



**The EITA Smart Cities Forum 2016
(EITA Knowledge and Smart Technology 2016)**

**"Knowledge, Smart Technology and the Internet of
Things: Challenges, Opportunities and Future
Directions"**

Conference Proceedings

**The Maclaurin Buildings (4)
Massachusetts Institute of Technology
Cambridge, Massachusetts, U.S.A.**

Friday, August 26, 2016
<Draft: 8/27/16>

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Welcome Message

Conference Themes

"Knowledge, Smart Technology and the Internet of Things: Challenges, Opportunities and Future Directions"

The EITA-Smart Cities Forum 2016 conference consists of two parallel workshops:

- **Workshop 1 (W1):** Smart Cities, the Internet of Things, Smart Technologies and Applications: (Smart Computing, Smart Mobility and Transportation, Smart Environments, Smart Supply Chain and Logistics, Smart Manufacturing, Smart Energy Systems, Smart Weather Forecasting, and)
- **Workshop 2 (W2):** Smart Healthcare Technologies, Services and Applications: (Computational Intelligence, Emerging Intelligent Technologies, Data-driven Discoveries and Uncertainty Quantification, High Performance and Cloud Computing)

Planning Committee

Conference Chairs

Michael Chang
Sheng-Ying (Aithne) Pao (包盛盈) Kyper Data Technologies
Massachusetts Institute of Technology

Project Manager

Woei-jyh (Adam) Lee (李偉智) University of Maryland, College Park

Conference Organizers

Shyhtsun Felix Wu (吳士駿) University of California, Davis
Li-San Wang (王立三) University of Pennsylvania
Howard Chen (陳浩) IBM Research (Retired)/Independent Consultant
Aichi Chien (簡艾琪) University of California at Los Angeles
Yung-Hsiang Lu (陸永祥) Purdue University
Yi-Hsiang (Sean) Hsu (許益祥) Harvard University
Yaoyu E. Wang (王耀煜) Harvard University
Hau-Tieng Wu (吳浩樞) University of Toronto
Alvin Wei-Cheng Wong (翁唯城) Patentcloud
Jia-Yu (Tim) Pan (潘家煜) Google
Ming-Yang Chen (陳明揚) Zenefits
Chen-Hsiang (Jones) Yu (余禎祥) Prentice Lab
Li-Chen Cheng Massachusetts Institute of Technology
Wei-Ning Hsu Massachusetts Institute of Technology
Tony Wu (吳張祺) Massachusetts Institute of Technology
James Ho-Chung Chang (張和中) Taipei Economic and Cultural Representative
Office the U.S.
Peter Ta-Lin Shih (石大玲) Taipei Economic & Cultural Office in Boston
Weiyu (Cynthia) Huang (黃蘊玉) Taipei Economic & Cultural Office in Boston
Cherng-Chuan Su (蘇成全) Taiwan Trade Center, New York

Program Committee

Workshop Track Co-Chairs

Workshop 1 (W1): Smart Cities, the Internet of Things, Smart Technologies and Applications: (Smart Computing, Smart Mobility and Transportation, Smart Environments, Smart Supply Chain and Logistics, Smart Manufacturing, Smart Energy Systems, Smart Weather Forecasting, and

Yung-Hsiang Lu (陸永祥) Purdue University

**Workshop 2 (W2): Smart Healthcare Technologies, Services and Applications:
(Computational Intelligence, Emerging Intelligent Technologies, Data-driven
Discoveries and Uncertainty Quantification, High Performance and Cloud
Computing)**

Yaoyu E. Wang (王耀煜) Harvard University

Publication

Publication Chair:

Woei-Jyh (Adam) Lee (李偉智) University of Maryland, College Park

Conference Program:

Woei-Jyh (Adam) Lee (李偉智) University of Maryland, College Park

Conference Proceedings:

Alvin Wei-Cheng Won (翁唯城) Patentcloud

Local Management

The Republic of China Student Association of M. I. T. (麻省理工學院中華民國(台灣)同學會)
Harvard Taiwan Student Association (哈佛台灣同學會)

On-Site Registration

The Republic of China Student Association of M. I. T. (麻省理工學院中華民國(台灣)同學會)
Harvard Taiwan Student Association (哈佛台灣同學會)

Web Development

Michael Hwa-Han Wang (王華漢) EBMedia, LLC

Co-Organizing Associations - TSAs

The Republic of China Student Association of M. I. T. (麻省理工學院中華民國(台灣)同學會)
Harvard Taiwan Student Association (哈佛台灣同學會)

Co-organizing Associations and Co-sponsors

Taipei Economic & Cultural Office in Boston
Science and Technology Division, Taipei Economic and Cultural Representative Office the U.S.

**The EITA Smart Cities Forum 2016 (EITA Knowledge and Smart Technology 2016),
Massachusetts Institute of Technology, Cambridge, Massachusetts, U.S.A.**

Education Division, Taipei Economic & Cultural Office in Boston
Commercial Division, Taipei Economic & Cultural Office in Boston
Taiwan Trade Center, New York

Conference Program

Day 1 (Friday, August 26, 2016)

8/26 (Fri) 8:30 am - 6:00 pm: Registration

Room: 4-257

8/26 (Fri) 9:30 am - 9:50 am: Opening Session

Co-Chair: **Dr. Michael Chang**, Chief Executive Officer, Kyper Data Technologies

Co-Chair: **Dr. Sheng-Ying (Aithne) Pao**, Director of Strategic Innovation, Lee Kum Kee Group and MIT Media Lab

Room: 4-257

Welcome Remarks:

Mr. Ming-chi Scott Lai

Director-General

Taipei Economic and Cultural Office in Boston

(駐波士頓台北經濟文化辦事處賴銘琪處長)

Plenary Sessions:

8/26 (Fri) 9:50 am - 10:35 am: Plenary Session (I):

Chair: **Dr. Michael Chang**, Chief Executive Officer, Kyper Data Technologies

Room: 4-257

Plenary Speaker:

“Alzheimer’s Disease Sequencing Project”

Dr. Li-San Wang

Associate Professor of Pathology and Laboratory Medicine

Co-Director, Penn Neurodegeneration Genomics Center

University of Pennsylvania Perelman School of Medicine

(賓州大學醫學院王立三教授)

8/26 (Fri) 10:35 am - 11:20 am: Plenary Session (II):

Chair: **Dr. Sheng-Ying (Aithne) Pao**, Director of Strategic Innovation, Lee Kum Kee Group and MIT Media Lab (麻省理工學院包盛盈博士)

Room: 4-257

Plenary Speaker:

“The Smart Localized Water Solution”

Dr. Ting-Yun Sasha Huang

CEO, AquaFresco Inc.

8/26 (Fri) 11:20 am - 11:35 am: Break

8/26 (Fri) 11:35 am – 12:20 pm: Plenary Session (III):

Chair: **Dr. Woei-jyh (Adam) Lee**, Tyser Teaching Fellow of Information Systems, Robert H. Smith School of Business, University of Maryland, College Park (馬里蘭大學學院市分校史密斯商學院李偉智教授)
Room: 4-257

Plenary Speaker:

Dr. Michael Chang
Chief Executive Officer
Kyper Data Technologies

8/26 (Fri) 12:20 pm - 1:50 pm: Lunch

Parallel Sessions:

8/26 (Fri) 1:50 pm – 3:20 pm: Technical Session D1-W1-T1: Smart Cities, the Internet of Things, Smart Technologies and Applications (Smart Computing, Smart Mobility and Transportation, Smart Environments, Smart Supply Chain and Logistics, Smart Manufacturing, Smart Energy Systems, Smart Weather Forecasting, and)

Chair: **Dr. Chen-Hsiang (Jones) Yu**, Founder and CEO, Prentice Lab, (Prentice Lab 余禎祥博士)
Room: 4-257

“Distributed Energy Management in Power Networks”

Dr. Na (Lina) Li
Assistant Professor in Electrical Engineering and Applied Mathematics
School of Engineering and Applied Sciences
Harvard University

Dr. Wencong Su
Assistant Professor, Department of Electrical and Computer Engineering
University of Michigan-Dearborn

"The climate change implications of the Paris agreement"

Dr. Erwan Monier
Principal Research Scientist, Center for Global Change Science
Joint Program on the Science and Policy of Global Change
Massachusetts Institute of Technology

"The Usage of Social Media Geospatial Aggregators for Disaster Response in Large Cities"

Dr. Thomas Chandler
Associate Research Scientist, National Center for Disaster Preparedness, The Earth Institute
Adjunct Assistant Professor, Communication, Media, and Learning Technologies Design,
Teachers College, Columbia University

8/26 (Fri) 1:50 pm – 3:20 pm: Technical Session D1-W2-T1: Smart Healthcare Technologies, Services and Applications (Computational Intelligence, Emerging Intelligent Technologies and Applications, Data-driven Discoveries and Uncertainty Quantification, High Performance/High Throughput (HPC/HTC), and Cloud Computing)

**The EITA Smart Cities Forum 2016 (EITA Knowledge and Smart Technology 2016),
Massachusetts Institute of Technology, Cambridge, Massachusetts, U.S.A.**

Chair: **Dr. Sheng-Ying (Aithne) Pao**, Director of Strategic Innovation, Lee Kum Kee Group and MIT Media Lab (麻省理工學院包盛盈博士)
Room: 4-265

“Big Data and Network Biology: A Case Study”

Dr. Jason Tsong-Li Wang

Professor of Bioinformatics and Computer Science
Director, Data and Knowledge Engineering Lab & Bioinformatics Center
Department of Computer Science
New Jersey Institute of Technology
(紐澤西理工學院電腦科學系暨數據知識工程實驗室及生物資訊中心主任王中力教授)

Dr. Hau-Tieng Wu

Assistant Professor, Department of Mathematics
University of Toronto
(多倫多大學數學系吳浩樅教授)

“The Use of Wearable Sensors and Systems in Rehabilitation Medicine”

Dr. Sunghoon Ivan Lee

Assistant Professor, College of Information and Computer Sciences
University of Massachusetts, Amherst

Dr. Woei-jyh (Adam) Lee

Tyser Teaching Fellow of Information Systems, Robert H. Smith School of Business
University of Maryland, College Park
(馬里蘭大學學院市分校史密斯商學院李偉智教授)

“Inference of genes associated with cancer targeted therapy resistance”

Dr. Peng Jiang

Postdoctoral Research Fellow, Department of Biostatistics and Computational Biology
Dana-Farber Cancer Institute
Harvard University

8/26 (Fri) 3:20 pm – 3:35 pm: Break

Parallel Sessions:

8/26 (Fri) 3:35 pm – 5:05 pm: Technical Session D1-W1-T2: Smart Cities, the Internet of Things, Smart Technologies and Applications (Smart Computing, Smart Mobility and Transportation, Smart Environments, Smart Supply Chain and Logistics, Smart Manufacturing, Smart Energy Systems, Smart Weather Forecasting, and)

Chair: **Dr. Chen-Hsiang (Jones) Yu**, Founder and CEO, Prentice Lab, (Prentice Lab 余禎祥博士)
Room: 4-257

“Incorporating Transit Capacity Constraints into the Regional Travel Demand Model”

Dr. Jieping Li

Senior Transportation Analyst
Central Transportation Planning Staff
The Boston Region Metropolitan Planning Organization (MPO)

Dr. Chen-Hsiang (Jones) Yu

Founder and CEO, Prentice Lab
(Prentice Lab 余禎祥博士)

“Constrained optimization methods for collaborative multi-robot motion planning and control”

Dr. Javier Alonso Mora

Postdoctoral Associate, Computer Science and Artificial Intelligence Laboratory (CSAIL)
Massachusetts Institute of Technology

“Impact of Urban Surface Albedo on Regional and Local Scales using the WRF model”

Dr. Liyi Xu

Postdoctoral Associate, Center for Global Change Science
Massachusetts Institute of Technology

**8/26 (Fri) 3:35 pm – 5:05 pm: Technical Session D1-W2-T2: Smart
Healthcare Technologies, Services and Applications (Computational
Intelligence, Emerging Intelligent Technologies and Applications, Data-
driven Discoveries and Uncertainty Quantification, High
Performance/High Throughput (HPC/HTC), and Cloud Computing)**

Chair: **Dr. Hau-Tieng Wu**, Assistant Professor, Department of Mathematics, University of
Toronto (多倫多大學數學系吳浩樅教授)

Room: 4-265

“A Constraint Mixture of Bayesian Hierarchical Models for Paired Data with Application to
Genomic Outcome Screening”

Dr. Weiliang Qiu

Assistant Professor, Channing Division of Network Medicine
Brigham and Women's Hospital
Harvard Medical School

Dr. Sheng-Ying (Aithne) Pao

Director of Strategic Innovation, Lee Kum Kee Group and
MIT Media Lab
(麻省理工學院包盛盈博士)

“How smart is your medicine? An overview on Precision Medicine and a view from the ground”

Dr. Chiao-Feng Lin

Senior Bioinformatician, Partners HealthCare Personalized Medicine;
Research Associate at Harvard Medical School
(Partners HealthCare 林嬌鳳博士)

“Metagenome and metatranscriptome data analysis in human microbiome studies”

Dr. Wen-Chi Chou

Postdoctoral Associate
Broad Institute of MIT and Harvard

Abstracts and Biographies

Day 1 (August 26, 2016)

Opening Session

Conference Co-Chair

Michael Chang

Chief Executive Officer, Kyper Data Technologies

BIOGRAPHY



Michael is the founder and CEO of Kyper Data Technologies, a big data aggregation as well as SCM intelligence platform. Michael started his first startup 4 years ago, building one of the first big data asset management funds. He has extensive experience in data science. As his first job at Foxconn, he used massive amounts of data to identify and solve the relationship between weather and a major manufacturing failure which cost tens of millions per quarter. His work has been featured on the cover stories on several prestigious journals. Michael holds a diploma from NTU, Taiwan and a Ph.D from MIT EECS.

Opening Session

Conference Co-Chair

Sheng-Ying Pao

Director of Strategic Innovation, Lee Kum Kee Group and MIT Media Lab
75 Amherst Street E14-464, Cambridge, MA, 02142 USA

Tel: +1-617-715-4382

Email: aithpao@media.mit.edu

(麻省理工學院包盛盈博士)

BIOGRAPHY



Sheng-Ying ‘Aithne’ Pao leads diverse teams to initiate and execute projects from conceptualization through execution. As the Director of Strategic Innovation at Lee Kum Kee Group, Pao developed strategies, initiated partnerships, and drove product teams to expand the 128-year-old sauce company into a digital tech business. Prior to that, Pao co-founded startup teams. She created design solutions and shaped go-to-market strategy for startups; one of which achieved 15-times its Kickstarter goal. She has consulted on innovation strategy for startups, reviewed, and judged competitions including IDEAS Global Challenge.

Her interdisciplinary background spans three areas: design, marketing, and engineering. Pao received her Ph.D. from MIT Media Lab focusing on interaction design, gesture sensing, and immersive experience. She was named MIT Cisco Fellow for two consecutive years. Pao is also government certified in international trading and marketing by the Taiwan External Trade Development Council. With her interdisciplinary experience, she was invited to co-lead and lecture at MIT graduate courses and to teach professional workshops for organizations such as the Tribeca Film Institute.

In addition, Pao creates new media, interactive design, and tech-enabled art. Her independent work has won several awards including the iF Communication Design Award, selected from several thousand commercial entries across 55 countries. Her recent creations were exhibited in museums and galleries in New York, Boston, Barcelona, Dubai, Munich, Singapore, and Shanghai. She has been invited to speak at conferences and research programs including Stanford University Creative Emergence keynote, MUTEK conference, Shanghai Jiaotong University, Shanghai University School of Art, and the Perkins School for the Blind. Her TEDx talk was on the front page selected as one of the most romantic technologies and her recent work has been featured in multiple magazines video/ radio interviews.

Opening Session

Welcome Remarks

Mr. Ming-chi Scott Lai

Director-General
Taipei Economic and Cultural Office in Boston
99 Summer St., Suite 801
Boston, MA 02110
Tel: 617-259-1357 E-mail: mclai@mofa.gov.tw
(駐波士頓台北經濟文化辦事處賴銘琪處長)

BIOGRAPHY



EDUCATION

- 2013/5 **Harvard University, John F. Kennedy School of Government,**
Executive Education, Cambridge MA
Certificate of Completion, Global Change Agents Program
(May 12-18, 2013)
- 2011/9 **Le directeur de l'Ecolenationale d'administration,** France
Certificate of Completion, Take-Off Program for
Senior Civil Service (September 12-23, 2011)
- 1991/1-12 University of Ottawa, Ottawa, Canada
English Language Training
- 1987-1990 **National Taiwan University,** Taipei, Taiwan
Department of Political Science
Master Degree
- 1981-1985 **National Taiwan University,** Taipei, Taiwan
Department of Political Science
Bachelor Degree
- 1979-1981 **Affiliate Senior High School of National Taiwan Normal University,**

**The EITA Smart Cities Forum 2016 (EITA Knowledge and Smart Technology 2016),
Massachusetts Institute of Technology, Cambridge, Massachusetts, U.S.A.**

Taipei, Taiwan
High School Diploma

EXPERIENCE

- 2014/9 – Present **Taipei Economic and Cultural Office in Boston**, Boston MA
Director-General
- 2012/7-2014/9 **Taipei Economic and Cultural Representative Office in the U.S.**,
Washington, D.C.
Director, Administrative Division
- 2010/9-2012/7 **Ministry of Foreign Affairs**, Taipei Taiwan
Director, Document Authentication Division, Bureau of Consular Affairs
- 2010/1-2010/5 **Ministry of Foreign Affairs**, Taipei Taiwan
Division Director on Home Assignment,
Department of North American Affairs
- 2004/1-2010/1 **Taipei Economic and Cultural Office in Boston**, Boston, MA
Division Director
- 2002/5-2004/1 **Ministry of Foreign Affairs**, Taipei, Taiwan
Assistant to Minister
- 2000/12-2002/5 **Ministry of Foreign Affairs**, Taipei, Taiwan
Section Chief, Public Diplomacy Coordination Council
- 2000/5-2000/12 **Ministry of Foreign Affairs**, Taipei, Taiwan
Assistant to Deputy Minister
- 1997/9-2000/1 **Taipei Economic and Cultural Representative Office in the U.S.**,
Washington, D.C.
Second Secretary
- 1994/9-1997/9 **Taipei Economic and Cultural Office in Atlanta**, Atlanta GA
Third Secretary
- 1992/10-1994/9 **Ministry of Foreign Affairs**, Taipei Taiwan
Assistant to Minister
- 1991/12-1992/10 **Ministry of Foreign Affairs**, Taipei Taiwan
Officer, Department of North American Affairs
- 1990/1-12 **Ministry of Foreign Affairs**, Taipei Taiwan
Officer, Department of Protocol
- 1988/9 Passed Foreign Service Examination

HOBBIES

Golf, table tennis, basketball, baseball, and traveling.

PERSONAL

Family: Wife Jennifer, son Thomas, and twin daughters Penny & Annie.

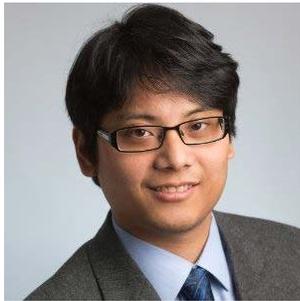
Plenary Session (I)

Session Chair

Michael Chang

Chief Executive Officer, Kyper Data Technologies

BIOGRAPHY



Michael is the founder and CEO of Kyper Data Technologies, a big data aggregation as well as SCM intelligence platform. Michael started his first startup 4 years ago, building one of the first big data asset management funds. He has extensive experience in data science. As his first job at Foxconn, he used massive amounts of data to identify and solve the relationship between weather and a major manufacturing failure which cost tens of millions per quarter. His work has been featured on the cover stories on several prestigious journals. Michael holds a diploma from NTU, Taiwan and a Ph.D from MIT EECS.

Plenary Session (I)

Plenary Speaker

Alzheimer's Disease Sequencing Project

Li-San Wang

Associate Professor of Pathology and Laboratory Medicine
Co-Director, Penn Neurodegeneration Genomics Center
University of Pennsylvania Perelman School of Medicine
D102 Richards Building, 3700 Hamilton Walk
Philadelphia, PA 19104 USA
Tel: +1-215-746-7015
Email: lswang@upenn.edu
(賓州大學醫學院王立三教授)

ABSTRACT

Alzheimer's disease (AD) is a progressive neurodegenerative disorder that is effectively untreatable, and invariably progresses to complete incapacitation and death 10 or more years after onset. As the US population ages, AD cases will increase from 5.4 million in 2016 to 11-16 million in 2050. AD costs the US \$203 billion in health care expenses and nearly doubles when informal unpaid care is considered. During the past decade, with improved genotyping and sequencing technologies and availability of larger cohorts, 26 new AD genetic risk factors were found. These findings may lead to better understanding of the disease and novel targets for drug development.

The Alzheimer's Disease Sequencing Project (ADSP) is a White House initiative to find new genetic variants for late-onset AD by analyzing genomic sequences. The entire effort involves >150 researchers in United States and Europe. The team has analyzed and made available whole genomes/whole exome sequences of more than 11,000 Alzheimer's patients and cognitively normal elderly controls, and will sequence at least 13,000 additional whole genomes in the coming years.

This talk is an introduction to the ADSP aimed for a general audience without background in genetics, genomics or Alzheimer's disease. I will present the history, study design, and current status of the project; challenges in data production and management, science in gene finding, data sharing, protection of privacy and our solutions; and lessons learned, opportunities, and implications in big genomics data research and precision medicine.

BIOGRAPHY



Li-San Wang received his B.S. and M.S. in Electrical Engineering from the National Taiwan University, and his Ph.D. in Computer Sciences from the University of Texas at Austin. Currently he is Associate Professor of Pathology and Laboratory Medicine, founding Co-Director of the Penn Neurodegeneration Genomics Center (PNGC), and Chair of The Graduate Group in Genomics and Computational Biology (GCB) at the University of Pennsylvania. Dr. Wang's research integrates

bioinformatics, genomics, and genetics to study neurodegeneration. He has authored more than 100 peer-reviewed book chapters and journal articles and served on the program and organizing committees of various international workshops and conferences, and NIH and NSF grant review panels and study sections. He is the Principal Investigator of the National Institute on Aging Genetics of Alzheimer's Disease Data Storage Site (NIAGADS), a national genetics data repository established by National Institute on Aging to facilitate access to genetics/genomics data for the study of late-onset Alzheimer's disease. He co-Directs the Center for Genetics and Genomics of Alzheimer's Disease (CGAD), a specialized center funded by NIH to coordinate analysis activities for the Alzheimer's Disease Sequencing Project (ADSP), a presidential initiative to sequence the genomes of more than 11,000 individuals and find novel genetic variants for Alzheimer's disease.

Plenary Session (II)

Session Chair

Sheng-Ying Pao

Director of Strategic Innovation, Lee Kum Kee Group and MIT Media Lab
75 Amherst Street E14-464, Cambridge, MA, 02142 USA
Tel: +1-617-715-4382
Email: aithpao@media.mit.edu
(麻省理工學院包盛盈博士)

BIOGRAPHY



Sheng-Ying 'Aithne' Pao leads diverse teams to initiate and execute projects from conceptualization through execution. As the Director of Strategic Innovation at Lee Kum Kee Group, Pao developed strategies, initiated partnerships, and drove product teams to expand the 128-year-old sauce company into a digital tech business. Prior to that, Pao co-founded startup teams. She created design solutions and shaped go-to-market strategy for startups; one of which achieved 15-times its Kickstarter goal. She has consulted on innovation strategy for startups, reviewed, and judged competitions including IDEAS Global Challenge.

Her interdisciplinary background spans three areas: design, marketing, and engineering. Pao received her Ph.D. from MIT Media Lab focusing on interaction design, gesture sensing, and immersive experience. She was named MIT Cisco Fellow for two consecutive years. Pao is also government certified in international trading and marketing by the Taiwan External Trade Development Council. With her interdisciplinary experience, she was invited to co-lead and lecture at MIT graduate courses and to teach professional workshops for organizations such as the Tribeca Film Institute.

In addition, Pao creates new media, interactive design, and tech-enabled art. Her independent work has won several awards including the iF Communication Design Award, selected from several thousand commercial entries across 55 countries. Her recent creations were exhibited in museums and galleries in New York, Boston, Barcelona, Dubai, Munich, Singapore, and Shanghai. She has been invited to speak at conferences and research programs including Stanford University Creative Emergence keynote, MUTEK conference, Shanghai Jiao Tong University, Shanghai University School of Art, and the Perkins School for the Blind. Her TEDx talk was on the front page selected as one of the most romantic technologies and her recent work has been featured in multiple magazines video/ radio interviews.

Plenary Session (II)

Plenary Speaker

The Smart Localized Water Solution

Ting-Yun Sasha Huang

CEO, AquaFresco Inc.
28 Dane St. Somerville MA 02143
Tel: +1-617-390-6998
Email: sasha_huang@aquafresco.co

ABSTRACT

Due to the drastic climate change and the increase in population, the water shortage problem has worsened over years. In some cities, although the water problem is not as evident, the soaring swage cost has become a pain point for business owners. Meanwhile, the government regulations have start to limit the water usage in certain areas and at the same time, the concept of being environmentally friendly has become the mainstream. However, the current water solution can only cut down water use by 50%, and the system requires large volume for high pressure operation, which ordinary households can't get access to.

In AquaFresco, we are developing a water filtration unit that does not require high pressure operation, and at the same time reinvent the idea of water cycles. Take laundry as an example, we use 20 gallons of water to wash away only 0.1% of the waste component, this inefficient process is not just a waste of water, also create environmental problems such as excess detergent discharge, as well as decrease in sewage life.

This talk is an overview of what AquaFresco envision the future of wastewater treatment to be, starting with the concept, the technology, and then to the demonstration in the laundry sectors. Besides the filtration technology itself, the smart process control of wastewater monitoring will also be discussed.

BIOGRAPHY



Sasha Huang received her B.S in Materials Science and Engineering, National Taiwan University in 2011. Later on, she got her PhD also in the Department of Materials Science and Engineering in Massachusetts Institute of Technology, 2016. She cofounded AquaFresco Inc. in 2015 and is now the CEO of AquaFresco.

During her PhD. days, her research area was in alloy design as well as material characterization. Prior to AquaFresco, she was a graduate researcher in Aramco Service Company where she did the characterization and optimization of fluorescence nanoparticles, she also served as a technical consultant for OpenWater Power, an MIT startup focus on Al battery.

In AquaFresco, she is doing technical support of the product development as well as business development, where she connects the technology to the potential clients need, brings the technology to real world use.

Plenary Session (III)

Session Chair

Woei-jyh (Adam) Lee

*Tyser Teaching Fellow of Information Systems
Robert H. Smith School of Business
University of Maryland, College Park*
(馬里蘭大學學院市分校史密斯商學院李偉智教授)

BIOGRAPHY



Dr. Woei-jyh (Adam) Lee received BSE degree from the National Taiwan University, MS degree from the Courant Institute at New York University, and PhD degree from the University of Maryland at College Park (UMD). He worked on distributed objects and fault tolerance at the AT&T Labs - Research in 1997. He focused on network software and management at the Bell Laboratories Research from 1998 to 2000. He visited the University of Southern California specializing in continuous media streaming and multimedia networking from 2002 to 2003.

He contributed in protein domain parsing and boundary prediction at the National Cancer Institute (NCI), National Institutes of Health (NIH) from 2004 to 2005. He was a fellow focusing on human genetics and genomics at the National Center for Biotechnology Information, National Library of Medicine, NIH from 2009 to 2012. He became a special volunteer working on computational modeling for cancer progression and metastatic at the NCI, NIH from 2012 to 2013. He was also affiliated with the Center for Bioinformatics and Computational Biology and the Institute for Advanced Computer Studies at UMD.

He is currently a faculty of Information Systems at the Robert H. Smith School of Business at UMD since 2012. His research interests include information integration, data analytics and mining, literature-based discovery, performance simulation and evaluation, bioinformatics and computational biology, human genomics and genetics, and cancer biology. He has two US Patents and is a member of the IAENG and the CAPA.

Plenary Session (III)

Plenary Speaker

Michael Chang

Chief Executive Officer, Kyper Data Technologies

ABSTRACT

BIOGRAPHY



Michael is the founder and CEO of Kyper Data Technologies, a big data aggregation as well as SCM intelligence platform. Michael started his first startup 4 years ago, building one of the first big data asset management funds. He has extensive experience in data science. As his first job at Foxconn, he used massive amounts of data to identify and solve the relationship between weather and a major manufacturing failure which cost tens of millions per quarter. His work has been featured on the cover stories on several prestigious journals. Michael holds a diploma from NTU, Taiwan and a Ph.D from MIT EECS.

Technical Session D1-W1-T1: Smart Cities, the Internet of Things, Smart Technologies and Applications: (Smart Computing, Smart Mobility and Transportation, Smart Environments, Smart Supply Chain and Logistics, Smart Manufacturing, Smart Energy Systems, Smart Weather Forecasting, and)

Session Chair

Chen-Hsiang (Jones) Yu

Founder and CEO
Prentice Lab
(余禎祥博士)

BIOGRAPHY



Jones Yu is an assistant professor of Computer Science and Networking at Wentworth Institute of Technology (WIT). He earned B.Eng. and M.S. in Computer Science and Information Engineering (CSIE) from Tamkang University in 1998 and from National Taiwan University in 2000, respectively, and Ph.D. in Computer Science from MIT under Prof. Rob Miller's guidance in 2012. He has won two institutional grants awards to create Externally-collaborative, Project-based, Interdisciplinary Curricula (EPIC) course and to conduct EPIC research in applying mobile technologies to Biomedical and Mechanical Engineering fields. His research in Human-Computer Interaction (HCI) focuses on mobile engineering, web customization and automation, readability enhancement, and mobile learning.

He is founder and CEO of Prentice Lab, which is a startup company focusing on investigating mobile technologies and developing software for improving learning, including language learning and subject learning. In the past, he has worked for a few startup companies as Director of Mobile Engineering and User Experience, and developed mobile apps as products.

Technical Session D1-W1-T1: Smart Cities, the Internet of Things, Smart Technologies and Applications: (Smart Computing, Smart Mobility and Transportation, Smart Environments, Smart Supply Chain and Logistics, Smart Manufacturing, Smart Energy Systems, Smart Weather Forecasting, and)

Distributed Energy Management in Power Networks

Na (Lina) Li

Assistant Professor in Electrical Engineering and Applied Mathematics
School of Engineering and Applied Sciences
Harvard University

ABSTRACT

Recent radical evolution in distributed sensing, computation, communication, and actuation has revolutionized the way the power grid operates and fostered the emergence of the smart grid. In the future, the grid, especially on the distribution system, will be a large-scale network of distributed energy resources (DERs), each introducing random and rapid fluctuations in power supply, demand, voltage and frequency. These DERs provide tremendous opportunity for sustainability, efficiency, and power reliability. However, a major issue is how intelligent devices and independent producers can respectively change their power consumption/production to achieve near maximum and reliable efficiency for the power network. In this talk, I will focus on how to develop scalable, distributed, and real-time control and optimization algorithms to achieve system-wide efficiency, reliability, and robustness for the future power grid.

BIOGRAPHY



Na Li is an assistant professor in Electrical Engineering and Applied Mathematics of the School of Engineering and Applied Sciences in Harvard University since 2014. She received her Bachelor degree in Mathematics in Zhejiang University in 2007 and PhD degree in Control and Dynamical systems from California Institute of Technology in 2013. She was a postdoctoral associate of the Laboratory for Information and Decision Systems at Massachusetts Institute of Technology 2013-2014. Her research lies in the design, analysis, optimization and control of distributed network systems, with particular applications to power networks. She received NSF career award (2016) and entered the Best Student Paper Award finalist in the 2011 IEEE Conference on Decision and Control.

Technical Session D1-W1-T1: Smart Cities, the Internet of Things, Smart Technologies and Applications: (Smart Computing, Smart Mobility and Transportation, Smart Environments, Smart Supply Chain and Logistics, Smart Manufacturing, Smart Energy Systems, Smart Weather Forecasting, and)

Wencong Su

Assistant Professor, Department of Electrical and Computer Engineering
University of Michigan-Dearborn

ABSTRACT

BIOGRAPHY



Technical Session D1-W1-T1: Smart Cities, the Internet of Things, Smart Technologies and Applications: (Smart Computing, Smart Mobility and Transportation, Smart Environments, Smart Supply Chain and Logistics, Smart Manufacturing, Smart Energy Systems, Smart Weather Forecasting, and)

The climate change implications of the Paris agreement

Erwan Monier

Principal Research Scientist, Center for Global Change Science
Joint Program on the Science and Policy of Global Change
Massachusetts Institute of Technology

ABSTRACT

A global agreement on the reduction of climate change was negotiated by 196 parties at the recent 2015 United Nations Climate Change Conference (COP21) held in Paris. The contribution that each individual country should make in order to achieve the worldwide goal of limiting global warming by 2°C by 2100 from pre-industrial era were determined by all countries individually and called "nationally determined contributions" (NDCs). On 22 April 2016 (Earth Day), 174 countries signed the agreement in New York, and began adopting their commitment to reduce greenhouse gas emissions (or emission intensity) through their legal systems. While these commitment only cover the period up to 2030 and do not specify actions after 2030, the Paris Agreement aims to hold "the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels" by 2100.

Projections of the long-term climate impacts of the Paris agreement produced by different research groups differ significantly because they make different assumptions about the policies after 2030. In this study, we estimate possible impacts using the MIT Integrated Global System Model, which couples a human activity model, the Economic Projection and Policy Analysis (EPPA) model, and an Earth system model of intermediate complexity, the MIT Earth System Model (MESM). We analyze how the Paris agreement have improved the probability to stay below the 2°C and 1.5°C targets compared to the Copenhagen agreement (COP15) using a series of scenarios extending the Paris agreement post-2030: a) no additional climate policy after 2030, but the proposed cuts are extended to 2100; b) reductions in emissions and emission intensities after 2030 at the same rate as in the 2020-2030 period; 3) in addition to the conditions in the previous no country increases its GHG emissions after 2050. Finally we contrast the results of our analysis to an emission scenario that leads to a 2°C stabilization using a global carbon tax.

BIOGRAPHY



Dr. Erwan Monier is a Principal Research Scientist at the MIT Center for Global Change Science and Joint Program on the Science and Policy of Global Change. He first joined the MIT Center for Global Change Science as a Postdoctoral Associate in 2009 and became a Research Scientist in 2011. His research focuses on understanding the uncertainty in future projections of global and regional climate change, assessing the impacts of climate change with a focus on the natural and managed land systems and improving the representation of the human-Earth coupled system in integrated assessment models.

He is a contributor to the intercomparison project with Earth System Models of Intermediate Complexity (EMICs) undertaken in support of the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5). He is also a leading climate scientist for the US Environmental Protection Agency (EPA) Climate Change Impacts and Risk Analysis (CIRA) project. Within this project, he has been involved in various climate impact assessments including the impacts of climate on agriculture and water resources, on forestry and wildfires, and on air quality and health. Currently, he is in charge of developing a new version of the MIT Integrated Global System Model (IGSM), which will include a 3-dimensional climate model explicitly coupled to a model of the human system through 3 pathways: air quality and health, water resources management and the land system. He completed his PhD in Atmospheric Science at the University of California, Davis, and holds a Master's degree in Hydraulics and Fluid Dynamics Engineering from the National Polytechnic Institute of Toulouse.

Technical Session D1-W1-T1: Smart Cities, the Internet of Things, Smart Technologies and Applications: (Smart Computing, Smart Mobility and Transportation, Smart Environments, Smart Supply Chain and Logistics, Smart Manufacturing, Smart Energy Systems, Smart Weather Forecasting, and)

The Usage of Social Media Geospatial Aggregators for Disaster Response in Large Cities

Thomas Chandler

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ABSTRACT

During Hurricane Sandy, which struck the U.S. eastern seaboard in late October, 2012, social media postings provided current, local, detailed, and continuous flows of information on storm conditions and community needs in ways that had never transpired before. In particular, location-based intelligence of social media data increased community engagement. To improve emergency response and further enhance the use of social media during times of extreme duress, The National Center for Disaster Preparedness (NCDP), of the Earth Institute, Columbia University, has been examining how online communities formed during the disaster, how they interacted with traditional formal response systems and organizations, such as the Federal Emergency Management Agency (FEMA) and the Red Cross, and how they enhanced recovery efforts. This presentation will shed light on the nature of instantaneous resource and information exchange between New York City residents and first responders during the storm, while also highlighting best practices for usage of location based online social media aggregators during catastrophic events in large cities. Findings from an ongoing stakeholder analysis of more than 100,000 geo-tagged social media postings will be discussed.

BIOGRAPHY



Thomas Chandler, PhD, is an associate research scientist at the National Center for Disaster Preparedness, Columbia University, and an Adjunct Assistant Professor in Communication, Media, and Learning Technologies Design at Teachers College, Columbia University. He received his PhD in social studies (Teachers College, New York 2009), his MA in instructional design (Teachers College, New York 2000) and his BA in journalism (Rutgers College, New Jersey, 1994).

He has been an Associate Research Scientist at Columbia University since 2011, and an instructional designer there since 2002, where he has focused on disaster preparedness, response, and recovery oriented themes. He is the principal investigator of a grant funded by the U.S. Assistant Secretary for Preparedness and Response (ASPR, 2014-2016), entitled Visualizing Social Media: New Tools for Research and Practice, while also

leading several other federal and nonprofit research and training projects. His recent publications include:

- Chandler, T., Abramson, D., Panigrahi, B., Schlegelmilch, J., & Frye, N. (2016). Crisis Decision Making During Hurricane Sandy: An Analysis of Established and Emergent Disaster Response Behaviors in the NY Metro Area, *Disaster Medicine and Emergency Preparedness*, 10; pp. 436-442
- Schlegelmilch, J., Petkova, E., Chandler, T., Sury, J., Bhaskar, S., Sehnert, E. & Marx, S. (2016). Children in Disasters: Do Americans Feel Prepared? A National Survey, National Center for Disaster Preparedness, Columbia University, Briefing Report #1, February
- Chandler, T. & Beedasy, J. (2014). Using Mobile Devices for Disaster Preparedness, Response, and Recovery: A Framework for K-12 Schools, In H. An, S. Alon, & D. Fuentes, (Eds.), *Tablets in K-12 Education: Integrated Experiences and Implications*, IGI Global, Hershey, PA

He focuses on the human impact of natural disasters, geographic and social networks, and community preparedness.

Dr. Chandler is a member of the American Public Health Association and a reviewer for *Disaster Medicine and Emergency Preparedness* and *Interactive Learning Environments*.

*Technical Session D1-W2-T1: Smart Healthcare Technologies, Services and Applications:
(Computational Intelligence, Emerging Intelligent Technologies, Data-driven Discoveries and
Uncertainty Quantification, High Performance and Cloud Computing)*

Session Chair

Sheng-Ying Pao

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BIOGRAPHY



Sheng-Ying 'Aithne' Pao leads diverse teams to initiate and execute projects from conceptualization through execution. As the Director of Strategic Innovation at Lee Kum Kee Group, Pao developed strategies, initiated partnerships, and drove product teams to expand the 128-year-old sauce company into a digital tech business. Prior to that, Pao co-founded startup teams. She created design solutions and shaped go-to-market strategy for startups; one of which achieved 15-times its Kickstarter goal. She has consulted on innovation strategy for startups, reviewed, and judged competitions including IDEAS Global Challenge.

Her interdisciplinary background spans three areas: design, marketing, and engineering. Pao received her Ph.D. from MIT Media Lab focusing on interaction design, gesture sensing, and immersive experience. She was named MIT Cisco Fellow for two consecutive years. Pao is also government certified in international trading and marketing by the Taiwan External Trade Development Council. With her interdisciplinary experience, she was invited to co-lead and lecture at MIT graduate courses and to teach professional workshops for organizations such as the Tribeca Film Institute.

In addition, Pao creates new media, interactive design, and tech-enabled art. Her independent work has won several awards including the iF Communication Design Award, selected from several thousand commercial entries across 55 countries. Her recent creations were exhibited in museums and galleries in New York, Boston, Barcelona, Dubai, Munich, Singapore, and Shanghai. She has been invited to speak at conferences and research programs including Stanford University Creative Emergence keynote, MUTEK conference, Shanghai Jiaotong University, Shanghai University School of Art, and the Perkins School for the Blind. Her TEDx talk was on the front page selected as one of the most romantic technologies and her recent work has been featured in multiple magazines video/ radio interviews.

*Technical Session D1-W2-T1: Smart Healthcare Technologies, Services and Applications:
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Uncertainty Quantification, High Performance and Cloud Computing)*

Big Data and Network Biology: A Case Study

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ABSTRACT

I will present a case study in big data and network biology, with a focus on the development of MapReduce algorithms for inferring gene regulatory networks in a cloud environment.

BIOGRAPHY



Jason T. L. Wang received the B.S. degree in mathematics from National Taiwan University, Taipei, Taiwan, in 1980, and the Ph.D. degree in computer science from the Courant Institute of Mathematical Sciences at New York University in 1991.

He is a full professor in the Computer Science Department at the New Jersey Institute of Technology, and Director of the University's Data and Knowledge Engineering Laboratory. He has published over 120 refereed papers and eight books including *Pattern Discovery in Biomolecular Data: Tools, Techniques and Applications* (New York, NY: Oxford University Press, 1999), *Data Mining in Bioinformatics* (London, UK: Springer, 2005) and *Pattern Recognition in Computational Molecular Biology: Techniques and Approaches* (Hoboken, NJ: Wiley, 2015). His research interests include databases and data mining, machine learning and computational biomedicine.

Dr. Wang is the Founding Editor of the World Scientific Book Series on Science, Engineering and Biology Informatics, and has been a program committee member of over 200 national and international conferences. He is a Founding Chair of the ACM SIGKDD Workshop on Data Mining in Bioinformatics, and a Co-Chair of the 2006 IEEE ICDM Workshop on Data Mining in Bioinformatics and the IEEE ICDM Workshop on Biological Data Mining and its Applications in Healthcare (2011-2015).

*Technical Session D1-W2-T1: Smart Healthcare Technologies, Services and Applications:
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Uncertainty Quantification, High Performance and Cloud Computing)*

Hau-Tieng Wu

Assistant Professor, Department of Mathematics
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ABSTRACT

BIOGRAPHY



*Technical Session D1-W2-T1: Smart Healthcare Technologies, Services and Applications:
(Computational Intelligence, Emerging Intelligent Technologies, Data-driven Discoveries and
Uncertainty Quantification, High Performance and Cloud Computing)*

The Use of Wearable Sensors and Systems in Rehabilitation Medicine

Sunghoon Ivan Lee

Assistant Professor, College of Information and Computer Sciences
University of Massachusetts, Amherst

ABSTRACT

There is a growing interest in the application of wearable technologies to monitor older adults and subjects with chronic conditions in the field of rehabilitation. The motivation for the use of wearable sensors and systems is due to the benefits that could be associated with long-term, frequent, and objective monitoring of individuals in their home and community settings. In this talk, I will review wearable systems and analytic methods that are currently used in the field of rehabilitation research by introducing a number of on-going projects that involve patients with Parkinson's disease and knee osteoarthritis. Then, I will end my talk by discussing the limitations of the current research and ideas for the future work.

BIOGRAPHY



Sunghoon Ivan Lee is an assistant professor of computer science at University of Massachusetts, Amherst. Professor Lee's research interests are in Mobile & Personalized Health, focusing on developing wearable sensors and data analytic methodologies to understand the health conditions associated with neurological, neuromuscular, or muscular skeleton disorders such as stroke, Parkinson's disease, traumatic brain injuries, osteoarthritis, etc. With a primary focus on evolution, his specific research interests include 1) designing and implementing novel sensors and remote monitoring systems that are motivated by practical medical needs, 2) constructing appropriate clinical trials, and 3) analyzing the obtained data to quantify patients' conditions and validate the systems' clinical efficacy. Prior to joining the University of Massachusetts, Professor Lee was a postdoctoral research fellow in the Department of Physical Medicine and Rehabilitation at Harvard Medical School. He received his Ph.D. in Computer Science from UCLA in 2014 with the Outstanding Doctoral Research Award. He received his M.S. degrees in Electrical Engineering and Computer Science from UCLA in 2010 and 2012, respectively. His work received several paper awards including the Best Demo Award from the ACM MobiSys, the Best Demo Honorable Mention at IEEE SECON, and a Featured Article of the Issue at IEEE JBHI.

*Technical Session D1-W2-T1: Smart Healthcare Technologies, Services and Applications:
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Uncertainty Quantification, High Performance and Cloud Computing)*

Woei-jyh (Adam) Lee

Tyser Teaching Fellow of Information Systems
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(馬里蘭大學學院市分校史密斯商學院李偉智教授)

ABSTRACT

BIOGRAPHY



Dr. Woei-jyh (Adam) Lee received BSE degree from the National Taiwan University, MS degree from the Courant Institute at New York University, and PhD degree from the University of Maryland at College Park (UMD). He worked on distributed objects and fault tolerance at the AT&T Labs - Research in 1997. He focused on network software and management at the Bell Laboratories Research from 1998 to 2000. He visited the University of Southern California specializing in continuous media streaming and multimedia networking from 2002 to 2003.

He contributed in protein domain parsing and boundary prediction at the National Cancer Institute (NCI), National Institutes of Health (NIH) from 2004 to 2005. He was a fellow focusing on human genetics and genomics at the National Center for Biotechnology Information, National Library of Medicine, NIH from 2009 to 2012. He became a special volunteer working on computational modeling for cancer progression and metastatic at the NCI, NIH from 2012 to 2013. He was also affiliated with the Center for Bioinformatics and Computational Biology and the Institute for Advanced Computer Studies at UMD.

He is currently a faculty of Information Systems at the Robert H. Smith School of Business at UMD since 2012. His research interests include information integration, data analytics and mining, literature-based discovery, performance simulation and evaluation, bioinformatics and computational biology, human genomics and genetics, and cancer biology. He has two US Patents and is a member of the IAENG and the CAPA.

*Technical Session D1-W2-T1: Smart Healthcare Technologies, Services and Applications:
(Computational Intelligence, Emerging Intelligent Technologies, Data-driven Discoveries and
Uncertainty Quantification, High Performance and Cloud Computing)*

Inference of genes associated with cancer targeted therapy resistance

Peng Jiang

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ABSTRACT

Drug resistance is a major challenge of targeted therapy in cancer. We present CARE (Comprehensive Analysis of REsistance), a computational method for identification of genes associated with targeted therapy resistance using pharmacological screen data. The methodology of CARE is based on interaction term significance test in multivariate regression. When applied on CCLE, CGP and CTRP datasets, CARE significantly outperformed previous computational methods in predicting drug resistance associated genes, such as Elastic Net and ANOVA. Moreover, the gene signature inferred by CARE can better predict therapy clinical outcome than the signatures from other experimental technologies including CRISPR and shRNA screens. When focusing on genes associated with Lapatinib resistance, CARE identified PRKD3 as the top candidate. Experimental validation by both siRNA pool and compounds (KBNB14270, CRT0066101) confirmed that inhibition of PRKD3 significantly sensitizes HER2+ breast cancer cell to Lapatinib.

BIOGRAPHY



Dr. Jiang received his Ph.D. in Computer Science from Princeton University in 2013 and his B.E. in Computer Science from Tsinghua University in China in 2007. His research focuses on building up computational frameworks to integrate big biological data resources from public domain and discover driver events of transcriptional regulation in diverse cancer types. He started working in the Department of Biostatistics and Computational Biology and Harvard School of Public Health as a Research Fellow on September 3, 2013. He has published several papers and reviews related with computational modeling and analysis of transcriptional and post-transcriptional regulation in biology system. Recently, his research focus is shifted to study of cancer therapy resistance through public data integration and statistical modeling.

Technical Session D1-W1-T2: Smart Cities, the Internet of Things, Smart Technologies and Applications: (Smart Computing, Smart Mobility and Transportation, Smart Environments, Smart Supply Chain and Logistics, Smart Manufacturing, Smart Energy Systems, Smart Weather Forecasting, and)

Session Chair

Chen-Hsiang (Jones) Yu

Founder and CEO
Prentice Lab
(余禎祥博士)

BIOGRAPHY



Jones Yu is an assistant professor of Computer Science and Networking at Wentworth Institute of Technology (WIT). He earned B.Eng. and M.S. in Computer Science and Information Engineering (CSIE) from Tamkang University in 1998 and from National Taiwan University in 2000, respectively, and Ph.D. in Computer Science from MIT under Prof. Rob Miller's guidance in 2012. He has won two institutional grants awards to create Externally-collaborative, Project-based, Interdisciplinary Curricula (EPIC) course and to conduct EPIC research in applying mobile technologies to Biomedical and Mechanical Engineering fields. His research in Human-Computer Interaction (HCI) focuses on mobile engineering, web customization and automation, readability enhancement, and mobile learning.

He is founder and CEO of Prentice Lab, which is a startup company focusing on investigating mobile technologies and developing software for improving learning, including language learning and subject learning. In the past, he has worked for a few startup companies as Director of Mobile Engineering and User Experience, and developed mobile apps as products.

Technical Session D1-W1-T2: Smart Cities, the Internet of Things, Smart Technologies and Applications: (Smart Comuting, Smart Mobility and Transportation, Smart Environments, Smart Supply Chain and Logistics, Smart Manufacturing, Smart Energy Systems, Smart Weather Forecasting, and)

Incorporating Transit Capacity Constraints into the Regional Travel Demand Model

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ABSTRACT

The Boston Region Metropolitan Planning Organization (MPO) utilizes a traditional, trip-based regional travel demand model to forecast highway traffic volumes, transit ridership, and air quality impacts. Transit modes are represented in the model, including rapid transit, commuter rail, bus, and boat services. Segments of the transit system in the Boston region operate at or near capacity at various times during peak travel periods. However, the current model has no feature to set transit capacity constraints during the transit assignment process. All transit trips are assigned to the “best transit route” regardless of capacity, with the “best transit route” assignment based solely on total trip cost. This research reviews a methodology for considering transit capacity during the transit assignment process. This methodology is intended to enable the model to more accurately reflect how people react to congestion in the transit system.

This research project evaluated the use of a transit capacity assignment tool, which is compatible with the TransCAD platform used for the model. The TransCAD program suite provides the pathfinder equilibrium (PFE) assignment method, which can take into account route, parking, and non-transit link capacity. Several scenarios were tested by running the PFE assignments with capacity constraint changes. During these scenario tests, capacities were placed on transit routes to constrain travel flows. These capacity inputs were used when running an equilibrium iterative loop. For each scenario, transit volumes were updated using the method of successive averages on the current and previous flows, and a convergence was achieved after a sufficient number of iterations. The result showed the expected shifts in ridership across modes and services, as well as changes to trip cost and travel time.

BIOGRAPHY



Jieping Li is a senior transportation planner at the Central Transportation Planning Staff, which is the staff to the Boston Region MPO. She utilizes the regional travel demand model and GIS techniques to assess the impacts of regionally significant transportation projects and land-use changes on travel behavior and the environment. Jieping Li received her PhD in Transportation Planning from Boston University in May 2009. Her research interests are travel behavior, land use, air quality, GIS application, advanced modeling techniques, and data mining methods.

Technical Session D1-W1-T2: Smart Cities, the Internet of Things, Smart Technologies and Applications: (Smart Computing, Smart Mobility and Transportation, Smart Environments, Smart Supply Chain and Logistics, Smart Manufacturing, Smart Energy Systems, Smart Weather Forecasting, and)

Chen-Hsiang (Jones) Yu

Founder and CEO
Prentice Lab
(余禎祥博士)

ABSTRACT

According to ZenithOptimedia's (Zo) annual New Media Forecast, more than 56% of the global population have smartphones by the end of 2015 and penetration rate of smartphone has reached 72% in the U.S. in 2015. Although people can use smartphones to absorb information easily from the remote, it is still not common to interact with surrounding devices. In this talk, I will introduce a few research results of connecting smartphones to surrounding gadgets and devices to provide specific services for the user, including Smart Guide and UVR detection system. In addition, I will also share our thoughts in the field of smart connectivity.

BIOGRAPHY



Jones Yu is an assistant professor of Computer Science and Networking at Wentworth Institute of Technology (WIT). He earned B.Eng. and M.S. in Computer Science and Information Engineering (CSIE) from Tamkang University in 1998 and from National Taiwan University in 2000, respectively, and Ph.D. in Computer Science from MIT under Prof. Rob Miller's guidance in 2012. He has won two institutional grants awards to create Externally-collaborative, Project-based, Interdisciplinary Curricula (EPIC) course and to conduct EPIC research in applying mobile technologies to Biomedical and Mechanical Engineering fields. His research in Human-Computer

Interaction (HCI) focuses on mobile engineering, web customization and automation, readability enhancement, and mobile learning.

He is founder and CEO of Prentice Lab, which is a startup company focusing on investigating mobile technologies and developing software for improving learning, including language learning and subject learning. In the past, he has worked for a few startup companies as Director of Mobile Engineering and User Experience, and developed mobile apps as products.

Technical Session D1-W1-T2: Smart Cities, the Internet of Things, Smart Technologies and Applications: (Smart Computing, Smart Mobility and Transportation, Smart Environments, Smart Supply Chain and Logistics, Smart Manufacturing, Smart Energy Systems, Smart Weather Forecasting, and)

Constrained optimization methods for collaborative multi-robot motion planning and control

Javier Alonso Mora

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ABSTRACT

Ubiquitous autonomous robots require novel methods for navigation and control that account for their interaction with other robots and humans. To enable autonomous operation, I will discuss constrained optimization methods for collision avoidance and formation control that apply to both ground and aerial vehicles. These methods model inter-agent cooperation, moving obstacles and the dynamic constraints of the robots. I'll show experimental results with differential driven robots, wheelchairs, quadrotors navigating among humans and mobile manipulators collaboratively carrying objects.

Towards human-in-the-loop multi-robot coordination, we have developed an interactive display formed by tens of small robots, and the methods to specify high-level tasks for the multi-robot team and to automatically convert them into controllers with performance guarantees.

BIOGRAPHY



Javier Alonso-Mora is a Postdoctoral Associate at the Computer Science and Artificial Intelligence Laboratory (CSAIL) of MIT. He received the M.Sc. and Ph.D. degrees in robotics from ETH Zurich, Switzerland in 2010 and 2014 respectively, and the Diploma degree in mathematics in 2008 and in industrial engineering in 2010, both from the Universitat Politècnica de Catalunya (UPC), Barcelona, Spain. During his Ph.D. he was a joint researcher at Disney Research Zurich. As of October 2016 he will be an Associate Professor at Delft Technical University, The Netherlands.

Dr. Alonso-Mora is a member of IEEE and the Robotics and Automation Society (RAS). He has received several awards for his research (finalist best student paper at DARS 2010 and Best video award at IEEE HRI 2012 (2nd price)) and grants from Spanish and Swiss institutions. My main research interest is in motion planning and control of autonomous multi-robot systems, where robots interact with one another and with humans. Towards the smart cities of the future, I develop optimization-based algorithms that span across multiple applications, such as self-driving cars, automated factories, aerial vehicles and mobility on demand.

Technical Session D1-W1-T2: Smart Cities, the Internet of Things, Smart Technologies and Applications: (Smart Computing, Smart Mobility and Transportation, Smart Environments, Smart Supply Chain and Logistics, Smart Manufacturing, Smart Energy Systems, Smart Weather Forecasting, and)

Impact of Urban Surface Albedo on Regional and Local Scales using the WRF model

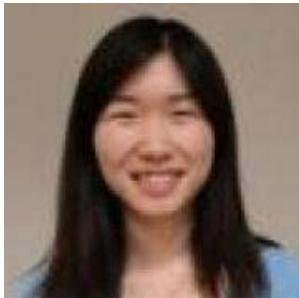
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ABSTRACT

Surface albedo is an important process in the overall earth energy budget in shaping local and regional climate. It could also be a potential tool to mitigate the anthropogenic effect on climate. In this study, the anthropogenic process of increasing urban and pavement albedo to offset the global warming effect is investigated using scientific model WRF. Two model simulations (urban surface with control or baseline albedo at 0.20 and an increases urban surface albedo at 0.40) with full sets of atmospheric and land surface physics and feedbacks along with an explicit urban model are simulated over the continental United States. The results are represented as the differences in surface temperature between the two scenarios when urban surface albedos are elevated.

BIOGRAPHY



Dr. Xu received her B.S. in Environmental and Resources Sciences and her Ph.D. in Atmospheric Science from the University of California, Davis. She joined the Massachusetts Institute of Technology as a Postdoctoral Associate at the Center for Global Change Science and at the Joint Program on the Science and Policy of Global Change in 2012. Dr. Xu's research interests include land surface modeling and regional modeling, climate change impact, carbon and hydrological cycles, as well as ecosystem and climate interactions. She is currently working on model development and numerical experimentation to investigate how various ecosystems respond to extreme weather events and how the changing natural and managed environments will alter the local and regional eco-hydro-climate. Dr. Xu is a member of the American Geophysical Union (AGU) and the American Meteorological Society (AMS).

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(Computational Intelligence, Emerging Intelligent Technologies, Data-driven Discoveries and
Uncertainty Quantification, High Performance and Cloud Computing)*

Session Chair

Hau-Tieng Wu

Assistant Professor
Department of Mathematics
University of Toronto
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BIOGRAPHY



*Technical Session D1-W2-T2: Smart Healthcare Technologies, Services and Applications:
(Computational Intelligence, Emerging Intelligent Technologies, Data-driven Discoveries and
Uncertainty Quantification, High Performance and Cloud Computing)*

A Constraint Mixture of Bayesian Hierarchical Models for Paired Data with Application to Genomic Outcome Screening

Weiliang Qiu

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ABSTRACT

How to reduce the effects of technical noises and how to handle the curse of dimensionality are two big challenges in genomic data analysis. Paired/matched design can effectively reduce effects of confounding factors. In this talk, we propose a constrained mixture of Bayesian hierarchical models (MBHM) for detecting disease associated genomic outcome for data obtained from paired/matched design. MBHM does not involve multiple testing, hence does not have the problem of the curse of dimensionality. It also could borrow information across genes so that it can be used for whole genome data with small sample size.

BIOGRAPHY



Weiliang Qiu received his B.S. (1996) in Applied Mathematics and M.S. (1999) in Statistics from Beijing Polytechnic University, Beijing China. He received his Ph.D. in Statistics (2004) from the University of British Columbia at Vancouver, Canada.

He went to Channing Laboratory as a postdoctoral research fellow in 2004. He was promoted to Instructor in 2006. Currently he is an Assistant Professor of Medicine, a faculty member of Brigham and Women's Hospital/Harvard Medical School.

Dr. Qiu's research interests include using biostatistical and holistic approaches to uncover the relationships between environmental, genetic, and epigenetic factors and complex diseases to facilitate the personalized prevention, diagnosis, and treatment of complex diseases. He has (co-)authored over sixty peer-reviewed papers. Dr. Qiu has strong computer computing skills and has contributed several software packages to R/Bioconductor websites. Dr. Qiu is a member of American Statistical Association, Statistical Society of Canada, and International Chinese Statistical Association.

*Technical Session D1-W2-T2: Smart Healthcare Technologies, Services and Applications:
(Computational Intelligence, Emerging Intelligent Technologies, Data-driven Discoveries and
Uncertainty Quantification, High Performance and Cloud Computing)*

Sheng-Ying Pao

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(麻省理工學院包盛盈博士)

ABSTRACT

BIOGRAPHY



Sheng-Ying 'Aithne' Pao leads diverse teams to initiate and execute projects from conceptualization through execution. As the Director of Strategic Innovation at Lee Kum Kee Group, Pao developed strategies, initiated partnerships, and drove product teams to expand the 128-year-old sauce company into a digital tech business. Prior to that, Pao co-founded startup teams. She created design solutions and shaped go-to-market strategy for startups; one of which achieved 15-times its Kickstarter goal. She has consulted on innovation strategy for startups, reviewed, and judged competitions including IDEAS Global Challenge.

Her interdisciplinary background spans three areas: design, marketing, and engineering. Pao received her Ph.D. from MIT Media Lab focusing on interaction design, gesture sensing, and immersive experience. She was named MIT Cisco Fellow for two consecutive years. Pao is also government certified in international trading and marketing by the Taiwan External Trade Development Council. With her interdisciplinary experience, she was invited to co-lead and lecture at MIT graduate courses and to teach professional workshops for organizations such as the Tribeca Film Institute.

In addition, Pao creates new media, interactive design, and tech-enabled art. Her independent work has won several awards including the iF Communication Design Award, selected from several thousand commercial entries across 55 countries. Her recent creations were exhibited in museums and galleries in New York, Boston, Barcelona, Dubai, Munich, Singapore, and Shanghai. She has been invited to speak at conferences and research programs including Stanford University Creative Emergence keynote, MUTEK conference, Shanghai Jiaotong University, Shanghai University School of Art, and the Perkins School for the Blind. Her TEDx talk was on the front page selected as one of the most romantic technologies and her recent work has been featured in multiple magazines video/ radio interviews.

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**How smart is your medicine?
An overview on Precision Medicine and a view from the ground**

Chiao-Feng Lin

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(林嬌鳳博士)

ABSTRACT

The advantages of personalized medicine, or precision medicine, are obvious: drugs and treatments tailored to each individual patient's genetic makeup should be more appropriate and less likely to have unwanted effects. Rapidly advancing technologies are changing personalized medicine from a far fetched dream into common practice. President Obama's Precision Medicine Initiative is aimed to further accelerate the advancement.

In this talk I will give an overview of genomic medicine and a view from the perspective of a bioinformatician at the Laboratory for Molecular Medicine of Partners HealthCare Personalized Medicine. Personalized medicine requires us to know which specific genetic variants, among the millions that each individual may or may not have, truly tell us something about their health and their response to medicine. Much of what I do at Partners involves enabling genetic counselors and molecular geneticists to efficiently interpret genetic variants found in clinical samples. Such curated variants are later submitted to ClinVar, "a freely accessible, public archive of reports of the relationships among human variations and phenotypes, with supporting evidence" run by NCBI. The resource, like The Human Gene Mutation Database (HGMD), is commonly used in genetic research on human conditions. Partners is one of the major submitters to ClinVar. Aggregation of clinical variants and their relationship to human health forms a knowledge base that is invaluable for precision medicine and medical research.

BIOGRAPHY



Chiao-Feng Lin received her B.S. (1992) in Electronic Engineering from Chung-Yuan Christian University, Chung-Li, Taiwan. She received her Masters degree in Library and Information Science (2000) from the University of Texas at Austin and Ph.D. in Biology (2008) from the Pennsylvania State University. She was a postdoctoral fellow between 2008 and 2011. Between 2011 and 2014, she was Senior Data Analyst at the National Institute on Aging Genetics of Alzheimer's Disease Data Storage Site (NIAGADS) and a member of Li-San Wang's laboratory in the Department of Pathology and Laboratory Medicine at the University of Pennsylvania. Her work was focused on biomedical informatics, including variant prioritization and tool/resource development with particular emphasis on large-scale DNA sequencing. She co-built and

published a DNaseq pipeline (DRAW+SneakPeek), used it to process 150 human exomes, and oversaw production of ~700 exomes. She is currently Senior Bioinformatician at Partners HealthCare Personalized Medicine and Research Associate at Brigham and Women's Hospital and Harvard Medical School in Boston, Massachusetts. Her work is focused on developing computational pipelines supporting genomics. This includes operations of clinical complex traits and pharmacogenetics programs, clinical laboratory, and translational genomics sequencing core.

*Technical Session D1-W2-T2: Smart Healthcare Technologies, Services and Applications:
(Computational Intelligence, Emerging Intelligent Technologies, Data-driven Discoveries and
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Metagenome and metatranscriptome data analysis in human microbiome studies

Wen-Chi Chou

Postdoctoral Associate
Broad Institute of MIT and Harvard

ABSTRACT

In addition to human body, communities of microbes (a.k.a. microbiota) are found in other environments, such as ocean, soil, and inside other animals and plants. Within the microbial communities, each microbiota have specific complexity, diversity, and competition. Together with the environments, members of the microbial communities interact and cooperate with the environments such as human guts. Using appropriate sequencing technologies, we can investigate genomes of microbiota (microbiome). Recently, human microbiota is rapidly linked to various diseases including diabetes, obesity, and recognition diseases. I will discuss about available technologies and data analytic methods for human microbiome studies.

BIOGRAPHY



Wen-Chi Chou is a postdoctoral associate in the Bacterial Genomics Group at the Broad Institute of MIT and Harvard. Chou's research projects mainly focus on understanding the role of gut microbiome in human diseases. Chou studies the effects of cranberry juice on the gut microbiome of patients with a history of recurrent urinary tract infections (UTIs), one of the most common infections in the U.S. He investigates the dynamic changes of bacterial uropathogens such as *Escherichia coli* (*E. coli*) to know when and how the gut bacteria become pathogens and cause infections. In addition to the UTI-related microbiome projects, Chou studies geographic gene expressions of bacteria and host in the gut to understand the bacteria-host interaction. Prior to joining the Broad Institute in 2015, Chou received his M.S. in molecular biology from Taipei Medical University, Ph.D. in bioinformatics from University of Georgia, and postdoctoral training from Harvard Medical School. His primary areas of expertise are in bioinformatics, genomics and metagenomics, human genetics, clinical research, and microbiome research.



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