterials and bioengineering at Emory University School of Medicine in Atlanta, Georgia.

He was appointed as a tenure-track assistant professor in the Department of Aerospace and Mechanical Engineering Department at University of Arizona in the fall of 2006. Currently, he is an associate professor of mechanical engineering and biomedical engineering at University of Arizona. While he teaches mechanical engineering, his research focuses on biomimetic biomaterials and their applications in tissue engineering and drug delivery. He has over 30 referred publications in these fields.

Prof. Wu is a member of Society for Biomaterials and American Society of Mechanical Engineers.

Technical Session D1-W3-T1: New Materials Science and Engineering, Nanotechnology and New Green Energy (1)

Nanobiology: Investigating Biological Processes at the Nanoscale

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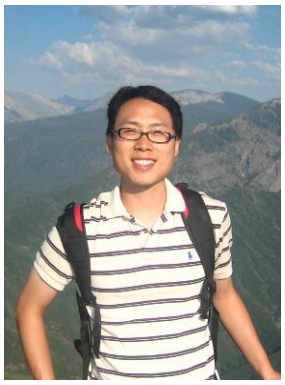
ABSTRACT

With the rapid advancement of nanoscience, investigating biology in the nanoscopic world is of increasing interests among physical scientists and providing new directions for modern medicine. New experimental tools are developed to both perturb and probe biomolecular processes inside and on the membrane of cells. Two new approaches for applying mechanical forces on biomolecules will be introduced, one through DNA molecular springs and the other through local manipulation of electrostatic interactions. These approaches allow us to control the function of biomolecules such as the catalytic reaction of enzymes and the current flow of ion channels.

To probe biomolecules with nanometer resolution, operating atomic force microscope (AFM) in fluidic environments has revealed unprecedented information of biomolecules. Newly developed AFM techniques for nanobiology in Stanford will be presented. First, high-bandwidth AFM is developed to resolve the rapid interaction between peptides and cell membrane. For example, cell-penetrating peptides (CPPs) have been used to successfully deliver drugs into cells through unclear mechanisms. Our approach provides new biophysical characterization of CPPs that will lead to rational design of new CPPs for medical applications. Finally, a new AFM imaging technique using high-bandwidth interferometric cantilevers will be demonstrated. This imaging technique is capable of measuring sample stiffness and adhesion simultaneously while scanning across the cell membrane using the so-called tapping mode AFM. Using AFM tip functionalized with specific ligands, protein receptors on the cell membrane are imaged with nanoscale resolution that will help understanding the relation between the spatial organization of receptors and cellular functions.

BIOGRAPHY



Andrew Yu-Jen Wang was born in Houston, Texas on September 6th, 1982. Mostly raised and educated in Taiwan, he obtained his undergraduate Bachelor of Science (BS) degrees in both physics and life science from National Taiwan University (Taipei, Taiwan) in 2004. He then continued his graduate training in University of California Los Angeles (UCLA, California, U.S.A.) under Prof. Giovanni Zocchi and earned his PhD degree in biophysics in 2010.

He worked briefly as a Research Assistant with Prof. Lin I (Physics, National Central University, Taoyuan, Taiwan) from July 2004 to Augest 2005 on biophysics of neural networks. During the graduate school from 2005-2010, he taught 9 quarters of undergraduate physics lab as a Teaching Assistant. After graduating from UCLA, he worked for the same department as a Lecturer and taught collage physics in the fall of 2010. Later, he worked as a

Postdoctoral Scholar under Prof. Zocchi to study voltage-gated ion channels in the winter of 2011. He currently works with Prof. Manish Butte (Pediatrics) and Prof. Nick Melosh (Materials Science) as a Postdoctoral Scholar since the spring of 2011 in Stanford University (Stanford, California, U.S.A.). His research interests have mainly focused on the understanding of life phenomena and processes – from molecular scale, to sub-cellular level, and to organization of cells – using the approaches in experimental physics. His works were highlighted in published articles: "Elastic energy driven polymerization. 2009. *Biophys J.* 18;96(6):2344-52", "Elastic energy of protein-DNA chimeras. *Phys Rev E.* 17;80(6 Pt1):061912", and "Artificial modulation of the gating behavior of a K^+ channel in a KvAP-DNA chimera. *PLoS One.* 19;6(4):e18598."

Dr. Wang is the member of Biophysical Society, American Physical Society, and Materials Research Society. He was awarded Taiwan Merit Scholarship from National Science Council in Taiwan (2005-2006), Summer Research Fellowship (2007 summer), GAANN Fellowship (2005-2007), and Dissertation Year Fellowship (2009-2010) from UCLA, and Dean's Postdoctoral Fellowship at the School of Medicine in Stanford University (2012).

Technical Session D1-W3-T1: New Materials Science and Engineering, Nanotechnology and New Green Energy (1)

Enhanced Transfection Efficiency of PEGylated Cation Lipid-DNA Complexes Prepared with an Acid-Labile PEG-Lipid

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ABSTRACT

Cationic liposome–DNA (CL–DNA) complexes are being pursued as nonviral gene delivery systems for use in applications that include clinic trials. However, to compete with viral vectors for systemic delivery in vivo, their efficiencies and pharmacokinetics need to be improved. The addition of poly (ethylene glycol)-lipids (PEGylation) prolongs circulation lifetimes of liposomes, but inhibits cellular uptake and endosomal escape of CL–DNA complexes. We show that this limits their transfection efficiency (TE) in a manner dependent on the amount of PEG-lipid, the lipid/DNA charge ratio, and the lipid membrane charge density. To improve endosomal escape of PEGylated CL–DNA complexes, we have prepared an acid-labile PEG-lipid (HPEG2K-lipid, PEG MW 2000) which is designed to lose its PEG chains at the pH of late endosomes. The HPEG2K-lipid and a similar but acid-stable PEG-lipid were used to prepare PEGylated CL–DNA complexes. TLC and dynamic light scattering showed that HPEG2K-CL–DNA complexes are stable at pH 7.4 for more than 24 hours, but the PEG chains are cleaved at pH 5 within one hour, leading to complex aggregation. The acid-labile HPEG2K-CL–DNA complexes showed enhanced TE over complexes stabilized with the acid-stable PEG-lipid. Live-cell imaging showed that both types of complexes were internalized to quantitatively similar particle distributions within the first 2 hours of incubation with cells. Thus, we attribute the increased TE of the HPEG2K-CL–DNA complexes to efficient endosomal escape, enabled by the acid-labile HPEG2K-lipid.

BIOGRAPHY

I was born and raised in Taipei. There are six members in my family, and I am the elder sister. Thus, being responsible, I always ask myself to run for better.

Since coming to Chung-Li to study at university, I have been starting to try my best getting used to any interpersonal relationship in the city. With that, beyond the text book knowledge, I've learned the different thoughts resulted from the different living background. In my grad school, my professor, Lin I, taught me no matter how complicated the work was, I could find the key through the basic theory. The philosophy is a key leading me to do research successfully. My research in the grad school was focused on the micro-dynamics of strongly coupled Coulomb liquid in confined channels. In the scientific self-achievement, I not only published few papers in very good journals (e.g. PRL), but also got some significant awards (e.g. Chien-Shiung Wu Fellowship). However, beyond science, I also learned how to be a team leader to take a lead in the lab. I got my bachelor, mater, and PhD degrees in Chung-Li, this city. Therefore, this city is almost like my hometown.

Due to extending my research experience, I came to University of California, Santa Barbara.

A smooth and stable life is the one I beg. It's almost impossible for me to strive for fame and wealth. Besides, I am filled with ambition to be a good researcher. That's why I choose this job. I think this job and its circumstance can give me what I want. I wish I could join your team. I will do my best to contribute myself here.

Technical Session D1-W1-T2: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (2)

Session Organizer & Chair

Shau-Shiun (James) Jan

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BIOGRAPHY

Dr. Shau-Shiun (James) Jan received his B.S. degree in Aerospace Engineering from Tamkang University in 1994. In 1997, he entered the Department of Aeronautics and Astronautics, Stanford University, to pursue higher degree in Guidance, Navigation, and Control fields. He has his M.S. and Ph.D. degrees in 1999 and 2003, respectively, under the supervision of Professor Per Enge. His main research topic is to develop new algorithms for using a modernized three-frequency (L1, L2, L5) Global Positioning System (GPS)/Wide Area Augmentation System (WAAS) receiver and barometric altimeter, that is robust to bad weather, disturbed ionosphere, and radio frequency interference. The research allows aviation users to operate longer and with significantly greater availability in the presence of these threats versus single frequency GPS/WAAS.

Immediately after his Ph.D. program, Dr. Jan joined the Federal Aviation Administration (FAA), contracted via Advanced Management Technology, Inc., Arlington, Virginia, as a Senior Systems Engineer in October, 2003. He worked in the WAAS Program Office of the Satellite Navigation Product Teams where he developed the Minimum Operational Performance Standard for GPS/WAAS Airborne Equipment (RTCA-DO229) for the new GPS L5 frequency user. Dr. Jan investigated and identified the necessary tasks to improve the service availability and continuity of current WAAS.

In February 2004, Dr. Jan joined the Department of Aeronautics and Astronautics, National Cheng Kung University (NCKU) as an Assistant Professor. Now, he is an Associate Professor and group leader in the Institute of Civil Aviation of the same department at NCKU, and he directs the Communication and Navigation Systems Laboratory at NCKU. Since 2004, he devoted himself to the research of GPS augmentation system design, analysis, and application to civil aviation. During these years, his laboratory has developed four operational systems for civil aviation in Asia Pacific region, and they are the APEC GNSS Test Bed, the RAIM prediction system for the new ATM system, the real-time RAIM system for airport controller, and Integrity Monitor Test Bed for Kaohsiung International Airport. All these systems are supported by Air Navigation and Weather Service (ANWS), Civil Aeronautics Administration (CAA) and Taiwan National Science Council (NSC).

Technical Session D1-W1-T2: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (2)

Decision Making under Uncertainty with Application to Air Traffic Management

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ABSTRACT

Air traffic management at the strategic time frame (with 2-15 hours look-ahead time) can significantly improve the safety and efficiency of the National Airspace System (NAS). However, decision-making at this long look-ahead time is complicated by a variety of uncertainties, the most prominent of which are demand and weather uncertainties. The intuitive Monte Carlo approach to find optimal management solutions involves enumerating all pairs of weather and demand ensembles. As both weather and demand are stochastic processes, this procedure results in a very large ensemble space and intensive simulations. To permit real-time management at a NAS level, we are in critical need of effective and systematic approaches to quickly 1) assess the impact of uncertain weather, and 2) design optimal management strategies under weather and demand uncertainties. In this talk, I will introduce an integrated weather-demand-management modeling framework to capture the uncertain traffic dynamics and environmental impact. Using this integrated modeling framework, I will introduce several promising techniques, including the Jump-Linear analysis and the Probabilistic Collocation Method for effective weather impact evaluation and optimal management design. We envision that the interfaced modeling framework and analysis methods hold promise to inform strategic flow contingency management (FCM) in the NextGen.

BIOGRAPHY

Yan Wan received the B.S. degree from Nanjing University of Aeronautics and Astronautics, Nanjing, China in 2001, the M.S. degree from The University of Alabama, Tuscaloosa, AL in 2004, and the Ph.D. degree from Washington State University, Pullman, WA in 2009.

She is currently an Assistant Professor with the Department of Electrical Engineering, University of North Texas, Denton. Before that, she worked as a postdoctoral scholar in the Control Systems program at the University of California at Santa Barbara. Her research interest lies in decision-making tasks in large-scale networks, with applications to air traffic management, sensor networking, biological systems, etc.

Dr. Wan is a member of IEEE and AIAA. She is the author and co-author of more than 70 publications. She was the recipient of the prestigious William E. Jackson Award (Excellence in aviation electronics and communication), presented by Radio Technical Commission for Aeronautics (RTCA), an advisory group for the Federal Aviation Agency, 2009.

Technical Session D1-W1-T2: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (2)

Dr.

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ABSTRACT

Robust Alternative Position Navigation and Time (APNT) systems for Aviation

Abstract:

Supporting more efficient operations and higher capacity airspace needed to support future air transportation requires a robust and high performance position navigation and timing (PNT) infrastructure. While Global Positioning System (GPS) and other Global Navigation Satellite Systems (GNSS) will be the backbone of this infrastructure, additional systems will be necessary to ensure safe and continuous service. The Federal Aviation Administration (FAA) is developing alternative PNT (APNT) systems in order to minimize the impact a degradation of GPS and GNSS. APNT will leverage existing terrestrial infrastructure to provide a robust means to continue and maintain economically important operations during periods when GNSS services are not available.

This talk will cover our APNT research efforts. It will highlight the candidate technologies and infrastructure that is being developed for APNT. These are: 1) an improved distance measuring equipment (DME) infrastructure, 2) passive multilateration, and 3) ground based passive ranging ("pseudolites"). It will use these systems to showcase the research that goes into the design and analysis of a safety of life aviation navigation system. Specifically, key performance requirements examined for these systems are accuracy, coverage, capacity, and integrity. Example analysis conducted so far will be presented to illustrate important concepts.

BIOGRAPHY

Sherman Lo attended Stanford University in Stanford, California and graduated with a M.S. in aeronautics and astronautics in 1995, a M.S. in engineering economic systems and operations research in 1998 and a Ph.D. in aeronautics and astronautics in 2002. He also attended the University of Maryland in College Park, Maryland graduating in 1994 with a B.S. in aerospace engineering and B.S. in mathematics.

He is currently a Senior Research Engineer at the Stanford University Global Positioning System (GPS) Laboratory in Stanford, California. He is the Associate Investigator for the Stanford University efforts on the Federal Aviation Administration (FAA) evaluation of alternative position navigation and timing (PNT) systems for aviation. In this

effort, he is developing aviation PNT systems that are robust to GPS interference. From 2002-2009, he served as Associate Investigator for the Stanford efforts on the Department of Transportation's technical evaluation of Loran. He co-authored the Loran technical evaluation completed in 2004. He has over 60 conference, 11 journal and 8 magazine publications. Recent magazine articles include: "Assessing the Security of Navigation System: A case study using enhanced Loran," Coordinates, Sept 2010 and "Detecting False Signals with Automatic Gain Control," GPS World, April 2012. Dr. Lo has 6 issued patent, including "Authenticating a signal based on an unknown component thereof," US Patent # 7,969,354, issued June 28 2011, and 2 pending U.S. patents.

Dr. Sherman Lo has been a member of several professional organizations including, American Institute of Aeronautics and Astronautics (AIAA), Institute of Navigation (ION), International Loran Association (ILA) and Institute of Electrical and Electronics Engineers (IEEE). He has been a Technical Chair for ION Global Navigation Satellite Systems (GNSS) conference (2007), the ILA Symposium (2007) and the IEEE/ION Position Location and Navigation Symposium (PLANS) (2012). He currently serves as the secretary for ION Northern California chapter, ION Meetings Chair and is a member of the ILA board. For his work and efforts, he has received the ION Early Achievement Award (2005), the ILA Polhemus Student paper award (2000), ILA President's Award (2003) and ILA Medal of Merit (2009), and the Royal Institute of Navigation (RIN) Michael Richey Medal best paper winner (2011).

Technical Session D1-W1-T2: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (2)

Modeling and Computation for Large-scale Air Traffic Flow Optimization

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ABSTRACT

National air traffic flow management is a very challenging problem due to many reasons, among which is the very large size of the air transportation network. This talk will present a solution which speeds up the optimization process for air traffic at a national level. In this work, air traffic is modeled using a Link Transmission Model, to which a dual decomposition method is applied to optimize the traffic. In this large-scale problem, a master problem and approximately 10,000 independent subproblems are formulated, and these problems are solvable using personal computers; in particular, the subproblems can be solved in parallel using standard parallel computing techniques, and a parallel computing framework will be presented for the air traffic flow optimization problem. The master problem is solved on a server, and a client cluster is deployed to solve the subproblems such that the most computationally intensive part of the optimization can be executed in parallel. The sever and the clients communicate via TCP/UDP. An adaptive job allocation method is developed to balance the workload among each client, resulting in a maximized utilization of the computing resource. Experimental results show that compared to an early single process solution, this parallel computing framework considerably increases the computational efficiency. The runtime of a two-hour nationwide air traffic flow optimization is reduced from two hours to six minutes with a nine-client cluster.

BIOGRAPHY

Dengfeng Sun was born in Jiangsu Province of China. He received a bachelor's degree in precision instruments and mechanology from China's Tsinghua University in 2000, a master's degree in industrial and systems engineering from the Ohio State University in 2002, and a PhD degree in civil engineering from the University of California – Berkeley in 2008.

His research areas include control and optimization, with an emphasis on applications in air traffic flow management, dynamic airspace configuration, and studies for the Next Generation Air Transportation System (NextGen). He has published more than forty papers in these areas. His research is sponsored by the National Science Foundation, the National Aeronautics and Space Administration, and the Federal Aviation Administration.

Prof. Sun is a member of the IEEE and the AIAA.

Technical Session D1-W2-T2: Medicine, Public Health, Biomedical Science and Engineering (2)

Session Organizer & Chair

Intra-Uterine Calorie Restriction Regulates the Placental DNA Methylation Profile Influencing Fetal Development and Adult-type Chronic Diseases

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BIOGRAPHY

Dr. Pao-Yang Chen was born in Taipei, Taiwan. He received a bachelor's degree from National Cheng Kung University, a M.S. from National Taiwan University. In 2008, he received his DPhil (Ph.D) degree in statistics (computational biology) from Oxford University, United Kingdom.

In 2009, he joined Matteo Pellegrini's laboratory at Department of Molecular, Cell and Developmental Biology, University of California, Los Angeles. His research covers several topics that are all related to DNA methylation profiles generated from the next generation sequencing, such as comparing methylomes across human embryonic stem cell lines, and studying the relationship between nucleosome positioning and DNA methylation. In addition, he has been developing methods and software tools specifically for analyzing methylation data. He is extending his research to study samples from different organisms / tissues, and to integrate other biological data from high throughput sequencing. Dr. Chen will join the faculty of Institute of Plant and Microbial Biology, Academia Sinica, in Fall 2012.

Technical Session D1-W2-T2: Medicine, Public Health, Biomedical Science and Engineering (2)

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Lin

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ABSTRACT

Decades of efforts in protein characterization have created an extensive knowledge-base of protein structure and function, but attempts to utilize this knowledge to rationally engineer proteins for sensing or controlling cellular functions are still in their infancy. We have undertaken efforts in both of these areas. For sensing applications, we are using a structure- and evolution-guided approach to tuning the colors and increasing the brightness of fluorescent proteins to optimize the performance of genetically encoded biosensors for cellular signaling events. For control applications, we are using sequence-specific proteases to modify protein function in a drug-controllable manner. Our initial results support the potential of engineered proteins for biotechnological applications but also reveal the nature of current limitations to rapidly achieving globally optimized engineered proteins.

BIOGRAPHY

Michael Lin was born in Taipei, Taiwan, in 1973. Dr. Lin received an A.B. degree in Biochemistry *summa cum laude* from Harvard University (Cambridge, Massachusetts, 1994), a Ph.D. degree in Biological and Biomedical Sciences from Harvard Medical School (Boston, Massachusetts, 2002), and an M.D. degree from UCLA (Los Angeles, California, 2004).

Dr. Lin has been an Assistant Professor of Pediatrics and Bioengineering at Stanford University since 2009. Information concerning previous publications may be included. His research interests are in engineering proteins for sensing and controlling signaling dynamics in mammalian cells, with a specific interest in understanding mechanisms of neuronal plasticity.

Dr. Lin is an active member of the Biophysical Society, Society for Neuroscience, and the American Society for Cell Biology. He has published over 16 articles in research journals including *Cell*, *Neuron*, and *Chemistry and Biology*.

Technical Session D1-W2-T2: Medicine, Public Health, Biomedical Science and Engineering (2)

Using Ultrasound Standing Wave Fields to Enhance Gene Delivery Efficiency – For Both Viral and Non-Viral DNA Vectors

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ABSTRACT

Among variety of gene delivery approaches, ultrasound-induced cavitation (i.e., sonoporation) is one of the most developed methods in terms of physical strategy. However, this method is not easily scalable for mass applications. In addition, sonoporation may seriously disrupt cell membranes and cause lethal damage due to high acoustic intensity from inertial cavitation field, resulting in a tremendous limitation for clinical use. In this study, instead of looking into the effect of sonoporation, the potential of ultrasonic standing wave fields (USWF) to facilitate gene delivery efficiency was explored. We reasoned that, driven by the primary acoustic radiation force, suspended cells move to the pressure nodal planes first and form cell bands. Nanometer-sized DNA vectors, circulating between nodal planes by acoustic microstreaming, then use the cell agglomerates as the nucleating sites to attach on. As a result, the encounter opportunity between DNA vectors and target cells increases and further facilitates the gene delivery efficiency accordingly.

In this study, acoustic resonance in a tubular chamber was generated from the bottom piezoelectric transducer and consequently reflected by a borosilicate glass coverslip on the top. The USWF was conducted using 1 MHz with 25 $V_{p\text{-}p}$ intensity magnitude and 100% duty cycle for 5 min. The enhanced green fluorescence protein (EGFP)-encoded vesicular stomatitis virus G-protein (VSV-G) pseudotyped retroviruses and polyethyleneimine (PEI)-conjugated EGFP-encoded DNA plasmids were exploited as DNA vectors for viral and non-viral applications, respectively. K562 erythroleukemia cells were used for both examinations. The transduction (viral approach) / transfection (non-viral approach) efficiency was measured by detecting the cellular EGFP expression using fluorescent microscopy and fluorospectrometry.

Our results showed that USWF enabled to bring suspended K562 cells and DNA vectors into close contact at the pressure nodal planes, yielding up to 4-fold and 10-fold increase for transduction and transfection rates, respectively as compared with the group without ultrasound treatment. In summary, USWF offer a feasible means to enhance gene delivery efficiency with potential of large-scale setting.

BIOGRAPHY

Yu-Hsiang Lee was born in Taiwan R.O.C. He received the B.S. degree in chemical engineering department from Tunghai University, Taiwan, R.O.C. in 1998, the M.S. degree in chemical engineering department from University of Southern California, Los Angeles, CA USA in 2002, and the Ph.D. degree in chemical engineering department from University of Southern California, Los Angeles, CA, USA in 2006.

He held a Research Scientist position at Sierra Science LLC (Reno, NV, USA) in 2006-2008, working on drug discovery for telomerase-activating compounds. He was a Postdoctoral Fellow in Dental Research Institute at University of California, Los Angeles (CA, USA) in 2008-2010, working on salivary biomarkers discovery for cancer and type II diabetes. He is currently an Assistant Professor at Graduate Institute of Biomedical Engineering of National Central University in Taiwan R.O.C. His main research interests include the fields of ultrasound-mediated gene delivery, cell & tissue engineering, photobioreactor design, nanotechnology, and molecular diagnostics.

Technical Session D1-W3-T2: New Materials Science and Engineering, Nanotechnology and New Green Energy (2)

Session Organizer & Chair

Jung-Tsung Shen

Bio:
J.T. Shen received his PhD in Physics in 2003 from the Massachusetts Institute of Technology, where he worked on theoretical and computational investigations of electron-hole plasma, laser-gain profile, and metamaterials. Since 2003, he worked at Stanford University in the Ginzton Laboratory, focusing on photon transport in nano-photonics, metamaterials, plasmonics, and thermal and energy transport in nano-structures. In 2009, J.T. Shen joined the electrical and systems engineering department in Washington University in St. Louis.

Technical Session D1-W3-T2: New Materials Science and Engineering, Nanotechnology and New Green Energy (2)

Development of a M2M-based Agroecological Monitoring System – *Making the M2M Technology to Large-Scale Practices and Beyond*

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ABSTRACT

In recently years, the world is becoming over populated, and food resources and environments around the world have become most essential issues for the sustainable development of all mankind. Food resources and environmental conditions could influence peoples' quality of living, especially in developing countries. In this project, we propose a M2M-based agroecological monitoring system with large-scale, long-distance, long-term, scalable, and real-time data collection capabilities that is able to provide the capacities required for large surveillance projects in the future. The system consists of three major layers, i.e., the front-end sensing layer, the telecommunication layer, and the data collection and analysis layer. A Global System of Mobile Communication (GSM) module is used to enhance the ubiquitous monitoring capability of the system. The monitoring system has been deployed to investigate the population dynamics of *B. dorsalis* since August 2008. By connecting to the Internet, historical sensing data is available through a web-based decision support program, a pest population forecast model is developed to provide smart services to the farmers and government officials, and the system operators and the system itself are able to remotely control the operations of the devices deployed in wild-fields according to the status of the network. We believe that the system presented in this talk provides an potential example that serves as a generic framework for future development of M2M networks.

BIOGRAPHY

Richard (Cheng-Long) Chuang was born in Taipei City, Taiwan, R.O.C., in 1980. He received two B.S. degrees in electrical engineering and computer science and information engineering from Tamkang University, Taipei, Taiwan, in 2003, the M.S. degree in electrical engineering from Tamkang University, Taipei, Taiwan, in 2005, and two Ph.D. degrees in biomedical engineering and bio-industrial mechatronics engineering at National Taiwan University (NTU), Taipei, Taiwan, both in 2010.

He is currently a post-doctoral research fellow with Intel-NTU Connected Context Center, National Taiwan University, Taipei, Taiwan. Furthermore, he is also a collaborative researcher with the Department of Bio-Industrial Mechatronics Engineering, National Taiwan University, and an Adjunct Assistant Professor in the Department of Computer Science at National Taipei University of Education. His research interests are in the areas of wireless sensor networks, wireless communications, biomedical engineering, power systems, artificial intelligence, cryptography, optimal theory, IC design, cognitive psychology, and bioinformatics.

Dr. Chuang is a member of IEEE. He has authored/co-authored over 70 papers in different international journals, conferences, book chapters and technical reports. He receives the third place award from the national contest of FPGA system design in 2003, and the outstanding student-paper award from IEEE computational intelligence society in 2007.

Technical Session D1-W3-T2: New Materials Science and Engineering, Nanotechnology and New Green Energy (2)

Transparent Photovoltaics

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ABSTRACT

The exterior sidewalls and window façades of a large commercial building can receive a significant amount of solar insolation. This energy is, however, underutilized. Because 47% of the solar insolation is in the visible spectrum, one must consider the trade-off in harvesting the sunlight to produce electricity, while letting it through for illumination, aesthetic, and other benefits. At least two approaches have been attempted to resolve this dilemma. One approach simply trades energy harvesting efficiency with window transparency. For example, one can use striped or meshed solar cell networks to allow light to pass through the gaps; one can also use an ultrathin PV absorber to create a semitransparent effect or an absorber that absorbs only the infrared light. Module efficiencies are typically low due to incomplete energy harvesting. Another approach attempts to increase PV module efficiency by moving the light harvesting zone outside the light path for viewing, e.g. by inserting thin slices of solar modules into the window such that their surface normal is orthogonal to the window surface. But the shading effect and small window thickness limit the total electricity that can be generated from this method.

We recently proposed a new approach based on the fact that the majority of solar insolation received at the building sidewalls do not overlap with the building occupants' fields of view. Hence a solar material exhibiting angle selectivity can harvest sunlight without obstructing the view. In this talk, demonstrations of the concept will be given. It will be shown that a three-fold enhancement in the efficiency of a transparent photovoltaic solar cell can be achieved as compared to the prior approaches.

BIOGRAPHY

P.C. Ku received his BS degree from National Taiwan University in 1995 and PhD degree from University of California at Berkeley in 2003, both in Electrical Engineering. During PhD study, he was a recipient of the Berkeley Fellowship. From 2003-4, he was a postdoctoral researcher in DARPA Center for Optoelectronic Nanostructured Semiconductor Technology. From 2004-5, he was with Intel Corporation, working on advanced lithography and phase-change memory. He joined the University of Michigan as an assistant professor in 2006. His current research focuses on nanoscale materials and structures for energy efficient photonic applications. He has received Ross Tucker Memorial Award in 2004 and DARPA Young Faculty Award in 2010.

Technical Session D1-W1-T3: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (3)

Session Organizer & Chair

Wen-wen Tung

BIOGRAPHY

Wen-wen Tung was born in Taiwan on October 8, 1974. She graduated from the National Taiwan University with a B.S. degree in atmospheric sciences in 1996. In 2002, she received her Ph.D. in atmospheric sciences from the Department of Atmospheric and Oceanic Sciences at the University of California, Los Angeles, USA.

She has since worked in the United States as a postdoctoral researcher in the Advanced Study Program at the National Center for Atmospheric Research (2002-2004). In 2005, she was hired as an assistant professor in the Department of Earth and Atmospheric Sciences at Purdue University, and became an associate professor in 2011. She has conducted teaching, research, and committee services, in random order. Currently she is on sabbatical leave, doing research at the Courant Institute of Mathematical Sciences at New York University. Her specialties are physical, dynamical, and stochastic characterizations of multiscale tropical convective systems. Her method of inquisition has resulted in collaborative multidisciplinary research.

Prof. Tung is a member of the American Meteorological Society, the American Geophysical Union, the Society for Industrial and Applied Mathematics, and the Sigma Xi. She was awarded the 2002-2004 Advanced Study Program Postdoctoral Fellowship at the National Center for Atmospheric Research and 2011 College of Science Graduate Mentor Award at Purdue University. She has authored and coauthored more than thirty referred journal publications and one textbook.

Technical Session D1-W1-T3: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (3)

Harvesting Ocean Thermal Energy for Unmanned Underwater Explorations

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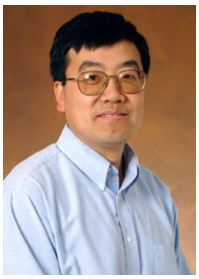
ABSTRACT

Unmanned Underwater Vehicles (UUVs) must be frequently recovered for battery change or recharging. This talk describes a new technology that can harvest energy from the natural temperature differences in the ocean. The innovation is to identify a Phase Change Material (PCM) that can be melted in warm waters and frozen in cold waters. This melting/frozen process can generate a significant volume change and therefore a high-pressure fluid that can drive a hydraulic motor for power generation and battery recharging. Results from the November 2009 deployment of a prototype thermally powered UUV funded by the Office of Naval Research will be described. The long-term goal is to use the renewable thermal energy in the ocean to power UUVs completely including buoyancy engine as well as navigation/communication and sensors. Future applications of this thermal-recharging power technology in detecting ocean temperature changes associated with the future climate change, monitoring ocean biogeochemical processes, listening environmental "noise" through acoustic sensors, and imaging the deep sea through both acoustic and optical sensors will be discussed.

BIOGRAPHY



Yi Chao received both the M.A. (1987) and Ph.D. degrees (1990) in atmospheric and oceanic sciences from Princeton University, and the B.S. degree (1985) from University of Science and Technology of China. After a 2-year postdoc at UCLA, he worked as a scientist at NASA's Jet Propulsion Laboratory, California Institute of Technology during 1993-2011. He was the Project Scientist for the Aquarius project during 2003-2011 developing the first NASA satellite mission to measure ocean salinity from space.

Since January 2012, he has been with Remote Sensing Solutions, Inc., as a Principal Scientist. He has published more than 70 peer-reviewed papers. He received NASA's Exceptional Achievement Medal in 2005 for setting a new standard for coastal oceanography by successfully demonstrating the capability of providing round-the-clock real-time data products based on satellite observations and numerical models. He was also funded by the US Navy to have successfully developed, deployed and recovered the first unmanned underwater vehicle that is completely powered by renewable energy using the ocean temperature difference. He is in the process of establishing a startup to commercialize this technology for underwater monitoring and explorations.

Technical Session D1-W1-T3: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (3)

Background ozone and carbon monoxide over the North Atlantic for 2001-2011

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ABSTRACT

The mountaintop PICO-NARE station located in the North Atlantic provides unique measurement of a variety of atmospheric species that can be used to examine the continental outflow from North America and evolution of atmospheric composition in the remote free troposphere. Long-term in-situ measurement of ozone and CO for 2001-2011 together with atmospheric chemical transport modeling results as well as satellite remote sensing data are examined in this study. The background ozone and CO have shown a slightly decreasing trend, possibly reflecting the emission reductions in North America during the past decade (which may have more than offset the impacts on North Atlantic background ozone and CO associated with increases in emissions from other regions). Additional factors that could potentially contribute to these decreases include climate change during this period. These hypotheses are tested through both statistical analysis and sensitivity model studies.

BIOGRAPHY

Dr. Shiliang Wu is an Assistant Professor at Michigan Technological University in Houghton, MI. He got his PhD in atmospheric chemistry in 2007 from Harvard University where he continued as a post-doc research fellow before joining Michigan Tech in 2009. He has authored or co-authored more than 20 peer-reviewed scientific journal articles and a book related to atmospheric chemistry and air quality. He received the Ralph E. Powe Junior Faculty Award from ORAU in 2010 and early career award from EPA in 2012.

Technical Session D1-W1-T3: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (3)

Modification of Hurricane Helene (2006) Development by Dust-Radiation-Cloud Interactions

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ABSTRACT

Saharan dust can modify the Saharan Air Layer (SAL) and its environment by changing the energy budget through direct and indirect radiative forcing. Scattering and absorption of radiation by suspended dust *directly* modifies the energy budget in the atmosphere and at the surface. Smaller dust particles can remain suspended in the air for prolonged periods and propagate over the Atlantic Ocean along with SAL. These fine particles can reach an altitude of 8-9 km, where they nucleate ice crystals and transform cloud microphysical properties, *indirectly* changing the energy budget. Thus, the dust within the air mass is likely to affect the evolution of hurricane properties, life cycles, and the corresponding cloud systems through the dust-cloud-radiation interactions.

A tracer model based on the Weather Research and Forecasting model (named WRFT) was developed to study the influence of dust-radiation-microphysics effects on hurricane activities. The dust-radiation effects and a two-moment microphysics scheme with dust particles acting as ice nuclei were implemented into WRFT. In this work, Hurricane Helene (2006), during 10-18 September 2006, was studied. Six high-resolution numerical experiments were conducted with the combinations of activating/deactivating dust-radiation and/or dust-microphysics processes, as well as different dust emission amounts. Results from these six experiments are compared to investigate the influence of dust-radiation-microphysics processes on Helene development.

BIOGRAPHY

Professor Shu-Hua Chen was born in Nantou, Taiwan. She received her B.S. degree in Atmospheric Science in 1993 from National Taiwan University in Taipei, Taiwan, and her M.S. (1995) and Ph.D. (1999) degrees in Atmospheric Science from Purdue University, West Lafayette, IN.

Shu-Hua was a postdoctoral researcher at National Center for Atmospheric Research in Boulder, CO for 2 years. She was there to help develop the Weather Research and Forecasting model, a current community mesoscale model. Shu-Hua taught one year in the Department of Atmospheric Science at National Central University, Taiwan in 2006-2007. She is now an Associate Professor in the Department of Land Air and Water Resources at University of California, Davis. Her major research interests are in regional climate change, cloud physics, orographic rainfall, data assimilation, and hurricanes using numerical modeling tools. Below are her recent publications:

Chen, S.-H., J.-Y. Chen, W.-Y. Chang, P.-L. Lin, P.-H. Lin, and W.-Y. Sun,2011: Observing System Simulation Experiment: Development of the system and preliminary results, J. Geophys. Res., 116, D13202, doi:10.1029/2010JD015103.

Chen, S.-H, S.-H. Wang, and M. Waylonis, 2010: Modification of Saharan air layer and environmental shear over the eastern Atlantic Ocean by dust-radiation effects, J. Geophys. Res., 115, D21202, doi:10.1029/2010JD014158.

Chen, S.-H. and Y.-C. Siao, 2010: Evaluation of an explicit one-dimensional time dependent tilting cloud model: sensitivity to relative humidity. J. Meteor. Soc. Japan, DOI:10.2151/jmsj.2010-201, 88, 95-121.

Dr. Chen. NASA Group Achievement Award to Genesis and Rapid Intensification Processes (GRIP), member of American Meteorological Society, member of American Geophysical Union, member of Hurricane Intensity Research Working Group, NOAA in 2006.

Technical Session D1-W2-T3: Medicine, Public Health, Biomedical Science and Engineering (3)

Session Organizer & Chair

Leslie Chen

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BIOGRAPHY

Dr. Leslie Chen received his Ph.D. degree in pharmacogenomics from the University of Cambridge in Cambridge, United Kingdom. His Ph.D. dissertation was conducted at the Wellcome Trust Sanger Institute (WTSI) under the supervision of Dr. Panos Deloukas. He received his B.Sc. and M.Sc. degrees in life science from National Tsing-Hua University in Hsinchu city, Taiwan.

He has more than seven-year professional work experiences in academia. In 2001, he joined the Institute of Biomedical Sciences, Academia Sinica, as a COMPUTATIONAL BIOLOGIST to develop bioinformatics algorithms for nucleotide sequences analysis. In 2007, he worked as a POSTDOCTORAL RESEARCH ASSOCIATE at the WTSI to expend his Ph.D project to identify the genetic factors underlying bleeding complication of warfarin treatment. In 2008, he was invited by Dr. Leroy Hood to join hist group at the Institute for Systems Biology (ISB) in Seattle as a POSTDOCTOAL FELLOW. In 2011, he was promoted to RESEARCH SCIENTIST position and is leading two research projects to study evolution of brain cancer genome and the development of GATA4 disruptive cardiomyopsy.

Dr Chen is a member of the International Warfarin Pharmacogenetics Consortium (IWPC). The novel algorithm for nucleotide sequence mapping that he and his co-worker developed was named "BLAST BUSTER" by the Genome Technology magazine in 2002. His recent publication in 2009 on BLOOD describing genetic forecasting of warfarin is selected by the Faculty of 1000 Medicine as 'Must Read'. More recently, he and his collaborators developed a new computational method for analyzing mRNA-seq was highlighted by GenomeWeb in December 2011.

Technical Session D1- W2-T3: Medicine, Public Health, Biomedical Science and Engineering (3)

Road to Innovation: Burgeoning Technology that will Change Neurosurgery

Abel Po-Hao Huang

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ABSTRACT

Recent burgeoning technology will significantly change the way of modern neurosurgical practice. These technology includes molecular imaging, nanotechnology, biomarkers, innovative medical devices, new surgical techniques, intra-operative and real time imaging, bioinformatics and cloud computing. The emerging field of neural engineering and prostheses will also help patients with disability after suffering from neurological diseases. Recent advances in genomics, proteomics, and biotechnology have provided unprecedented opportunities for translational research and personalized medicine. Personalized medicine has been applied recently for cell replacement therapy and brain tumor vaccine and its clinical application is still expanding. The concept of standard data collection with regard to clinical data, lab data, imaging data, biospecimen and pathological data will also improve the efficacy of our research. In the near future, personalized, preemptive and predictive medicine will change and improve clinical neurosurgical practice significantly. However, multidisciplinary collaboration from different fields is mandatory.

BIOGRAPHY

Birth Place and Date: Taipei, Taiwan, June 22, 1978

Doctor of Medicine (Sep1996-Jun 2002) Department of Medicine,
College of Medicine National Taiwan University, Taipei, Taiwan

Major field of study: medicine, neurosurgery

Work experience:
Resident
Department of Surgery, National Taiwan University Hospital
(Jul 2003-Jun 2004)
Division of Neurosurgery, Department of Surgery, National Taiwan University Hospital (Jul 2004-Jun 2009)
Clinical observer at the department of Neurological Surgery, University of California San Francisco (UCSF) 2008
International Fellowship at the department of Neurological Surgery, Brigham and Women's Hospital and Harvard Medical School 2010
Attending Physician (current occupation)

Division of Neurosurgery, Department of Surgery, National Taiwan University Hospital, Yun-Lin branch (Jul 2009-present)
Clinical lecturer, College of medicine, National Taiwan University (No.7, Chung Shan S. Rd, Zhongzheng Dist., Taipei City 100, Taiwan (R.O.C.)) (Sep 20010-present)

Pertinent publications:
1: Kuo LT, Chen CM, Li CH, Tsai JC, Chiu HC, Liu LC, Tu YK, Huang AP. Early endoscope-assisted hematoma evacuation in patients with supratentorial intracerebral hemorrhage: case selection, surgical technique, and long-term results. Neurosurg Focus. 2011 Apr;30(4):E9. PubMed PMID: 21456936.

2. Huang AP, Huang SJ, Hong WC, Chen CM, Kuo LT, Chen YS, Lu YJ, Chuang HY, Tu YK, Tsai JC. Minimally invasive surgery for acute non-complicated epidural hematoma: An innovative endoscopic-assisted method. Journal of Trauma. 2012 June.

3. Chapter 44, Outcomes and Quality of Life after Surgery for Meningiomas. Almefty's meningioma, 2nd edition, Thieme Medical Publishers, 2011.

Research interest:
Clinical neurosurgery
Minimally invasive neurosurgery
Surgical innovation and biosurgery
Multimedia medical education
Traumatic brain injury
Neuro-oncology
Cerebrovascular surgery
Functional neurosurgery

Dr. Huang is a member of:
Taiwan neurosurgical society
Taiwan surgical society
Taiwan society for Neuro-oncology

Honors and Scholarships:
2004, Best Speaker of Grand Round, awarded by the Department of Surgery, National Taiwan University Hospital

2005, Best Speaker of Morbidity and Mortality Conference, awarded by the Department of Surgery, National Taiwan University Hospital

2007, Best Teaching Resident, awarded by the Department of Surgery, National Taiwan University Hospital

2009, World Federation of Neurosurgical Societies (WFNS) sponsored international fellowship at the Brigham and Women's Hospital & Harvard Medical School

2009, Excellent paper award given by the Cerebrovascular Disease Prevention & Treatment Foundation of Taiwan

Publications:
1: Huang AP, Lee CW, Hsieh HJ, Yang CC, Tsai YH, Tsuang FY, Kuo LT, Chen YS, Tu YK, Huang SJ, Liu HM, Tsai JC. Early Parenchymal Contrast Extravasation Predicts Subsequent Hemorrhage Progression, Clinical Deterioration, and Need for Surgery in Patients With Traumatic Cerebral Contusion. J Trauma. 2011 Dec;71(6):1593-1599. PubMed PMID: 22182869.

2: Tsuang FY, Huang AP, Tsai YH, Chen JY, Lee JE, Tu YK, Wang KC. Treatment of patients with traumatic subdural effusion and concomitant hydrocephalus. J Neurosurg. 2011 Dec 16. PubMed PMID: 22175725.

3: Huang AP, Chen YC, Hu CK, Lin TK, Huang SJ, Tu YK, Tsai YH. Intraoperative sonography for detection of contralateral acute epidural or subdural hematoma after decompressive surgery. J Trauma. 2011 Jun;70(6):1578-9; author reply 1579. PubMed PMID: 21817999.

4: Chen CM, Huang AP, Kuo LT, Tu YK. Contemporary surgical outcome for skull base meningiomas. Neurosurg Rev. 2011 Jul;34(3):281-96; discussion 296. Epub 2011 May 26. Review. PubMed PMID: 21614426.

5: Kuo LT, Chen CM, Li CH, Tsai JC, Chiu HC, Liu LC, Tu YK, Huang AP. Early endoscope- assisted hematoma evacuation in patients with supratentorial intracerebral hemorrhage: case selection, surgical technique, and long-term results. Neurosurg Focus. 2011 Apr;30(4):E9. PubMed PMID: 21456936.

6: Huang AP, Chen CL. Transciliary supraorbital approach. Neurosurgery. 2011 Jul;69(1):E261-3; author reply E263. PubMed PMID: 21415782.

7: Huang AP, Tu YK. Progressive PCA steno-occlusive changes after revascularization for moyamoya disease: a neglected phenomenon. Neurosurgery. 2010 Dec;67(6):E1865-6; author reply E1866. PubMed PMID: 21107161.

8: Huang AP, Arora S, Wintermark M, Ko N, Tu YK, Lawton MT. Perfusion computed tomographic imaging and surgical selection with patients after poor-grade aneurysmal subarachnoid hemorrhage. Neurosurgery. 2010 Oct;67(4):964-74; discussion 975. PubMed PMID: 20881562.

9: Kuo LT, Huang AP, Yang CC, Tsai SY, Tu YK, Huang SJ. Clinical outcome of mild head injury with isolated oculomotor nerve palsy. J Neurotrauma. 2010 Nov;27(11):1959-64. PubMed PMID: 20799883.

10: Huang AP, Chen JS, Yang CC, Wang KC, Yang SH, Lai DM, Tu YK. Brain stem cavernous malformations. J Clin Neurosci. 2010 Jan;17(1):74-9. Epub 2009 Dec 14. PubMed PMID: 20005720.

11: Huang AP, Liu HM, Lai DM, Yang CC, Tsai YH, Wang KC, Yang SH, Kuo MF, Tu YK. Clinical significance of posterior circulation changes after revascularization in patients with moyamoya disease. Cerebrovasc Dis. 2009;28(3):247-57. Epub 2009 Jul 14. PubMed PMID: 19602876.

12: Huang AP, Tu YK, Tsai YH, Chen YS, Hong WC, Yang CC, Kuo LT, Su IC, Huang SH, Huang SJ. Decompressive craniectomy as the primary surgical intervention for hemorrhagic contusion. J Neurotrauma. 2008 Nov;25(11):1347-54. PubMed PMID:19061378.

13: Huang AP, Yang SH, Yang CC, Kuo MF, Wu MZ, Tu YK. Malignant prolactinoma with craniospinal metastasis in a 12-year-old boy. J Neurooncol. 2008 Oct;90(1):41-6. Epub 2008 Jul 12. PubMed PMID: 18622581.

14: Kuo LT, Huang AP, Kuo KT, Tseng HM. Extradural dumbbell schwannoma of the hypoglossal nerve: a case report with review of the literature. Surg Neurol. 2008 Dec;70 Suppl 1:S1:34-8; discussion S1:38-9. Epub 2008 Apr 18. PubMed PMID:18423539.

15. Hsieh MS, Ho JT, Lin LW, Tu PH, Perry A, Huang AP. Cerebellar anaplastic pilocytic astrocytoma in a patient of neurofibromatosis type-1: Case report and review of the literature. Clin Neurol Neurosurg. 2012 Mar 5. [Epub ahead of print] PubMed PMID: 22397971.

16. Huang AP, Chen YS, Hong WC, Yang CC, Kuo LT, Su IC, Huang SH,Huang SJ, Tu YK, Tsai YH, Tsai JC. Minimally Invasive Surgery for Acute Non-complicated Epidural Hematoma: An innovative endoscopic- assisted method. J Trauma 2012 (accepted).

Technical Session D1- W2-T3: Medicine, Public Health, Biomedical Science and Engineering (3)

Finding Immune Mechanisms of Airway Inflammation in Pulmonary Diseases: the Role of Surfactant Protein D and Biomedical Informatics Applications

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ABSTRACT

Asthma, an airway inflammatory disease, is classically characterized by adaptive antigen-dependent immune responses. Pulmonary surfactant protein D (SP-D), one of the components in airway mucus and a member of the collectin family, is an innate immune molecule critical for defense that can also modulate adaptive immune responses. SP-D-deficient mice exhibit enhanced allergic responses and SP-D induction requires lymphocytes. We hypothesized that SP-D may decrease adaptive allergic responses through interaction with T cells. Our study shows that SP-D administration suppresses pulmonary allergic inflammation, perhaps mediated by cytotoxic T-lymphocyte antigen 4 (CTLA4), a negative regulator of T cells. This mechanism impacts both Treg and Th17 cell subsets, and involves diminishing associate microRNAs that negatively regulate CTLA4. Thus, SP-D may be a potential candidate for therapeutic intervention in allergic asthma.

The database of Genotypes and Phenotypes (dbGaP) is one of several biomedical informatics tools that can be used to explore genes associated with or regulated by SP-D, which could play important roles in the modulation of pulmonary diseases. The dbGaP hosts various datasets, including many from genome-wide association studies (GWAS). The proper use or reuse of GWAS data could promote exploratory research, novel scientific discovery, validation of existing findings, and reduction of cost and time for conducting research. However, in dbGaP, the data variables are stored without proper standardization or annotation, making systematic data querying a very challenging process. In the *Phenotype Finder IN Data Resources* (PFINDR) project funded by the National Heart, Lung, and Blood Institute (NHLBI), we are developing a robust way to query the data in dbGaP. We have identified specific limitations and assessed current problems in using dbGaP as a cohort discovery tool, and tested the Clinical Element Model as an underlying information model to standardize phenotype variables in lung studies. We intend to incorporate our findings and ultimately algorithmically formalize variable descriptions into an information model that supports the PFINDR project and to develop a technological platform to identify genes associated with the development and treatment of lung diseases.

BIOGRAPHY

Ko-Wei Lin was born in Taipei, Taiwan. She received the Doctor of Veterinary Medicine (DVM) degree from National Taiwan University (NTU), Taipei, Taiwan, in 2000. She received her Ph.D. degree in comparative biomedical sciences focusing on cell biology with a minor in biotechnology from North Carolina State University (NCSU), Raleigh, North Carolina, USA, in 2007.

She completed her internship training at NTU Veterinary Teaching Hospital in 1999, and summer externship training in small animal cardiology at NCSU Veterinary Teaching hospital in 2000. She worked as a Research Assistant in clinical pathology and oncology laboratory in department of Veterinary Medicine, NTU, in 2001, and was awarded a research assistantship during graduate study from 2001-2007 at NCSU. From 2008-2011, she was a Postdoctoral Fellow in the Division of Pulmonary and Critical Care Medicine at University of California, San Diego (UCSD). She is currently a Postdoctoral Fellow in the Division of Biomedical Informatics at UCSD in La Jolla, California, USA. Her research interest during graduate study was discovering pathogenic mechanisms of airway inflammation, specifically focused on signaling pathways and proteomics of mucus secretion in airway epithelium. During postdoctoral training, she was interested in examining immune pathways of pulmonary inflammatory diseases, including asthma and acute lung injury. Her current research work involves team projects, including the Phenotype Finding IN Data Resources (PFINDR) project and molecular phenotyping in specific diseases.

Dr. Lin is a member of American Thoracic Society, Veterinary Comparative Respiratory Society, and American Medical Informatics Association. She was elected to membership in the Gamma Sigma Delta Honor Society during graduate study. She currently serves as an associate faculty member for the Faculty of 1000, reviewing journal publications in the field of respiratory pharmacology. She has authored or co-authored more than 20 journal publications and conference presentations in the fields of lung biology, respiratory medicine, immunology, and biomedical informatics.

Technical Session D1- W2-T3: Medicine, Public Health, Biomedical Science and Engineering (3)

Erythroid/Myeloid Progenitors and Hematopoietic Stem Cells Originate from Distinct Populations of Endothelial Cells

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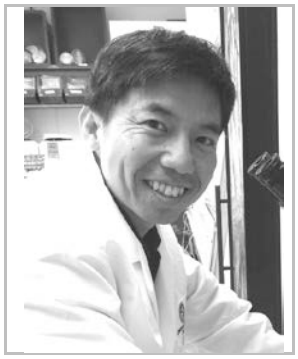
ABSTRACT

Hematopoietic stem cells (HSCs) and an earlier wave of definitive erythroid/myeloid progenitors (EMPs) differentiate from hemogenic endothelial cells in the conceptus. EMPs can be generated in vitro from embryonic or induced pluripotent stem cells, but efforts to produce HSCs have largely failed. The formation of both EMPs and HSCs requires the transcription factor Runx1 and its non-DNA binding partner core binding factor b (CBFb). Here we show that the requirements for CBFb in EMP and HSC formation in the conceptus are temporally and spatially distinct. Panendothelial expression of CBFb in Tek-expressing cells was sufficient for EMP formation, but was not adequate for HSC formation. Expression of CBFb in Ly6a-expressing cells, on the other hand, was sufficient for HSC, but not EMP, formation. The data indicate that EMPs and HSCs differentiate from distinct populations of hemogenic endothelial cells, with Ly6a expression specifically marking the HSC-generating hemogenic endothelium.

BIOGRAPHY



Michael J. Chen was born in Taoyuan, Taiwan in 1969. He received a B.S. in Life Science from National Tsing Hua University, Hsinchu, Taiwan in 1995, a M.S. in Microbiology and Immunology from National Yang- Ming University, Taipei, Taiwan in 1999, and a Ph.D. in Genetics from Dartmouth College, Hanover, New Hampshire in 2008.

He served as a private in R.O.C. Taiwan Army from 1995 to 1997, experienced 1996 Missile Crisis and pig foot-mouth disease. He worked as a research assistant at Dr. Ying-Hui Lee's lab at Institute of Molecular Biology, Academia Sinica from 1999 to 2001. He worked as a post-doctoral fellow at Dr. Nancy Speck's lab at the University of Pennsylvania, Philadelphia, PA. from 2008 to 2011. He joined Dr. George Q. Daley's lab at Children's Hospital Boston, Boston, MA since March 2011.

Dr. Chen is a member of the Society for Hematology and Stem Cells (ISEH) since 2011.

Technical Session D1- W2-T3: Medicine, Public Health, Biomedical Science and Engineering (3)

Intra-Uterine Calorie Restriction Regulates the Placental DNA Methylation Profile Influencing Fetal Development and Adult-type Chronic Diseases

Pao-Yang Chen, DPhill (陳柏仰)

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ABSTRACT

Maternal nutrient restriction underlies the development of adult onset chronic diseases in the intra-uterine growth restricted fetus. Investigations in mice have shown that either protein or calorie restriction during pregnancy leads to glucose intolerance, increased fat mass and hypercholesterolemia in adult male offspring. In addition, there is evidence to suggest that these phenotypes persist in successive generations in both rats and mice. The molecular mechanism behind the transmission of these phenotypes is being actively investigated, but to date remains unclear. One mechanism by which the changes in the environment of the placenta could affect the health of adult mice is via epigenetic effects. To shed light on these mechanisms we examined placentas from mice that had been exposed to different diets. We have previously assessed trans-placental nutrient transport in mouse models of caloric restriction. In the present study, we measured whole genome DNA methylation in placentas of mice exposed to either caloric restriction or ad libitum diets. We generated genome-wide DNA methylation profiles in both male and female mouse placentas. We observed a decrease in the overall methylation between these groups as well as sex-specific effect on the offspring of maternal diet. In addition, a set of significantly differentially methylated genes that are enriched for known imprinted genes were identified between the calorie restricted and control groups. In the case of the most significant of these, the prostaglandin E receptor, we validated that the expression of the gene was significantly increased in the calorie restriction group. We also identified a small set of differentially methylated microRNAs that target genes associated with immunological, metabolic, gastrointestinal, cardiovascular and neurological chronic diseases, as well as genes responsible for trans-placental nutrient transfer and fetal development. Lastly, we also compared the methylation profiles between male and female placentas.

BIOGRAPHY

Dr. Pao-Yang Chen was born in Taipei, Taiwan. He received a bachelor's degree from National Cheng Kung University, a M.S. from National Taiwan University. In 2008, he received his DPhil (Ph.D) degree in statistics (computational biology) from Oxford University, United Kingdom.

In 2009, he joined Matteo Pellegrini's laboratory at Department of Molecular, Cell and Developmental Biology, University of California, Los Angeles. His research covers several topics that are all related to DNA methylation profiles generated from the next generation sequencing, such as comparing methylomes across human embryonic stem cell lines, and studying the relationship between nucleosome positioning and DNA methylation. In addition, he has been developing methods and software tools specifically for analyzing methylation data. He is extending his research to study samples from different organisms / tissues, and to integrate other biological data from high throughput sequencing. Dr. Chen will join the faculty of Institute of Plant and Microbial Biology, Academia Sinica, in Fall 2012.

Technical Session D1-W3-T3: New Materials Science and Engineering, Nanotechnology and New Green

Session Organizer & Chair

Jung-Tsung Shen

Bio:
J.T. Shen received his PhD in Physics in 2003 from the Massachusetts Institute of Technology, where he worked on theoretical and computational investigations of electron-hole plasma, laser-gain profile, and metamaterials. Since 2003, he worked at Stanford University in the Ginzton Laboratory, focusing on photon transport in nano-photonics, metamaterials, plasmonics, and thermal and energy transport in nano-structures. In 2009, J.T. Shen joined the electrical and systems engineering department in Washington University in St. Louis.

Technical Session D1-W3-T3: New Materials Science and Engineering, Nanotechnology and New Green

Exchange Interactions in Perovskite Oxide Nanostructures

Yayoi Takamura

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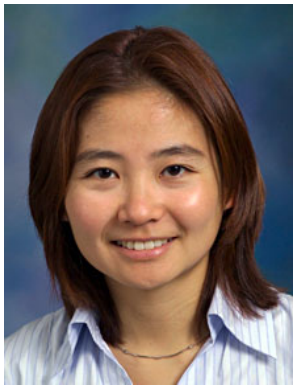
ABSTRACT

The interfaces of perovskite oxides have been shown to possess unexpected functional properties not found in the constituent materials. These functional properties arise due to structural and chemical changes as well as electronic and/or magnetic interactions occurring over nanometer length scales at the interfaces. Gaining a fundamental understanding of these interfacial effects requires a comprehensive approach of state-of-the-art growth techniques as well as detailed characterization of their structural, chemical, and functional properties. In this work, we studied exchange interactions in perovskite oxide bilayers consisting of the ferromagnet (FM) $La_{0.7}Sr_{0.3}MnO_3$ (LSMO) and the G-type antiferromagnet (AFM) $LaFeO_3$ (LFO). In the absence of uncompensated spins, this type of interface has been shown to exhibit spin-flop coupling characterized by a perpendicular orientation between the FM moments and the AFM spin axis. Furthermore, an applied magnetic field was able to reorient the AFM spin axis while maintaining this perpendicular orientation. Using soft x-ray photoemission electron microscopy, the local FM/AFM domain patterns in each layer were selectively imaged in patterned nanostructures of varying size, aspect ratio, and crystallographic orientation. As the size of the nanostructures decreased, a transition from perpendicular to parallel spin alignment was observed. The results showed that shape-induced anisotropy in the antiferromagnet can overcome the interface exchange coupling in spin-flop coupled nanostructures. This type of control has direct implications for the use of perovskite oxide heterostructures in magnetic recording and sensor technology.

BIOGRAPHY



Yayoi Takamura received her B.Sc. degree from Cornell University, Ithaca, NY (1994), as well as her M.Sc. (2000) and Ph.D. degrees from Stanford University, Stanford, CA (2004), all in materials science and engineering. She was a Postdoctoral Researcher in the Department of Materials Science at the University of California, Berkeley before joining the Department of Chemical Engineering and Materials Science at the University of California, Davis in Davis, CA in 2006. Her research interests focus on the growth and evaluation of complex oxide thin films, heterostructures, and patterned nanostructures, in particular investigating the structure-properties relationships underlying the novel magnetic and electronic properties associated with their surfaces and interfaces. Prof.

Takamura was a recipient of the National Science Foundation CAREER Award in 2008 and the DARPA Young Faculty Award in 2011.

Technical Session D1-W3-T3: New Materials Science and Engineering, Nanotechnology and New Green

Computational Design of Photocatalytic Materials for Solar Powered Hydrogen Production

Gyeong S. Hwang

ABSTRACT

Department of Chemical Engineering, The University of Texas at Austin, U.S.A.

Renewable sources of energy are increasingly needed and solar production of hydrogen fuel from water offers significant potential to contribute to these needs. It is estimated that a solar-to-hydrogen conversion efficiency of at least 10% is necessary for solar water splitting to become competitive with traditional hydrogen production techniques such as steam reforming. Unfortunately, current water splitting efficiencies under actual sunlight fall far short of this goal. The most promising photocatalytic materials are likely to be complex metal oxides composed of many elements. Considering that an astronomical number of multicomponent metal oxides are possible, even if only four-component materials are considered, a successful photocatalyst search requires considerable guidance from theory to rationally narrow the potential candidates, along with the ability to examine systematically a great many combinations. In this talk, I will present recent progress in our collaborative theoretical and experimental efforts to explore promising candidate metal oxide semiconductors with the requisite band gaps, stability, costs, and abundance for practical high efficiency photoelectrochemical devices. In particular, the effect of doping on photocatalysis will be highlighted. Recent experiments by collaborators demonstrated that consecutive doping of W and Mo into $BiVO_4$ can dramatically increase the photooxidation current of water on the $BiVO_4$ electrode; the W/Mo-doped $BiVO_4$ exhibits more than 10 times higher photocurrent for water oxidation than undoped $BiVO_4$. This talk will cover our theoretical explanation and prediction of the doping effect on the enhanced photocatalytic performance. The fundamental understanding provides valuable insight into the rational design of new and existing materials for high efficiency solar-powered hydrogen generation.

BIOGRAPHY

Dr. Gyeong Hwang is a professor of chemical engineering at the University of Texas at Austin. He holds the Lyondell Endowed Faculty Fellowship in Engineering. He received his B.S. (1991) and M. S. (1993) degrees in Chemical Engineering from Seoul National University, and his Ph.D. (1999) in Chemical Engineering (with M.S. in Applied Physics) from California Institute of Technology. Prior to joining the faculty of UT-Austin in September 2001, he was the F.M. Becket Fellow of the Electrochemical Society at the Max Planck Institute, Stuttgart, in Germany, and a research staff at the Materials Process and Simulation Center of California Institute of Technology. His current research has a well-balanced emphasis on fundamentals and applications, ranging from first principles studies of surface chemistry, bulk dynamics and interfacial interactions to multiscale, multiphysics modeling of engineering problems encountered in the fabrication of nanoscale electronic, photonic and energy devices. He has published more than 120 peer-reviewed journal articles, and has been granted 4 US patents. He has received numerous awards and fellowships including: Lyondell Endowed Faculty Fellowship in Engineering (2007, UT-Austin), Myron L. Begeman Fellowship in Engineering (2005, UT-Austin); Faculty Early Career Development (CAREER) Award (2005, NSF); and F.M. Becket Memorial Award (1999, ECS).

Gyeong S. Hwang

Education

Seoul National University	Chemical Engineering	B.S.	1991
Seoul National University	Chemical Engineering	M.S.	1993
California Institute of Technology	Applied Physics	M.S.	1998
California Institute of Technology	Chemical Engineering	Ph.D.	1999

Professional Experience:

2011– present	Professor, Department of Chemical Engineering, University of Texas at Austin
2006 – 2011	Associate Professor, Department of Chemical Engineering, University of Texas
2007 – present	Lyondell Corp. Endowed Faculty Fellow in Engineering, University of Texas at Austin
2005 – 2007	Myron L. Begeman Fellow in Engineering, University of Texas at Austin
2001 – 2006	Assistant Professor, Department of Chemical Engineering, University of Texas at Austin
2000 – 2001	Post Doctoral Fellow, Materials Simulation Center, California Institute of Technology
1999	F.M. Becket Visiting Scientist, Max Planck Institute for Solid State Chemistry

Five Recent Publications:

*From a total of **121** refereed journal papers; **26** refereed proceedings; **4** US patents granted.*

1. Ham, H.-C., Stephens, J.A., Hwang, G.S., Han, J., Nam, S. W., Lim, T. H. (2012) "Role of Small Pd Ensembles in Boosting CO Oxidation in AuPd Alloys," *J. Phys. Chem. Lett.* 3, pp 566-570.
2. Park, H.-S., Kweon, K. E., Ye, H., Paek, E., Hwang, G.S., Bard, A. J. (2011). "Factors in the Metal Doping of $BiVO_4$ for Improved Photoelectrocatalytic Activity as Studied by Scanning Electrochemical Microscopy (SECM) and First-Principles Density-Functional Calculation," *J. Phys. Chem. C* 115, pp 17870-17879.
3. Bondi, R.J., Lee, S., Hwang, G.S. (2011). "First-Principles Study of the Structural, Electronic, and Optical Properties of Oxide-Sheathed Silicon Nanowires," *ACS Nano* 5, pp 1713-1723.
4. Stephens, J.A., Hwang, G.S. (2011). "Atomic Arrangements of AuPd/Pd(100) and AuPt/Pt(100) Surface Alloys: A Monte Carlo Study using First Principles-based Cluster Expansion," *J. Phys. Chem. C* 115, pp 21205-21210.
5. Yu, J.H., Liu, X., Kweon, K.E., Joo, J., Park, J., Ko, K.T., Lee, D.W., Son, J.S., Park, J., Kim, Y.-W., Hwang, G.S., Dobrowolska, M., Furdyna, J.K., Hyun, T. (2010). "Giant Zeeman splitting in nucleation-controlled doped CdSe:Mn^{2+} quantum nanoribbons," *Nature Materials* 9, pp 47-53.

Honors & Awards:

Lyondell Corp. Endowed Faculty Fellow in Engineering, UT-Austin (2007-date); NSF Career Award, National Science Foundation (2005); Myron L. Begeman Fellowship in Engineering, UT-Austin (2005–2007); F. M. Becket Summer Fellowship, The Electrochemical Society (to student Scott Harrison, 2005); CCG Excellence Award, The American Chemical Society (to student Devina Pillay, 2005); Invited Participant in the National Academies Keck Future Initiative Conference (2004); F.M. Becket Memorial Award, Electrochemical Society (1999); Colin Garfield Fink Fellowship, Electrochemical Society (1998); Graduate Research Award, American Vacuum Society (1997); Applied Materials Chemistry and Chemical Engineering Fellowship, Caltech (1997-1999); Constantin G. Economou Memorial Lecture and Prize, Caltech (1996); Powell Foundation Graduate Fellowship, Caltech (1994-1995); Il-Ju Academic Foundation Overseas Graduate Fellowship, Tae-Gwang Group, Korea (1994-1999).

Graduate and Postdoctoral Advisors:

Postdoc:	Michelle Parrinello, Swiss Center for Scientific Computing
	William A Goddard III, California Institute of Technology
Ph.D:	Konstantinos P. Giapis, California Institute of Technology

Technical Session D1-W3-T3: New Materials Science and Engineering, Nanotechnology and New Green

Title: Microfluidic applications in optics and biosensing

Sindy K.Y. Tang

ABSTRACT

Optofluidics, a new class of optical devices with optical in terfacesformed between two liquids, possess unique characteristics that arenot achievable in conventional solid-state optical systems. In optofluidic systems, it is possible to reconfigure and fine-tune the optical output in real time by manipulating liquid composition or the shape of the liquid-liquid interface dynamically. In addition, liquid-liquid interfaces are intrinsically smooth as a result of minimization of interfacial energy. Polishing is thus unnecessary. Furthermore, it is straightforward to obtain a graded profile of refractive index by taking advantage of diffusion between miscible liquids possessing different refractive indices to create devices such as GRIN lenses. This talk focuses on the design and development of optical components based on dynamic liquid-liquid interfaces in microfluidic systems: liquid waveguides, lenses, and multi-color droplet dye lasers. We will also describe the use of microfluidics for simple biosensing applications.

BIO

Sindy K.Y. Tang joined the faculty of Stanford University in September 2011 as an assistant professor in the Department of Mechanical Engineering. She received her B.S. degree in Electrical Engineering from California Institute of Technology in 2003, M.S. from Stanford University in 2004, and Ph.D. from Harvard University in Engineering Sciences in 2010. Dr. Tang's research interests include optofluidics, microfluidics and nanophotonics for the development of tools for biology and smart materials.

Technical Session D1-W3-T3: New Materials Science and Engineering, Nanotechnology and New Green

Thermal Conductivity of a Single Nylon-6 Nanofiber

Professor

Ming-Chang Lu

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ABSTRACT

This study aims to investigate the thermal conductivity of a single nylon-6 nanofiber. It has been shown that an ultra-drawn polyethylene nanofiber has a thermal conductivity much larger than its bulk value (Shen et al., Nat. Nanotechnol., Vol. 5, No. 4, pp. 251-255, 2010). The thermal conductivity enhancement in the nanofiber was attributed to the lattice-reconstructing during ultra-drawing. Accordingly, most chains are aligned in the nanofiber after ultra-drawing as compared to randomly oriented in the bulk polyethylene, resulting in an enhanced thermal transport. In this study, the thermal conductivity of a single nylon-6 nanofiber was investigated. Since the bulk nylon-6 has an uncomplicated molecular structure as that in the polyethylene, it is expected that the nylon-6 nanofiber might show similar thermal conductivity enhancement. A device consisting of an array of heating and sensing membranes has been made to measure the thermal conductivity of the single nylon-6 nanofiber. The nylon-6 nanofibers were electrospinned on the device. Laser cutting was performed to ensure that only a single fiber bridges the heating and the sensing membranes. Preliminary results show that the thermal conductivity of the nylon-6 nanofiber is about 3 to 5 times that of the bulk nylon-6 and increases from 0.8 to 1.4 W/m-K when temperature rises from 90 to 120 K.

BIOGRAPHY

Photo (1.5" x 2")

Dr. Ming-Chang Lu received his Ph.D. degree in Mechanical Engineering from the University of California at Berkeley in 2010. He was a visiting scholar at the University of California in 2006 and a visiting research student at the Tokyo University in 2001. He worked at the Industrial Technology Research Institute (ITRI) in Taiwan from 2002 to 2006. He was elected as elite2008 of ITRI in 2004 because of his outstanding performance in ITRI. He joined the National Chiao Tung University as an assistant professor in 2010. His research focuses on enhancing thermal energy transportation, storage and conversion efficiency using micro/nano researches. Specific areas of research are enhancing phase-change heat transfer (thin film evaporation, dropwise condensation and boiling) using micro/nano structured surfaces, enhancing solar-thermal storage using nanocrystals, enhancing thermoelectric energy conversion efficiency using conducting polymer nanowires, investigating phonon transport in nanowires and molecular dynamics simulation, etc.

Technical Session D1-W1-T4: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (4)

Session Organizer & Chair

Fang-Cheng Chan

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BIOGRAPHY

Dr. Fang-Cheng Chan received his B.S. in mechanical engineering from National Taiwan University, Taipei, Taiwan, in 1991, and received his M.S. (in 2001) and Ph.D (in 2008) in mechanical and aerospace engineering from Illinois Institute of Technology, Chicago, IL. Dr. Chan is a Senior Research Associate at Navigation and Guidance Laboratory in the Department of Mechanical and Aerospace Engineering of Illinois Institute of Technology in Chicago since 2008.

He is currently working on GPS receiver integrity for Local Area Augmentation System (LAAS) ground receivers, and developing navigation and fault detection algorithms for Technical Subgroup of EU/US Working Group C (WGC) with focus on receiver autonomous integrity monitoring (RAIM) including advanced RAIM (ARAIM), carrier-phase relative RAIM (RRAIM), extended RAIM (ERAIM). He also provides technical support to the FAA for the LAAS Cat I/III integrity analysis including GPS satellite orbit error detection and integrity monitoring.

Beside the ongoing integrated GPS navigation system research (GPS/INS/atomic receiver clock), Dr. Chan has participated research for the GNSS Evolutionary Architecture Study (GEAS) program supported by the FAA, developed and analyzed GPS navigation systems for aircraft precision approach. He also has supervised the analysis for Local Area Augmentation System (LAAS) CAT I orbit ephemeris monitoring. In addition to working on fault detection and navigation system integrity analysis, Dr. Chan has involved in carrier-phase differential GPS (DGPS) positioning and integers fixing algorithms (joint lab-meeting with automated aerial refueling (AAR) and unmanned combat air system (UCAS) for shipboard landing). Dr. Chan is a member of American Institute of Aeronautics and Astronautics, and a member of Institute of Navigation.

Technical Session D1-W1-T4: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (4)

ON THE FOREFRONT OF A NEW GENERATION OF AVIATION SYSTEM PERFORMANCE

Seth Young, PhD, CM, CFI
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ABSTRACT

Over the last 10 years, there has been a strategic vision on the part of the United States targeting a significant paradigm shift in how the National Airspace System (NAS) is both constructed and managed. One of the more significant efforts towards meeting this vision has been to improve the efficiency of the NAS through latest technologies in communication and navigation. This program, known as *NextGen*, is in the early stages of phased implementation for improving the efficiency and safety of aircraft movement in the en-route and terminal area airspace, as well as on the airfields of airports. *NextGen* implementation not only potentially provides significant improvements in NAS efficiency and safety, but also great opportunities for additional aviation and transportation research.

This presentation will provide a brief background of the NAS, a familiarization of NextGen technologies that are being applied to the NAS, and an analysis of how these technologies may be applied to new policies and procedures for improving the safety and efficiency of the system.

BIOGRAPHY

Seth Young, Ph.D., C.M., CFI, is the Director of The Ohio State University's Center for Aviation Studies. Dr. Young is on the faculty at the OSU College of Engineering as an Associate Professor and interim chair of the Department of Aviation with a courtesy appointment in the Knowlton School of Architecture's Department of City and Regional Planning. Dr. Young has been with Ohio State since 2008.

Dr. Young's teaching and research interests are in airport and aviation system planning, design, operations, and management. He has more than 14 years of experience in academia and industry focusing on issues of site selection, infrastructure planning, capacity and delay estimation, airside and landside operations, security policies, engineering, and financing of civil use airports. He has published numerous journal articles in the aviation field and is a co-author of the industry's leading texts on airport planning, design, and management.

Dr. Young holds a Ph.D. In Civil and Environmental Engineering/Transportation and an MS in Industrial Engineering /Operations Research from the University of California, Berkeley, and a B.A. in Applied Mathematics from the State University of New York at Buffalo. Dr. Young is a certified member of the American Association of Airport Executives and holds an instrument-rated commercial airplane and seaplane pilot's license and certified flight instructor certificate from the U.S. Federal Aviation Administration.

Technical Session D1-W1-T4: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (4)

Shau-Shiun (James) Jan

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ABSTRACT

Title: **Global Navigation Satellite System Interference Monitoring System at Airport Environment**

Nowadays navigation is done worldwide with the aid of the Global Navigation Satellite System (GNSS) receivers. With the developing augmentation system or regional satellite systems, the performance of GNSS for civil users is extremely improved especially on the error budget from system characteristics. However, unpredictable factors on the ground user environment, such as intentional or unintentional interferences, strongly degrade the performance of GNSS receiver. It is because the strength of received GNSS signal transmitted from a satellite to the ground users is less than -157 dBm and below the noise floor (i.e., -138.5 dBm). It is a significant issue to monitor and investigate the interference effect while applying GNSS for safety of life applications, aviation applications especially. Airports equip with a series of Ground Auxiliary Navigation Equipments that are used for navigation, communication and localization. Several equipments transmit fairly high power that might be possible to directly interfere with the GNSS signal. In addition, if the transmitted harmonics are strong and located just outside the GNSS L1/E1 band, it might pass the band-pass filters of the GNSS front-end and therefore raise the noise floor of the received GNSS signal. In other words, the interference might result in degraded navigation accuracy or complete loss of receiver tracking. An interference monitoring system is implemented for the airport environment, and the results show its effectiveness in interference monitoring.

It is an important issue to recognize what the observed interference is, intentional or not, and how the influence on navigation service is. To that end, the further study on the interference via Time–Frequency (TF) analysis is presented to identify the interference characteristics and the influence on navigation service. Note that most the signals in reality are non-stationary characterized as time-variant statistic properties, TF analysis is chosen because it can characterize signals whose spectral characteristics changes with time. The time-frequency method based on the Fourier sine spectrum is chosen due to its frequency/time resolution and the capability of low power interference detection. In this talk, the GNSS interference characteristics and statistics will be summarized by analyzing the spectrograms of several interference cases observed in the airport. Moreover, the interference statistics such as the period, the duration, the drift rate, the frequency of occurrence, and so on will be presented as well. Importantly, the resulting interference characteristics and statistics offer the possibility to find useful information of these interference events for the airport environment in locating jammers or mitigating the effects of interference signals.

BIOGRAPHY

Dr. Shau-Shiun (James) Jan received his B.S. degree in Aerospace Engineering from Tamkang University in 1994. In 1997, he entered the Department of Aeronautics and Astronautics, Stanford University, to pursue higher degree in Guidance, Navigation, and Control fields. He has his M.S. and Ph.D. degrees in 1999 and 2003, respectively, under the supervision of Professor Per Enge. His main research topic is to develop new algorithms for using a modernized three-frequency (L1, L2, L5) Global Positioning System (GPS)/Wide Area Augmentation System (WAAS) receiver and barometric altimeter, that is robust to bad weather, disturbed ionosphere, and radio frequency interference. The research allows aviation users to operate longer and with significantly greater availability in the presence of these threats versus single frequency GPS/WAAS.

Immediately after his Ph.D. program, Dr. Jan joined the Federal Aviation Administration (FAA), contracted via Advanced Management Technology, Inc., Arlington, Virginia, as a Senior Systems Engineer in October, 2003. He worked in the WAAS Program Office of the Satellite Navigation Product Teams where he developed the Minimum Operational Performance Standard for GPS/WAAS Airborne Equipment (RTCA-DO229) for the new GPS L5 frequency user. Dr. Jan investigated and identified the necessary tasks to improve the service availability and continuity of current WAAS.

In February 2004, Dr. Jan joined the Department of Aeronautics and Astronautics, National Cheng Kung University (NCKU) as an Assistant Professor. Now, he is an Associate Professor and group leader in the Institute of Civil Aviation of the same department at NCKU, and he directs the Communication and Navigation Systems Laboratory at NCKU. Since 2004, he devoted himself to the research of GPS augmentation system design, analysis, and application to civil aviation. During these years, his laboratory has developed four operational systems for civil aviation in Asia Pacific region, and they are the APEC GNSS Test Bed, the RAIM prediction system for the new ATM system, the real-time RAIM system for airport controller, and Integrity Monitor Test Bed for Kaohsiung International Airport. All these systems are supported by Air Navigation and Weather Service (ANWS), Civil Aeronautics Administration (CAA) and Taiwan National Science Council (NSC).

Technical Session D1-W1-T4: Earth and Atmospheric Sciences, Aerospace and Ocean Engineering (4)

Local Area Augmentation System (LAAS) Ground Receiver Interference Analysis and Mitigation

Fang-Cheng Chan

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ABSTRACT

Current LAAS proto-type has experienced disruption in GPS signal tracking from time to time. The main cause of the discontinuity of the service is due to illegal usage of personal privacy devises (PPD) inside drive-by vehicle. A number of researches have studied typical properties of popular PPDs found in the market. The effect of PPD interference to GPS signal is concluded in these researches as equivalent to a wideband signal jammer, to which the current GPS signal is most vulnerable. This specific threat impacts existing LAAS system in two ways:

- System continuity degradation – vehicles installed PPDs inside frequently pass LAAS system nearby. The reference receivers lose tracks due to overwhelming noise power.
- System integrity degradation – the probability of incorrect code tracking will increase when noise level in tracking loop increases.

Interference mitigation techniques have been widely studied and can be categorized into two stages in the chain of GPS signal processing: the frontend stage which automatic gain control (AGC) and antenna nulling/beam forming are the main focuses, and the baseband stage which code and carrier tracking loop algorithms and augmentation methods are the topics.

In this research, a baseband analysis for atomic clock aided stationary receiver tracking loop is presented. GPS receivers need to keep tracking the incoming signal phase/frequency in order to measure the range and obtain navigation messages. Tracking loop bandwidth, therefore, is usually designed to have a wide range to accommodate time variation in signal frequency and phase caused by user and receiver clock dynamics. The wide-bandwidth also allows more noise to enter into the tracking loop, which will be problematic when intentional/unintentional wideband inference exists. The typical approach resolving the issue caused by wideband interference is to reduce the tacking bandwidth with external aid. Therefore, lower noise power can be achieved inside the tracking loop.

Stationary reference receiver has nearly perfect knowledge of user dynamics, which eliminates the need for receivers to track user's dynamics. However, traditional receivers employing temperature control crystal oscillators (TCXO) or oven controlled crystal oscillators (OCXO) as receiver clocks will reach a limitation in reducing tracking bandwidth, even user dynamics is not a concern. The limitation is resulted from the receiver clock dynamics, which has to be estimated and corrected to maintain the lock of tracking loop. However, an atomic clock equipped receiver can significantly lower the minimum tracking bandwidth, because the atomic clock has stability much better than TCXO/OCXO with several magnitudes.

The tracking loop performance under different C/N_0 will be quantified based on the quality of receiver atomic clocks. Moreover, Code tracking performance under deteriorated C/N_0 will also be studied. A conservative interference condition described in literature is investigated to quantify the requirements on the quality of atomic clocks and on the receiver tracking algorithms (second or third order tracking algorithm, code and carrier tracking bandwidths etc.)

BIOGRAPHY

Dr. Fang-Cheng Chan received his B.S. in mechanical engineering from National Taiwan University, Taipei, Taiwan, in 1991, and received his M.S. (in 2001) and Ph.D (in 2008) in mechanical and aerospace engineering from Illinois Institute of Technology, Chicago, IL. Dr. Chan is a Senior Research Associate at Navigation and Guidance Laboratory in the Department of Mechanical and Aerospace Engineering of Illinois Institute of Technology in Chicago since 2008.

He is currently working on GPS receiver integrity for Local Area Augmentation System (LAAS) ground receivers, and developing navigation and fault detection algorithms for Technical Subgroup of EU/US Working Group C (WGC) with focus on receiver autonomous integrity monitoring (RAIM) including advanced RAIM (ARAIM), carrier-phase relative RAIM (RRAIM), extended RAIM (ERAIM). He also provides technical support to the FAA for the LAAS Cat I/III integrity analysis including GPS satellite orbit error detection and integrity monitoring.

Beside the ongoing integrated GPS navigation system research (GPS/INS/atomic receiver clock), Dr. Chan has participated research for the GNSS Evolutionary Architecture Study (GEAS) program supported by the FAA, developed and analyzed GPS navigation systems for aircraft precision approach. He also has supervised the analysis for Local Area Augmentation System (LAAS) CAT I orbit ephemeris monitoring. In addition to working on fault detection and navigation system integrity analysis, Dr. Chan has involved in carrier-phase differential GPS (DGPS) positioning and integers fixing algorithms (joint lab-meeting with automated aerial refueling (AAR) and unmanned combat air system (UCAS) for shipboard landing). Dr. Chan is a member of American Institute of Aeronautics and Astronautics, and a member of Institute of Navigation.

Technical Session D1-W2-T4: Medicine, Public Health, Biomedical Science and Engineering (4)

Session Organizer & Chair

Ching-Pin Chang

A. Academic history:

Colleges and universities attended, degrees received, dates.

9/1983-6/1990	MD	National Taiwan University Taipei, Taiwan
9/1992-6/1997	PhD	Stanford University - Cancer Biology Stanford, California

Scholarships and honors:

1982	Mathematic Olympics Competition, Taiwan, Silver Medal [youngest awardee]
1983	Thomas Alva Edison Award, 27th International Science Symposium for Edison Science and Engineering Youth Day Program, Thomas Alva Edison Foundation, USA [only student from Taiwan selected to attend]
1983-1990	National Taiwan University, Dean's Lists & Dean's Awards
1989	Harvard Medical School, Exchange Student selection [funded by Harvard Medical School and Ministry of Education, Taiwan]
1990	Best Intern Award (top of class, 160 interns), College of Medicine, National Taiwan University
2001-2004	Physician-Scientist Fellowship Award, Howard Hughes Medical Institute
2004	Weinstein Award, Weinstein Cardiovascular Development Conference, Leiden, Netherlands
2004	Keystone Symposia Scholarship Award, Keystone Symposia, Molecular Biology of Heart Disease, Cardiac Development and Congenital Heart Disease, Colorado, USA
2005	National Scientist Development Award, American Heart Association
2006	Faculty Scholar Award, Donald E. and Delia B. Baxter Foundation
2007	Medical Research Grant Award, Children's Heart Foundation
2007	Research Grant Award, March of Dimes Birth Defects Foundation
2008	New Faculty Award, California Institute of Regenerative Medicine
2011	Junior Faculty Award, Keystone Symposia, Mechanisms of Cardiac Growth, Death and Regeneration, Colorado, USA
2011	Elected member, American Society for Clinical Investigation
2012	National Established Investigator Award, American Heart Association

Post-doctoral and residency training:

7/1/97-6/30/99	Internship and Residency, Internal Medicine Massachusetts General Hospital, Boston, Massachusetts
7/1/99-6/30/01	Clinical Cardiology Fellowship Stanford University School of Medicine, Stanford, California
7/1/01-6/30/04	HHMI Physician-Scientist Fellowship Stanford University School of Medicine, Stanford, California
7/1/99-6/30/04	Fellowship, Clinical Investigator Pathway, Cardiovascular Medicine Stanford University School of Medicine, Stanford, California

Medical Board

2000	A.B.I.M. Certification, Internal Medicine	Certificate No.: 197361
2004	A.B.I.M. Certification, Cardiovascular Disease	Certificate No.: 197361

Licensure

7/1999	California Medical License #A69033

B. Employment history:

Academic positions:

2/1/05-11/01/11	Assistant Professor of Medicine, Cardiovascular Medicine Stanford University School of Medicine, Stanford, CA
11/01/11-pres	Associate Professor of Medicine, with tenure, Cardiovascular Medicine Stanford University School of Medicine, Stanford, CA

C. Public and professional service.

National committees:

8/06	Moderator, Undergraduate Research Roundtable Faculty, Undergraduate Research Training Program American Heart Association (AHA), CA
11/06	American Heart Association (AHA), Western Review Consortium, Peer Review Committee 2B Integrative Cardiology & Physiology
10/07	AHA, National Center, Peer Review Committee BASIC 3 Basic Science & Molecular Biology 3 Study Group
11/07	AHA, Western Review Consortium, Peer Review Committee 3B (Cardiovascular Development Group)
2010-11	Medical Research Council Grant Review, England (declined because of conflicts of schedule)

2008-pres University Grant Committee Grant Review, Hong Kong

National and international speeches:

14. Tissue Interactions during Heart Valve Morphogenesis. Research in Innovative Tissue Engineering Meeting, National Heart, Lung and Blood Institute, National Institute of Health, Washington, DC. 2004
15. Repression of VEGF Expression by NFAT Underlies Initiation of Heart Valve Morphogenesis. Molecular Biology of Heart Disease, Cardiac Development and Congenital Heart Disease, Keystone Symposia, Keystone, Colorado. 2004
16. Sequential Myocardial-Endocardial NFAT Signaling Defines a Morphogenetic Field Essential for Heart Valve Development. FASEB 2004 Summer Research Conference, Calcium and Cell Function, Snowmass, Colorado. 2005
17. Sequential Myocardial-Endocardial NFAT Signaling Defines a Morphogenetic Field Essential for Heart Valve Development. Research in Innovative Tissue Engineering Meeting, National Heart, Lung and Blood Institute, National Institute of Health, Washington DC. 2005
18. Tissue Interactions during Heart Valve Morphogenesis. American Heart Association Western Affiliate Young Investigators Forum. 2005
19. Pbx Mutant Mice Provide a Multigenetic Model for Congenital Heart Disease Weinstein Cardiovascular Conference, Tuscon, Arizona. 2005
20. Calcineurin-NFAT Signaling and Heart Valve Development. FASEB Summer Research Conference, Protein Kinase and Phosphorylation, Snowmass Colorado. 2005
21. A Field of Myocardial-Endocardial NFAT Signaling Directs Heart Valve Morphogenesis. FASEB Summer Research Conference, Receptors and Signal Transduction, Snowmass, Colorado. 2006
22. Endocardial Brg1 Represses Adamts1 to Maintain the Microenvironment for Myocardial Morphogenesis. Weinstein Cardiovascular Conference, Indianapolis, Indiana. 2007
23. Epigenetic Control of Cardiac Myogenesis. Western Society of Pediatric Cardiology, CA 2008
24. Epigenetic Control of Myocardial Morphogenesis. SCBA Northern California Chapter, CA 2008
25. Chromatin and Transcriptional Regulation of Heart Development. Workshop, Weinstein Cardiovascular Conference, Dallas, Texas. 2008
26. NFAT Signaling in Heart Development, American Heart Association Research Symposium, New Orleans, Louisiana. 10/2008
14. Chromatin regulation of cardiac growth, differentiation and morphogenesis, Weill Medical College, Cardiology Grand Round, Cornell University, New York 2/2009
15. Control of Cardiac Growth, Differentiation and Hypertrophy by the BAF complex, Keystone symposium, Plenary Section, North Carolina. 3/2009
24. Multigenetic Interactions in the Pathogenesis of Congenital Heart Disease, Western Society of Pediatric Cardiology, Yosemite, CA. 5/2009

25. From Heart Development to Heart Disease, Keynote speech, Developmental Biology Retreat, Academia Sinica, Taiwan
    8/2009
26. Chromatin Regulation of Cardiac Differentiation and Morphogenesis. Institute of Molecular Biology, Academia Sinica, Taiwan
    8/2009
27. Control of Cardiac Growth, Differentiation and Hypertrophy by the BAF complex, Weinstein Cardiovascular Conference, San Francisco, CA
    5/2009
28. Sculpting heart valves with NFAT and VEGF, Oak Foundation Symposium
    8/2009
29. Mechanism of cardiac hypertrophy and failure, Amgen Inc., San Francisco
    2009
30. Control of cardiac growth, differentiation and hypertrophy by chromatin remodeling, Krannert Institute of Cardiology, Division of Cardiology Indiana University School of Medicine, Indiana 5/2010
31. Control of cardiac growth, differentiation and hypertrophy by a chromatin remodeling complex. Birth, Life and Death of the Cardiac Myocyte Conference, Napa Valley, CA
    6/2010
24. Chromatin regulation in heart development and disease, Cardiology grand round, Krannert Institute of Cardiology, Division of Cardiology Indiana University School of Medicine, Indiana 7/2010
25. Epigenetic control of heart development and disease, Cardiology grand round, National Taiwan University Hospital, National Taiwan University, Taiwan
    8/2010
26. Heart development and disease, Research Seminar, Institute of Biochemistry and Molecular Biology, Yang-Ming University, Taiwan
    8/2010
27. Chromatin remodeling in cardiomyopathy, Department of Genetics, Albert Einstein College of Medicine, New York
    10/2010
28. Chromatin remodeling in cardiovascular development and physiology, Department of Systems Biology and Translational Medicine, Texas A&M University, Texas
    11/2010
29. Chromatin remodeling in the heart, Workshop, American Heart Association, Chicago
11/2010
30. Chromatin regulation in heart development and disease, Zing Conference, Cardiovascular Remodeling, Cancun, Mexico
    12/2010
31. Chromatin remodeling in cardiomyopathy, Cardiology research seminar, UCSD, San Diego, CA 1/2011
32. Chromatin regulation of heart development and disease, Frontiers of cardiovascular science seminar, Stanford University, Stanford, CA
    2/2011
33. Chromatin regulation by Brg1 controls cardiac growth, differentiation, and hypertrophy, Joint Keystone symposia on Mechanisms of Cardiac Growth, Death, and Regeneration; Molecular Cardiology, Keystone, Colorado
    2/2011
34. Mechanisms of heart development and disease, Distinguished Cardiovascular Lectureship, UCLA, Los Angeles, CA
    2/2011

35. Mechanisms of heart development, disease, and regeneration, Japanese Circulation Society and University of Tokyo, Yocohama, Japan (cancelled because of earthquake) 3/2011
36. Mechanism of heart development and disease, Gilead, Palo Alto, CA 4/2011
37. Chromatin regulation in heart development and disease. Translational Medicine Seminar, Proteomics Society, Taiwan 4/2011
38. Chromatin regulation in cardiac pathophysiology. Institute of Biomedical Sciences, Academia Sinica, Taipei, Taiwan 4/2011
39. Mechanism of cardiovascular development and disease, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China 5/2011
40. Epigenetic control of cardiac pathophysiology, Biomolecular Engineering Seminar, Hong Kong University of Science and Technology, Hong Kong, China 5/2011
41. Chromatin regulation in development and disease, Department of Molecular and Cellular Biology, Program in Developmental Biology, Baylor College of Medicine, Houston, Texas 5/2011
42. Chromatin remodeling in cardiac pathophysiology, Cardiovascular Institute, University of Pennsylvania, Philadelphia, Pennsylvania 6/2011
43. Heart development and disease (Section Chair), SCBA symposium, Guangzhou, China 7/2011
44. Chromatin remodeling in heart development and disease, TaiGen Inc., Taipei, Taiwan 11/2011
45. Epigenetic regulation of cardiomyopathy and heart failure, Keynote speech, 104th Annual Meeting, Formosan Medical Association, Taipei, Taiwan 11/2011
46. Epigenetic regulation of the spatial and temporal development of mammalian heart, Cardiovascular Science Seminar, Education Section, American Heart Association, Orlando, Florida 11/2011
47. Unraveling the genetic etiologies of congenital heart disease, 3rd International Conference on Innovations and Engineering, Palo Alto, California 4/2012
48. Epigenetics, heart development, and heart failure. Institute of Clinical Medicine, Veterans General Hospital, Yang-Ming University, Taiwan 7/2012
49. Epigenetic mechanism of heart muscle development and disease (section chair), "Leadership, Innovation, Growth", 2nd Young Investigator Conference, Palo Alto, CA 7/2012
50. Therapy for cardiac hypertrophy and failure, Gilead Sciences Inc., Foster City, CA 8/2012
51. Chromatin remodeling in cardiovascular physiology and pathology, Cardiovascular Science Seminar, Education Section, American Heart Association, Los Angeles, CA 11/2012
52. Molecular mechanism of cardiac pathophysiology, Cardiology, Weill Medical College, Cornell University, New York TBD, 2012

Local committees & task forces:

2005-pres. Admissions Committee, Cardiovascular Medicine Fellowship
Stanford University School of Medicine

2005-pres. Admissions Committee, Clinical Investigator Pathway and Residency
Stanford University School of Medicine

2005-pres. Career Advisor for Medical Students in the Clinical Investigator Pathway
Stanford University School of Medicine

9/2005-pres. Faculty, Medical Scientist Training Program
Stanford University School of Medicine

9/2005-pres. Faculty, Cancer Biology Training Program
Stanford University School of Medicine

9/2005-pres. Faculty, BioX Training Program
Stanford University School of Medicine

9/2005-pres. Faculty, Molecular Medicine Training Program
Stanford University School of Medicine

9/2005-pres. Faculty, Cardiopulmonary Concentrates Training Program
Stanford University School of Medicine

3/2007-pres. Steering Committee Member, Stanford Cardiovascular Institute
Stanford University

Stanford Intramural Teaching

Courses

10/05 DBIO 201, Medical Student Developmental Biology
Current: *Early Heart and Vascular Development*
Stanford University School of Medicine

1/06 MED 223, Cardiovascular and Pulmonary Sciences Seminar
Current: *Epicardial cells as multi-potential cardiac cells*
Stanford University School of Medicine

5/06 DBIO 156, Heart Development - Undergraduate
Stanford University School of Medicine

6/06 MED 221, Human Health and Disease – Medical Students
Current: Clinical Pathologic Conference
Coronary artery disease, cardiomyopathy and peripheral vascular disease
Stanford University School of Medicine

4/08 DBIO/Path 296, Stem Cell Biology & Regenerative Medicine – Graduate/Medical Students
Stanford University School of Medicine

10/12 DBIO 201, Medical Student Developmental Biology
Current: *Heart Development*
Stanford University School of Medicine

Seminars

1. The Pbx gene family regulates cardiac outflow tract development. Developmental Biology Retreat, Developmental Biology, Stanford
2. Calcineurin/NFAT signaling in cardiovascular development. Angiogenesis Forum, Cardiovascular Medicine/Hematology, Stanford
3. Regulation of great artery patterning. Donald W. Reynolds Cardiovascular Clinical Research Center
4. Patterning of the cardiovascular development. Cardiovascular Medicine Division Research Conference
5. Regulation of cardiac morphogenesis Cardiopulmonary Research-in-Progress Seminar. Wall Cardiopulmonary Research Center, Department of Pediatrics, Stanford
6. Reciprocal exchange of calcineurin/NFAT signals between myocardium and endocardium in heart valve morphogenesis. Angiogenesis Forum, Cardiovascular Medicine/Hematology, Stanford
7. Sequential myocardial-endocardial calcineurin/NFAT signaling directs heart valve morphogenesis. Developmental Biology Retreat, Developmental Biology, Stanford
8. A field of myocardial-endocardial NFAT signaling underlies heart valve morphogenesis. Wall Cardiopulmonary Research Center, Department of Pediatrics, Stanford
9. NFAT signaling in heart valve development. 3D Seminar, Department of Developmental Biology
10. Multi-genetic Model for Congenital Heart Disease. Pediatric Cardiology Journal Club. Lucile Packward Children's Hospital, Stanford
11. Mechanism of heart valve morphogenesis. Developmental Biology, Stanford University, Stanford
12. Repression of VEGF by NFAT is essential for heart valve formation. Vascular Biology Seminar
13. Mechanisms of Cardiovascular Development. MSTP Program, Stanford
14. Cell-cell Signaling during development. Cancer Biology Program, Stanford
15. Mechanisms of Renal Development. Seminars in Nephrology, Medicine, Stanford
16. Epicardial cells as multi-potential cardiac cells. Cardiovascular and Pulmonary Sciences Seminar
17. Sculpting heart valves with NFAT and VEGF. Regenerative Medicine Seminar, Stanford.

18. Tissue-tissue interactions during heart development. Research talk for Interns and Residents
19. Transcriptional regulation of cardiac outflow tract and great artery patterning, Cardiopulmonary research
in progress conference, Stanford
20. Heart specification, development, ES embryonic cardiogenesis. Stem Cell Biology and Regenerative Medicine
21. Heart Development, BioX undergraduate research program, Stanford.

22. Chromatin regulation of cardiac growth, differentiation and morphogenesis. Regenerative Medicine Seminar, Stanford
23. Chromatin regulation of cardiac growth, differentiation and hypertrophy, Cardiovascular Institute
24. Adventitial stem cell signaling and vascular repair, Cardiovascular Institute symposium, Stanford

25. Cardiomyopathy caused by calcineurin-NFAT dysregulation, Cardiomyopathy seminar, Stanford
26. Epigenetic regulation of heart development and disease, Cardiopulmonary research in progress seminar 27. Mechanisms of cardiac hypertrophy, Cardiovascular Institute (CVI), Stanford
28. Heart Development, Cardiology Fellow Seminar

29. Cardiomyopathy and heart failure. Fellow, Myocardial Training Program

30. Mechanisms of pathological vascular remodeling, CVI workshop, Stanford

31. Are there cells to control pathological vascular remodeling? Stem Cells and Regenerative Medicine Seminar, Stanford

Review for scientific journals

Development
Developmental Biology
Developmental Cell
Cell Research
Circulation
Circulation Research
Circulation: Cardiovascular Genetics
FASEB
Pediatric Research
PLos
Proceedings of National Academy of Sciences
Nature
Nature Genetics

Community Service:

7/90-8/92 Medical Officer, Second Lieutenant, National Army, Taiwan

D. Publications

D.1. Peer-reviewed articles [37 total: 1 in press]

D.1.A. *Original research contributions* (30 total)

31. **Chang CP**, Shen WF, Rozenfeld S, Lawrence HJ, Largman C, Cleary ML. Pbx proteins display hexapeptide-dependent cooperative DNA binding with a subset of Hox proteins. *Genes Dev* 1995;9(6):663-674.

32. Shen WF, **Chang CP**, Rozenfeld S, Sauvageau G, Humphries RK, Lu M, Lawrence HJ, Cleary ML, Largman C. Hox homeodomain proteins exhibit selective complex stabilities with Pbx and DNA. *Nucleic Acids Res* 1996;24(5):898-906.

33. **Chang CP**, Brocchieri L, Shen WF, Largman C, Cleary ML. Pbx modulation of Hox homeodomain amino-terminal arms establishes different DNA-binding specificities across the Hox locus. *Mol Cell Biol* 1996;16(4):1734-1745.

34. **Chang CP**, de Vivo I, Cleary ML. The Hox cooperativity motif of chimeric oncoprotein E2a-Pbx1 is necessary and sufficient for oncogenesis. *Mol Cell Biol* 1997;17(1):81-88.

35. Smith KS, Jacobs Y, **Chang CP**, Cleary ML. Chimeric oncoprotein E2a-Pbx1 induces apoptosis of hematopoietic cells by a p53-independent mechanism that is suppressed by Bcl-2. *Oncogene* 1997;14(24):2917-2926.

36. **Chang CP**, Jacobs Y, Nakamura T, Jenkins NA, Copeland NG, Cleary ML. Meis proteins are major *in vivo* DNA binding partners for wild-type but not chimeric Pbx proteins. *Mol Cell Biol* 1997;17(10):5679-5687.

37. Piper DE, Batchelor AH, **Chang CP**, Cleary ML, Wolberger C. Structure of a HoxB1-Pbx1 heterodimer bound to DNA: role of the hexapeptide and a fourth homeodomain helix in complex formation. *Cell* 1999;96(4)587-597.

38. Pelletier MP, **Chang CP**, Vagelos R, Robbins RC. Alternative approach for use of a left ventricular assist device with a thrombosed prosthetic valve. *J Heart Lung Transplant* 2002; 21(3):402-404.

39. Rugolotto M, **Chang CP**, Hu B, Schnittger I, Liang DH. Clinical use of cardiac ultrasound performed with a hand-carried device in patients admitted for acute cardiac care. *Am J Cardiol* 2002;90(9):1040-1042.

40. **Chang CP**, Chen L, Crabtree GR. Sonographic staging of the developmental status of mouse embryos *in utero. Genesis* 2003;36(1):7-11.

41. **Chang CP**, McDill BW, Neilson JR, Joist HE, Epstein JA, Crabtree GR, Chen F. Calcineurin is required in the urinary tract mesenchyme for the development of the pyeloureteral peri-staltic machinery. *J Clin Invest* 2004;113(7):1051-1058. Editorial commentary: Mendelsohn C. Functional obstruction: the renal pelvis rules. *J Clin Invest* 2004;113(7):957-959.

42. **Chang CP**, Neilson JR, Bayle JH, Gestwicki JE, Kuo A, Graef IA, Crabtree GR. A field of myocardial-endocardial NFAT signaling underlies heart valve morphogenesis. *Cell* 2004; 118(5):649-663. [Cover] Editorial commentary: Lambrechts D, Carmeliet P. Sculpting heart valves with NFAT and VEGF. *Cell* 2004;118(5):532-534.

43. Kofidis T, de Bruin JL, Hoyt G, Lebl DR, Tanaka M, Yamane T, **Chang CP**, Robbins RC. Injectable bioartificial myocardial tissue for large-scale intramural cell transfer and functional recovery of injured heart muscle. *J Thorac Cardiovasc Surg* 2004;128(4):571-578.

44. Kofidis T, de Bruin JL, Hoyt G, Ho Y, Tanaka M, Yamane T, Lebl DR, Swijnenburg RJ, **Chang CP**, Quertermous T, Robbins RC. Myocardial restoration with embryonic stem cell bioartificial tissue transplantation. *J Heart Lung Transplant* 2005;24(6):737-744.

45. Aaron JR, Winslow MM, Polleiri A, **Chang CP**, Wu H, Gao X, Neilson JR, Chen L, Heit JJ, Kim SK, Yamasaki N, Miyakawa T, Francke U, Graef IA, Crabtree GR. NFAT dysregulation by increased dosage of DSCR1 and DYRK1A on chromosome 21. *Nature* 2006;441(7093):595-600. [Article]

46. Sheikh AY, Lin SA, Cao F, Cao YA, van der Bogt KE, Chu P, **Chang CP**, Contag CH, Robbins RC, Wu JC. Molecular imaging of bone marrow mononuclear cell homing and engraftment in ischemic myocardium. *Stem Cells*. 2007 Oct;25(10):2677-2684.

47. Wu H, Kao SC, Barrientos T, Baldwin SH, Olson EN, Crabtree GR, Zhou B, **Chang CP**. Down syndrome critical region-1 is a transcriptional target of nuclear factor of activated T cells-c1 within the endocardium during heart development. *J Biol Chem* 2007;282(42): 30673-30679.

48. Jia Q, McDill BW, Li SZ, Deng C, **Chang CP**, Chen F. Smad signaling in the neural crest regulates cardiac outflow tract remodeling through cell autonomous and non-cell autonomous effects. *Dev Biol* 2007;311(1):172-184.

49. Stankunas K, Hang CT, Tsun ZY, Chen H, Lee NV, Wu JI, Shang C, Bayle JH, Shou W, Iruela-Arispe ML, **Chang CP**. Endocardial Brg1 represses ADAMTS1 to maintain the microenvironment for myocardial morphogenesis. *Dev Cell* 2008 Feb;14(2):298-311.

50. El-Bizri N, Guignabert C, Wang L, Cheng A, Stankunas K, **Chang CP**, Mishina Y, Rabinovitch M. SM22α-targeted deletion of bone morphogenetic protein receptor 1A in mice impairs cardiac and vascular development, and influences organogenesis. *Development* 2008;135(17):2981-2991.

51. Stankunas K, Shang C, Twu KY, Kao SC, Jenkins NA, Copeland NG, Sanyal M, Selleri L, Cleary ML, **Chang CP**. Pbx/Meis deficiencies demonstrate multigenetic origins of congenital heart disease. *Circ Res* 2008;103:702-709. [Cover]

52. **Chang CP***, Stankunas K, Shang C, Kao SC, Twu KY, Cleary ML. Pbx1 functions in distinct regulatory networks to pattern the great arteries and cardiac outflow tract**.** *Development* 2008 Nov;135(21):3577-3586. *Corresponding author.

53. Kao SC, Wu H, Xie J, **Chang CP**, Ranish JA, Graef IA, Crabtree GR. Calcineurin/NFAT signaling is required for neuregulin-regulated Schwann cell differentiation. *Science* 2009 Jan; 323(5914);651-654.

54. Zeini M, Hang CT, Lehrer-Graiwer J, Dao T, Zhou B, **Chang CP**. Spatial and temporal regulation of coronary vessel formation by calcineurin-NFAT signaling. *Development* 2009 Oct;136(19):3335-3345.

55. Wu B, Zhou B, Wang Y, Cheng HL, Hang CT, Pu WT, **Chang CP**, Zhou B. Inducible cardiomyocyte-specific gene disruption directed by the rat Tnnt2 promoter in the mouse. *Genesis* 2010 Jan;48(1):63-72.

56. Bajpai R, Chen DA, Rada-Iglesias A, Zhang J, Xiong Y, Helms J, **Chang CP**, Zhao Y, Swigut T, Wysocka J. CHD7 cooperates with PBAF to control multipotent neural crest formation. *Nature* 2010 Feb;463(7283):958-962.

57. Hang CT, Yang J, Han P, Cheng HL, Shang C, Ashley E, Zhou B, **Chang CP**. Chromatin regulation by Brg1 underlies heart muscle development and disease. *Nature* 2010 Jul; 466(7302):62-67. [Article, Press-released by *Nature*]

58. Stankunas K, Ma GK, Kuhnert FJ, Kuo CJ, **Chang CP**. VEGF signaling has distinct spatiotemporal roles during heart valve development. *Dev Biol* 2010 Nov;347(2):325-336.

59. Lin CY, Lin CJ, Chen CH, Chen RM, Zhou B, **Chang CP**. The secondary heart field is a new site of calcineurin/Nfatc1 signaling for semilunar valve development. *J Mol Cell Cardiology*. 2012; 52(5): 1096-102

60. Koss M, Bolze A, Brendolan A, Saggese M, Capellini TD, Bojilova E, Boisson B, Prall OW, Elliott DA, Solloway M, Lenti E, Hidaka C, **Chang** CP, Mahlaoui N, Harvey RP, Casanova JL, Selleri L. Congenital asplenia in mice and humans with mutations in a Pbx/Nkx2-5/p15 Module. *Dev Cell.* 2012;22(5):913-26

D.1.B. *Reviews* (4 total, 1 in press)

5. Lieber MR, **Chang CP**, Gallo M, Gauss G, Gerstein R, Islas A. The mechanism of V(D)J recombination: site-specificity, reaction fidelity, and immunologic diversity. *Semin Immunol* 1994;6(3):143-153.

6. Han P, Hang CT, Yang J, **Chang CP**. Chromatin remodeling in cardiovascular development and physiology. *Circ Res* 2011 Feb;108(3):378-396.

7. **Chang CP**, Bruneau BG. Epigenetics and cardiovascular development. *Annu Rev Physiol* 2012 Feb;74: 13.1–13.28.

8. Lin CJ, Lin CY, Chen CH, Zhou B, **Chang CP**. Partitioning of the heart: mechanism of cardiac septation and valve development. *Development* 2012 in press

D.3. Book Chapters [3]

1. Xiong Y, Zhou B, Chang **CP**. Analysis of the endocardial-to-mesenchymal transformation of heart valve development by a collagen gel culture assay. *Methods in Molecular Biology: Cardiovascular Development* 2012; 843:21-8
2. Hang C, **Chang CP**. Whole embryo culture for heart development studies. *Methods in Molecular Biology: Cardiovascular Development* 2012; 843:3-9
3. **Chang CP**. Analysis of the patterning of great arteries with angiography and vascular casting. *Methods in Molecular Biology: Cardiovascular Development* 2012; 843:101-9

D.4. Abstracts [3 published]

1. Rugolotto M, Liang DH, Hu BS, **Chang CP**, Schnittger I. Bedside point-of-care echocardiography performed with a new generation hand-carried device: impact on the management of patients hospitalized for acute cardiac care. *Eur Heart J* 2001;22 (Suppl S):707.

2. **Chang CP**, Neilson JR, Bayle JH, Gestwicki, Graef I, Crabtree GR. Sequential myocardial-endocardial NFAT signaling initiates and perpetuates heart valve morphogenesis. *Dev Biol* 2004;271(2):612.

3. El-Bizri N, Wang L, **Chang CP**, Helms JA, Mishina Y, Rabinovitch M. Vascular, cardiac, and craniofacial defects in mice with vascular smooth muscle cell-specific deletion of bone morphogenetic protein type IA receptor (BMPR-IA). *Circulation* 2006;114(18 Suppl II): II-141.

Technical Session D1-W2-T4: Medicine, Public Health, Biomedical Science and Engineering (4)

Targeting Her2 in tumor-initiating cells in non-Her2 amplified breast cancer

Cleo Yi-Fang Lee

Postdoctoral research fellow, Stanford Cancer Institute
Lorry I Lokey Stem Cell Research Building
265 Campus Drive, Room G2115, Stanford, CA 94305-5101
Tel: 1-650-723-3719
Email: cleolee@stanford.edu

ABSTRACT

The role of Her2 remains controversial in non-Her2 amplified breast cancer and recent clinical observations suggest that patients with HER2-negative breast cancers respond equally well from Herceptin treatment as patients with HER2-positive tumors. In the current study, we examined the effect of targeting Her2 in breast tumor-initiating cells (TIC) using MMTV-Wnt1 mouse breast caner model. We found that neuregulins were overexpressed in TIC as compared to non-tumorigenic cells (NTC) and Nrg1 treatment of breast TIC increased the colony forming abilities and the phosphorylation levels of Akt and Erk1/2. Furthermore, treatment with anti-Nrg1 antibody, AG825 (inhibitor of Her2) or lapatinib (dual inhibitor of Egfr and Her2) inhibited breast TIC proliferation and self-renewal and reduced the percentage of TIC subpopulation *in vitro*. Mice bearing tumors were treated with AG825 or lapatinib and both drugs effectively inhibited tumor growth and reduced breast TIC subpopulation by FACS analysis. Importantly, the frequency of breast TIC was significantly reduced by AG825 and lapatinib treatment in a limiting dilution analysis of secondary transplantations. In conclusoin, our findings suggest that autocrine production of Nrg1 promotes and maintains the proliferation and self-renewal of breast TIC via activation of Akt and Erk1/2 pathways and targeting Her2 may be clinically beneficial in non-Her2 amplified breast cancer. This could potentially lead to new clinical applications of Her2 targeted anti-cancer therapies to treat patients with HER2-negative breast cancers.

BIOGRAPHY

Place of Birth: Taiwan **Date of Birth**: 03/14/1981 **Citizenship:** Canadian

Education
B.Sc. Honors Biochemistry & Molecular Biology, University of British Columbia, Vancouver, British Columbia, 2003

Ph.D. Pathology & Laboratory Medicine, University of British Columbia, Vancouver, British Columbia, 2009
Research Experience
UUSUMMER RESEARCH STUDENT Division of Infectious Disease, Vancouver General Hospital, May-Aug, 2003

PH.D. STUDENT University of British Columbia, Sept. 2003 – Aug. 2009
Published articles:
1. **Lee CY**, Rennie PS, Jia WW. MicroRNA regulation of oncolytic herpes simplex virus type 1 for selective killing of prostate cancer cells. *Clinical Cancer Research* 2009.
2. **Lee CY**, Bu LX, DeBenedetti A, Williams BJ, Rennie PS, Jia WW. Transcriptional and Translational Dual-regulated Oncolytic Herpes Simplex Virus Type 1 for Targeting Prostate Tumors. *Mol Ther* 2010.

POSTDOCTORAL RESEARCH FELLOW, Stanford University (current position)
Book Chapter: **Lee C**, Diehn M. "Mechanisms of Radioresistance in Cancer Stem Cells" in Cancer Stem Cells in Solid Tumors. Ed: Allan A. 2011, Part 5, 345-360.

During her predoctoral training period, she worked on designing targeted oncolytic viruses for prostate cancer treatment. Her dedication to and aptitude for cancer research is evidenced by her three first-author papers in Cancer Gene Therapy (2007), Clinical Cancer Research (2009), and Molecular Therapy (2010). She is now a postdoctoral research fellow at Stanford University and her research interest is to identify genes involved in the proliferation and self-renewal of breast cancer stem cells (CSC) and to evaluate the effects of targeting self-renewal-associated genes or pathways in CSC. The ultimate goal is to eventually design targeted therapies to eliminate breast tumor-initiating cells and the remaining tumor cells for the treatment of breast cancer.

Awards and Distinctions
1. The Canadian Student Health Research Forum (CSHRF) Travel Award CIHR – Institute of Cancer Research Silver Poster Award, 2007
2. US Army DOD pre-doctoral award (3 years), 2008
3. AACR-Qiagen Scholar-in-Training Award, 2009
4. The Prostate Cancer Research Foundation of Canada (PCRFC) Research Grant
   $60,000 for one year (Co-Investigator, Dr. William Jia is PI), Oncolytic HSV-1 with a 3'UTR regulatory element for prostate cancer specific virotherapy, 2007-2008.

Publications
Refereed Article
1. Jung C*, **Lee CY***, Grigg ME. The SRS superfamily of Toxoplasma surface proteins. UU*International Journal for ParasitologyUU* 2004; 34: 285-296. *CJ and CYL contributed equally to this work.
2. **Lee CY**, Bu LX, Rennie PS, Jia WW. An HSV-1 amplicon system for prostate-specific expression of ICP4 to complement oncolytic viral replication for *in vitro* and *in vivo* treatment of prostate cancer cells. *Cancer Gene Therapy* 2007; 14(7): 652-660.
3. **Lee CY**, Rennie PS, Jia WW. MicroRNA regulation of oncolytic herpes simplex virus type 1 for selective killing of prostate cancer cells. *Clinical Cancer Research* 2009; 15(16): 5126-5135.
4. Zhang KX, Matsui Y, Hadaschik BA, **Lee C**, Jia W, Bell JC, Fazli L, So AI, Rennie PS. Down-regulation of type I interferon receptor sensitizes bladder cancer cells to vesicular stomatitis virus-induced cell death. *Int J Cancer* 2009; 127(4): 830-838.
5. **Lee CY**, Bu LX, DeBenedetti A, Williams BJ, Rennie PS, Jia WW. Transcriptional and Translational Dual-regulated Oncolytic Herpes Simplex Virus Type 1 for Targeting Prostate Tumors. *Mol Ther* 2010; 18(5): 929-935.
6. Wong J, **Lee C**, Zhang K, Rennie PS, Jia W. Targeted Oncolytic Herpes Simplex Viruses for Aggressive Cancers. *Curr Pharm Biotechnol.* 2011. [Epub ahead of print].

Book Chapter
1. **Lee C**, Diehn M. "Mechanisms of Radioresistance in Cancer Stem Cells" in Cancer Stem Cells in Solid Tumors. Ed: Allan A. 2011, Part 5, 345-360.

Technical Session D1-W2-T4: Medicine, Public Health, Biomedical Science and Engineering (4)

Leslie Chen

Research Scientist, Institute for Systems Biology
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Email: lchen@systemsbiology.org

Abstract:
Coined by Dr. Leroy Hood, P4 medicine delivers new insights to the future medicine on the aspects of predictive, preventive, personalized, and participatory. To translate P4 medicine, we need to employ a systems approach – systems biology and medicine. In my presentation, I will highlight some state-of-the-art technologies and techniques I employed in my current research in studying malignant brain caner and cardiomyopathy. The ultimate goals are to understand the cause of diseases and that investigating new therapeutic targets and strategies.

BIOGRAPHY

Dr. Leslie Chen received his Ph.D. degree in pharmacogenomics from the University of Cambridge in Cambridge, United Kingdom. His Ph.D. dissertation was conducted at the Wellcome Trust Sanger Institute (WTSI) under the supervision of Dr. Panos Deloukas. He received his B.Sc. and M.Sc. degrees in life science from National Tsing-Hua University in Hsinchu city, Taiwan.

He has more than seven-year professional work experiences in academia. In 2001, he joined the Institute of Biomedical Sciences, Academia Sinica, as a COMPUTATIONAL BIOLOGIST to develop bioinformatics algorithms for nucleotide sequences analysis. In 2007, he worked as a POSTDOCTORAL RESEARCH ASSOCIATE at the WTSI to expend his Ph.D project to identify the genetic factors underlying bleeding complication of warfarin treatment. In 2008, he was invited by Dr. Leroy Hood to join hist group at the Institute for Systems Biology (ISB) in Seattle as a POSTDOCTOAL FELLOW. In 2011, he was promoted to RESEARCH SCIENTIST position and is leading two research projects to study evolution of brain cancer genome and the development of GATA4 disruptive cardiomyopsy.

Dr Chen is a member of the International Warfarin Pharmacogenetics Consortium (IWPC). The novel algorithm for nucleotide sequence mapping that he and his co-worker developed was named "BLAST BUSTER" by the Genome Technology magazine in 2002. His recent publication in 2009 on BLOOD describing genetic forecasting of warfarin is selected by the Faculty of 1000 Medicine as 'Must Read'. More recently, he and his collaborators developed a new computational method for analyzing mRNA-seq was highlighted by GenomeWeb in December 2011.

Technical Session D1-W2-T4: Medicine, Public Health, Biomedical Science and Engineering (4)

Epigenetic mechanism of heart muscle development and disease

Ching-Pin Chang, MD, PhD

Division of Cardiovascular Medicine, Department of Medicine, Stanford University, California, USA

Abstract:

Cardiac hypertrophy and failure are characterized by transcriptional reprogramming and fetal gene activation, which correlate with cardiac performance and clinical outcome. In the mammalian heart, there are two isoforms of the molecular motor gene—α- and β-myosin heavy chain (α- and β-MHC)—which encode ATPase to hydrolyze ATP and drive heart muscle contraction. In mice the adult cardiomyocytes are post-mitotic and express mainly α-MHC, whereas embryonic cardiomyocytes are highly proliferative and express primarily β-MHC. However, when the adult heart is stressed by pathological insults, it develops hypertrophy (enlargement of muscle cells), accompanied by a shift from α-MHC to fetal β-MHC isoform, leading to contractile dysfunction and heart failure. Mechanisms bridging the developmental and pathological gene expression are not well understood. We show that Brg1, a core ATPase component of the BAF chromatin-remodeling complex, plays critical roles in regulating gene expression, tissue growth and differentiation in embryonic hearts and adult hearts under stress. In embryos, *Brg1* promotes myocardial proliferation by maintaining *Bmp10* and suppressing a CDK inhibitor, $p57^{kip2}$. In parallel, Brg1/BAF preserves fetal cardiac differentiation by interacting with HDACs and PARP1 to transcriptionally repress *α-MHC* and activate *β-MHC*. In adults, *Brg1* expression is turned off in cardiomyocytes. It is reactivated by cardiac stresses and complexes with its embryonic partners, HDACs and PARP1, to induce a pathological shift from *α-* to *β-MHC*. Preventing *Brg1* re-expression decreases hypertrophy, and reverses the pathological *MHC* switch. Our studies uncover a role of Brg1 in maintaining cardiomyocytes in an embryonic state, and an epigenetic mechanism by which three chromatin-regulating factors, Brg1/BAF, HDACs and PARP1, cooperate to control developmental and pathological gene expressions. Furthermore, *Brg1* is activated in certain patients with hypertrophic cardiomyopathy. Its level correlates with disease severity and *MHC* changes, suggesting a pathogenic role of Brg1 activation in human hypertrophic heart disease.

BIOGRAPHY

Curriculum Vitae

Ching-Pin Chang

A. Academic history:

Colleges and universities attended, degrees received, dates.

9/1983-6/1990	MD	National Taiwan University Taipei, Taiwan
9/1992-6/1997	PhD	Stanford University - Cancer Biology Stanford, California

Scholarships and honors:

1982	Mathematic Olympics Competition, Taiwan, Silver Medal [youngest awardee]
1983	Thomas Alva Edison Award, 27th International Science Symposium for Edison Science and Engineering Youth Day Program, Thomas Alva Edison Foundation, USA [only student from Taiwan selected to attend]
1983-1990	National Taiwan University, Dean's Lists & Dean's Awards
1989	Harvard Medical School, Exchange Student selection [funded by Harvard Medical School and Ministry of Education, Taiwan]
1990	Best Intern Award (top of class, 160 interns), College of Medicine, National Taiwan University
2001-2004	Physician-Scientist Fellowship Award, Howard Hughes Medical Institute
2004	Weinstein Award, Weinstein Cardiovascular Development Conference, Leiden, Netherlands
2004	Keystone Symposia Scholarship Award, Keystone Symposia, Molecular Biology of Heart Disease, Cardiac Development and Congenital Heart Disease, Colorado, USA
2005	National Scientist Development Award, American Heart Association
2006	Faculty Scholar Award, Donald E. and Delia B. Baxter Foundation
2007	Medical Research Grant Award, Children's Heart Foundation
2007	Research Grant Award, March of Dimes Birth Defects Foundation
2008	New Faculty Award, California Institute of Regenerative Medicine
2011	Junior Faculty Award, Keystone Symposia, Mechanisms of Cardiac Growth, Death and Regeneration, Colorado, USA
2011	Elected member, American Society for Clinical Investigation
2012	National Established Investigator Award, American Heart Association

Post-doctoral and residency training:

7/1/97-6/30/99	Internship and Residency, Internal Medicine Massachusetts General Hospital, Boston, Massachusetts
7/1/99-6/30/01	Clinical Cardiology Fellowship Stanford University School of Medicine, Stanford, California
7/1/01-6/30/04	HHMI Physician-Scientist Fellowship Stanford University School of Medicine, Stanford, California
7/1/99-6/30/04	Fellowship, Clinical Investigator Pathway, Cardiovascular Medicine Stanford University School of Medicine, Stanford, California

Medical Board

2000	A.B.I.M. Certification, Internal Medicine	Certificate No.: 197361
2004	A.B.I.M. Certification, Cardiovascular Disease	Certificate No.: 197361

Licensure

7/1999 California Medical License #A69033

B. Employment history:

Academic positions:

2/1/05-11/01/11 Assistant Professor of Medicine, Cardiovascular Medicine
Stanford University School of Medicine, Stanford, CA

11/01/11-pres Associate Professor of Medicine, with tenure, Cardiovascular Medicine
Stanford University School of Medicine, Stanford, CA

C. Public and professional service.

National committees:

8/06 Moderator, Undergraduate Research Roundtable
Faculty, Undergraduate Research Training Program
American Heart Association (AHA), CA

11/06 American Heart Association (AHA), Western Review Consortium, Peer Review Committee 2B
Integrative Cardiology & Physiology

10/07 AHA, National Center, Peer Review Committee BASIC 3
Basic Science & Molecular Biology 3 Study Group

11/07 AHA, Western Review Consortium, Peer Review Committee 3B (Cardiovascular Development Group)

2010-11 Medical Research Council Grant Review, England (declined because of conflicts of schedule)

2008-pres University Grant Committee Grant Review, Hong Kong

National and international speeches:

27. Tissue Interactions during Heart Valve Morphogenesis. Research in Innovative Tissue Engineering Meeting, National Heart, Lung and Blood Institute, National Institute of Health, Washington, DC. 2004
28. Repression of VEGF Expression by NFAT Underlies Initiation of Heart Valve Morphogenesis. Molecular Biology of Heart Disease, Cardiac Development and Congenital Heart Disease, Keystone Symposia, Keystone, Colorado. 2004
29. Sequential Myocardial-Endocardial NFAT Signaling Defines a Morphogenetic Field Essential for Heart Valve Development. FASEB 2004 Summer Research Conference, Calcium and Cell Function, Snowmass, Colorado. 2005
30. Sequential Myocardial-Endocardial NFAT Signaling Defines a Morphogenetic Field Essential for Heart Valve Development. Research in Innovative Tissue Engineering Meeting, National Heart, Lung and Blood Institute, National Institute of Health, Washington DC. 2005
31. Tissue Interactions during Heart Valve Morphogenesis. American Heart Association Western Affiliate Young Investigators Forum. 2005

32. Pbx Mutant Mice Provide a Multigenetic Model for Congenital Heart Disease Weinstein Cardiovascular Conference, Tuscon, Arizona.
    2005
33. Calcineurin-NFAT Signaling and Heart Valve Development. FASEB Summer Research Conference, Protein Kinase and Phosphorylation, Snowmass Colorado.
    2005
34. A Field of Myocardial-Endocardial NFAT Signaling Directs Heart Valve Morphogenesis. FASEB Summer Research Conference, Receptors and Signal Transduction, Snowmass, Colorado. 2006
35. Endocardial Brg1 Represses Adamts1 to Maintain the Microenvironment for Myocardial Morphogenesis. Weinstein Cardiovascular Conference, Indianapolis, Indiana.
    2007
36. Epigenetic Control of Cardiac Myogenesis. Western Society of Pediatric Cardiology, CA
    2008
37. Epigenetic Control of Myocardial Morphogenesis. SCBA Northern California Chapter, CA
    2008
38. Chromatin and Transcriptional Regulation of Heart Development. Workshop, Weinstein Cardiovascular Conference, Dallas, Texas.
    2008
39. NFAT Signaling in Heart Development, American Heart Association Research Symposium, New Orleans, Louisiana.
    10/2008
14. Chromatin regulation of cardiac growth, differentiation and morphogenesis, Weill Medical College, Cardiology Grand Round, Cornell University, New York
    2/2009
15. Control of Cardiac Growth, Differentiation and Hypertrophy by the BAF complex, Keystone symposium, Plenary Section, North Carolina.
    3/2009
32. Multigenetic Interactions in the Pathogenesis of Congenital Heart Disease, Western Society of Pediatric Cardiology, Yosemite, CA.
    5/2009
33. From Heart Development to Heart Disease, Keynote speech, Developmental Biology Retreat, Academia Sinica, Taiwan
    8/2009
34. Chromatin Regulation of Cardiac Differentiation and Morphogenesis. Institute of Molecular Biology, Academia Sinica, Taiwan
    8/2009
35. Control of Cardiac Growth, Differentiation and Hypertrophy by the BAF complex, Weinstein Cardiovascular Conference, San Francisco, CA
    5/2009
36. Sculpting heart valves with NFAT and VEGF, Oak Foundation Symposium
    8/2009
37. Mechanism of cardiac hypertrophy and failure, Amgen Inc., San Francisco
    2009
38. Control of cardiac growth, differentiation and hypertrophy by chromatin remodeling, Krannert Institute of Cardiology, Division of Cardiology Indiana University School of Medicine, Indiana 5/2010
39. Control of cardiac growth, differentiation and hypertrophy by a chromatin remodeling complex. Birth, Life and Death of the Cardiac Myocyte Conference, Napa Valley, CA
    6/2010

24. Chromatin regulation in heart development and disease, Cardiology grand round, Krannert Institute of Cardiology, Division of Cardiology Indiana University School of Medicine, Indiana 7/2010
25. Epigenetic control of heart development and disease, Cardiology grand round, National Taiwan University Hospital, National Taiwan University, Taiwan 8/2010
26. Heart development and disease, Research Seminar, Institute of Biochemistry and Molecular Biology, Yang-Ming University, Taiwan 8/2010
27. Chromatin remodeling in cardiomyopathy, Department of Genetics, Albert Einstein College of Medicine, New York 10/2010
28. Chromatin remodeling in cardiovascular development and physiology, Department of Systems Biology and Translational Medicine, Texas A&M University, Texas 11/2010
29. Chromatin remodeling in the heart, Workshop, American Heart Association, Chicago 11/2010
30. Chromatin regulation in heart development and disease, Zing Conference, Cardiovascular Remodeling, Cancun, Mexico 12/2010
31. Chromatin remodeling in cardiomyopathy, Cardiology research seminar, UCSD, San Diego, CA 1/2011
32. Chromatin regulation of heart development and disease, Frontiers of cardiovascular science seminar, Stanford University, Stanford, CA 2/2011
33. Chromatin regulation by Brg1 controls cardiac growth, differentiation, and hypertrophy, Joint Keystone symposia on Mechanisms of Cardiac Growth, Death, and Regeneration; Molecular Cardiology, Keystone, Colorado 2/2011
34. Mechanisms of heart development and disease, Distinguished Cardiovascular Lectureship, UCLA, Los Angeles, CA 2/2011
35. Mechanisms of heart development, disease, and regeneration, Japanese Circulation Society and University of Tokyo, Yocohama, Japan (cancelled because of earthquake) 3/2011
36. Mechanism of heart development and disease, Gilead, Palo Alto, CA 4/2011
37. Chromatin regulation in heart development and disease. Translational Medicine Seminar, Proteomics Society, Taiwan 4/2011
38. Chromatin regulation in cardiac pathophysiology. Institute of Biomedical Sciences, Academia Sinica, Taipei, Taiwan 4/2011
39. Mechanism of cardiovascular development and disease, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China 5/2011
40. Epigenetic control of cardiac pathophysiology, Biomolecular Engineering Seminar, Hong Kong University of Science and Technology, Hong Kong, China 5/2011

41. Chromatin regulation in development and disease, Department of Molecular and Cellular Biology, Program in Developmental Biology, Baylor College of Medicine, Houston, Texas 5/2011
42. Chromatin remodeling in cardiac pathophysiology, Cardiovascular Institute, University of Pennsylvania, Philadelphia, Pennsylvania 6/2011
43. Heart development and disease (Section Chair), SCBA symposium, Guangzhou, China 7/2011
44. Chromatin remodeling in heart development and disease, TaiGen Inc., Taipei, Taiwan 11/2011
45. Epigenetic regulation of cardiomyopathy and heart failure, Keynote speech, 104th Annual Meeting, Formosan Medical Association, Taipei, Taiwan 11/2011
46. Epigenetic regulation of the spatial and temporal development of mammalian heart, Cardiovascular Science Seminar, Education Section, American Heart Association, Orlando, Florida 11/2011
47. Unraveling the genetic etiologies of congenital heart disease, 3rd International Conference on Innovations and Engineering, Palo Alto, California 4/2012
48. Epigenetics, heart development, and heart failure. Institute of Clinical Medicine, Veterans General Hospital, Yang-Ming University, Taiwan 7/2012
49. Epigenetic mechanism of heart muscle development and disease (section chair), "Leadership, Innovation, Growth", 2nd Young Investigator Conference, Palo Alto, CA 7/2012
50. Therapy for cardiac hypertrophy and failure, Gilead Sciences Inc., Foster City, CA 8/2012
51. Chromatin remodeling in cardiovascular physiology and pathology, Cardiovascular Science Seminar, Education Section, American Heart Association, Los Angeles, CA 11/2012
52. Molecular mechanism of cardiac pathophysiology, Cardiology, Weill Medical College, Cornell University, New York TBD, 2012

Local committees & task forces:

2005-pres. Admissions Committee, Cardiovascular Medicine Fellowship
Stanford University School of Medicine

2005-pres. Admissions Committee, Clinical Investigator Pathway and Residency
Stanford University School of Medicine

2005-pres. Career Advisor for Medical Students in the Clinical Investigator Pathway
Stanford University School of Medicine

9/2005-pres. Faculty, Medical Scientist Training Program
Stanford University School of Medicine

9/2005-pres. Faculty, Cancer Biology Training Program
Stanford University School of Medicine

9/2005-pres. Faculty, BioX Training Program

Stanford University School of Medicine

9/2005-pres. Faculty, Molecular Medicine Training Program
Stanford University School of Medicine

9/2005-pres. Faculty, Cardiopulmonary Concentrates Training Program
Stanford University School of Medicine

3/2007-pres. Steering Committee Member, Stanford Cardiovascular Institute
Stanford University

Stanford Intramural Teaching

Courses

10/05 DBIO 201, Medical Student Developmental Biology
Current: *Early Heart and Vascular Development*
Stanford University School of Medicine

1/06 MED 223, Cardiovascular and Pulmonary Sciences Seminar
Current: *Epicardial cells as multi-potential cardiac cells*
Stanford University School of Medicine

5/06 DBIO 156, Heart Development - Undergraduate
Stanford University School of Medicine

6/06 MED 221, Human Health and Disease – Medical Students
Current: Clinical Pathologic Conference
Coronary artery disease, cardiomyopathy and peripheral vascular disease
Stanford University School of Medicine

4/08 DBIO/Path 296, Stem Cell Biology & Regenerative Medicine – Graduate/Medical Students
Stanford University School of Medicine

10/12 DBIO 201, Medical Student Developmental Biology
Current: *Heart Development*
Stanford University School of Medicine

Seminars

1. The Pbx gene family regulates cardiac outflow tract development. Developmental Biology Retreat, Developmental Biology, Stanford
2. Calcineurin/NFAT signaling in cardiovascular development. Angiogenesis Forum, Cardiovascular Medicine/Hematology, Stanford
3. Regulation of great artery patterning. Donald W. Reynolds Cardiovascular Clinical Research Center
4. Patterning of the cardiovascular development. Cardiovascular Medicine Division Research Conference
5. Regulation of cardiac morphogenesis Cardiopulmonary Research-in-Progress Seminar. Wall Cardiopulmonary Research Center, Department of Pediatrics, Stanford
6. Reciprocal exchange of calcineurin/NFAT signals between myocardium and endocardium in heart valve morphogenesis. Angiogenesis Forum, Cardiovascular Medicine/Hematology, Stanford

7. Sequential myocardial-endocardial calcineurin/NFAT signaling directs heart valve morphogenesis. Developmental Biology Retreat, Developmental Biology, Stanford
8. A field of myocardial-endocardial NFAT signaling underlies heart valve morphogenesis. Wall Cardiopulmonary Research Center, Department of Pediatrics, Stanford
9. NFAT signaling in heart valve development. 3D Seminar, Department of Developmental Biology
10. Multi-genetic Model for Congenital Heart Disease. Pediatric Cardiology Journal Club. Lucile Packward Children's Hospital, Stanford
11. Mechanism of heart valve morphogenesis. Developmental Biology, Stanford University, Stanford
12. Repression of VEGF by NFAT is essential for heart valve formation. Vascular Biology Seminar
13. Mechanisms of Cardiovascular Development. MSTP Program, Stanford
14. Cell-cell Signaling during development. Cancer Biology Program, Stanford
15. Mechanisms of Renal Development. Seminars in Nephrology, Medicine, Stanford
16. Epicardial cells as multi-potential cardiac cells. Cardiovascular and Pulmonary Sciences Seminar
17. Sculpting heart valves with NFAT and VEGF. Regenerative Medicine Seminar, Stanford.

18. Tissue-tissue interactions during heart development. Research talk for Interns and Residents
19. Transcriptional regulation of cardiac outflow tract and great artery patterning, Cardiopulmonary research
in progress conference, Stanford
20. Heart specification, development, ES embryonic cardiogenesis. Stem Cell Biology and Regenerative Medicine
21. Heart Development, BioX undergraduate research program, Stanford.

22. Chromatin regulation of cardiac growth, differentiation and morphogenesis. Regenerative Medicine Seminar, Stanford
23. Chromatin regulation of cardiac growth, differentiation and hypertrophy, Cardiovascular Institute
24. Adventitial stem cell signaling and vascular repair, Cardiovascular Institute symposium, Stanford
25. Cardiomyopathy caused by calcineurin-NFAT dysregulation, Cardiomyopathy seminar, Stanford
26. Epigenetic regulation of heart development and disease, Cardiopulmonary research in progress seminar 27. Mechanisms of cardiac hypertrophy, Cardiovascular Institute (CVI), Stanford
28. Heart Development, Cardiology Fellow Seminar

29. Cardiomyopathy and heart failure. Fellow, Myocardial Training Program

30. Mechanisms of pathological vascular remodeling, CVI workshop, Stanford

31. Are there cells to control pathological vascular remodeling? Stem Cells and Regenerative Medicine Seminar, Stanford

Review for scientific journals

Development
Developmental Biology

Developmental Cell
Cell Research
Circulation
Circulation Research
Circulation: Cardiovascular Genetics
FASEB
Pediatric Research
PLos
Proceedings of National Academy of Sciences
Nature
Nature Genetics

Community Service:

7/90-8/92 Medical Officer, Second Lieutenant, National Army, Taiwan

D. Publications

D.1. Peer-reviewed articles [37 total: 1 in press]

D.1.A. *Original research contributions* (30 total)

61. **Chang CP**, Shen WF, Rozenfeld S, Lawrence HJ, Largman C, Cleary ML. Pbx proteins display hexapeptide-dependent cooperative DNA binding with a subset of Hox proteins. *Genes Dev* 1995;9(6):663-674.

62. Shen WF, **Chang CP**, Rozenfeld S, Sauvageau G, Humphries RK, Lu M, Lawrence HJ, Cleary ML, Largman C. Hox homeodomain proteins exhibit selective complex stabilities with Pbx and DNA. *Nucleic Acids Res* 1996;24(5):898-906.

63. **Chang CP**, Brocchieri L, Shen WF, Largman C, Cleary ML. Pbx modulation of Hox homeodomain amino-terminal arms establishes different DNA-binding specificities across the Hox locus. *Mol Cell Biol* 1996;16(4):1734-1745.

64. **Chang CP**, de Vivo I, Cleary ML. The Hox cooperativity motif of chimeric oncoprotein E2a-Pbx1 is necessary and sufficient for oncogenesis. *Mol Cell Biol* 1997;17(1):81-88.

65. Smith KS, Jacobs Y, **Chang CP**, Cleary ML. Chimeric oncoprotein E2a-Pbx1 induces apoptosis of hematopoietic cells by a p53-independent mechanism that is suppressed by Bcl-2. *Oncogene* 1997;14(24):2917-2926.

66. **Chang CP**, Jacobs Y, Nakamura T, Jenkins NA, Copeland NG, Cleary ML. Meis proteins are major *in vivo* DNA binding partners for wild-type but not chimeric Pbx proteins. *Mol Cell Biol* 1997;17(10):5679-5687.

67. Piper DE, Batchelor AH, **Chang CP**, Cleary ML, Wolberger C. Structure of a HoxB1-Pbx1 heterodimer bound to DNA: role of the hexapeptide and a fourth homeodomain helix in complex formation. *Cell* 1999;96(4)587-597.

68. Pelletier MP, **Chang CP**, Vagelos R, Robbins RC. Alternative approach for use of a left ventricular assist device with a thrombosed prosthetic valve. *J Heart Lung Transplant* 2002; 21(3):402-404.

69. Rugolotto M, **Chang CP**, Hu B, Schnittger I, Liang DH. Clinical use of cardiac ultrasound performed with a hand-carried device in patients admitted for acute cardiac care. *Am J Cardiol* 2002;90(9):1040-1042.

70. **Chang CP**, Chen L, Crabtree GR. Sonographic staging of the developmental status of mouse embryos *in utero. Genesis* 2003;36(1):7-11.

71. **Chang CP**, McDill BW, Neilson JR, Joist HE, Epstein JA, Crabtree GR, Chen F. Calcineurin is required in the urinary tract mesenchyme for the development of the pyeloureteral peristaltic machinery. *J Clin Invest* 2004;113(7):1051-1058. Editorial commentary: Mendelsohn C. Functional obstruction: the renal pelvis rules. *J Clin Invest* 2004;113(7):957-959.

72. **Chang CP**, Neilson JR, Bayle JH, Gestwicki JE, Kuo A, Graef IA, Crabtree GR. A field of myocardial-endocardial NFAT signaling underlies heart valve morphogenesis. *Cell* 2004; 118(5):649-663. [Cover] Editorial commentary: Lambrechts D, Carmeliet P. Sculpting heart valves with NFAT and VEGF. *Cell* 2004;118(5):532-534.

73. Kofidis T, de Bruin JL, Hoyt G, Lebl DR, Tanaka M, Yamane T, **Chang CP**, Robbins RC. Injectable bioartificial myocardial tissue for large-scale intramural cell transfer and functional recovery of injured heart muscle. *J Thorac Cardiovasc Surg* 2004;128(4):571-578.

74. Kofidis T, de Bruin JL, Hoyt G, Ho Y, Tanaka M, Yamane T, Lebl DR, Swijnenburg RJ, **Chang CP**, Quertermous T, Robbins RC. Myocardial restoration with embryonic stem cell bioartificial tissue transplantation. *J Heart Lung Transplant* 2005;24(6):737-744.

75. Aaron JR, Winslow MM, Polleiri A, **Chang CP**, Wu H, Gao X, Neilson JR, Chen L, Heit JJ, Kim SK, Yamasaki N, Miyakawa T, Francke U, Graef IA, Crabtree GR. NFAT dysregulation by increased dosage of DSCR1 and DYRK1A on chromosome 21. *Nature* 2006;441(7093):595-600. [Article]

76. Sheikh AY, Lin SA, Cao F, Cao YA, van der Bogt KE, Chu P, **Chang CP**, Contag CH, Robbins RC, Wu JC. Molecular imaging of bone marrow mononuclear cell homing and engraftment in ischemic myocardium. *Stem Cells*. 2007 Oct;25(10):2677-2684.

77. Wu H, Kao SC, Barrientos T, Baldwin SH, Olson EN, Crabtree GR, Zhou B, **Chang CP**. Down syndrome critical region-1 is a transcriptional target of nuclear factor of activated T cells-c1 within the endocardium during heart development. *J Biol Chem* 2007;282(42): 30673-30679.

78. Jia Q, McDill BW, Li SZ, Deng C, **Chang CP**, Chen F. Smad signaling in the neural crest regulates cardiac outflow tract remodeling through cell autonomous and non-cell autonomous effects. *Dev Biol* 2007;311(1):172-184.

79. Stankunas K, Hang CT, Tsun ZY, Chen H, Lee NV, Wu JI, Shang C, Bayle JH, Shou W, Iruela-Arispe ML, **Chang CP**. Endocardial Brg1 represses ADAMTS1 to maintain the microenvironment for myocardial morphogenesis. *Dev Cell* 2008 Feb;14(2):298-311.

80. El-Bizri N, Guignabert C, Wang L, Cheng A, Stankunas K, **Chang CP**, Mishina Y, Rabinovitch M. SM22α-targeted deletion of bone morphogenetic protein receptor 1A in

mice impairs cardiac and vascular development, and influences organogenesis. *Development* 2008;135(17):2981-2991.

81. Stankunas K, Shang C, Twu KY, Kao SC, Jenkins NA, Copeland NG, Sanyal M, Selleri L, Cleary ML, **Chang CP**. Pbx/Meis deficiencies demonstrate multigenetic origins of congenital heart disease. *Circ Res* 2008;103:702-709. [Cover]

82. **Chang CP***, Stankunas K, Shang C, Kao SC, Twu KY, Cleary ML. Pbx1 functions in distinct regulatory networks to pattern the great arteries and cardiac outflow tract**.** *Development* 2008 Nov;135(21):3577-3586. *Corresponding author.

83. Kao SC, Wu H, Xie J, **Chang CP**, Ranish JA, Graef IA, Crabtree GR. Calcineurin/NFAT signaling is required for neuregulin-regulated Schwann cell differentiation. *Science* 2009 Jan; 323(5914);651-654.

84. Zeini M, Hang CT, Lehrer-Graiwer J, Dao T, Zhou B, **Chang CP**. Spatial and temporal regulation of coronary vessel formation by calcineurin-NFAT signaling. *Development* 2009 Oct;136(19):3335-3345.

85. Wu B, Zhou B, Wang Y, Cheng HL, Hang CT, Pu WT, **Chang CP**, Zhou B. Inducible cardiomyocyte-specific gene disruption directed by the rat Tnnt2 promoter in the mouse. *Genesis* 2010 Jan;48(1):63-72.

86. Bajpai R, Chen DA, Rada-Iglesias A, Zhang J, Xiong Y, Helms J, **Chang CP**, Zhao Y, Swigut T, Wysocka J. CHD7 cooperates with PBAF to control multipotent neural crest formation. *Nature* 2010 Feb;463(7283):958-962.

87. Hang CT, Yang J, Han P, Cheng HL, Shang C, Ashley E, Zhou B, **Chang CP**. Chromatin regulation by Brg1 underlies heart muscle development and disease. *Nature* 2010 Jul; 466(7302):62-67. [Article, Press-released by *Nature*]

88. Stankunas K, Ma GK, Kuhnert FJ, Kuo CJ, **Chang CP**. VEGF signaling has distinct spatiotemporal roles during heart valve development. *Dev Biol* 2010 Nov;347(2):325-336.

89. Lin CY, Lin CJ, Chen CH, Chen RM, Zhou B, **Chang CP**. The secondary heart field is a new site of calcineurin/Nfatc1 signaling for semilunar valve development. *J Mol Cell Cardiology*. 2012; 52(5): 1096-102

90. Koss M, Bolze A, Brendolan A, Saggese M, Capellini TD, Bojilova E, Boisson B, Prall OW, Elliott DA, Solloway M, Lenti E, Hidaka C, **Chang** CP, Mahlaoui N, Harvey RP, Casanova JL, Selleri L. Congenital asplenia in mice and humans with mutations in a Pbx/Nkx2-5/p15 Module. *Dev Cell.* 2012;22(5):913-26

D.1.B. *Reviews* (4 total, 1 in press)

9. Lieber MR, **Chang CP**, Gallo M, Gauss G, Gerstein R, Islas A. The mechanism of V(D)J recombination: site-specificity, reaction fidelity, and immunologic diversity. *Semin Immunol* 1994;6(3):143-153.

10. Han P, Hang CT, Yang J, **Chang CP**. Chromatin remodeling in cardiovascular development and physiology. *Circ Res* 2011 Feb;108(3):378-396.

11. **Chang CP**, Bruneau BG. Epigenetics and cardiovascular development. *Annu Rev Physiol* 2012 Feb;74: 13.1–13.28.

12. Lin CJ, Lin CY, Chen CH, Zhou B, **Chang CP**. Partitioning of the heart: mechanism of cardiac septation and valve development. *Development* 2012 in press

D.3. Book Chapters [3]

1. Xiong Y, Zhou B, Chang **CP**. Analysis of the endocardial-to-mesenchymal transformation of heart valve development by a collagen gel culture assay. *Methods in Molecular Biology: Cardiovascular Development* 2012; 843:21-8
2. Hang C, **Chang CP**. Whole embryo culture for heart development studies. *Methods in Molecular Biology: Cardiovascular Development* 2012; 843:3-9
3. **Chang CP**. Analysis of the patterning of great arteries with angiography and vascular casting. *Methods in Molecular Biology: Cardiovascular Development* 2012; 843:101-9

D.4. Abstracts [3 published]

1. Rugolotto M, Liang DH, Hu BS, **Chang CP**, Schnittger I. Bedside point-of-care echocardiography performed with a new generation hand-carried device: impact on the management of patients hospitalized for acute cardiac care. *Eur Heart J* 2001;22 (Suppl S):707.

2. **Chang CP**, Neilson JR, Bayle JH, Gestwicki, Graef I, Crabtree GR. Sequential myocardial-endocardial NFAT signaling initiates and perpetuates heart valve morphogenesis. *Dev Biol* 2004;271(2):612.

3. El-Bizri N, Wang L, **Chang CP**, Helms JA, Mishina Y, Rabinovitch M. Vascular, cardiac, and craniofacial defects in mice with vascular smooth muscle cell-specific deletion of bone morphogenetic protein type IA receptor (BMPR-IA). *Circulation* 2006;114(18 Suppl II): II-141.

Technical Session D1-W3-T4: New Materials Science and Engineering, Nanotechnology and New Green Energy (4)

Session Organizer & Chair

Transparent Photovoltaics

Pei-Cheng Ku (古培正)

BIOGRAPHY

P.C. Ku received his BS degree from National Taiwan University in 1995 and PhD degree from University of California at Berkeley in 2003, both in Electrical Engineering. During PhD study, he was a recipient of the Berkeley Fellowship. From 2003-4, he was a postdoctoral researcher in DARPA Center for Optoelectronic Nanostructured Semiconductor Technology. From 2004-5, he was with Intel Corporation, working on advanced lithography and phase-change memory. He joined the University of Michigan as an assistant professor in 2006. His current research focuses on nanoscale materials and structures for energy efficient photonic applications. He has received Ross Tucker Memorial Award in 2004 and DARPA Young Faculty Award in 2010.

Technical Session D1-W3-T4: New Materials Science and Engineering, Nanotechnology and New Green Energy (4)

Emerging charge trapping nonvolatile memories

Jianlin Liu

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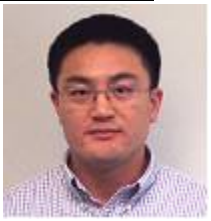
ABSTRACT

Flash memory as a classical charge trapping memory is running into the limit as the device continues to scale down. There are tremendous efforts in academia and industry searching various emerging nonvolatile memory technologies. In this presentation, I will present recent progress on the charge trapping memories and focus on reporting some recent effort in my group on nanocrystal-based charge trapping nonvolatile memories. Having a goal of extending scaling limit of nanocrystal memories in mind, we explored a few approaches on top of our earlier silicide nanocrystal approach, such as making vertical nanocrystal memory cells, and assembling nanocrystals into well-ordered charge storage nodes by using di-block co-polymer self-assembly process and using oxide-covered parallel-assembled carbon nanotubes as templates to circumvent dot density variation. I will also discuss other charge trapping memories to possibly scale beyond the nanocrystal memories.

BIOGRAPHY



Jianlin Liu received B.S. and Ph.D. degrees in physics from Nanjing University, China in 1993 and 1997, respectively, and another Ph.D. in electrical engineering from UCLA in 2003. In March 2003, he joined Department of Electrical Engineering, University of California at Riverside as a tenure-track faculty member, and currently he is a tenured full professor. The areas of his research interest include Si-based and ZnO-based thin films, nanowires, and quantum dots, and their optoelectronic and nanoelectronic devices, in particular, nonvolatile memories and light emitting devices. Prof. Liu has authored or co-authored more than 200 technical journals and refereed conference papers in these areas. His PhD thesis on Si nanowires is one of the 100 Excellent National PhD Theses of all discipline in China in 2001. He is also a recipient of US Department of Defense Young Investigator Award in 2008. He is a member of IEEE, APS, MRS, and SPIE. He served as international advisory board member, co-organizers, and technical committee members of a few technical conferences, such as International Conferences on Si Epitaxy and Heterostructures. More information can be found at the website of his Quantum Structures Laboratory http://qsl.ee.ucr.edu.

Technical Session D1-W3-T4: New Materials Science and Engineering, Nanotechnology and New Green Energy (4)

Plasmonic Metamaterials and Their Applications in Super Resolution Imaging

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ABSTRACT

The imaging resolution of conventional optical lens system is limited by the diffraction to a few hundreds of nanometers. Emerging artificially engineered plasmonic metamaterials offer a new possibility to build superlenses that overcome such a limit. In this talk I will review some of our work on optical superlens and hyperlens that are able to transfer super resolution image to the far-field as well as our recent development of Janus lens that shows different imaging properties along forward and backward directions. Other plasmonic based imaging techniques such as plasmonic structured illumination microscopy (PSIM), plasmonic dark field (PDF) microscopy will also be discussed.

BIOGRAPHY

Zhaowei Liu received his B.S. and M.S. in Physics from Nanjing University (Nanjing, China), Ph.D. in Mechanical and Aerospace Engineering (MEMS/Nanotechnology) from UCLA (Los Angeles, United States) in 1998, 2001, and 2006, respectively.

He held a postdoctoral position from 2006 to 2008 in NSF Nanoscale Science & Engineering Center (NSEC) and Mechanical Engineering at UC Berkeley. In 2008 he joined the faculty at UCSD and now is an Assistant Professor in the Electrical and Computer Engineering Department. He has published 56 peer-reviewed journal papers (2 in Science, 1 in Nature Materials, 1 in Nature Communications, 10 in Nano Letters, and 12 in Applied Physics Letters). His total citation is >2000 and h-index is 20. He has expertise in the development of new optical imaging concepts and techniques and also the general field of nanophotonics, metamaterials, plasmonics, micro/nanofabrication, and optical characterization technologies. His current research interest resides on an interdisciplinary approach towards research that bridges the areas of nanoscale photonics, nanostructured materials, as well as their potential applications in optoelectronics and the biological sciences.

Prof. Liu is a member of IEEE, SPIE, OSA, and MRS. His research on negative refraction in metamaterials proved the possibility of optical invisibility and was selected as top 10 scientific discoveries of 2008 by the Time Magazine.

He is a recipient of the 2010 SME Outstanding Young Manufacturing Engineer Award, 2010 Hellman Fellowship Award, and 2010 Kavli Fellow (National Academy of Sciences).

Technical Session D1-W3-T4: New Materials Science and Engineering, Nanotechnology and New Green Energy (4)

Nanostructured Thermoelectric Materials for Waste Heat Recovery

Zhixi Bian

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ABSTRACT

Thermoelectric materials can be used for solid-state refrigeration and thermal-to-electrical energy conversion. However, with advantages of small size and no moving parts, their application is still limited mainly because the efficiency is poor compared to conventional dynamic thermal cycles. A good thermoelectric material should possess a large Seebeck effect while it is electrically conductive and thermally insulating. Usually these three properties are interdependent in traditional materials. We utilize nanostructures and heterointerfaces in semiconductors to decouple electron and thermal transport properties and pursue superior thermoelectric performance. One example is by embedding with ErAs nanoparticles, the thermal conductivity of InGaAs alloys can be greatly reduced by enhanced phonon scattering and the thermoelectric power factor can also be increased at the same time by modulation doping and electron energy filtering. Another example is nanostructured Magnesium silicide based thermoelectric materials, which have demonstrated high thermoelectric figure-of-merit values in the mid-temperature range for waste heat recovery and have received significant attention since they are abundant on earth and non-toxic.

Along with the measurement results, we also present a model based on Boltzmann transport equation which includes multiple conduction valleys as well as dominant electron-phonon and impurity scattering mechanisms. The scattering of electrons by embedded nanoparticles and heterointerfaces are investigated using the quantum theory. We further discuss optimizations of nanoparticle potentials and nanograin boundaries which could possibly enhance the thermoelectric transport performance.

BIOGRAPHY

Dr. Zhixi Bian was born in Tianjin, China in 1971. He received his B.S. degree in electronics from Nankai University in 1993, M.S. degree in electronics from Beijing University in 1996, and Ph.D. degree in electrical engineering from the University of California, Santa Cruz in 2004, respectively.

He is currently an Assistant Adjunct Professor in the Electrical Engineering Department at University of California, Santa Cruz. He ever worked for Vishay Siliconix at Santa Clara as a Senior Reliability Engineer in 2008 and taught in the physics department of Beijing University, China from 1996 to 1999.

Dr. Bian is a member of MRS and IEEE. He has more than 60 peer reviewed publications and serves as a paper reviewer for many scientific journals. His research interests include tunable semiconductor lasers, optoelectronic and photonic integrated circuits, electron and heat transport in micro and nano scales, thermoelectric energy conversion, renewable energy, and electronics cooling.

Technical Session D1-W3-T4: New Materials Science and Engineering, Nanotechnology and New Green Energy (4)

Jung-Tsung Shen

Abstract:

Quantum nano-photonics: photonics interacting with atomic degrees of freedom

The quest for all-optical signal processing is generally deemed to be impractical because optical nonlinearities are usually weak. The emerging field of quantum nano-photonics, namely, nano-photonics with atomic degrees of freedom, seems destined to change this view. In this talk, I will explain how extraordinarily strong optical nonlinearities can be created in quantum nano-photonics. Examples including single-photon frequency conversion will be discussed in details.

Bio:
J.T. Shen received his PhD in Physics in 2003 from the Massachusetts Institute of Technology, where he worked on theoretical and computational investigations of electron-hole plasma, laser-gain profile, and metamaterials. Since 2003, he worked at Stanford University in the Ginzton Laboratory, focusing on photon transport in nano-photonics, metamaterials, plasmonics, and thermal and energy transport in nano-structures. In 2009, J.T. Shen joined the electrical and systems engineering department in Washington University in St. Louis.

Friday July 27th Opening Speech

Session Organizer & Chair

Session : Session Title

Session Organizer & Chair

Prof. Liang-Gee Chen
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BIOGRAPHY

Prof. Liang-Gee Chen was born in Taiwan on September 23, 1956.He received the B.S., M.S., and Ph.D. degrees in electrical engineering from National Cheng Kung University, Tainan, Taiwan, R.O.C. in 1979, 1981, and 1986, respectively.

He joined the Department of Electrical Engineering, National Taiwan University. During 1993–1994, he was a Visiting Consultant in the DSP Research Department, AT&T Bell Labs, Murray Hill, NJ. In 1997, he was a Visiting Scholar of the Department of Electrical Engineering, University of Washington, Seattle. During 2004-2006, he was the Vice President and General Director of the Electronics Research and Service Organization (ERSO) of the Industrial Technology Research Institute (ITRI), Taiwan. Since 2007, he has been serving as a Co-Director General of National SoC Program. Currently, he is the Deputy Dean of college of EECS and a Distinguished Professor of Department of Electrical Engineering at National Taiwan University. He is the IEEE Fellow from 2001. His research interests include DSP architecture design, video processor design, and video coding systems. He has over 420 publications and 15 US patents. He is a member of Phi Tau Phi.

Dr. Chen has served as an Associate Editor of IEEE Transactions on Circuits and Systems for Video Technology in 1996-2008, as Associate Editor of the IEEE Transactions on VLSI Systems in 1999-2001, and as Associate Editor of IEEE Transactions Circuits and Systems II in 2000-2001. He has been the Associate Editor of the Journal of Circuits, Systems, and Signal Processing (CSSP) in 1999-2008, and a Guest Editor for the Journal of Video Signal Processing Systems. He has been an Associate Editor for the Journal of Information Science and Engineering (JISE) from 2002. Since 2007, he has served as an Associate Editor of Research Letter in Signal Processing and for EURASIP Journal on Advances in Signal Processing. During 2001 -2004, he was also the Associate Editor of the Proceedings of the IEEE. He was the General Chair of 7th VLSI Design/CAD Symposium in 1995 and of the 1999 IEEE Workshop on Signal Processing Systems: Design and Implementation. He was Chair of Taipei Chapter of IEEE Circuits and Systems (CAS) Society, and is a member of IEEE CAS Technical Committee of VLSI Systems and Applications, the Technical Committee of Visual Signal Processing and Communications, and the IEEE Signal Processing Technical Committee of Design and Implementation of SP Systems. He was the Chair of the IEEE CAS Technical Committee on Multimedia Systems and Applications. During 2001–2002, he served as a Distinguished Lecturer of IEEE CAS Society. He has been the program committee member of IEEE ISSCC in 2004 - 2007. He is the TPC chair of 2009 IEEE ICASSP and ISCAS 2012. He received the Best Paper Award from the R.O.C. Computer Society in 1990 and 1994. In 1990 to 2005, he received Long-Term (Acer) Paper Awards annually. In 1992, he received the Best Paper Award of the 1992 Asia-Pacific Conference on circuits and systems in the VLSI design track. In 1993, he received the Annual Paper Award of Chinese Engineer Society. In 1996, 2000 and 2002, he received the Outstanding Research Award from the National Science Council, and in 2000, the Dragon Excellence Award from Acer. He guides students won the DAC/ISSCC Student Design Contest for ten times since 2004, and had the honor of Student Paper Contest at ICASSP 2006. In 2011, he received the Best paper award of CICC 2010's paper.

Friday July 27th Opening Speech

Combating Click Fraud: Challenges and Approaches

Jia-Yu Pan
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BIOGRAPHY

Jia-Yu (Tim) Pan received his Ph.D. degree in Computer Science from Carnegie Mellon University. His thesis topic was on techniques for mining multimodal data sets.

Jia-Yu is currently a Software Engineer at Google Inc., in Mountain View, CA, U.S.A. His research interests include anomaly detection, data mining in multimedia and graphs, clustering techniques, and WWW technology.

Dr. Pan has served on the program committee of several conferences, and has organized several workshops including the Multimedia Data Mining workshop series (MDMKDD 2008, 2010, 2011, 2012) in conjunction with the ACM KDD conferences. He received three best paper awards from the conferences ICDM 2006, ICDM 2005, and PAKDD 2004.

Friday july 27th Opening Keynote

Plenary Session:

Combating Click Fraud: Challenges and Approaches

Jia-Yu Pan
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Technical Session D2-W1-T1: Cloud Computing, Cyber Security, and Data Center

Session Organizer & Chair

Facebook Recommendation System for Heterogeneous Content in Social Networks

Ching-Chih Weng

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BIOGRAPHY

Ching-Chih Weng was born in Taipei, Taiwan, R.O.C., on October 15, 1981. He received the B.S. degree from National Taiwan University (NTU), Taipei, in 2004. He received the M.S. degree in electrical engineering and the Ph.D. degree in electrical engineering with a minor degree in applied and computational mathematics, both from the California Institute of Technology (Caltech), Pasadena, in 2007 and 2011, respectively.

Since August 2011, he has been with Facebook Inc., Palo Alto, CA, working on various large-scale machine learning and data mining problems in social networks. His industrial experiences include internship at Qualcomm Inc., CA, in 2009, and Microsoft Inc., WA, in 2010. His research interests include machine learning, data mining, filter-bank theory, signal processing for digital communications, data compressions, and radar applications.

Technical Session D2-W1-T1: Cloud Computing, Cyber Security, and Data Center

Title: Security Challenges of the Internet of Things (IoT)

Meiyuan Zhao

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ABSTRACT
There have been significant advances in the areas of computing, communication and control systems, forming the emergent paradigm of Internet of Things. The magnitude and impact of Internet of Things touches every aspect of human life as never before. New security threats have emerged with growth of cloud computing, smart phones, internet enabled medical devices, sensors and actuators, connected vehicles, smart energy control systems, etc. Unique properties of the IoT systems lead to new challenges to identify threats, and define and deploy security solutions. This talk presents representative IoT usages and the new challenges of securing these IoT systems. The challenges of designing and deploying security solutions come from unique properties of many of these IoT systems. We identify these properties and analyze the perceived security and function requirements. We use the secure intelligent transportation system (ITS) as an example to demonstrate our analysis. We show that the start-of-art secure ITS mechanisms have failed to address real problems, due to the lack of comprehensive analysis of requirements. We call for actions to take a fresh look at the emergent IoT systems and to design security mechanisms that meet practical requirements.

BIOGRAPHY
Meiyuan Zhao is a senior research scientist in the Security Research Lab inside Intel Labs. She leads secure machine-to-machine (M2M) system program for Intel-NTU Connected Context and Computing Center (iCCCC) in Taiwan. She is also working on embedded security system and vehicular security research projects in Intel Labs. Her research interests include network security, trust management, analytics for security, embedded system security, cyber/physical system security, and distributed systems. Dr. Zhao received her BS from University of Electronic Science and Technology in China (UESTC), Chengdu, China in 1998 and her Ph.D. in Computer Science from Dartmouth College, New Hampshire, US in 2005.

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Technical Session D2-W1-T1: Cloud Computing, Cyber Security, and Data Center

Combating Click Fraud: Challenges and Approaches

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ABSTRACT

Online advertising has been one of the most important revenue sources for Web 2.0 companies. One common form of online advertising is "pay-per-click", where advertisers were charged and publishers were paid for the clicks on the ads. "Click fraud" is generally referred to actions of getting illegitimate benefits by generating "invalid clicks" on online ads. To preserve a viable online advertising marketplace and the continued prosperity of the next generation of the Web, it is important to detect and prevent click fraud. In this talk, I will give an overview on click fraud, the challenges on detecting and preventing it, and some approaches that have been used in combating it.

BIOGRAPHY

Jia-Yu (Tim) Pan received his Ph.D. degree in Computer Science from Carnegie Mellon University. His thesis topic was on techniques for mining multimodal data sets.

Jia-Yu is currently a Software Engineer at Google Inc., in Mountain View, CA, U.S.A. His research interests include anomaly detection, data mining in multimedia and graphs, clustering techniques, and WWW technology.

Dr. Pan has served on the program committee of several conferences, and has organized several workshops including the Multimedia Data Mining workshop series (MDMKDD 2008, 2010, 2011, 2012) in conjunction with the ACM KDD conferences. He received three best paper awards from the conferences ICDM 2006, ICDM 2005, and PAKDD 2004

Technical Session D2-W2-T1: New Media, Web, and Entertainment Technology

Session Organizer & Chair

Combating Click Fraud: Challenges and Approaches

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BIOGRAPHY

Jia-Yu (Tim) Pan received his Ph.D. degree in Computer Science from Carnegie Mellon University. His thesis topic was on techniques for mining multimodal data sets.

Jia-Yu is currently a Software Engineer at Google Inc., in Mountain View, CA, U.S.A. His research interests include anomaly detection, data mining in multimedia and graphs, clustering techniques, and WWW technology.

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Technical Session D2-W2-T1: New Media, Web, and Entertainment Technology

title: Challenges and Opportunities of Machine Learning Research

Chih-Jen Lin

ABSTRACT:
Machine learning has been widely applied in many areas. Its basic techniques such as classification and clustering are well developed. However, recently many new real-world applications require more sophisticated machine learning methods. Further, existing machine learning methods may not be able to cope with large-scale data. Another challenge is that machine learning is often a component of a complicated application. The design of machine learning algorithms must take application scenarios into account. We illustrate these challenges using Internet applications as examples. We then discuss possible directions of future machine learning research.

bio:

Chih-Jen Lin is currently a distinguished professor at the Department of Computer Science, National Taiwan University. He obtained his B.S. degree in Mathematics from National Taiwan University in 1993 and Ph.D. degree in Industrial Engineering and Operations from University of Michigan in 1998. His major research areas include machine learning, data mining, and numerical optimization. He is best known for his work on support vector machines (SVM) for data classification. His software LIBSVM is one of the most widely used and cited SVM packages. Nearly all major companies apply his software for classification and regression applications. He has received many awards for his research work. A recent one is the ACM KDD 2010 best paper award. He is an IEEE fellow and an ACM distinguished scientist for his contribution to machine learning algorithms and software design. More information about him and his software tools can be found at \url{http://www.csie.ntu.edu.tw/~cjlin}.

Technical Session D2-W2-T1: New Media, Web, and Entertainment Technology

Session : Session Title

Video Aware Wireless Networks (VAWN) Research Program Overview

Douglas S. Chan

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ABSTRACT

In recent years, demand for data services over wireless networks has increased significantly. Due to broad adaption of video streaming over the Internet, viewing traditional TV/radio broadcasts are being replaced by viewing on portable personal computing devices, like smartphones and tablets, over wireless networks. Such new paradigms also give rise to new viewing habits that are unrestricted by time or place. These trends are expected to accumulate to a 65 times increase in video traffic to mobile devices.

Unfortunately, the application-agnostic paradigm of current data networks, in both wired and wireless, is not well-suited to meet this projected growth in video traffic volume. In particular, there are unique characteristics in real-time and stored video that can be leveraged to make more efficient use of existing capacity.

In order to address these issues, the Video Aware Wireless Networks (VAWN) Research Program is established by Cisco Systems, Intel, and Verizon Wireless to investigate and propose novel architectures for the anticipated dramatic scaling of wireless network capacity requirements. VAWN is currently in the second year of its three-year program and involves five universities: Cornell University, Moscow State University, University of California San Diego, University of Southern California, and University of Texas Austin. In this talk, we give an overview of the VAWN Research Program.

BIOGRAPHY

Douglas S. Chan received his B.Sc. degree in electrical engineering (EE) from Queen's University in Canada. He received from Cornell University the M.Eng. degree in EE in 2001 and the Ph.D. degree in electrical and computer engineering (ECE) with a minor in applied mathematics in Jan 2006. Doug's fields of research have been on communications theory and its applications.

From 1998 to 2000, Doug was with the IBM Toronto Lab as Software Engineer, when he was involved with developing enterprise-scaled applications for database access, distributed computing and network management. From Jan to May 2006, he was a Visiting Scientist with the School of ECE at Cornell University. In July 2006, Doug joined Cisco Systems, Wireless Networking Business Unit, as Wireless Systems Engineer; and he has been Senior Wireless Systems Engineer since July 2008. His current work includes research and development (R&D) of wireless local area networking products and their standardizations.

In addition, Doug had multiple internships in the wireless industry: Hong Kong Telecom CSL (now CSL New World Mobility), Mobile Networks (Radio Planning); Texas Instruments, Communications Systems Lab, Digital Signal Processing R&D Center; and Symbol Technologies (now Motorola), Corporate R&D.

Doug is a member of IEEE and a licensed professional engineer (P.Eng.) of Ontario, Canada. From 2007 to 2009, he was elected as the Secretary for the IEEE Signal Processing Society Santa Clara Valley chapter. Doug has also received recognitions from the IEEE Standards Association for his contributions to the 802.11n and 802.11y standards.

Technical Session D2-W2-T1: New Media, Web, and Entertainment Technology

Life of a data miner at Google

Yu-To Chen

Quantitative Analyst, Google
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ABSTRACT

This presentation will provide a glimpse of the life of a data miner at Google. At a high level, a data miner plays a role as an ensemble of product manager, software engineer, database admin, statistician and financial guru. At the technical level, a data miner literally lives, embraces and breathes cloud-enabled knowledge discovery and data mining. In particular, a data miner lives and dies by their ability to manage data, make sense of data, build predictive models, prototype analytic engines, and make recommendations and decisions. Greater technical detail will be presented for a few ongoing projects at YouTube. For instance, site abuser behavior modeling using cloud-based on-line adaptive logistic regression, and video recommendation systems using co-visitation. Finally, the presentation will be concluded by reiterating the importance of data miners as an integral part of cloud computing services, among platform engineers, hardware engineers, system architects and software engineers, etc.

BIOGRAPHY

Yu-To Chen (陳毓鐸) is a Quantitative Analyst at Google and is currently with the Google Play team in Mountain View, CA. He is working on projects such as Android market metrics and purchase behavior modeling, Android device lifetime value and optimization of Android device energy consumption. His areas of expertise are analytics, fuzzy logic, data mining and predictive modeling. Prior to Google, he worked at PayPal, GE Global Research and a number of startups in between - covering risk management, web analytics, pricing and supply chain management. Once he was a visiting assistant professor at University of Iowa (1993) and an adjunct professor at Union College, NY (2000). He has been awarded 26 US patents and published over a dozen of journal/conference papers. He earned his B.S. in Mechanical Engineering from National Central University in Taiwan (1985) and Ph.D. in Industrial Engineering with a minor in Computer Science from Penn State University in 1993.

Technical Session D2-W2-T1: New Media, Web, and Entertainment Technology

Directed Learning

Edward Yi-Hao Kao (高奕豪)

Stanford University
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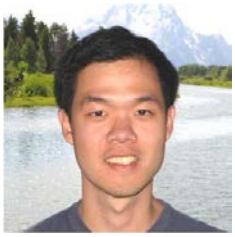
ABSTRACT

In machine learning, it is common to treat estimation of model parameters separately from subsequent use of the model to guide decisions. In particular, the learning process typically aims to maximize "goodness of fit" without consideration of decision objectives. In this talk, we propose a new approach -- *directed learning* -- which factors decision objectives into the model fitting procedure in order to improve decision quality. We develop and analyze directed learning algorithms for two classes of problems. In the first case, we consider a problem where linear regression analysis is used to guide decision making. We propose *directed regression*, an efficient algorithm that takes into account the decision objective when computing regression coefficients. We demonstrate through a computational study that directed regression can generate significant performance gains, and establish a theoretical result that motivates it. In the second case, we consider a problem that involves estimating a covariance matrix and making a decision based on that estimate. Such problems arise in portfolio management among other areas, and a common approach is to employ principal component analysis (PCA) to estimate a parsimonious factor model. We propose *directed PCA*, an efficient algorithm that accounts for the decision objective in the selection of components, and demonstrate through experiments that it leads to significant improvement. We also establish through a theoretical result that the possible degree of improvement can be unbounded.

BIOGRAPHY



Dr. Yi-Hao Kao received his B.S. degree in electrical engineering from National Taiwan University in 2006, and Ph.D. degree in the same field from Stanford University in 2012.

From 2006 to 2010, he has worked as interns in Google, Yahoo!, and Goldman Sachs. He will be joining Two Sigma Investments as a quantitative researcher in 2012. His research interests include machine learning and optimization, with a special focus on their applications in operations research.

Dr. Kao is the recipient of Numerical Technologies Founders Prize (2009), Stanford Graduate Fellowship (2007), and ACM ICPC Silver Medal (2004). More about his recent work can be found at: Kao and Van Roy, *Directed Principal Component Analysis* (2012); Kao et al., *Directed Regression* (NIPS 2009); Kao and Van Roy, *Learning a Factor Model via Regularized PCA* (2011).

Technical Session D2-W1-T2: Cloud Computing, Cyber Security, and Data Center

Session Organizer & Chair

Facebook Recommendation System for Heterogeneous Content in Social Networks

Ching-Chih Weng

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BIOGRAPHY

Ching-Chih Weng was born in Taipei, Taiwan, R.O.C., on October 15, 1981. He received the B.S. degree from National Taiwan University (NTU), Taipei, in 2004. He received the M.S. degree in electrical engineering and the Ph.D. degree in electrical engineering with a minor degree in applied and computational mathematics, both from the California Institute of Technology (Caltech), Pasadena, in 2007 and 2011, respectively.

Since August 2011, he has been with Facebook Inc., Palo Alto, CA, working on various large-scale machine learning and data mining problems in social networks. His industrial experiences include internship at Qualcomm Inc., CA, in 2009, and Microsoft Inc., WA, in 2010. His research interests include machine learning, data mining, filter-bank theory, signal processing for digital communications, data compressions, and radar applications.

Technical Session D2-W1-T2: Cloud Computing, Cyber Security, and Data Center

Responding to Attacks in Cloud Computing Environment

Yu-Sung Wu

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ABSTRACT

IT resource consolidation in cloud computing has made the cloud a de facto magnet for security attacks. Incidents such as Facebook hit by spam attack and Amazon EC2 being used as a stepping-stone in the Sony PSN attack are evidence that security attacks in cloud computing environment is now a reality.

Traditionally, protecting IT infrastructure from attack is through the deployment of network intrusion detection system (NIDS) and end-point security protection software. The approach now faces new challenges in the cloud computing environment. First, the network topology in a cloud environment can change due to dynamic resource consolidation or load balancing. Second, the multi-tenant nature of cloud computing environment means that attack can very possibly originate from a compromised system within the cloud. The distinction between external network and internal network is quite blurred in the cloud making it difficult to identify a fixed vantage point in the network for the deployment of network intrusion detection systems. Third, the multi-tenant nature also complicates the use of end-point security protection as its proper installation requires cooperation from individual tenants and is thereby hard to enforce in practice. Fourth, the resource consumed by individual end-point protection software is not amortized across systems posing a barrier on the resource consolidation pursued by cloud computing.

We begin our study on the challenges of applying traditional network intrusion detection system and end-point security software in an IaaS cloud computing environment. We then continue our research on designing a new architecture for security monitoring and attack response in the cloud environment. The proposed architecture enables unified security monitoring and protection in a multi-tenant cloud environment. It also allows the consolidation of security monitoring resource and helps reduce the cost to defend security attacks in the cloud environment. A prototype system based on a modified Xen hypervisor is built to provide unified and cost-effective anti-virus protection for systems in an IaaS cloud as a proof of concept of the proposed architecture. The system does not require agent programs to be pre-installed in individual hosted systems and can still achieve reasonable performance benchmark under the constraint of today's hardware virtualization technology. We hope the project will provide new insights to the design of security monitoring and protection mechanisms for the cloud, which we believe will be the key to achieve secure and promising cloud computing environment.

BIOGRAPHY

Yu-Sung Wu was born in Hsinchu, Taiwan. He received B.S. in electrical engineering from National Tsing Hua University, Hsinchu, Taiwan in 2002, M.S. and Ph.D. in electrical and computer engineering from Purdue University, West Lafayette, Indiana in 2004 and 2009.

In 2009, he joined National Chiao Tung University in Hsinchu, Taiwan, where he is currently an assistant professor of the computer science department. Previously, he had worked at Purdue CERIAS research center conducting research on the design of automated response system for distributed applications. Over the summers, he had also worked at Avaya Labs in New Jersey developing prototypes intrusion detection system for VoIP environment.

Prof. Yu-Sung Wu is a member of IEEE and ACM. He had served on the program committees of several conferences including DSN, ICDCS, and WRAITS.

Technical Session D2-W1-T2: Cloud Computing, Cyber Security, and Data Center

Dr.

Elaine (Runting) Shi

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ABSTRACT

Offering strong data protection to cloud users while enabling rich applications is a challenging task. In this talk, I will describe a new cloud platform architecture called Platform for Private Data (PPD). PPD allows cloud users to retain control of their data in the cloud, in the presence of potentially malicious or compromised cloud applications. PPD also dramatically reduces the per-application development effort required to offer data protection, while still allowing rapid development and maintenance.

BIOGRAPHY

Elaine Shi is a research scientist at University of California, Berkeley. She obtained her Ph.D. and Masters in Computer Science from Carnegie Mellon University, and her B.E. from Tsinghua University. Previously, she was also a Member of Research Staff at Palo Alto Research Center (PARC).

Elaine Shi is broadly interested in the general area of security, privacy, and applied cryptography. In her research, she takes a unique approach where she combines theoretic innovations with practical system design and implementation. Her research spans a wide range of topics, including computation on encrypted data, privacy-preserving data mining, system security, sensor network and vehicular network security, usable authentication, secure storage systems, and so on. She has published more than 35 scholarly publications, and her work has received more than 2000 citations. Aside from security and privacy, Elaine is also interested in data mining. In particular, she and her team won the IJCNN/Kaggle Social Network Challenge in 2011.

Technical Session D2-W1-T2: Cloud Computing, Cyber Security, and Data Center

title: Erasure coding and data storage at Facebook
Chun-Yang Chen

Abstract:

Large-scale data warehouses often use 3-way replication in HDFS resulting in very high storage overhead and cost. Erasure codes such as Reed-Solomon codes approximately double the storage efficiency but require high disk I/O and network bandwidth during repairs. We discuss an implementation over HDFS RAID used in Facebook's large data warehouses and present new designs of erasure codes over HDFS that maintain high storage efficiency but have significantly smaller repair traffic and disk requirements.

Bio:
Chun-Yang Chen works on MapReduce, HDFS Raid and more recently HBase at Facebook. He has become a Hadoop MapReduce committer since September 2010. He received PhD degree from California Institute of Technology in Electrical Engineering with a minor in Applied Computational Mathematics in 2009.

Technical Session D2-W2-T2: New Media, Web, and Entertainment Technology

Session Organizer & Chair

Life of a data miner at Google

Yu-To Chen

Quantitative Analyst, Google
1600 Amphitheatre Parkway, Mountain View, CA, USA
Email: ytchen@google.com

BIOGRAPHY

Yu-To Chen (陳毓鐸) is a Quantitative Analyst at Google and is currently with the Google Play team in Mountain View, CA. He is working on projects such as Android market metrics and purchase behavior modeling, Android device lifetime value and optimization of Android device energy consumption. His areas of expertise are analytics, fuzzy logic, data mining and predictive modeling. Prior to Google, he worked at PayPal, GE Global Research and a number of startups in between - covering risk management, web analytics, pricing and supply chain management. Once he was a visiting assistant professor at University of Iowa (1993) and an adjunct professor at Union College, NY (2000). He has been awarded 26 US patents and published over a dozen of journal/conference papers. He earned his B.S. in Mechanical Engineering from National Central University in Taiwan (1985) and Ph.D. in Industrial Engineering with a minor in Computer Science from Penn State University in 1993.

Technical Session D2-W2-T2: New Media, Web, and Entertainment Technology

Title:Everyday sensing and feedback

Hao-Hua (Hao) Chu

Abstract:
Everyday sensing and feedback are key technology to realize the vision of UbiComp and persuasive technology. UbiComp (ubiquitous computing) is about how future computing technologies can seamlessly blend into our everyday activities. Persuasive technology is about digital technologies that engage and excite people into active participation of desirable physical and mental activities. In this talk, I will present several everyday sensing and feedback projects in UbiComp and Persuasive technologies.

Bio:
Hao-Hua (Hao) Chu is a professor at National Taiwan University's Department of Computer Science and Information Engineering. He received his B.S. in computer science from Cornell and his Ph.D. in computer science from University of Illinois at Urbana-Champaign. Prior to joining NTU, he worked at NTT DoCoMo USA Labs and Intel. His research areas are in ubiquitous computing, sensor/wireless networks, and persuasive technologies.

Technical Session D2-W2-T2: New Media, Web, and Entertainment Technology

Title: Which Tweets Will Be Headlines? Hierarchical Bayesian Models for Bridging Social Media and Traditional Media

Yan Liu

Abstract:
Microblogging platforms such as Twitter provide a convenient channel for people to express their feelings, report news, and communicate with friends. It has been argued as one of the main outlet for timely news. However, there are limited research efforts on uncovering the relationships between social media (e.g. Twitter) and traditional media (e.g., Washington Post and New York Times), which has a big impact in our daily lives and our society. In this talk, we present a novel and important research problem as to which and whose tweets are favored by the public media. The basic intuition is that whether a tweet is picked up or not by traditional media depends not only on whether its content matches public media's interests towards this specific user but also the writer's personal influence, reflected by factors such as the number of followers. Based on this intuition, we propose a hierarchical Bayesian model, namely Twitter Pick-Up Recommendation (TPUR) model, to simultaneously integrate all factors. Our model can recommend new tweets for public media by estimating the tweets' likelihood of being picked-up. I will also discuss an extensive set of experiments on two popular micro-blogging platforms, i.e., the Twitter dataset and the Sina Weibo (Chinese version Twitter) dataset, to demonstrate the advantages of our algorithm.

Bio:
Yan Liu is an assistant professor in Computer Science Department at University of Southern California from 2010. Before that, she was a Research Staff Member at IBM Research from 2006. She received her M.Sc and Ph.D. degree from Carnegie Mellon University in 2004 and 2006. Her research interest includes developing scalable machine learning and data mining algorithms with applications to social media analysis, computational biology, climate modeling and business analytics. She has received several awards, including 2007 ACM Dissertation Award Honorable Mention, best application paper award in SDM 2007, and winner of several data mining competitions, including KDD Cup 2007, 2008, 2009 and INFORMS data mining competition 2008. She has published over 40 referred articles and served as a program committee of SIGKDD, ICML, NIPS, CIKM, SIGIR, ICDM, AAAI, COLING, EMNLP and co-chair of workshops in KDD and ICDM. Her research work is supported by NSF, DARPA, Yahoo! and ExxonMobil.

Technical Session D2-W2-T2: New Media, Web, and Entertainment Technology

DBLOG: an Open Universe Probabilistic Programming Language for Relational Modeling

Lei Li

UC Berkeley, Computer Science Division
leili@cs.berkeley.edu

ABSTRACT

How to represent uncertain knowledge about the world? How to model relationships between entities and reason about uncertainties associated with them? In this talk, I will introduce DBLOG, a programming language for describing probability models over worlds with unknown objects, identity uncertainty and relationship uncertainty. DBLOG unifies and extends several the conventional Bayesian Networks, which define conceptual models of probabilistic relations among finite objects. A well defined DBLOG program specifies a unique probability distribution over first-order model structures that can contain varying and unbounded numbers of objects. Furthermore, automatic and complete inference algorithms exist for a large fragment of the language. Through the talk, we will present several example DBLOG programs for a variety of real applications such as modeling text documents on the web, tracking multiple moving objects, matching citations, monitoring wireless sensor networks, and etc.

BIOGRAPHY

Dr. Lei Li is a Post-Doctoral researcher at EECS department of University of California, Berkeley. His research interest lies in the intersection of machine learning, statistical inference and database systems. Specifically, he has been working on Bayesian inference in open universe probabilistic models, probabilistic programming language, large-scale learning, time series, communication and social networks. He has published 17 papers on referred journals and conferences about learning time series models, covering challenges in motion capture analysis, environmental monitoring, data center monitoring, computer network security, bio-image databases, and identifying anomalies in social networks. He has served in the Program Committee for IJCAI 2011, ICDM 2011 workshop on collective intelligence, KDD 2011, 2012 workshop on Multimedia data mining. He has been invited as reviewer for TOMCCAP,DAMI, KDD, SIGMOD,VLDB,PKDD, and WWW.

Lei received his B.S. in Computer Science and Engineering from Shanghai Jiao Tong University in 2006 and Ph.D. from Carnegie Mellon University in 2011, respectively. His dissertation work is on fast algorithms for mining co-evolving time series.

Technical Session D2-W1-T3: Cloud Computing, Cyber Security, and Data Center

Session Organizer & Chair

Combating Click Fraud: Challenges and Approaches

Jia-Yu Pan
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BIOGRAPHY

Jia-Yu (Tim) Pan received his Ph.D. degree in Computer Science from Carnegie Mellon University. His thesis topic was on techniques for mining multimodal data sets.

Jia-Yu is currently a Software Engineer at Google Inc., in Mountain View, CA, U.S.A. His research interests include anomaly detection, data mining in multimedia and graphs, clustering techniques, and WWW technology.

Dr. Pan has served on the program committee of several conferences, and has organized several workshops including the Multimedia Data Mining workshop series (MDMKDD 2008, 2010, 2011, 2012) in conjunction with the ACM KDD conferences. He received three best paper awards from the conferences ICDM 2006, ICDM 2005, and PAKDD 2004.

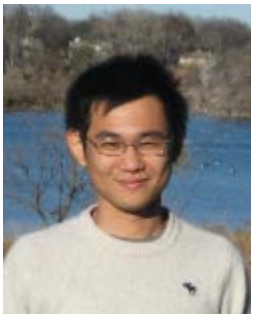
Technical Session D2-W1-T3: Cloud Computing, Cyber Security, and Data Center

Yun-Hsuan Sung

Abstract:

Speech technology has played an important role while mobile devices with internet connection become popular in the last couple years. Typing text are difficult on mobile devices since most of them lack keyboards and mice. Speech becomes one of the most convenient ways to communicate between human and these devices. Because of the internet connection, the speech technology can make use of cloud computing power to provide accurate recognition results and information. In this talk, I will describe our efforts to build cloud-based Google speech recognition for 40 languages on mobile applications.

Bio:



Yun-Hsuan Sung is a senior research scientist at Google. He is a member of Google speech team which deploys speech recognition and synthesis to mobile application. His research interests are applying machine learning and statistical graphical models with large amount of data to speech and natural language processing. He received his B.S from National Taiwan University in 2002 and Ph.D. from Stanford University in 2010, both in Electrical Engineering.

Technical Session D2-W1-T3: Cloud Computing, Cyber Security, and Data Center

Hen-I Yang

Bio

Hen-I Yang is a research scientist associated with Smart Home Laboratory in the Department of Computer Science at the Iowa State University. His research areas include service, mobile and pervasive computing, with special focus on intelligent environments such as smart homes. Current research interests include middleware to support smart environment, designing and implementation of technology services to aid aging-in-place, human-centered software engineering process, and automated system adaptation and maintenance. Yang received his PhD in computer engineering from the University of Florida. Contact him at hiyang@iastate.edu.

Abstract
The rapidly growing number of aging adults, both in actual numbers and as the percentage of the overall population, makes elder care a serious and imminent issue. This seismic change requires innovative ideas beyond the traditional forms of service and institution, to include the integration and use of technology, in order to improve the quality and cost of care in particular, and the quality of life in general, for older adults. This presentation focuses on a systematic approach in analyzing the needs and opportunities to apply technology in the care and welfare of older adults, and the ongoing research, education and deployment efforts in gerontechnology at the Iowa State University.

Technical Session D2-W1-T3: Cloud Computing, Cyber Security, and Data Center

Facebook Recommendation System for Heterogeneous Content in Social Networks

Ching-Chih Weng

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ABSTRACT

Facebook recommendation engine is to compare heterogeneous types of content, and find the most relevant recommendations based on users' past behavior and current page context. This recommendation engine inevitably has many engineering challenges. First, the data being processed is at a very large scale. Second, different types of content usually have very distinct characteristics, which makes generic feature engineering and resources allocation difficult. Third, unlike a search engine that can capture intention of users based on their search queries, Facebook's recommendation engine needs to actively recommend contents to users by focusing more on users' profile, interests, past behaviors, and current actions in order to infer their cognitive states. In this presentation, we will talk about Facebook's online machine learning framework that addresses the aforementioned challenges. Especially, we will focus on the friending recommendation system as an example.

BIOGRAPHY

Ching-Chih Weng was born in Taipei, Taiwan, R.O.C., on October 15, 1981. He received the B.S. degree from National Taiwan University (NTU), Taipei, in 2004. He received the M.S. degree in electrical engineering and the Ph.D. degree in electrical engineering with a minor degree in applied and computational mathematics, both from the California Institute of Technology (Caltech), Pasadena, in 2007 and 2011, respectively.

Since August 2011, he has been with Facebook Inc., Palo Alto, CA, working on various large-scale machine learning and data mining problems in social networks. His industrial experiences include internship at Qualcomm Inc., CA, in 2009, and Microsoft Inc., WA, in 2010. His research interests include machine learning, data mining, filter-bank theory, signal processing for digital communications, data compressions, and radar applications.

Technical Session D2-W2-T3: New Media, Web, and Entertainment Technology

Session Organizer & Chair

Talk title: Erasure coding and data storage at Facebook
Chun-Yang Chen

Bio:
Chun-Yang Chen works on MapReduce, HDFS Raid and more recently HBase at Facebook. He has become a Hadoop MapReduce committer since September 2010. He received PhD degree from California Institute of Technology in Electrical Engineering with a minor in Applied Computational Mathematics in 2009.

Technical Session D2-W2-T3: New Media, Web, and Entertainment Technology

Title: Mobile Sensing for Behavior-ware Mobile Computing: a Language Approach
Speaker: Dr. Joy Zhang, Carnegie Mellon University, Silicon Valley

Abstract:
Today's smart phones come equipped with a rich range of sensors including GPS, accelerometers, WiFi, Bluetooth, NFC, microphone etc. Combined, this contextual information can tell us a great deal about a user's current activity: what is the user doing now at which location and for how long. When logged, this data can provide important information about the user's behavior patterns based on which caregivers can design effective and personalized plans to improve the user's health and wellbeings. If we can aggregate this kind of information across hundreds of volunteers in a city, it can also tell us a great deal about that city, for example, wait times for buses, how public and private places are used, what residents typically do, and so on. This kind of large-scale data collection and analysis offers a way to understand human behavior at large scale, which can have positive impact in a number of domains, including health care, traffic planning, urban design, and social network analysis.

Though collecting sensor information is trivial, making sense of these heterogeneous sensory data is challenging. In our research, we separate the data representation and the processing algorithms to develop a generic framework for mobile sensing. Though quantization and sensor fusion, heterogeneous sensor input is converted into a symbolic representation called behavior text. Based on this text-like representation, well-established statistical natural language processing algorithms developed in the areas of language modeling, information retrieval, text summarization, text classification and even machine translation can be applied to tackle the mobile sensing problems.

Bio:

Dr. Joy Ying Zhang is an assistant research professor in Mobility Research Center at Carnegie Mellon University Silicon Valley with appointments from the department of ECE, Language Technologies Institute, and CyLab. He received his Ph.D. from Language Technologies Institute of Carnegie Mellon University. Most of his research centers around applying statistical learning on natural language processing problems, in particular, statistical machine translation systems. He has developed the Pandora translation system, a full-scale two-way phrase-based statistical machine translation engine for mobile devices. This technology has been commercialized in the Jibbigo Speech Translator for iPhone, the first and so-far only voice-to-voice translation system that does not require network connection. His current research interests include applying statistical learning methods on mobile applications for user behavior modeling and behavior-aware mobile computing including indoor positioning, geo-trace modeling, mobile lifelog. URL: http://mlt.sv.cmu.edu/joy

Technical Session D2-W2-T3: New Media, Web, and Entertainment Technology

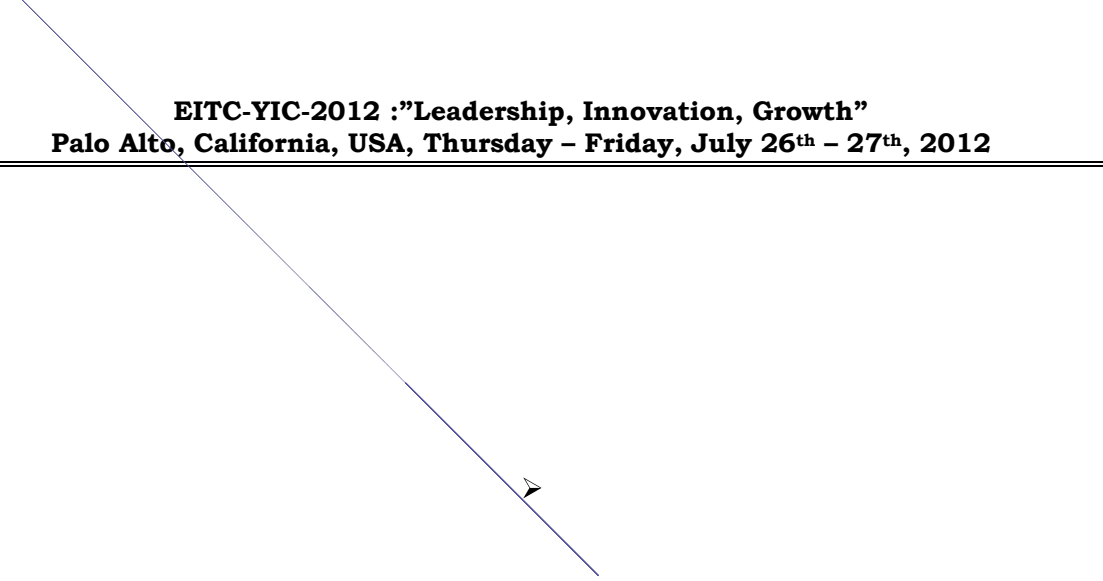
Yu-Chi Lai

Talk Abstract:

Computer animations and games are two important branches in the entertainment industry. Computer Graphics plays an important role in these two fields to provide proper human-computer interactions, set up actions in the virtual world, render fantastic views of the virtual world and etc. People start to realize their potentials. In Taiwan, investment in games and animations becomes important and popular. In this talk, I will give a short introduction about the usage of Computer Graphics in Taiwan for the development of important products or pipelines by several representative companies including Next Media, Digimax, IGS and Pito. In addition, a team led by Prof. Jay Kuo in USC starts to think about how to combine several fields include Computer Graphics, Computer Vision, Multimedia, Machine Learning and etc. into a single work to open up a new future business chance for Taiwan. The ideas and concepts proposed by the team are discussed.

Bio

Yu-Chi Lai received his B.S. degree from National Taiwan University, Taipei, R.O.C., in 1996 in Electrical Engineering Department. He received his M.S. and Ph.D. degrees from University of Wisconsin—Madison in 2003 and 2009 respectively in Electrical and Computer Engineering. The title of his ECE dissertation is "*Lesion Size Estimator in Cardiac Ablation*". He received his M.S. and Ph.D. degrees in 2004 and 2010 respectively in Computer Science. The title of his CS dissertation is "Photorealistic Animation Rendering with Population Monte Carlo Energy Redistribution". He is currently an assistant professor in NTUST. His research interests are in Computer Graphics, Computer Vision, and Multimedia. He puts more focus on interactive technologies, real-time rendering algorithms, photorealistically rendering, physically-based simulation, motion editing and 3D reconstruction.

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