The First Young Investigator Conference (EITC-YIC 2011)

"Leadership, Innovation, Growth"

Conference Proceedings

Harvard University
Cambridge, Massachusetts, U.S.A.

Thursday - Friday, August 18th - 19th, 2011

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Welcome Message

On behalf of the Emerging Information and Technology Conference (EITC) Planning Committee, it is our great pleasure to invite distinguished as well as young scientists/researchers from all around the world to attend and participate in the **First Annual EITC Young Investigator Conference (EITC-YIC 2011)**, August 18-19, 2011 at Maxwell Dworkin Conference Center in Harvard University, Cambridge, MA, U.S.A. This year's Biomedicine, Biotechnology, New Green Energy, Nanotechnology, Materials Science, Broadband Technologies, Cloud Computing, New Media and Creative Industries. As always, the EITC Conference provides numerous opportunities to connect and engage with your colleagues. We hope you will be able to participate in the EITC-YIC 2011 Conference and look forward to welcoming you to Boston.

Sincerely,

Yi-Hsiang (Sean) Hsu Conference Co-Chair Harvard University

Conference Themes

The EITC-YIC-2011 consists of following workshops:

Emerging Science & Technology:

- Workshop 1 (W1): Medicine, Public Health, Biotechnology, Bioinformatics
- Workshop 2 (W2): New Materials Science and Engineering, Nanotechnology
- Workshop 3 (W3): Broadband Technologies and Multimedia Services, Cloud Computing and Cyber Security

New Media & Creative Industries:

- Digital Media, Culture and Technology
- New Media, Web and Entertainment

Planning Committee

Conference General Chair

Andrew H.-J Wang	王惠鈞	Academia Sinica

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Lin-shan Lee	李琳山	National Taiwan University
Yi-Hsiang (Sean) Hsu	許益祥	Harvard University

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Program Committee

Technical Program Committee Chairs

Liang-Gee Chen	陳良基	National Taiwan University
Li-San Wang	王立三	University of Pennsylvania

Workshop Track/Session Chairs

Emerging Science and Technology:

Workshop 1: Medicine, Public Health, Biotechnology, Bioinformatics

Wen-Hui Lien	連文慧	The Rockefeller University
Huai-Kuang Tsai	蔡懷寬	Academia Sinica
Li-San Wang	王立三	University of Pennsylvania
Yi-Hsiang (Sean) Hsu	許益祥	Harvard University

Workshop 2: New Materials Science and Engineering, and Nanotechnology

Jeff Tza-Huei Wang	王澤輝	John Hopkins University
Bingqing (B.Q.) Wei	魏秉庆	University of Delaware
Yu-Bin Chen	陳玉彬	National Cheng Kung University
Jung-Tsung Shen	沈榮聰	Washington University in St. Louis

Workshop 3: C4I: Broadband Technologies and Multimedia Sewrvices, Cloud Computing and Cyber Security

Wen-Chieh (Steve) Lin	林文杰	National Chiao Tung University
Jia-Yu (Tim) Pan	潘家煜	Google U.S.A.
Tsung-Han Lin	林宗翰	Harvard University
Trista P. Chen	陳佩君	Gracenote Inc.

New Media & Creative Industries:

Digital Media, Culture, and Technology:

Ching-chih Chen	劉欽智	Global Connection and Collaboration, Inc.
Yung-Cheng Hsieh	謝顒丞	National Taiwan University of Arts
Jieh Hsiang	項潔	National Taiwan University

New Media, Web and Entertainment:

Liang-Gee Chen	陳良基	National Taiwan University
Chen-Hsiang (Jones) Yu	余禎祥	Massachusetts Institute of Technology

Conference Manager

Joyce Yang	楊立琦	Harvard University

Publication

Conference Program:

Woei-Jyh (Adam) Lee	李偉智	National Institutes of Health

Conference Proceedings:

Kajia Cao	曹卡佳	University of Pennsylvania
Yuk-Yee Fanny Leung	梁玉儀	University of Pennsylvania
Otto Valladares		University of Pennsylvania
Woei-Jyh (Adam) Lee	李偉智	National Institutes of Health

Conference Brochure:

Harvard Taiwan ROC Student Club
哈佛大學台灣(中華民國)同學會

Conference Treasurer

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

Local Management (Student Volunteer)

Keng-Yen Chiang	江庚晏	Massachusetts Institute of Technology
Hao-Wei Su	蘇皓瑋	Massachusetts Institute of Technology

General Inquiries & Advanced Registration

Investment & Trade Office, TECRO in the U.S.
駐美投資貿易服務處
Tel: +1-212-317-7395
E-mail: investny@msn.com

On-Site Registration

Harvard Taiwan (ROC) Student Club
哈佛大學台灣(中華民國)同學會

Web Operations

Wei-Cheng Wong	翁唯城	University of Texas at Dallas
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Harvard Taiwan (ROC) Student Club
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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

Taipei Economic & Cultural Office in Boston
駐波士頓臺北經濟文化辦事處

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Taiwan Trade Center, New York
對外貿易發展協會 駐紐約辦事處

Conference Program

Thursday, August 18th, 2011 : Emerging Science & Technology

August 18th (Thursday) 8:30 am - 6:00 pm : Registration (Room: MD-G123)

August 18th (Thursday) 9:00 am - 9:50 am : Opening Speech (Room: MD-G115)
Chair: **Dr. Yi-Hsiang (Sean) Hsu**, Harvard University
哈佛大學許益祥博士

Ms. Anne Hung, Director General, Taipei Economic and Cultural Office in Boston
駐波士頓臺北經濟文化辦事處洪慧珠處長

Opening Keynote:
"Academia Sinica and The National Research Program for Biopharmaceuticals (NRPB) – the role in biotechnological development of Taiwan"
Academician Andrew H.-J. Wang, Vice President, Academia Sinica, Republic of China (Taiwan)
中央研究院副院長王惠鈞院士

Parallel Sessions:

August 18th (Thursday) 9:50 am - 11:10 am : Technical Session D1-W1-T1: (Room: MD-G135)
Medicine/Public Health/Biotechnology/Bioinformatics (1)
Chair: **Professor Li-San Wang**, University of Pennsylvania
賓州大學王立三教授

"Discovering the Genetics Cause of Disease and New Mitochondrial Biology with MitoExome Sequencing"
Mr. Steve Hershman
Ph.D. Candidate, MGH, Harvard Systems Biology, Harvard University

"Integrative Network Analysis of Multimodal Genomic Microarrays"
Dr. Hsun-Hsien Chang
Children's Hospital Informatics Program, Harvard Medical School
哈佛醫學院張洵銑博士

"Bioinformatics and Genomics for Aging and Neurodegeneration"
Dr. Kajia Cao
Research Associate, Department of Cell Development and Biology, University of Pennsylvania
賓州大學曹卡佳博士

"MCAB – Multiple Tumor Class Classification using Covariance among Binary Classifiers"
Dr. Fanny Yuk Yee Leung
Postdoctoral Researcher, Department of Pathology and Laboratory Medicine, Penn Center for Bioinformatics, University of Pennsylvania
賓州大學梁玉儀博士

August 18th (Thursday) 9:50 am - 11:10 am : Technical Session D1-W2-T1: (Room: MD-G119)

New Materials Science and Engineering, Nanotechnology (1)
Chair: **Professor Jeff Tza-Huei Wang**, Johns Hopkins University
約翰霍普金斯大學王澤輝教授

"Transforming Light and Sound With Metamaterials"
Professor Nicholas Xuanlai Fang
Mechanical Engineering Department, Massachusetts Institute of Technology
麻省理工学院机械工程系方绚莱教授

"Acoustic Tweezers: Patterning, Focusing, and Separating Cells and Microparticles Using Standing Surface Acoustic Waves (SSAW)"
Professor Tony Jun Huang
Biomedical NanoElectroMechanicalSystems (BioNEMS) -- Multi-Physics of Micro/Nano Systems, Department of Engineering Science and Mechanics, The Pennsylvania State University
宾州州立大学黄竣教授

"Microfluidics: From Laboratory Automation to Cellular Self-Organization"
Professor Pak Kin Wong
Department of Aerospace and Mechanical Engineering, The University of Arizona
亞利桑那大學航空航天與機械工程系黃百健教授

"Quantum Dots-Enabled Highly Sensitive Detection of Epigenetic Cancer Markers in Clinical Samples"
Professor Jeff Tza-Huei Wang
Departments of Mechanical Engineering, Biomedical Engineering and Oncology, Johns Hopkins University
約翰霍普金斯大學機械工程系與生物醫學工程系王澤輝教授

August 18th (Thursday) 9:50 am - 11:10 am : Technical Session D1-W3-T1: (Room: MD-G125)
C4I (1): Broadband Technologies and Multimedia Services, Cloud Computing and Cyber Security
Chair: **Professor Wen-Chieh (Steve) Lin**, National Chiao Tung University
交通大學林文杰教授

"CloudSense: Continuous Fine-Grain Cloud Monitoring with Compressive Sensing"
Mr. Chit-Kwan Lin
Ph.D. Candidate in Computer Science, School of Engineering and Applied Sciences, Harvard University
哈佛大學練哲軍

"Anomaly Detection in Online Reputation Systems"
Professor Yan (Lindsay) Sun
Department of Electrical, Computer and Biomedical Engineering, University of Rhode Island
罗德岛大学孙琰教授

"From Information Retrieval to Active Media"
Dr. Trista P. Chen
Gracenote Inc.
陳佩君博士

August 18th (Thursday) 11:10 am - 11:25 am : Break (Room: MD-G123)

Parallel Sessions:

August 18th (Thursday) 11:25 am – 12:45 pm : Technical Session D1-W1-T2: (Room: MD-G135)
Medicine/Public Health/Biotechnology/Bioinformatics (2)
Chair: **Dr. Wen-Hui Lien**, Rockefeller University
洛克菲勒大學連文慧博士

"Cell Cycle-dependent Regulation of FoxM1 Activity by Phosphorylation"
Dr. Yi-Ju Chen
Postdoctoral Fellow, Department of Medicine, Abramson Family Cancer Research Institute, University of Pennsylvania
賓州大學陳怡如博士

"Integrins Traffic Rapidly via Circular Dorsal Ruffles and Macropinocytosis during Stimulated Cell Migration"
Dr. Zhizhan Gu
Postdoctoral Research Fellow, Division of Rheumatology, Immunology and Allergy, Department of Medicine, Brigham and Women's Hospital, Harvard Medical School
哈佛醫學院顧智湛博士

"Proteomic Assessment of a Cell Model of Spinal Muscular Atrophy"
Dr. Chia-Yen Wu
Department of Biological Sciences, University of Delaware
德拉瓦大學吳佳燕博士

"Toward the Treatment of Human Genetic Disorders"
Dr. Peng-Chieh Jessica Chen
Postdoctoral Fellow, Brigham & Women's Hospital, Harvard Medical School
哈佛醫學院陳芃潔博士

"Genome-Wide Maps of Histone Modifications in the Hair Follicle Lineages"
Dr. Wen-Hui Lien
Postdoctoral Fellow, Laboratory of Mammalian Cell Biology and Development, The Rockefeller University
洛克菲勒大學連文慧博士

August 18th (Thursday) 11:25 am – 12:45 pm : Technical Session D1-W2-T2: (Room: MD-G119)
New Materials Science and Engineering, Nanotechnology (2)
Chair: **Professor Bingqing Wei**, University of Delaware
德拉瓦大學魏秉庆教授

"In-situ Transmission Electron Microscopy Studies on Nanowire Growth"
Professor Cheng-Yen Wen
Department of Materials Science and Engineering, National Taiwan University
臺灣大學材料科學與工程學系溫政彥教授

"Strength of Nanofiber Reinforced Composites"
Professor Quanfang Chen
Department of Mechanical, Materials and Aerospace Engineering, University of Central Florida

中佛州大学機械材料與航太工程學系陳教授

"Carbon-based 2D Materials, Structures and their Applications"
Dr. Robert Vajtai
Faculty Fellow, Department of Mechanical Engineering & Materials Science, Rice University

"CNT Supercapacitor Based Efficient Energy Management for Autonomous Wireless Sensor Nodes"
Professor Dongsheng Brian Ma
TxACE Chair Professor and Thrust Leader in Energy Efficiency, Texas Analog Center of Excellence (TxACE), The University of Texas at Dallas
德州大学达拉斯分校**电**机工程系**马东**升教授

August 18th (Thursday) 11:25 am – 12:45 pm : Technical Session D1-W3-T2: (Room: MD-G125)
C4I (2): Multimedia Services, Visualization and Web Technologies
Chair: **Dr. Trista P. Chen**, Gracenote Inc.
陳佩君博士

"Web Page Readability Enhancement"
Mr. Chen-Hsiang (Jones) Yu
Ph.D. Candidate in EECS, Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology
麻省理工學院電機工程與資訊科學系余禎祥

"iPOEM: A GPS Tool for Integrated Management in Virtualized Data Centers"
Professor Ya-Yunn Su
Department of Computer Science & Information Engineering, National Taiwan University
臺灣大學資訊工程學系蘇雅韻教授

"Active Learning for Interactive 3D Scene Reconstruction"
Dr. Yao-Jen (Kevin) Chang
Research Associate, Advanced Multimedia Processing (AMP) Lab, School of Electrical and Computer Engineering, Cornell University
康乃爾大學電機**暨**電腦工程學院張耀仁博士

August 18th (Thursday) 12:45 pm - 2:15 pm : Lunch (On Your Own)

August 18th (Thursday) 2:15 pm - 3:15 pm: Keynote Panel Discussion: (Room: MD-G115)
New Green Energy, Environment, and Sustainability
Moderator: **Dr. Lin-wen Hu**, Massachusetts Institute of Technology
麻省理工學院胡玲文博士

Professor Gang Chen
Carl Richard Soderberg Professor of Power Engineering, Director, Pappalardo Micro and Nano Engineering Laboratories, Director, DOE EFRC: Solid-State Solar-Thermal Energy Conversion Center, Massachusetts Institute of Technology
麻省理工学院机械工程系美国国家工程院院士陈刚教授

Dr. Lin-wen Hu
Associate Director & Principal Research Scientist, Nuclear Reactor Laboratory (NRL), Massachusetts

Institute of Technology
麻省理工學院核子反應爐實驗室副主任胡玲文博士

Parallel Sessions:

August 18th (Thursday) 3:15 pm – 4:35 pm : Technical Session D1-W1-T3: (Room: MD-G135)
Medicine/Public Health/Biotechnology/Bioinformatics (3)
Chair: **Dr. Huai-Kuang Tsai**, Academia Sinica
中央研究院蔡懷寬博士

"Characterization of Transcription Factor and MicroRNA Regulatory Networks Involved in Myelination"
Dr. Li-Wei Chang
Research Instructor, Department of Pathology and Immunology, Washington University in St. Louis
聖路易華盛頓大學章立維博士

"Integrating Bioinformatics Technologies with Biomedical Research by Collaborative Consulting Model"
Dr. Yaoyu E. Wang
Bioinformatics Analyst, Center for Cancer Computational Biology, Dana-Farber Cancer Institute
波士頓達納法伯癌症研究所王耀煜博士

"Precise Mapping for Bisulfite Sequencing in Generating DNA Methylation Profiles"
Dr. Pao-Yang Chen
Postdoctoral Fellow, Department of Molecular Cell and Developmental Biology, University of California at Los Angeles
加州大學洛杉磯分校陳柏仰博士

August 18th (Thursday) 3:15 pm – 4:35 pm : Technical Session D1-W2-T3: (Room: MD-G119)
New Materials Science and Engineering, Nanotechnology (3)
Chair: **Professor Jung-Tsung Shen**, Washington University in St. Louis
聖路易華盛頓大學沈榮聰博士

"Nanophotonic Emitters for Future Communication, Energy, and Health Care"
Professor Pei-Cheng Ku
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

"Organic and Inorganic Nanocrystal Thin Film Solar Cells"
Dr. Hsiang-Yu Chen
Postdoctoral Fellow, National Renwable Energy Laboratory, The U.S. Department of Energy
美國國家可再生能源實驗室陳香妤博士

"Electromechanical Stability of Nanocrystalline Silicon Thin Film Transistors Made on Colorless Polyimide Foil Substrates"
Professor I-Chun Cheng
Graduate Institute of Photonics and Optoelectronics, Department of Electrical Engineering, National Taiwan University
臺灣大學電機工程學系陳奕君教授

"Nanostructured Group IV Elements for Energy Storage"
Professor Bingqing Wei
Associate Professor, Department of Mechanical Engineering, University of Delaware
德拉瓦大學機械工程系魏秉庆教授

August 18th (Thursday) 3:15 pm – 4:35 pm : Technical Session D1-W3-T3: (Room: MD-G125)
C4I (3): Broadband Technologies, Cloud Computing, Supercomputing and Smart Home
Chair: **Dr. Jia-Yu (Tim) Pan**, Google U.S.A.
美國谷歌公司潘家煜博士

"Compressive Bidding for Wireless LAN Medium Access Control"
Mr. Tsung-Han Lin
Ph.D. Candidate in Computer Science, School of Engineering and Applied Sciences, Harvard University
哈佛大學林宗翰

"Make the Web Faster Through Cloud Routing"
Mr. Coach Wei
CEO, Yottaa Inc

"Human Centered Software Design for Multi-Modal Sensing Smart House"
Dr. Hen-I Yang
Smart Home Laboratory, Department of Computer Science, Iowa State University
愛何華州立大學楊博士

"Current Status and Trend in Supercomputing"
Dr. Charng-Da Lu
The Center for Computational Research, The State University of New York at Buffalo
纽约州立大學水牛城分校呂長達博士

August 18th (Thursday) 4:35 pm – 4:50 pm : Break (Room: MD-G123)

Parallel Sessions:

August 18th (Thursday) 4:50 pm – 6:10 pm : Technical Session D1-W1-T4: (Room: MD-G135)
Medicine/Public Health/Biotechnology/Bioinformatics (4)
Chair: **Dr. Yi-Hsiang (Sean) Hsu**, Harvard University
哈佛大學許益祥博士

"Gene Set Testing, Stem Cells and Breast Cancer"
Dr. Di Wu
Postdoctoral Research Fellow, Department of Statistics, Harvard University
哈佛大學博士

"Medical Genetics: Using Pedigrees to Characterize the Founder Structure of a Closed Population"
Dr. Woei-Jyh (Adam) Lee
Fellow, National Institute of Health
美國國家衛生院李偉智博士

"Using Modeling and Simulation on Personalized Medical Decision Support and Comparative Effectiveness Research"
Dr. Chih-Lin Chi
Postdoctoral Research Associate, Laboratory for Personalized Medicine, Center for Biomedical Informatics, Harvard Medical School
哈佛醫學院紀志霖博士

"Energy Restriction as an Antitumor Target of Thiazolidinediones"
Dr. Shuo Dennis Wei
Postdoctoral Research Fellow, Department of Medicine, Beth Israel Deaconess Medical Center, Harvard Medical School
哈佛醫學院魏碩博士

"Local Raster Scanning with Atomic Force Microscopy and its Application in Biology and Drug Development"
Peter I-Tsyuen Chang
Ph.D. Candidate in Mechanical Engineering, School of Engineering, Boston University
波士頓大學機械系張以全

August 18th (Thursday) 4:50 pm – 6:10 pm : Technical Session D1-W2-T4: (Room: MD-G119)
New Materials Science and Engineering, Nanotechnology (4)
Chair: **Professor Yu-Bin Chen**, National Cheng Kung University
成功大學陳玉彬教授

"Ultra-low-power Nonlinear Optical Devices"
Professor Jung-Tsung Shen
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

"Optimization of Nano-Structures Embedded in Glass Windows for Energy-Saving"
Professor Yu-Bin Chen
Assistant Professor, Department of Mechanical Engineering, National Cheng Kung University
成功大學機械工程學系陳玉彬教授

""
Professor Hong Yang
Department of Chemical Engineering, University of Rochester
羅徹斯特大學楊教授

August 18th (Thursday) 4:50 pm – 6:10 pm : Technical Session D1-W3-T4: (Room: MD-G125)
C4I (4): Broadband Technologies and Multimedia Services, Cloud Computing and Cyber Security
Chair: **Mr. Tsung-Han Lin**, Harvard University
哈佛大學林宗翰

"A Simple Queueing Network Model of Mobility in a Campus Wireless Network"
Mr. Yung-Chih Chen
Ph.D. Candidate in Computer Engineering, Electrical and Computer Engineering Department, University of Massachusetts Amherst
麻州大學安默斯特分校陳勇志

"Making Virtual More Realistic: from a Computer Graphics Perspective"
Professor Wen-Chieh (Steve) Lin
Department of Computer Science, National Chiao Tung University
交通大學資訊工程學系林文杰教授

"The Goals and Challenges of Click Fraud Penetration Testing Systems"
Dr. Jia-Yu (Tim) Pan
Google U.S.A.
美國谷歌公司潘家煜博士

Taiwan Night:

August 18th (Thursday) 7:00 pm – 9:30 pm : Taiwan Cultural Festival
Film Festival (臺灣新銳電影回顧展)
Film Title: No Puedo Vivir Sin Ti (不能沒有你)
Venue: Carpenter Center, Harvard University (24 Quincy Street, Cambridge, MA 02138)
Organizer: **Mr. Steven Lai**, Director, Press Division, Taipei Economic and Cultural Office in Boston
駐波士頓臺北經濟文化辦事處賴水池組長

Friday, August 19, 2011 : New Media & Creative Industries

August 19th (Friday) 8:30 am - 6:00 pm : Registration (Room: MD-G123)

August 19th (Friday) 9:00 am - 9:50 am : Opening Speech (Room: MD-G115)
Chair: **Professor Lin-shan Lee**, National Taiwan University
臺灣大學李琳山教授

Professor Lin-shan Lee
Dean, College of Electrical Engineering and Computer Science, National Taiwan University
臺灣大學電機資訊學院李琳山院長

Opening Keynote:

"Cultural Creative Industries v.s. National Palace Museum"
Dr. Kung-Shin Chou
Director, National Palace Museum, Republic of China (Taiwan)
國立故宮博物院院長周功鑫博士

August 19th (Friday) 9:50 am - 11:10 am : Plenary Session 1: (Room: MD-G115)
New Media, Culture and Technology
Chair: **Professor C.–C. Jay Kuo**, University of Southern California
南加州大學郭宗杰教授

"World Culture and Heritage is One-click Away!
Have We Fully Explored the Potentials of New Media and Technology?"
Professor Ching-chih Chen
President, Global Connection and Collaboration, Inc.
全球連結與合作董事長陳劉欽智教授

Professor Emeritus of Simmons College
美國波士頓西蒙斯學院榮譽教授

"How an Art Museum Develops its Cultural Creative Applications and Services"
Professor Yung-Cheng Hsieh
Dean, Office of Research and Development, National Taiwan University of Arts
臺灣藝術大學研究發展處研發長謝顒丞教授

August 19th (Friday) 11:10 am - 11:25 am : Break (Room: MD-G123)

August 19th (Friday) 11:25 am – 12:45 pm : Plenary Session 2: (Room: MD-G115)
New Media, Entertainment Technology and Culture
Chair: **Professor Yung-Cheng Hsieh**, National Taiwan University of Arts
臺灣藝術大學謝顒丞教授

"Paradigm Shifts in Modern ICT Era and Future Trends"
Professor C.–C. Jay Kuo
Director of the Signal and Image Processing Institute (SIPI) and Department of Electrical Engineering and Computer Science, University of Southern California
南加州大學電機系郭宗杰教授

"Melodic Variations: Toward Cross-Cultural Transformation"
Ms. Cheng-Zhi (Anna) Huang
Ph.D. Candidate in Computer Science, School of Engineering and Applied Sciences, Harvard University
哈佛大學黃成之

August 19th (Friday) 12:45 pm - 2:15 pm : Lunch (On Your Own)

August 19th (Friday) 2:15 pm - 3:15 pm: Keynote Speech (Room: MD-G115)
Moderator: **Professor Lin-shan Lee**, National Taiwan University
臺灣大學李琳山教授

"The Art of Tangible Bits"
Professor Hiroshi Ishii
Muriel R. Cooper Professor of Media Arts and Sciences, Associate Director of MIT Media Laboratory, Head of Tangible Media Group, Media Lab, Massachusetts Institute of Technology

August 19th (Friday) 3:15 pm – 4:35 pm : Plenary Session 3: (Room: MD-G115)
Creative Design, Digital Humanities
Chair: **Professor Yung-Cheng Hsieh**, National Taiwan University of Arts
臺灣藝術大學謝顒丞教授

"World Heritage for Digital Humanities: Sights in Creative Panophotography and Domoscopy"
Mr. Tito Dupret
Hypermedia Director of Patrimonium-mundi.org, Université Laval, Québec, Canada

"From Digital Archives to Digital Humanities"
Professor Jieh Hsiang
Distinguished Professor in Computer Science, Director, Research Center for Digital Humanities, National Taiwan University

臺灣大學數位典藏中心主任**暨**資訊工程系特聘教授項潔教授

August 19th (Friday) 4:35 pm – 4:50 pm : Break (Room: MD-G123)

August 19th (Friday) 4:50 pm – 6:10 pm : Plenary Session 4: (Room: MD-G115)
Future Development
Chair: **Professor Ching-chih Chen**, Global Connection and Collaboration & Simmons College
全球連結與合作**暨**西蒙斯學院陳劉欽智教授

Part A: 4:50 pm – 5:30 pm

"Towards Understanding the Ecology of Art History"
Dr. Maximilian Schich
DFG Visiting Research Scientist from Germany & CCNR, Northeastern University

Part B: 5:30 pm - 6:10 pm: Open Discussions and Q&A

Professor Ching-chih Chen, Global Connection and Collaboration & Simmons College
全球連結與合作**暨**西蒙斯學院陳劉欽智教授
Dr. Kung-Shin Chou, National Palace Museum, Republic of China (Taiwan)
國立故宮博物院周功鑫院長
Mr. Tito Dupret, Université Laval, Québec, Canada
Professor Jieh Hsiang, National Taiwan University
臺灣大學項潔教授
Professor Yung-Cheng Hsieh, National Taiwan University of Arts
臺灣藝術大學謝顒丞教授
Professor Hiroshi Ishii, Massachusetts Institute of Technology
Professor C.–C. Jay Kuo, University of Southern California
南加州大學郭宗杰教授
Professor Lin-shan Lee, National Taiwan University
臺灣大學李琳山教授
Dr. Maximilian Schich, Northeastern University

Abstracts and Biographies

Thursday August 18th Opening Speech

Session Organizer & Chair

Dr. Yi-Hsiang (Sean) Hsu (哈佛醫學院許益祥教授)

Harvard University

BIOGRAPHY

Dr. Yi-Hsiang Hsu is an Assistant Professor in Medicine, Harvard Medical School, Beth Israel Deaconess Medical Center and Hebrew SeniorLife Institute for Aging Research. He also directs the High Performance Computing System Lab at Institute for Aging Research. Dr. Hsu is a statistical geneticist who has extensive experience with the genetic fields using genome-wide association approach (GWAS), linkage and candidate gene association methods to find genes associated with musculoskeletal disorders, osteoporosis, cancers, type 2 diabetes and drug response of blood pressure to hypertensive medications. Dr. Hsu also involved in the statistical method development for GWAS, such as multivariate GWAS methods and to study the pleiotropic effects on skeletal and energy metabolisms. Dr. Hsu has experience using systems biology approaches to integrate GWAS, genomics, trascriptomics, proteomics and metabolomics resources for better understanding relationships between the biological components that work together to drive a complex pathophysiological process of common diseases across signal pathways, organisms and even species on a global scale.

Thursday August 18th Opening Speech

Ms. Anne Hung (駐波士頓臺北經濟文化辦事處洪慧珠處長)

Director General
Taipei Economic and Cultural Office in Boston
99 Summer Street, Suite 801, Boston, MA 02110
Tel.: (617) 737-2050, Fax: (617) 737-1260
Email: tecob@tecoboston.org
Website: http://www.tecoboston.org/

BIOGRAPHY

Thursday August 18th Opening Keynote

Academia Sinica and The National Research Program for Biopharmaceuticals (NRPB) – the role in biotechnological development of Taiwan

Andrew H.-J. Wang (中央研究院副院長王惠鈞院士)

Vice President, Academia Sinic
Republic of China (Taiwan)

ABSTRACT

The Government of Taiwan launched "**Diamond Action Plan for Biotech Takeoff**" in 2008 to promote biotechnology development and the associated industries in Taiwan, aiming at making Taiwan a significant bio-medical and pharmaceutical partner and collaborator in the Asian regions. The Action Plan has four main themes: (1) strengthening the pre-clinical and early clinical development in the biotech industrial value chain, (2) establishing a biotechnology venture capital fund (BVC), (3) promoting an integrated biotech business incubation mechanism, and (4) setting up the Taiwan Food and Drug Administration (TFDA). To facilitate the first objective, a six-year program titled as "**National Research Program for Biopharmaceuticals (NRPB)**" has been initiated in this year.

The vision of NRPB is to develop new therapeutics and applications for disease prevention, diagnosis, and treatment, through strengthening the "second runner" part of the biotech value chain, namely **value identification** through research discoveries to **value creation involving** early or Phase I/II Clinical stage, in order to realize commercialization of research discoveries.
In this talk, I will discuss the objectives of NRPB and the role of Academia Sinica in the biotechnology development in Taiwan.

BIOGRAPHY

Prof. Andrew H.-J. Wang was educated in Taiwan with B.S. (1967) and M.S. (1970) degrees, both from the Department of Chemistry, National Taiwan University. He obtained the Ph.D. degree from the Department of Chemistry, University of Illinois in 1974. He was Professor of Biochemistry, Biophysics and Chemistry at the University of Illinois (Urbana), during 1988-2000. Dr. Wang is currently Vice President of Academia Sinica and Distinguished Research Fellow of the Institute of Biological Chemistry, Academia Sinica, Taipei. He is an outstanding research scholar, as evidenced by over 400 of his papers that have appeared in top journals of the field. Dr. Wang has also actively been involved in the advancement of sciences. He served as Editor for *European J. Biochem*., on Advisory Board of *Nucleic Acids Research*. He is Council Member of Human Proteomics Organization (HUPO). As the President of three societies (Taiwan Society of Biochemistry and Molecular Biology till 2004 (a member of IUBMB), Biophysical Society of ROC (a member of IUPAB) and Taiwan Proteomics Society (a member of AOHUPO)), he has successfully organized several major international conferences in Taipei. Dr. Wang's numerous achievements were recognized by his election as Academician of Academia Sinica (Taiwan), Fellow of American Association for the Advancement of Science, Fellow of Third World Academy of Sciences and

President of FAOBMB, etc. His research interests include structural proteomics, drug discovery, synchrotron crystallography, structure-function relationship of enzymes and DNA.

Technical Session D1-W1-T1: Medicine/Public Health/Biotechnology/Bioinformatics (1)

Session Organizer & Chair

Li-San Wang(賓州大學醫學院王立三教授)

Assistant Professor of Pathology and Laboratory Medicine
Institute on Aging / Penn Center for Bioinformatics
University of Pennsylvania
Email: lswang@mail.med.upenn.edu

BIOGRAPHY

Li-San Wang received his B.S. (1994) and M.S. (1996) in Electrical Engineering from the National Taiwan University. He received his M.S. (2000) and Ph.D. (2003) from the University of Texas at Austin, both in Computer Sciences, and was a postdoctoral fellow at the University of Pennsylvania between 2003 and 2006. Currently he is an Assistant Professor of Pathology and Laboratory Medicine, a faculty member of Penn Center for Bioinfomatics, and a fellow of Institute on Aging and Penn Genome Frontiers Institute, University of Pennsylvania. Dr. Wang's research interests include comparative genomics, biology of aging, and genetics and genomics of neurodegeneration. He has authored more than forty peer-reviewed book chapters and journals on computational biology, gneomics, genetics, and bioinformatics, and served on the program and organizing committees of several international workshops and conferences.

Technical Session D1-W1-T1: Medicine/Public Health/Biotechnology/Bioinformatics (1)

Discovering the genetics cause of disease and new mitochondrial biology with MitoExome Sequencing

Steve Hershman

PhD student, MGH, Harvard Systems Biology
Address: Boston, MA, USA
Email: hershman@gmail.com

ABSTRACT

Disorders of mitochondrial oxidative phosphorylation (OXPHOS) are the most common inborn error of metabolism. These devastating disorders are difficult to diagnose because they are clinically heterogeneous and genetically can arise from mutations in the mitochondrial genome (mtDNA) or potentially in any of ~1000 nuclear genes encoding the mitochondrial proteome. Advances in sequencing technology now enable systematic gene sequencing to aid in clinical diagnosis. We developed a targeted DNA capture and next-generation sequencing method to detect variants within the mtDNA and exons of 1034 nuclear genes encoding mitochondrial proteins. We first applied 'MitoExome' sequencing to 40 unrelated patients withclinical and biochemical evidence of severe OXPHOS disease. 22 patients (55%) harbored rare, protein-modifying variants compatible with a recessive mode of pathogenesis, representing a 4.8-fold enrichment over the background rate. Molecular diagnoses in known disease genes were made for 8 of these patients.

A novel link between mtDNA depletion and the acylglycerol kinase (AGK) gene was suggested by mutations in two unrelated patients. For the remaining 12 patients, 16 genes were prioritized but await additional proof of pathogenicity. In an additional 2 patients, we have found mutations in the mitochondrial methionyl-tRNA formyltransferase, a gene involved in mitochondrial translation initiation. Fibroblasts from these patients exhibit dramatically reduced fMet-tRNAMet and severe defects in mitochondrial translation that can be rescued by exogenous expression of MTFMT. Furthermore, analysis of the N-termini of mitochondrial translated peptides provides the first evidence of human translation in the absence of formylation. Our findings demonstrate that MTFMT is essential for efficient human mitochondrial translation and reveal a human disorder of Met-tRNAMet formylation.

BIOGRAPHY

Steve Hershman received his B.A. (Biochemistry), M.S. (Chemistry) and M.S.E. (Computer Science) from the University of Pennsylvania in 2008. He is currently a Ph.D. student in Harvard's Systems Biology working in the Mootha Lab where he studies the application of next-generation sequencing to mitochondrial disease.

Technical Session D1-W1-T1: Medicine/Public Health/Biotechnology/Bioinformatics (1)

Integrative Network Analysis of Multimodal Genomic Microarrays

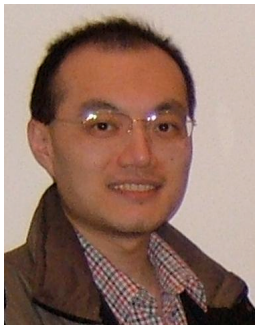
Hsun-Hsien Chang (哈佛醫學院張洵銑博士)

Research Associate, Children's Hospital Informatics Program, Harvard Medical School
300 Longwood Ave, Enders 144, Boston, MA 02115
Email: hsun-hsien.chang@childrens.harvard.edu

ABSTRACT

A long-term goal of biomedical research is to decipher how genetic processes influence disease formation. Ubiquitous and advancing microarray technology can measure millions of DNA structural variants (single-nucleotide polymorphisms, or SNPs) and thousands of gene transcripts (RNA expression microarrays) in cells. All of these information modalities can be brought to bear on disease etiology. This talk develops a Bayesian network-based approach to integrate multimodal (e.g., SNP and expression) microarray data. The network models molecular interactions using a phenotype-centric network. Inferring the network consists of two steps: variable selection and distributed network learning. The learned network illustrates how functionally dependent biomolecules influence each other, and also serves as a predictor of the phenotype. The application of the proposed method to a pediatric acute lymphoblastic leukemia dataset demonstrates the feasibility of our approach and its impact on biological investigation and clinical practice.

BIOGRAPHY



Hsun-Hsien Chang received BS in electrical engineering (1998) from National Tsing Hua University, Hsinchu, Taiwan, MBA (2000) from National Chengchi University, Taipei, Taiwan, and PhD in computer engineering (2007) from Carnegie Mellon University, Pittsburgh, PA, USA. Since 2007, he has been a Research Fellow in Children's Hospital Informatics Program, Harvard-MIT Division of Health Sciences and Technology, Harvard Medical School. His research interests are in the general area of statistical signal processing and machine learning with applications in biomedical imaging and biomedical informatics.

Dr. Chang is a member of the Bio Imaging and Signal Processing Technical Committee, IEEE Signal Processing Society. He was on the program committee of 2009 GENSIPS, 2010 BIBM and 2010 SiPS. He was honored a government scholar by the Ministry of Education, Taiwan (2002-2005). He received a junior
investigator award in 2004 ISBI and 2007 SSP, and an outstanding paper award in 2009 and 2010 American Medical Informatics Association (AMIA) Summit on Translational Bioinformatics. He is a member of IEEE, Sigma Xi, and AMIA.

Technical Session D1-W1-T1:Medicine/Public Health/Biotechnology/Bioinformatics (1)

Bioinformatics and Genomics for Aging and Neurodegeneration

Kajia Cao (賓州大學曹卡佳博士) Ph.D.

Research Associate, Department of Cell Development and Biology
1038 BRB II/III, 421 Guardian Drive, Philadelphia, PA19104
Email: kajiacao@mail.med.upenn.edu

ABSTRACT

Human brain aging has received special attention in part because of the elevated risks of neurodegenerative disorders such as Alzheimer's disease in seniors. Recent technological advances enable us to investigate whether similar mechanisms underlie aging and neurodegeneration, by quantifying the similarities and differences in their genome-wide gene expression profiles. We have developed a computational method for assessing an individual's "physiological brain age" by comparing global mRNA expression datasets across a range of normal human brain samples. Application of this method to brains samples from select regions in two diseases -- Alzheimer's disease (AD, superior frontal gyrus), frontotemporal lobar degeneration (FTLD, in rostral aspect of frontal cortex ~BA10) -- showed that while control cohorts exhibited no significant difference between physiological and chronological ages, FTLD and AD exhibited prematurely aged expression profiles. Our study establishes a quantitative scale for measuring premature aging in neurodegenerative disease cohorts, and it identifies specific physiological mechanisms common to aging and some forms of neurodegeneration. In addition, accelerated expression profiles associated with AD and FTLD suggest some common mechanisms underlying the risk of developing these diseases.

BIOGRAPHY

Dr. Kajia Cao received the B.E. degree in computer science and engineering (1999) from Southeast University, Nanjing, China, and the M.S. degree in computer science (2003) and Ph.D. in Information Technology (2007) from the University of Nebraska at Omaha, Omaha.

In 2007, she started her postdoctoral research in Dr. Li-San Wang's lab in the Department of Pathology and Laboratory Medicine, Penn Center for Bioinformatics at the University of Pennsylvania. In 2001 April, She joined Shelley Berger's lab in the Department of Cell Development and Biology at UPenn as a research associate. Her research focuses on bioinformatics and genomics for aging and neurodegenerative diseases, computational modeling for microarray analysis, specifically on infant leukemia and lymphoma, analysis of novel genomic functional motifs such as G-quadruplexes, computational epigenetics of human aging and yeast senescence.

Dr. Kajia Cao severed as reviewer in several bioinformatics conferences including International Conference on Bioinformatics and Computational Biology (BICoB), the IEEE International Conference on Bioinformatics and Biomedicine (BIBM), the Workshop on Algorithms in Bioinformatics (WABI), Americas Conference on

Information System (AMCIS) and International Conference on Computational Science (ICCS). She is also serving as reviewer for several computer science and bioinformatics journals including Annals of Operations Research, Applied Soft Computing (ASOC), IEEE Transactions on Information Technology in BioMedicine (TITB), Information Science (INS), International Journal of Information Technology & Decision Making (IJITDM), and International Journal of Data Mining and Bioinformatics (IJDMB) etc. She served as session chair in Americas Conference on Information System (AMCIS 2005) and International Conference on Computational Science (ICCS 2007). She has authored and co-authored 15 journal and conference papers.

Technical Session D1-W1-T1: Medicine/Public Health/Biotechnology/Bioinformatics (1)

MCAB – Multiple Tumor Class Classification using Covariance Among Binary classifiers

Fanny Yuk Yee Leung (賓州大學梁玉儀博士) Ph.D.

Postdoctoral Researcher,
Department of Pathology and Laboratory Medicine
Penn Center for Bioinformatics
Room 1404, Blockley Hall,
423 Guardian Drive, Philadelphia, PA19104
Tel: 1-215-573-3729
Email: yyee@mail.med.upenn.edu

ABSTRACT

Many microarray tumor datasets include patients with different tumor types and subtypes and call for models capable of multi-class classification. Prior work such as Dudoit *et al.* pioneered on comparative multi-class classification studies using simple classifiers including *k*-NN, SVM in a one-versus-one (OVO) manner and vote aggregation using multiple binary classifiers. A different approach by Dietterich and Bakiri is the Error-correcting-output-coding (ECOC). ECOC works by first generating "output codes" as vectors of outcomes from two-class sub-problems. These codes are then decoded to solve the overall multi-class problem using dissimilarity to class-specific codes such as Euclidean distance. Neither the aggregation approach nor ECOC utilize potential correlations among binary classifiers.

We present a new multi-class classification framework called MCAB (Multiple tumor class classification using Covariance Among Binary classifiers). Our method improves upon the ECOC approach by incorporating covariance information among binary classifiers. MCAB uses *hybrid* gene selection based on the accuracy of SVM or other binary classifiers for two-class sub-problems to identify informative genes. ECOC estimates the covariance matrix among outcomes from the binary classifiers, and uses Mahalanobis distance for decoding. MCAB implements a down-sampling strategy when the number of samples in different classes vary substantially.

We compared MCAB with eight other methods on four published multi-class cancer gene expression microarray datasets. We found that MCAB has better classification accuracy than most of these methods, and selects smaller gene sets with higher significance by Ingenuity Pathway Analysis. Furthermore, leave-class-out experiment showed that MCAB improves the accuracy of binary classification sub-problems when incorporating samples from classes other than the two classes being studied in a multi-class setting.

Our study shows by incorporating covariance among binary classifiers, MCAB achieves better multi-class classification accuracy and identifies gene expression signatures that are robust, specific, and reproducible for tumor classification. The study also points out the intriguing possibility in leveraging samples from other classes to improve classification accuracy through multi-class classification. Further research on multi-class classification problems will be required to better understand its implication and potential.

BIOGRAPHY

Fanny Yuk Yee Leung received the BEng degree in Medical Engineering from the University of Hong Kong in 2005. She obtained her PhD degree in the Department of Electrical and Electronic Engineering at the same university in 2009, under the supervision of Prof Y.S. Hung. In 2010, she started her postdoctoral research in Li-San Wang's lab in the Department of Pathology and Laboratory Medicine, Penn Center for Bioinformatics at the University of Pennsylvania.

Dr. Leung completed all her studies in Hong Kong. During her undergraduate study, she finished her final year project on unsupervised clustering in microarray data. Besides, she spent her summers as an intern in two different labs. In 2004, in Bio-cancer Treatment International Limited, a biotech company developing an anti-liver cancer drug, she helped to study drugs' effects on nude mice models, both in *vitro* and in *vivo*. In 2005, in the Department of Surgery at The University of Hong Kong Li Ka Shing Faculty of Medicine, she helped to run proteomics experiments on rats affected by liver cancers. There are places where she developed most of her wet laboratory skills.

Dr. Leung then pursued her PhD study focusing on different aspects of microarray data analyses, including studying the effects of pre-processing steps, developing a new clustering algorithm, finding stable gene sets, detecting outliers, and developing better classification models for microarray datasets. Her thesis entitled 'An Integrated Framework for Feature Selection and Classification in Microarray Data Analysis' is a three-in-one algorithm for outlier detection, feature selection and classification in high-dimensional data. She was a student member of the IEEE Engineering in Medicine and Biology Society (EMBS).

Dr. Leung is currently a postdoctoral researcher at the University of Pennsylvania. Her research focuses on developing machine learning and data mining algorithms for multi-class datasets and next-generation sequencing experiments. She also works closely with clinicians on different biomarker discovery projects. She is interested in neurodegenerative diseases, such as Alzheimer's disease and depression , a psychological disease.

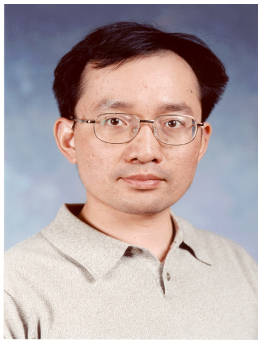
Technical Session D1-W2-T1: New Materials Science and Engineering, Nanotechnology (1)

Session Organizer & Chair

Jeff Tza-Huei Wang (約翰霍普金斯大學機械工程系與生物醫學工程系王澤輝教)

Associate Professor
Mechanical Engineering & Biomedical Engineering Depts.
Sidney Kimmel Comprehensive Cancer Center
Institute of NanoBioTechnology
Johns Hopkins University
108 Latrobe /3400 N. Charles Street
Baltimore, MD 21218
Tel: (410)516-7086
Fax :(410)516-7254
email: thwang@jhu.edu
Web: http://pegasus.me.jhu.edu/~thwang/

BIOGRAPHY



Dr. Wang received his B.S. and M.S. in Mechanical Engineering from National Taiwan University in 1988 and 1994. He served in the R.O.C. military service from 1994 to 1996 and then worked in Taiwan Semiconductor Manufacturing Company (TSMC) from 1996 to 1998. He received his Ph.D. in Mechanical Engineering from University of California, Los Angeles in 2002. After graduation, Dr. Wang joined The Johns Hopkins University as an Assistant Professor in the departments Mechanical Engineering and Biomedical Engineering, and was promoted to Associate Professor in 2006. He has published more than 50 peer-reviewed research manuscripts and filed 4 US patents. Dr. Wang received the NSF CAREER award in 2006, and the Jorge Heller Award for Outstanding Paper from the Control Release Society in 2007. The major research focus of his laboratory involves technology development in microfluidic single-molecule detection and nanobiosensors for molecular and cellular analysis of diseases.

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

Transforming Light and Sound with Metamaterials

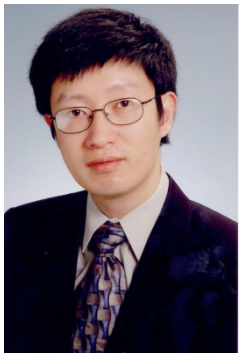
Nicholas X. Fang (麻省理工学院机械工程系方绚莱教授), PhD

Associate Professor
Department of Mechanical Engineering
Massachusetts Institute of Technology

ABSTRACT

Recently, exciting new physics and applications are emerging from metamaterials made of artificial "atoms" and "molecules". These metamaterials has inspired a series of key explorations to manipulate, store and control the flow of energy at unprecedented dimensions. Yet, these ground-breaking achievements are only the tip of the iceberg, where the next-generation metamaterials, incorporating unique topological interactions between waves and matter, are waiting to be discovered.
In this talk, I will discuss our progress of fabrication and characterization of these optical and acoustic metamaterials. We demonstrated, for the first time, focusing and rerouting ultrasound through broadband and highly transparent metamaterials. We also observed a set of localized modes in optical metamaterials, using novel near field optical and electron probes. These novel metamaterials, could be the foundation of broadband photo-absorbers, directional emitters, as well as compact and power-efficient devices in highly parallel optical networks.

BIOGRAPHY



Professor Nicholas X. Fang received his BS and MS in physics from Nanjing University, and his PhD in mechanical engineering from University of California Los Angeles. He arrived at MIT earlier this year as an associate professor in MechE. Prior to MIT, he worked as an assistant professor at the University of Illinois Urbana-Champaign. Professor Fang's areas of research look at nanophotonics and 3D nanomanufacturing. He is an invited participant of the Frontiers of Engineering Conference by National Academies in 2010, a recipient of the NSF CAREER Award (2009), the Society of Manufacturing Engineering Outstanding Young Investigator Award (2009); MIT Technology Review Magazine's 35 Young Innovators Award (2008); and the ASME Pi Tau Sigma Gold Medal Award (2006).

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

Acoustic Tweezers: Patterning, Focusing, and Separating cells and Microparticles using Standing Surface Acoustic Waves (SSAW)

Tony Jun Huang (宾州州立大学黄竣教授)

Associate Professor
Department of Engineering Science and Mechanics
The Pennsylvania State University
http://www.esm.psu.edu/huang/

ABSTRACT

The ability to arrange cells and microparticles into desired patterns is critical for numerous biological studies and applications such as microarrays, tissue engineering, and regenerative medicine. Here we summarize our recent progress on a "acoustic tweezers" technique that utilizes standing surface acoustic wave (SSAW) to manipulate cells and microparticles. This technique is capable of manipulating cells and microparticles regardless of shape, size, charge or polarity. Its power intensity, approximately 5×10^5 times lower than that of optical tweezers, compares favorably with those of other active patterning methods. Flow cytometry studies have revealed it to be non-invasive. The aforementioned advantages, along with this technique's simple design and ability to be miniaturized, render the "acoustic tweezers" technique a promising tool for various applications in biology, chemistry, engineering, and materials science.

BIOGRAPHY

Tony Jun Huang is an Associate Professor in the Department of Engineering Science and Mechanics at The Pennsylvania State University. He received his Ph.D. degree in Mechanical and Aerospace Engineering from the University of California, Los Angeles (UCLA) in 2005, and his B.S. and M.S. degrees in Energy and Power Engineering from Xi'an Jiaotong University, Xi'an, China, in 1996 and 1999, respectively. His research is focused on (1) multi-physics of active nanostructures, and (2) multi-physics of micro/nano fluidics and lab-on-a-chip systems. He has authored or coauthored over 130 technical publications and six book chapters in these fields. The journal publications he authored/co-authored has been cited at ISI for over 1100 times. His work has been highlighted as news in the journals *Nature*, *Nature Photonics*, and *Nature Materials*, and reported in *National Science Foundation (USA)* and many public media such as *US News and World Report, Yahoo News, Live Science, Medical News Today, Science Daily, Wired Science, Popular Mechanics, Highlights in*

Chemical Technology, Nanotechnology Now, and *R&D Magazine*. He serves as Vice Chair of the American Society of Mechanical Engineers (ASME) Nanotechnology Council and chair of the ASME Society-Wide Micro/Nano Technology Forum. He has received many awards and honors such as 2005 Outstanding Ph.D. Award from UCLA, 2006 Rustum and Della Roy Innovation in Materials Research Award, 2010 National Institutes of Health (NIH) Director's New Innovator Award, and 2011 Penn State Engineering Alumni Society Outstanding Research Award. More information about him and his research group can be found at www.esm.psu.edu/huang/.

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

Microfluidics: From Laboratory Automation to Cellular Self-Organization

Pak Kin Wong (亞利桑那大學航空航天與機械工程系黃百健教授)

Assistant Professor, The University of Arizona
Aerospace and Mechanical Engineering
PO Box 210119, Tucson AZ 85721-00119
Tel: +1-520-626-2215, Fax: +1-520-621-8191
Email: pak@email.arizona.edu

ABSTRACT

Microfluidics has been touted as the transformative, translational technology for molecular diagnostics, drug discovery, and other laboratory automation applications. Despite of the fact that intensive efforts have been devoted into the field in the past decade, transition of microfluidics from research laboratories into biological and clinical domains remains an elusive goal. This is due to several fundamental obstacles including the requirement of labor-intensive sample preparation procedures in most biological assays, the ineffectiveness of many standard sample preparation techniques at the microscale, the necessity of cumbersome supporting equipments, and most significantly, system integration of the different sample preparation modules into a single platform, which often requires distinct fabrication processes for different components. With a unique universal electrode array that is capable of electrokinetic sample preparation, electrical impedance analysis, and electrochemical sensing simultaneously, we are developing a microfluidic bioprocessor for fully automated biomedical analysis. In particular, we will present our on-going effect of using the bioprocessor for laboratory automation applications including phenotypic antimicrobial susceptibility testing and genotypic identification of infectious agents.

BIOGRAPHY

Dr. Wong is an Assistant Professor in the Department of Aerospace and Mechanical Engineering, Biomedical Engineering IDP, and Bio5 Institute at the University of Arizona. He received his Ph.D. in Mechanical Engineering from the University of California, Los Angeles in 2005. He is an editor in the *IEEE Nanotechnology Magazine* and serves on the editorial board of the Journal of Association for Laboratory Automation. His research interests include electrokinetic techniques for point-of-care diagnostics, stochastic search algorithms for drug cocktail screening, and mechanoregulation of tissue morphogenesis. Dr. Wong received the NIH Director's New Innovator Award in 2010.

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

Quantum Dots-Enabled Highly Sensitive Detection of Epigenetic Cancer Markers in Clinical Samples

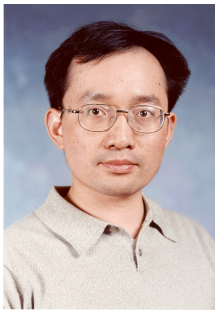
Jeff Tza-Huei Wang (約翰霍普金斯大學機械工程系與生物醫學工程系王澤輝教)

Associate Professor
Mechanical Engineering & Biomedical Engineering Depts.
Sidney Kimmel Comprehensive Cancer Center
Institute of NanoBioTechnology
Johns Hopkins University
108 Latrobe /3400 N. Charles Street
Baltimore, MD 21218
Tel: (410)516-7086
email: thwang@jhu.edu
Web: http://pegasus.me.jhu.edu/~thwang/

ABSTRACT

The unique photophysical properties of semiconductor quantum dots (QDs) have made them ideal for use as spectral labels and luminescent probes. In recent years, there have been several QD applications that utilize these nanocrystals as scaffolds and active participants in biosensing, wherein biological specificity within hybrid inorganic/organic assemblies results in capture and detection of molecular disease markers. The high surface area to volume ratio, and well-documented conjugation chemistries for QDs allow attachment of biomolecular probes, thus transforming the nanocrsytals into scaffolds for molecular interactions. QDs also make excellent donors to pair with organic dyes in the fluorescence resonance energy transfer (FRET) process due to the features of narrow emission spectra and small Stokes shift. This enables FRET with minimal direct acceptor excitation and donor-acceptor crosstalk, thereby permitting the design of FRET molecular sensors with extremely low intrinsic fluorescence backgrounds necessary for detecting biomolecular targets at low abundance. We have demonstrated the use of QDs in developing molecular assays for detecting biomarkers at both the genetic and epigenetic levels. A point mutation assay is developed by incorporating QDs into DNA ligation reactions, facilitating highly sensitive and specific mutation detection in a simplified homogeneous format. This mutation nanoassay has been exemplified with detection of Kras point mutations in clinical samples from patients with ovarian serous borderline tumors (SBTs). In addition, a DNA methylation assay called MS-qFRET is developed based on the above QD-FRET technique. This approach detects as little as 15 pg of methylated DNA in the presence of a 10,000-fold excess of unmethylated alleles and allows for multiplexed analyses. The high sensitivity of MS-qFRET enables one-step detection of methylation at ASC/TMS-1 gene in patient sputum samples that contain low concentrations of methylated DNA, which normally would require a nested PCR approach. The direct application of QD nanoassays on clinical samples offers great promise for its translational use in early cancer diagnosis, prognostic assessment of tumor behavior, as well as monitoring response to therapeutic agents.

BIOGRAPHY



Dr. Wang received his B.S. and M.S. in Mechanical Engineering from National Taiwan University in 1988 and 1994. He served in the R.O.C. military service from 1994 to 1996 and then worked in Taiwan Semiconductor Manufacturing Company (TSMC) from 1996 to 1998. He received his Ph.D. in Mechanical Engineering from University of California, Los Angeles in 2002. After graduation, Dr. Wang joined The Johns Hopkins University as an Assistant Professor in the departments Mechanical Engineering and Biomedical Engineering, and was promoted to Associate Professor in 2006. He has published more than 50 peer-reviewed research manuscripts and filed 4 US patents. Dr. Wang received the NSF CAREER award in 2006, and the Jorge Heller Award for Outstanding Paper from the Control Release Society in 2007. The major research focus of his laboratory involves technology development in microfluidic single-molecule detection and nanobiosensors for molecular and cellular analysis of diseases.

Technical Session D1-W3-T1: C4I(1): Broadband Technologies and Multimedia Services, Cloud Computing and Cyber Security

Session Organizer & Chair

Wen-Chieh Lin (交通大學資訊工程學系林文杰教授)

Assistant Professor, National Chiao Tung University
Hsinchu City, Taiwan
Email: wclin@cs.nctu.edu.tw

BIOGRAPHY

Wen-Chieh Lin received the BS and MS degrees in control engineering from National Chiao Tung University, Hsinchu, Taiwan, in 1994 and 1996, respectively, and the PhD degree in robotics from Carnegie Mellon University, Pittsburgh, in 2005. Since 2006, he has been with the Department of Computer Science, National Chiao Tung University, as an assistant professor. Dr. Lin's research interests include computer graphics, computer animation, and computer vision. In recent years, he works on near-regular texture analysis and manipulation, real-time translucent rendering, texture-based non-photorealistic rendering, optimized parameterization for bidirectional texture function modeling, physics-based character animation, and perception-based graphics. Some of his current research projects include attention-based high dynamic range imaging, visual saliency modeling for textures, generating rising up motions, and balance control for virtual characters. He is a member of the IEEE and the ACM and also a founding member of Taipei ACM SIGGRAPH.

Technical Session D1-W3-T1: C4I(1): Broadband Technologies and Multimedia Services, Cloud Computing and Cyber Security

CloudSense: Continuous Fine-Grain Cloud Monitoring with Compressive Sensing

Chit-Kwan Lin (哈佛大學練哲軍)

PhD Candidate, Harvard University School of Engineering and Applied Sciences
33 Oxford Street, Maxwell-Dworkin 207, Cambridge, MA 02138, USA
Tel: +0-000-000-0000, Fax: +0-000-000-0000
Email: cklin@eecs.harvard.edu

ABSTRACT

Continuous fine-grain status monitoring of a cloud data center enables rapid response to anomalies, but handling the resulting torrent of data poses a significant challenge. As a solution, we propose CloudSense, a new switch design that performs in-network compression of status streams via compressive sensing. Using MapReduce straggler detection as an example of cloud monitoring, we give evidence that CloudSense allows earlier detection of stragglers, since finer-grain status can be reported for a given bandwidth budget. Furthermore, CloudSense showcases the advantage of an intrinsic property of compressive sensing that enables detection of the slowest stragglers first. Finally, CloudSense achieves in-network compression via a low-complexity encoding scheme, which is easy and convenient to implement at a switch. We envision that CloudSense switches could form the foundation of a "compressed status information plane" that is useful for monitoring not only the cloud data center itself, but also the user applications that it hosts.

BIOGRAPHY

Chit-Kwan Lin is a Ph.D. candidate in computer science at Harvard University in Cambridge, MA. He holds an S.M. in computer science and an Honors A.B. in biochemical sciences, both from Harvard. Prior to graduate school, he was a software engineer at several technology start-ups in the Boston area, most recently at Glance Networks, Inc. His research interests are centered around distributed systems and networks and his current work focuses on using coding techniques to improve distributed data processing systems (such as MapReduce) and wireless mobile ad-hoc networks in airborne vehicular platforms. He also maintains an interest in the application of computational and machine learning methods to problems in
genomics and systems biology.

Technical Session D1-W3-T1: C4I(1): Broadband Technologies and Multimedia Services, Cloud Computing and Cyber Security

Anomaly Detection in Online Reputation Systems

Yan (Lindsay) Sun (罗德岛大学孙琰教授)

Associate Professor, University of Rhode Island
4 East Alumni Ave. Kingston, RI, USA 02881
Tel: +1-401-874-5803, Fax: +1-401-782-6422
Email: yansun@ele.uri.edu

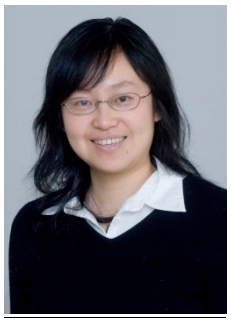
ABSTRACT

The Internet has created vast opportunities to interact with strangers. The interactions can be fun, informative and even profitable. However, there is also risk involved. Will a seller at eBay ship the product in time? Is the advice from a self proclaimed expert at Epinion.com trustworthy? Does a product at Amazon.com have high quality as described?

To address these problems, one of the most ancient mechanisms in the history of human society, word-of-mouth, is gaining new significance in the cyber space, where it is called reputation system. A reputation system collects evidence about the properties of individual objects, analyzes and aggregates the evidence, and disseminates the aggregated results. Here, the objects can be products (e.g. in the Amazon product rating system), businesses (e.g. hotel ratings in various travel sites), users (e.g. sellers and buyers at eBay), and digital content (e.g. video clips at YouTube). The aggregated results are called reputation scores. Most commercial systems collect user feedbacks (i.e. ratings/reviews) as evidence.

As the reputation systems are having increasing influence on consumers online purchasing decisions and online digital content distribution, the incentive to manipulate and mislead reputation systems is growing. In this talk, we will introduce the evolution of attack strategies against online reputation systems and discuss an effective defense mechanism.

BIOGRAPHY



Yan (Lindsay) Sun received her B.S. degree with the highest honor from Peking University in 1998, and the Ph.D. degree in electrical and computer engineering from the University of Maryland in 2004. She joined the University of Rhode Island in 2004, where she is currently an associate professor in the department of Electrical, Computer and Biomedical Engineering.

Her research interests include trustworthy social computing, wireless network security, and security in biomedical systems. She is the director of Network Security and Trust (NEST) Laboratories at the University of Rhode Island. Her recent research projects include developing trust quantification and establishment framework, defending trust management vulnerabilities, designing securing routing protocols in mobile ad hoc networks, securing online rating

systems, and modeling user behaviors in online social networks. She is one of the three founding members of the Laboratory for Integrating Neuron and Cyber (LINC), which is funded by a $1.38M NSF award. She recently received the best paper award at the IEEE International Conference on Social Computing (SocialCom'10, acceptance ratio <11%). She co-authored the book "Network-aware security for group communications" (Springer 2007). She has two pending U.S. Patents. She was the organizer of the CANT online cyber competition that aimed collecting attack data from real human users and attracted over 630 participants.

Dr. Sun has served as co-chair of Trust, Reputation, Evidence and other Collaboration Know-how track at the 25th ACM Symposium on Applied Computing (ACM SAC) in 2009, publication chair at the 4th Annual Boston Area Architecture Workshop (BARC) in 2006, and local arrangement chair at IEEE International Workshop on Genomic Signal Processing and Statistics (Gensips) in 2005. She will serve as the special session chair of International Workshop on Multimedia Signal Processing (MMSP) in 2012. She is an associate editor of Inside Signal Processing eNewsletter, a part of the IEEE Signal Processing Magazine since 2010. She is the guest editor of IEEE Signal Processing Magazine special issue on signal and information processing for social learning and networking (2010). She was the recipient of NSF CAREER Award (2007).

Technical Session D1-W3-T1: C4I(1): Broadband Technologies and Multimedia Services, Cloud Computing and Cyber Security

From Information Retrieval to Active Media

Trista P. Chen (陳佩君博士)

Ph.D., Gracenote Inc
Email: trista.chen@gmail.com

ABSTRACT

The paradigm of information service has shifted from passive information retrieval to active media experience. Instead of typing "Carrie Brashaw Shoes in Sex and the City" at the Google search box, we are seeing a future where rich information actively presents itself to the user, at the right time and at the right place.

The talk first introduces media research activities at Gracenote, with focuses on media identification with fingerprints and rich media experience. Video fingerprinting, like human fingerprinting, uniquely identifies a queried video. The timestamp, or elapsed time from the start of the video is also identified. The video ID together with the timestamp info, can be linked to a wealth of scene-level information that greatly enrich user's media experience. For example, actor bio and trivia are automatically presented to the user at the scene where he appears. A Caribbean cruise package is recommended to the user when the set includes a beach scene. All the rich scene-level information is actively presented to the user without requiring her to act.

BIOGRAPHY

Trista P. Chen was the architect of Nvidia's first video processor, conducted research in computer vision for many-core processors at Intel, and led video research at Gracenote/Sony including automatic video metadata extraction and media recommendations. She also advises start-ups in the field of computer vision, machine learning, and video processing.

She received her Ph.D. in video processing and computer vision from Carnegie Mellon University. She co-authored 25 publications and >10 issued and pending patents, and served in technical committees of international IEEE conferences. She also gave invited talks at academic institutes as NTU, Columbia University, Cornell University, NSF Math Institute, etc.

Technical Session D1-W1-T2: Medicine/Public Health/Biotechnology/Bioinformatics (2)

Session Organizer & Chair

Wen-Hui Lien (洛克菲勒大學連文慧博士) Ph.D.

Postdoctoral Fellow,
Laboratory of Mammalian Cell Biology and Development
The Rockefeller University
1230 York Ave Box 300, New York NY 10065, USA
Tel: 1-212-327-7482, Fax: 1-212-327-7954
Email: wlien@rockefeller.edu

BIOGRAPHY

Wen-Hui Lien was born in Taipei. She got her Bachelor degree in Biology from Kaohsiung Medical University in Kaohsiung city, Taiwan, in 2000, and then obtained a Master's degree in Molecular Medicine from National Chung Kung University in Tainan city, Taiwan, in 2002 under the supervision of Dr. Li-Wha Wu (吳梨華). In 2008, she was awarded a PhD degree in Molecular and Cellular Biology from the University of Washington in Seattle, USA, under supervision of Dr. Valeri Vasioukhin.

Dr. Lien started her undergraduate research under the supervision of Dr. Chung-Yee You (游仲逸) in Kaohsiung Medical University, and her research made her receive the Undergraduate Innovative Research Award from National Science Council in Taiwan in 2000. During her Master's graduate research in Taiwan, she studied the molecular mechanism of the angiogenic inhibitor. This work led to her first two publication of which she was second and first author, respectively. Before starting her PhD research, she worked as a research technician in the laboratory of Dr. Robert Eisenman at Fred Hutchinson Cancer Research Center in Seattle from 2003 to 2004. In her PhD studies, she has focused on understanding the underlying mechanisms and physiological significance of the cell adhesion protein, αE-catenin. Her works have leaded to her publication in the significant journal, *Science*. Her following studies also resulted in first authored publications in the *Journal of Cell Science* and *Journal of Cell Biology*. By the end of her PhD study, she was invited to give a talk in Gordon Research Conference on Signaling by Adhesion Receptors in 2008. Adding to her accomplishment, she received the prestigious 2009 Harold M. Weintraub Graduate Student Award for her outstanding achievement during her graduate studies.

Dr. Lien is currently a postdoctoral fellow in the laboratory of Dr. Elaine Fuchs at the Rockefeller University in New York City. Her research was supported by a Harvey L. Karp Postdoctoral Fellowship in 2009-2010, and she is currently an Anna Fuller Fund Fellow of The Jane Coffin Childs Memorial Fund since 2011. Her research focuses on understanding the epigenetic regulation of hair follicle stem cells and the Wnt signaling pathway in regulation of epidermal homeostasis, hair follicle stem cell activation, wound healing, and tumorigenesis.

Technical Session D1-W1-T2: Medicine/Public Health/Biotechnology/Bioinformatics (2)

Cell cycle-dependent regulation of FoxM1 activity by phosphorylation

Yi-Ju Chen, Ph.D. (賓州大學陳怡如博士)

Postdoctoral Fellow, University of Pennsylvania
Abramson Family Cancer Research Institute
BRBII/III Rm 527, 421 Curie Boulevard,
Philadelphia, PA 19105 U.S.A.
Tel: 1-215-746-5559
Email: cheny3@mail.med.upenn.edu

ABSTRACT

The forkhead box M1 (FoxM1) transcription factor is critical for cell cycle progression, cell proliferation as well as tumor progression. Previously, we have observed that the depletion of FoxM1 in U2OS cells by siRNA technique causes cell cycle arrest at the G2/M phase and significantly reduced S-phase population. In the further analysis, we demonstrated that FoxM1 is essential for transcriptional regulation of genes involved in G1/S transition and mitotic progression. In addition to uncovering the role of FoxM1 in cell cycle regulation, we also demonstrate that FoxM1 is necessary for tumor cells migration and invasion.

To gain insights into the basis of unscheduled cell proliferation and tumor progression contributed by deregulated FoxM1, I focused on the posttranslational regulation of FoxM1 activity. It has been shown that the transcriptional activity of FoxM1 is regulated by Cdk1-dependent phosphorylation. However, the mechanism of temporal activation of subset genes by FoxM1 in a timely controlled fashion remains unknown. Here, I show that the phosphorylated status and the activity of FoxM1 increase as cell progress from S to G2/M phases. Moreover, dephosphorylation of FoxM1 coincides with exit from mitosis. I found that Polo-like kinase 1 (Plk1) can bind to FoxM1 at M phase and stimulates its transcriptional activity. Furthermore, using mass spectrometry to study the in vivo phosphorylation sites of FoxM1, I identified a critical conserved phosphorylation site (Ser-251) within the DNA binding domain of FoxM1. Disruption of this site inhibits phosphorylation of FoxM1 and dramatically decreases its transcriptional activity. The experiments show that Ser-251 residue is required for Cdk1-dependent phosphorylation of FoxM1 as well as its interaction with the coactivator CREB binding protein (CBP). Cells expressing the S251A mutant exhibit reduced expression of the G2/M phase genes and impaired mitotic progression. These results demonstrated that FoxM1 activity is controlled in a cell cycle-dependent fashion by temporally regulated phosphorylation and dephosphorylation events, and that the phosphorylation at Ser-251 is critical for the activation of FoxM1.

BIOGRAPHY

Yi-Ju Chen was born in Kaohsiung, Taiwan, in 1977. She received her Bachelor degree in Medical Technology from Chung Shan Medical University in Taichung city, Taiwan, in 1999. In 2001, she obtained a Master degree in Molecular Medicine from National Chung Kung University (NCKU) in Tainan, Taiwan, under the supervision of Dr. Li-Wha Wu (吳梨華). In 2009, she obtained a Ph.D. degree in Biochemistry and Molecular Genetics from University of Illinois at Chicago (UIC) in Chicago, USA. Currently, she is a postdoctoral fellow in University of Pennsylvania under supervision of Dr. Ben Stanger.

During her master research at NCKU, she focused on molecular characterization of angiogenic properties in oral cancer cells, which led to her first authored publication. Before starting her PhD research, she worked as a Research Assistant in the laboratory of Dr. Hsiao-Fang Sunny Sun (孫孝芳) at NCKU in Taiwan, from 2002 to 2003. She joined Dr. Robert Costa's laboratory at UIC as a PhD student in the summer of 2004 and studied the molecular mechanism regulated by FoxM1 in cell cycle progression. Her mentor, Dr. Costa unfortunately passed away on September 1, 2006 after a heroic fight with pancreatic cancer. She continued her Ph.D. research on the molecular mechanism and regulation of FoxM1 activity under the supervision of Dr. Pradip Raychaudhuri from 2007 to 2009.

During her PhD study, Dr. Chen's works have resulted in several publications in the high-ranking peer review journals, including Molecular and Cellular Biology, and Journal of Biological Chemistry, etc. The works, which were published on Molecular and Cellular Biology at 2005, have significantly increased the knowledge and strengthen the importance of FoxM1 in cell cycle regulation, cell proliferation as well as the progress of tumorigenesis. Since published, this paper has been cited for 139 times so far. Dr. Chen is currently a postdoctoral fellow in the laboratory of Dr. Ben Stanger at Abramson Family Cancer Research Institute at the University of Pennsylvania in Philadelphia. She works on the in vivo approach to cell-based therapy for Type 1 diabetes.

Technical Session D1-W1-T2: Medicine/Public Health/Biotechnology/Bioinformatics (2)

Integrins Traffic Rapidly via Circular Dorsal Ruffles and Macropinocytosis during Stimulated Cell Migration

Zhizhan Gu (哈佛醫學院顧智湛博士), M.D., Ph.D.

Postdoctoral Research Fellow
Division of Rheumatology, Immunology and Allergy, Department of Medicine,
Brigham and Women's Hospital, Harvard Medical School
Smith Building Room 508, One Jimmy Fund Way, Boston, MA 02115, USA
Tel: +1-617-525-1015, Fax: +1-617-525-1010
E-mail: zzgu@rics.bwh.harvard.edu

ABSTRACT

Cell migration starts with trailing edge integrin focal adhesion disassembly, followed by integrin endocytosis and recycling to the leading edge to form new contacts. A current model explaining constitutive integrin turnover suggests integrin endocytosis occurs at the ventral cell surface and is clathrin dependent. However, fast integrin turnover in induced cell migration is largely unknown. Here, we report growth factor induced fast cell migration employs a distinct integrin endocytosis and recycling mechanism. We examined the spatial and temporal movements of integrins under PDGF, VEGF and EGF stimulation in various cell types. 4-Dimentional time-lapse confocal live cell imaging showed integrins translocated from ventral cell surface focal adhesions to circular dorsal ruffles (CDRs) at the dorsal cell surface. Following CDR formation, the CDR cup closed and internalized in large, condensed macropinosomes. These macropinosomes quickly disassembled, following which new integrin focal adhesions appeared at the ventral cell surface at the migration leading edge. Antibody stripping recycling assays further confirmed these were integrin molecules recycled from former focal adhesions present prior to stimulation. siRNA downregulation experiments showed such integrin macropinocytosis is BARS dependent but clathrin independent. The recycling of integrins followed the fast recycling pathway of macropinosomes to early endosomes to recycling endosomes, and back to the cell surface. Such dramatic CDR recruitment, macropinocytosis and recycling of integrins provides a rapid molecular mechanism for how cells induced to migrate under growth factor stimulation conditions release existing adhesion contacts to quickly form new adhesion contacts at the migration leading edge. These findings explain why integrins have long been observed to redistribute through both surface-based and internal routes, and identify a new function for macropinocytosis during growth-factor induced cell migration.

BIOGRAPHY

Dr. Zhizhan Gu came from a family of 27-generation medical practice history in China. He was born in Shanghai, 1978. Following his family tradition, Dr. Gu initially joined the Fudan University Medical School, Shanghai, China

to start his medical doctor career. He received his M.D. degree in year 2002. During his hospital internship, Dr. Gu gained strong interest in medical research which broadly benefits the whole population.

To fulfill the transition from a physician to a medical scientist, Dr. Gu firstly joined the Ph.D. program at The National University of Singapore and then transferred to Brown University to seek a comprehensive training in cell physiology. He joined the laboratory of Dr. Chi-Ming Hai to work on the newly discovered cellular feet "podosomes and invadopodia". Dr. Gu and Dr Hai were among the very few scientists who firstly worked on such cellular feet in the United States. They did the early work on podosome formation, structure and function. Dr. Gu reported the significance of Erk signaling pathway in regulating podosome dynamics. Recently, more and more evidences suggest that podosomes and invadopodia significantly regulate the pathological cell invasion in various diseases including atherosclerosis, osteoporosis and cancer metastasis, etc. The research field of these two newly defined cellular feet is now quickly expanding worldwide. Dr. Gu received his Ph.D. degree in Molecular Pharmacology, Physiology and Biotechnology in year 2007 at Brown University, Providence, RI, USA.

Upon finishing his Ph.D., Dr. Gu joined the laboratory of Dr. Michael B. Brenner at Harvard Medical School, Boston, MA, USA to continue his interest in cell migration and invasion in disease pathogenesis. During his postdoctoral work on the role of cell invasion in rheumatoid arthritis, Dr. Gu accidently discovered a new mechanism of integrin trafficking through circular dorsal ruffles and macropinocytosis, which broadly answered the question of how cell migrates under stimulated conditions such as inflammation and cancer. Dr. Gu is now continuing his work on the role of cell adhesion and invasion in the pannus tissue formation in rheumatoid arthritis and breast cancer metastasis.

Technical Session D1-W1-T2: Medicine/Public Health/Biotechnology/Bioinformatics (2)

Proteomic assessment of a cell model of spinal muscular atrophy

Chia-Yen Wu, Ph.D., M.B.A. (德拉瓦大學吳佳燕博士)

Postdoctoral Fellow
Nemours Biomedical Research
Alfred I. duPont Hospital for Children
1700 Rockland road, Wilmington, DE 19803
Tel: +1-302-651-6707, Fax: +1-302-651-6767
Email: cwu@nemours.org

ABSTRACT

Deletion or mutation(s) of the Survival Motor Neuron 1 (SMN1) gene causes spinal muscular atrophy (SMA), a neuromuscular disease characterized by spinal motor neuron death and muscle paralysis. Complete loss of the SMN protein is embryonically lethal, yet reduced levels of this protein result in selective death of motor neurons. Why motor neurons are specifically targeted by SMN deficiency remains to be determined.

In this study, we established a cell-culture model of SMA by using embryonic stem (ES) cells were derived from a severe SMA mouse model. Moreover, in order to enhance the neuralization process, we developed a new protocol to improve differentiation efficiency from ~25% to ~50% by priming the ES cells with the bone morphogenetic protein antagonist, Noggin, and with fibroblast growth factors (bFGF and FGF8). The differentiated ES cells expressed a pan-neuronal marker (neurofilament) and motor neuron markers (Hb9, Islet-1, and ChAT). Proteomic in conjunction with Western blot analyses revealed 6 down-regulated and 14 up-regulated proteins with most of them involved in energy metabolism, cell stress-response, protein degradation, and cytoskeleton stability. Increased p21 expression indicated that SMA ES cells were responding to cellular stress. Further analysis confirmed up-regulation of p21 in the spinal cords isolated from the same SMA mouse model where the SMN-deficient ES cells were derived.

In summary, SMN-deficient ES cells provide a cell-culture model for SMA. SMN deficiency activates cellular stress pathways, causing a dysregulation of energy metabolism, protein degradation, and cytoskeleton stability.

BIOGRAPHY

Chia-Yen Wu was born in Kaohsiung, Taiwan, in 1976. She received her Bachelor degree in Medical Technology from Chung Shan Medical University in Taichung city, Taiwan, in 1999. In 2001, she obtained a Master degree in Molecular Medicine from National Chung Kung University in Tainan, Taiwan, under the supervision of Dr. Sunny H Sun (孫孝芳). In 2005, she obtained a Master degree in Neuroscience from SUNY at Buffalo in Buffalo, USA, under supervision of Dr. Parsa Kazemi-Esfarjani. Recently, she earns her Ph.D. and M.B.A. dual degrees from

Department of Biological Sciences and Business Adminstration in University of Delaware under supervision of Dr. Wenlan Wang. Currently, She is a postdoctoral fellow in Nemours, A.I. duPont Hospital for Children.

Before starting her PhD research, she worked as a Research Assistant in the laboratory of Dr. Alexander Gow at Wayne State University in Detroit, USA, from 2005 to 2006. In her first year of PhD study, she was Teaching Assistant for laboratory courses of Introductory Biology I and Introductory Biology II from 2006 to 2007 at University of Delaware. In her PhD study, she focuses on understanding pathogenesis of spinal muscular atrophy and the functions of survival motor neuron (SMN) in cell survival.

During her PhD study, Dr. Wu's works have resulted in several first authored publications in the high-ranking peer review journals, including *BMC Cell Biology*, *BMC Neuroscience*, and *Biochim Biophys Acta-Proteins and Proteomics*. Her excellent academic achievements also lead her to receive a prestigious 2010 Dissertation fellowship from University of Delaware and Carson's Best Graduate Student Publication Award in 2011. She graduated and received her PhD/MBA dual degrees in summer 2011. As she had has a longstanding interest in biomedical research and finding cures for human diseases, such as SMA, Dr. Wu currently continues her research as a postdoctoral fellow in A.I. duPont Hospital for Children.

Technical Session D1-W1-T2: Medicine/Public Health/Biotechnology/Bioinformatics (2)

Toward the Treatment of Human Genetic Disorders

Peng-Chieh Jessica Chen (哈佛醫學院陳芃潔博士)

Postdoctoral Fellow, Harvard Medical School
77 Avenue Louis Pasteur, NRB164, Boston, MA 02115 USA
Tel: 1-617-525-4448, Fax: 1-617-525-4435
Email: pchen@rics.bwh.harvard.edu

ABSTRACT

Noonan syndrome is a relatively common genetic disorder characterized by short stature, unique facial features, and heart defects. About 10%-15% of affected individuals have mutations in their SOS1 gene.
We now generated mice expressing a Sos1 mutation associated with Noonan syndrome and used them to identify potential therapeutic targets for the treatment of individuals with Noonan syndrome.
Specifically, we found that the Ras/MAPK signaling pathway as well as the Rac and Stat3 proteins were activated in the hearts of the mutant mice. Normalizing signaling from all of these pathways and proteins might be required for successful amelioration of the entire spectrum of Noonan syndrome symptoms.

BIOGRAPHY

Peng-Chieh Chen was born in Kaohsiung, Taiwan in 1979. She completed her undergraduate degree, with major in chemistry and minor in life sciences, at National Tsing Hua University, Taiwan in 2001. She received her Ph.D. of biological sciences from University of California, Irvine in 2006.

She visited a stem cell lab in Academia Sinica, Taiwan shortly before joining the lab of Dr. Raju Kucherlapati as a Post-doctoral Fellow at Harvard Medical School in 2007. Her current research focuses on understanding the biology of human genetic disorders and cancers. She works on generating and characterizing mouse models for genetic disorders, and looks for possible treatments for these disorders. She also works on the Cancer Genome Atlas projects on searching for structural variations in human colorectal cancers.

Dr. Chen is a member of American Heart Association (AHA), American Association of Cancer Research, and American Society of Human Genetics. She is awarded by AHA with post-doctoral fellowship. Her recent publication on a mouse model of Noonan syndrome in Journal of Clinical Research was highlighted by the editors and covered in the press.

Technical Session D1-W1-T2:Medicine/Public Health/Biotechnology/Bioinformatics (2)

Genome-Wide Maps of Histone Modifications in the Hair Follicle Lineages

Wen-Hui Lien (洛克菲勒大學連文慧博士) Ph.D.

Postdoctoral Fellow
Laboratory of Mammalian Cell Biology and Development
The Rockefeller University
1230 York Ave Box 300, New York NY 10065, USA
Tel: 1-212-327-7482, Fax: 1-212-327-7954
Email: wlien@rockefeller.edu

ABSTRACT

The adult appendages of the epidermis, hair follicles undergo synchronized hair cycles throughout the animal's life. Cyclical HF regeneration and hair growth is fueled by hair follicle stem cells (HF-SCs) residing in the bulge. During the rest phase, HF-SCs remain quiescent and slow-cycling at the HF base. In response to activating cues, HF-SCs become more proliferative, and then exit the bulge and move downward; and finally their progeny reach to the point of no return and become transit-amplifying cells (TACs). This spatially and temporally well-defined program makes the HF an excellent model to study how SCs transition from a quiescent to active state and how their properties change again as they become TAC progeny fated to differentiate. Much is now known about the importance of signaling pathways and signaling-mediated TFs in the activation and progression of HF-SCs along their lineages. However, very little studied is the extent to which these changes are governed at the transcriptional level, and how epigenetics and chromatin remodeling might impact on HF-SC behavior and lineage determination.

In previous studies when coupled with mRNA expression data, epigenetic mapping has revealed that in cultured ESCs, a set of key developmental genes are primed by the H3K4me3 mark but are prevented from being activated due to the presence of repressive H3K27me3 marks. By contrast, many of these genes are resolved to either active or repressed states when ESCs are differentiated *in vitro* to become neural progenitors and fibroblasts. While genome-wide chromatin mapping has provided many new insights into cellular states that go beyond mRNA expression profiling, it remains unaddressed as to whether such mechanisms are physiologically relevant and how they may play out in an adult SC, such as the HF-SC, where multiple steps in the control of lineage commitment are involved.

In my study, we first identified signature genes for HF-SCs and their committed-progeny TACs by comparing the mRNA expression profiles of purified quiescent and activated HF-SCs over the TA matrix cells. We then conducted chromatin immunoprecipitations and high-throughput sequencing (ChIP-seq) with histone modification-specific antibodies to unveil chromatin states of the hair follicle lineage. By coupling ChIP-seq and mRNA profiling on cells in their native states, we uncovered global chromatin modifications that occur as a quiescent adult SC transitions first through an activated state and then to a committed state along its lineage. In summary, our findings provide for the first time the genome-wide mapping of histone modifications in *in vivo* states of the hair follicle lineage, and illuminate a role for PcG-mediated regulation in placing a molecular threshold on the transition from a multipotent activated SC to a differentiation-committed TA cell. Finally, we draw upon the increasing body of knowledge linking epigenetic regulation to adult stem cell biology.

BIOGRAPHY

Wen-Hui Lien was born in Taipei. She got her Bachelor degree in Biology from Kaohsiung Medical University in Kaohsiung city, Taiwan, in 2000, and then obtained a Master's degree in Molecular Medicine from National Chung Kung University in Tainan city, Taiwan, in 2002 under the supervision of Dr. Li-Wha Wu (吳梨華). In 2008, she was awarded a PhD degree in Molecular and Cellular Biology from the University of Washington in Seattle, USA, under supervision of Dr. Valeri Vasioukhin.

Dr. Lien started her undergraduate research under the supervision of Dr. Chung-Yee You (游仲逸) in Kaohsiung Medical University, and her research made her receive the Undergraduate Innovative Research Award from National Science Council in Taiwan in 2000. During her Master's graduate research in Taiwan, she studied the molecular mechanism of the angiogenic inhibitor. This work led to her first two publication of which she was second and first author, respectively. Before starting her PhD research, she worked as a research technician in the laboratory of Dr. Robert Eisenman at Fred Hutchinson Cancer Research Center in Seattle from 2003 to 2004. In her PhD studies, she has focused on understanding the underlying mechanisms and physiological significance of the cell adhesion protein, αE-catenin. Her works have leaded to her publication in the significant journal, *Science*. Her following studies also resulted in first authored publications in the *Journal of Cell Science* and *Journal of Cell Biology*. By the end of her PhD study, she was invited to give a talk in Gordon Research Conference on Signaling by Adhesion Receptors in 2008. Adding to her accomplishment, she received the prestigious 2009 Harold M. Weintraub Graduate Student Award for her outstanding achievement during her graduate studies.

Dr. Lien is currently a postdoctoral fellow in the laboratory of Dr. Elaine Fuchs at the Rockefeller University in New York City. Her research was supported by a Harvey L. Karp Postdoctoral Fellowship in 2009-2010, and she is currently an Anna Fuller Fund Fellow of The Jane Coffin Childs Memorial Fund since 2011. Her research focuses on understanding the epigenetic regulation of hair follicle stem cells and the Wnt signaling pathway in regulation of epidermal homeostasis, hair follicle stem cell activation, wound healing, and tumorigenesis.

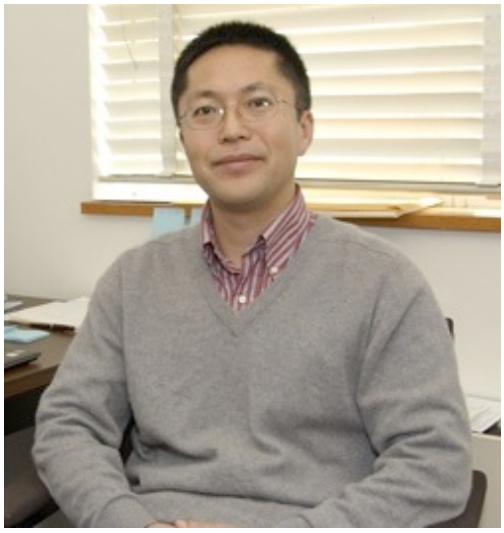
Technical Session D1-W2-T2: New Materials Science and Engineering, Nanotechnology (2)

Session Organizer & Chair

Bingqing (B. Q.) Wei (德拉瓦大學機械工程系魏秉庆教授)

Department of Mechanical Engineering, University of Delaware
Newark, DE 19176, USA
Email: weib@UDel.Edu

BIOGRAPHY



Dr. Bingqing (B. Q) Wei received his Bachelor's degree (1987), M.S (1989), and Ph.D. (1992) in Mechanical Engineering from Tsinghua University, China. His research expertise lies in nanomaterials and nanotechnology. His recent research focuses on controllable synthesis of macroscale nanotube architectures with 1-, 2-, and 3-dimensions; physical, chemical, electrochemical and mechanical property characterizations of nanotubes; and nanotube device applications.

Dr. Wei is promoted to a Full Professor in the summer, 2011 after serving as an Associate Professor in the Department of Mechanical Engineering at the University of Delaware since January 2007. He was an Assistant Professor in the Department of Electrical & Computer Engineering and Center for Computation & Technology at Louisiana State University from 2003 to 2007. He had worked as a research scientist at Rensselaer Polytechnic Institute, Department of Materials Science and Engineering and Rensselaer Nanotechnology Center from 2000 to 2003. Dr. Wei was a visiting scientist for Max-Planck Institut für Metallforschung, Stuttgart, Germany in 1998 and 1999. He was a faculty at Tsinghua University in Beijing from 1992 to 2001.
Dr. Wei is a member of The Materials Research Society (MRS), The Electrochemical Society (ECS), The International Society for Optical Engineering (SPIE), The American Chemical Society (ACS), and The American Society of Mechanical Engineering (ASME). His scholarly achievements in the field of nanomaterials and nanotechnology and, particularly in the research of carbon nanotubes are fully reflected from his 180 papers published in refereed international journals, including *Nature* and *Science*, more than 95 scientific conference presentations and 90 plus invited talks and seminars in academia and industry worldwide. His research work has been cited more than 6700 times by peer scientists with *h*-index of 44 and has also been highlighted many times in scientific journals, web journals and public media.

Technical Session D1-W2-T2: New Materials Science and Engineering, Nanotechnology (2)

In-situ Transmission Electron Microscopy Studies on Nanowire Growth

Cheng-Yen Wen ((台灣大學材料科學與工程學系溫政彥教授)

Department of Materials Science and Engineering,
National Taiwan University, Taipei, Taiwan
Email: cwen@ntu.edu.tw

ABSTRACT

In-situ transmission electron microscopy (TEM) is a unique tool to directly monitor the growth of materials, measure the growth kinetics, and obtain real-time information during phase transformations. We modified an ultra-high vacuum TEM to allow flowing semiconductor gas precursors to the surroundings of a specimen, so that we can observe the growth of nanowires. The growth of semiconductor nanowires typically employs metal catalysts, which decompose the gas precursors, absorb the growth species, and precipitate crystalline material at the metal-semiconductor interfaces for one-dimensional growth. The metal catalysts can be in the liquid or solid state. From in-situ TEM observations, we found that the growth of Si nanowires has similar features despite the catalyst's state, but the kinetics of step growth at the interface is significantly different at different states. Using the real-time data, we developed a theoretical model of the step flow mechanism; it is concluded that solid catalysts have lower step nucleation barrier and hence have lower excess Si concentration than liquid catalysts. An immediate application of the above results is in the growth of Si-Ge axial heterojunction nanowires. For example, solid AlAu2 catalysts have low Si and Ge solubility; intermixing of Si and Ge at the growth of heterojunctions is therefore small. We'll show that compositionally abrupt Si-Ge heterojunction interfaces with a width of less than 1 nm in nanowires can be fabricated using the solid AlAu2 catalysts.

BIOGRAPHY

Cheng-Yen Wen is an assistant professor in the Department of Materials Science and Engineering at National Taiwan University. He received his BS and MS degrees from National Taiwan University and PhD degree from Harvard University. He was a postdoctoral fellow at the Massachusetts Institute of Technology from 2005 to 2007. In 2007, he participated in a collaborative project of Purdue University and the IBM T. J. Watson Research Center for postdoctoral research. He joined National Taiwan University in 2011. His research interests include in-situ transmission electron microscopy and the growth mechanism of materials.

Technical Session D1-W2-T2: New Materials Science and Engineering, Nanotechnology (2)

Strength of Nanofiber Reinforced Composites

Quanfang Chen

MEMS and Nanomaterials Lab, Mechanical, Materials and Aerospace Engineering
Department, University of Central Florida
Orlando, FL 32816-2450. Email: qchen@mail.ucf.edu

ABSTRACT

How to effectively increase the mechanical strength of nanofiber/nanotube reinforced nanocomposites has been a challenge to the scientific community. This article investigates main factors affecting strength of nanofiber/nanotube reinforced nanocomposites based on energy consideration. It shows that the strength of nanocomposites is systematically dependent on the volume fraction of nanofibers added, their diameters, the interfacial bonding strength between the nanofiber and the matrix, as well as the Yong's moduli ratios between the nanofiber and the matrix, as following equation indicates:
The schematic relationships between reinforced strength and dependent factors will be presented that the reinforced strength is largely dependent on the diameter of the nanofiber/nanotube. For example, in order to realize a nanocomposite with strength of 10GPa, it will need 90% nanofiber/nanotube if the diameter is 5nm. The volume fraction will be reduced to 20% if the diameter is reduced to 2nm. If the diameter is reduced further to 1nm the required volume fraction of nanofibers will be only 5%. Therefore, a much smaller volume fraction is needed if a smaller diameter nanotube/nanofiber is used. On the other hand, for the same amount of nanofiber addition, the smaller the diameter the greater the reinforced strength of the nanocomposite. For example, for a 1% addition of nanofibers, the resultant strength of nanocomposite will be about 4GPa if nanofibers are 1nm in diameter. However, nanofibers with 10nm in diameter will produce only about 0.2GPa in strength. Therefore a much less required addition of diameter nanofibers with smaller diameters to achieve a desired resultant strength. The smaller addition smaller diameter nanofibers makes nanocomposites more efficient and more cost effective in comparison to conventional composites.

BIOGRAPHY

Technical Session D1-W2-T2: New Materials Science and Engineering, Nanotechnology (2)

Carbon-based 2D Materials, Structures and their Applications

Robert Vajtai

Faculty Fellow, Rice University
6100 Main Street, Houston, TX, USA
Tel: +1-713-348-2344, Fax: +1-713-348-5423
Email: Robert.Vajtai@rice.edu

ABSTRACT

In this talk we introduce our new experimental work that describes the preparation, modification, characterization and application of two-dimensional sheets, as well as structures and devices fabricated from these materials.

First, our growth and modification methods for preparation of graphene sheets and several related 2D materials will be summarized including basic parameters of the chemical vapor deposition method, the number of layers produced, and the extension of growth temperature range. We summarize the most important features of graphene, hexagonal boron nitride, multilayered structures and hybrid materials composed from carbon, boron and nitrogen.

Second, a method of modifying graphene sheets as well as creating nanomaterials similar to or derived from graphene will be introduced. Cutting nano sheets along predefined crystal directions and preparation of B-C-N structures are shortly described here.

Finally, specific applications of the structures as energy storage materials will be demonstrated. The energy storage applications include preparation of a macroscopic structure from the graphene flakes and use as electrode materials in supercapacitors and batteries.

BIOGRAPHY

Robert Vajtai was born in Papa Hungary, in 1962. He received his M.S. degree in physics and his Ph.D. degree in solid-state physics from University of Szeged, Hungary, in 1986 and 1997, respectively.

He was a Scientific Research Fellow in 1986, Tenured Lecturer and Physicist, in 1987-2002, Assistant Professor in 1993-2002 in the Department of Experimental Physics of JATE University, now: University of Szeged. In 2000-2002 he was a Visiting Professor and Scientist, in the Department of Materials Science and Engineering at Rensselaer Polytechnic Institute. In 2002-2004 he held the position of Research Scientist and in 2004-2008 Laboratory Manager at the Rensselaer Nanotechnology Center, RPI. Currently he is a Faculty fellow in the Department of Mechanical Engineering and Materials Science at Rice University. His scientific interest covers preparation, properties and applications of nanomaterials, mainly carbon-based systems.

Dr. Vajtai received the Siemens Westinghouse Mentor Award (2003-2004), NATO-NSF Fellowship (2000-2001) Bolyai Fellowship (1999-2000), Fellowships of the Swedish Institute to Angstrom Labs., Uppsala, Sweden, (1998-1999), Eötvös Fellowship to EPFL, Lausanne, Switzerland, (1995-1996) and Max-Planck Fellowship to MPI, Göttingen, Germany, 1993. He has 120 publications in international scientific journals with ~3300 citations.

Technical Session D1-W2-T2: New Materials Science and Engineering, Nanotechnology (2)

CNT Supercapacitor Based Efficient Energy Management for Autonomous Wireless Sensor Nodes

Dongsheng Brian Ma (德州大学达拉斯分校电机工程系马东升教授)

TxACE Chair Professor and Thrust Leader in Energy Efficiency
Texas Analog Center of Excellence (TxACE)
The University of Texas at Dallas,
800 W Campbell Rd., EC 37,
Richardson, TX 75080
Tel: +1-972-883-5558, Fax: +1-972-883-5550
Email: d.ma@utdallas.edu

ABSTRACT

In this talk, an energy storage and management system is presented to achieve long lifetime and miniaturization for autonomous wireless sensor nodes, which can be used in communication network for microgrids. The system employs supercapacitors to form a multi-energy-source structure, and thus features multidirectional power delivery capability, which in turn allows the implementation of such state-of-the-art power management techniques as dynamic voltage scaling (DVS). A global energy management strategy is introduced to realize appropriate energy delivery, with the aid of a power management unit consisting of several proposed power converters that are capable of bidirectional operation. The multidirectional operation also dramatically increases the tracking speed during DVS with a charge-recycle technique. A prototype of a DC–DC converter experimentally verifies the bidirectional operation and an improvement of over 30 times on tracking speed during DVS.

BIOGRAPHY

Prof. Dongsheng Brian Ma is presently Texas Analog Center of Excellence (TxACE) Chair Professor and an associate professor in Department of Electrical Engineering at the Erik Jonsson School of Engineering and Computer Science, the University of Texas at Dallas. He also serves as the Leader of Energy Efficiency Thrust at the SRC's largest national analog center - TxACE. From 2004 to 2010, he was a faculty member of the Department of Electrical and Computer Engineering at the University of Arizona, where he held Analog Devices Chair assistant professor position from 2004 and then promoted as an associate professor with early tenure in 2009. Prof. Ma was the founding director of Integrated System Design Laboratory (ISDL) at the University of Arizona. In 2003, he was with Louisiana State University as assistant professor.

He has been awarded the United States National Science Foundation (NSF) CAREER Award, TxACE Chair Professorship and Analog Devices Chair Professorship. He was the recipient of the University of Arizona AAFSAA Outstanding Faculty Award in 2006 and was nominated for University of Arizona Accolades Outstanding Faculty Award in 2009. Prof. Ma was also the co-recipient of the Best Design Award of IEEE/ACM Design Automation Conference Asia & South Pacific in 2004 and the Best Student Paper Award in the 52nd IEEE Midwest Symposium on Circuits & Systems in 2009. He was also nominated for the Best Paper Award in IEEE/ACM International Conference on Computer-Aided Design in 2007.

Focusing on developing core technologies for high performance energy efficient integrated circuits and systems, Prof. Ma has published over 100 peer-reviewed journal and conference papers and holds 4 patents. Prof. Ma currently services on RF, Analog and Mixed Signal Circuits and Systems Committee for International Technology Roadmap for Semiconductor (ITRS), Analog Signal Processing Technical Committee and Power System and Circuit Committee for IEEE Circuits and Systems society. He has been an IEEE senior member since 2007.

Technical Session D1-W3-T2: C4I(2): Multimedia Services, Visualization and Web Technologies

Session Organizer & Chair

Trista P. Chen (陳佩君)

Ph.D., Gracenote Inc
Email: trista.chen@gmail.com

BIOGRAPHY

Trista P. Chen was the architect of Nvidia's first video processor, conducted research in computer vision for many-core processors at Intel, and led video research at Gracenote/Sony including automatic video metadata extraction and media recommendations. She also advises start-ups in the field of computer vision, machine learning, and video processing.

She received her Ph.D. in video processing and computer vision from Carnegie Mellon University. She co-authored 25 publications and >10 issued and pending patents, and served in technical committees of international IEEE conferences. She also gave invited talks at academic institutes as NTU, Columbia University, Cornell University, NSF Math Institute, etc.

Technical Session D1-W3-T2: C4I(2): Multimedia Services, Visualization and Web Technologies

Web Page Readability Enhancement

Chen-Hsiang (Jones) Yu (麻省理工學院電機工程與資訊科學系余禎祥)

Ph.D. Candidate in EECS
Department of Electrical Engineering and Computer Science
Massachusetts Institute of Technology
Email: chyu@mit.edu

ABSTRACT

Readers face many obstacles on today's Web, including distracting content competing for the user's attention and other factors interfering with comfortable reading. On today's primarily English-language Web, non-native readers encounter even more problems, even if they have some fluency in English. This research focuses on the presentation of content and proposes a new transformation method, Jenga Format, to enhance web page readability. To evaluate the Jenga Format, we conducted a user study on 30 Asian users with moderate English fluency and the results indicated that the proposed transformation method improved reading comprehension without negatively affecting reading speed. In this talk, I will also introduce a Firefox extension, Froggy, that reduces distractions and changes paragraph format to enhance reading comprehension.

BIOGRAPHY

Chen-Hsiang (Jones) Yu is a Ph.D. candidate working with Prof. Robert C. Miller in User Interface Group (UID) at MIT CSAIL. He earned his B.S. and M.S. in Computer Science and Information Engineering (CSIE) from Tamkang University in 1998 and from National Taiwan University in 2000, respectively. After finishing his master's degree on the topic of Digital Libraries and Museums, he worked as a team lead in the wireless industry for a few years and returned to school to pursue a further understanding in Web technologies at MIT CSAIL. His current research focuses on solving web page usability issues in desktop and mobile browsers by investigating useful customization and automation techniques.

Technical Session D1-W3-T2: C4I(2): Multimedia Services, Visualization and Web Technologies

iPOEM: A GPS Tool for Integrated Management in Virtualized Data Centers

Ya-Yunn Su (台灣大學資訊工程學系蘇雅韻教授)

Department of Computer Science & Information Engineering
National Taiwan University
Email: yysu@csie.ntu.edu.tw

ABSTRACT

A fundamental problem that confronts data center administrators in integrated management is to understand potential management options and evaluate corresponding space of the managed system's potential status. In this paper, we present iPOEM, a middleware with GPS-like UIs to support integrated power and performance management in virtualized data centers. iPOEM o ers novel system positioning services to enable a declarative management methodology: administrators specify a target location in terms of system performance and power cost, and iPOEM returns the management congurations and operations that are required to drive the system to the target status. This is joint work with Hui Zhang, Kenji Yoshihira, Guofei Jiang, Ming Chen, and Xiaorui Wang.

BIOGRAPHY

Ya-Yunn Su received her B.A. degree in Information Management from National Taiwan University in 2001, and her M.S. and Ph.D. degrees in Computer Science and Engineering from the University of Michigan Ann Arbor in 2004 and 2008, respectively. After graduation, she joined the Autonomous and Scalable Distributed Systems Group at NEC Labs in Princeton, NJ as a research staff member. After almost two years with NEC Labs, she joined the faculty of Computer Science and Information Engineering Department at National Taiwan University, where she is currently an assistant professor since August 2010. Her research interests include operating systems, systems management, mobile computing, and cloud computing.

Technical Session D1-W3-T2: C4I(2): Multimedia Services, Visualization and Web Technologies

Active Learning for Interactive 3D Scene Reconstruction

Yao-Jen (Kevin) Chang, PhD (康乃爾大學電機暨電腦工程學院張耀仁博士)

Research Associate, School of Electrical and Computer Engineering, Cornell University
105 Ward Hall, Ithaca, NY 14853, USA
Tel: +1-607-216-8450, Fax: +1-607-255-1001
Email: ychang@cornell.edu

ABSTRACT

Interactive 3D scene construction algorithms leverage human's knowledge in reconstruction of a 3D scene from multiple images. While previous interactive algorithms require the user to provide tedious interactions to identify all of the surfaces in the scene, we build on successful ideas from the automatic algorithms and introduce the idea of active learning, thereby improving the reconstructions while considerably reducing the human effort. Our algorithm first attempts to obtain a piecewise planar reconstruction of the scene automatically through an energy minimization framework. The proposed active-learning algorithm then uses intuitive cues to quantify the uncertainty of the algorithm and suggest regions, querying the user to provide support for the uncertain regions via simple scribbles. These interactions are used to suitably update the algorithm, leading to better reconstructions. We show through machine experiments and a user study that the proposed approach can intelligently query users for interactions on informative regions, and users can achieve better reconstructions of the scene faster, especially for scenes with textureless surfaces lacking cues like lines which automatic algorithms rely on.

BIOGRAPHY

Yao-Jen (Kevin) Chang was born in Taipei, Taiwan. He received his B.S. and Ph.D. degrees from the Department of Electrical Engineering, National Tsing Hua University, Hsinchu, Taiwan, in 1996 and 2002, respectively.

He worked as a Researcher for the Advanced Technology Center of the Information & Communications Research Labs in Industrial Technology Research Institute (ITRI) from 2003 to 2007, where he conducted research on videorealistic speech animation and video surveillance. In the meantime, he served as a visiting scholar at the Advanced Multimedia Processing Laboratory, Department of Electrical and Computer Engineering, Carnegie Mellon University during July to September, 2003, and a visiting scientist at the Center for Biological and Computational Learning, MIT during October to December, 2003. He then joined Department of Electrical and Computer Engineering, Carnegie Mellon University as a Research Scientist from 2007 to 2009. Since 2009, he holds a position of Research Associate at the School of Electrical and Computer Engineering, Cornell University in Ithaca, NY. His research interests include computer vision, computer graphics, and machine learning.

Keynote Panel Discussion: New Green Energy, Environment, and Sustainability

Moderator

Lin-wen Hu (麻省理工學院核子反應爐實驗室副主任胡玲文博士)

Associate Director & Principal Research Scientist
Nuclear Reactor Laboratory (NRL)
Massachusetts Institute of Technology
Email: lwhu@mit.edu

BIOGRAPHY

Lin-wen Hu (Nuc Eng PhD, MIT, 1996; Nuc Eng MS, MIT, 1993) is Associate Director and Principal Research Scientist at the MIT Nuclear Reactor Laboratory (NRL). She directs NRL's research and utilization program, and is responsible for the development, design, and safety reviews of major reactor experiments. Her research interests include fluid dynamics and heat transfer, computational fluid dynamics simulations, nuclear reactor design and safety analysis, and research reactor applications. Dr. Hu holds a Senior Reactor Operator license for the 6MW MIT Research Reactor issued by the US Nuclear Regulatory Commission, and is a licensed Professional Engineer in the Commonwealth of Massachusetts. Dr. Hu authored over 100 peer-reviewed journal and conference papers.

Keynote Panel Discussion: New Green Energy, Environment, and Sustainability

Gang Chen (麻省理工学院机械工程系美国国家工程院院士陈刚教授)

Carl Richard Soderberg Professor of Power Engineering, Director, Pappalardo Micro and Nano Engineering Laboratories, Director, DOE EFRC: Solid-State Solar-Thermal Energy Conversion Center (S3TEC Center)
Massachusetts Institute of Technology
77 Massachusetts Avenue, Cambridge MA 02139-4307
Phone: 617-253-0006
Fax: 617-324-5519
Email: gchen2@mit.edu

BIOGRAPHY

Dr. Gang Chen is currently the Carl Richard Soderberg Professor of Power Engineering at Massachusetts Institute of Technology. He obtained his Ph.D. degree from UC Berkeley in 1993. He was an assistant professor at Duke University from 1993-1997, and associate professor at University of California at Los Angeles from 1997-2000, and moved to MIT in 2000. He is a recipient of the NSF Young Investigator Award, a Guggenheim Fellow, an ASME fellow, the ASME Heat Transfer Memorial Award, and MIT Warren and Towneley Rohsenow Professorship. He has published extensively in the area of nanoscale energy transport and conversion and nanoscale heat transfer. He serves on the editorial boards for five journals in heat transfer and nanotechnology and chairs the advisory board of ASME Nanotechnology Institute. He is the director of Solid-State Solar-Thermal Energy Conversion Center (S3TEC Center) funded under US Department of Energy's Energy Frontier Research Centers Program.

Technical Session D1-W1-T3:Medicine/Public Health/Biotechnology/Bioinformatics (3)

Session Organizer & Chair

Huai-Kuang Tsai (蔡懷寬)

Academia Sinica, Taiwan
Email: hktsai@iis.sinica.edu.tw

BIOGRAPHY

Dr. Huai-Kuang Tsai is an Associate Research Fellow of the Institute of Information Science in Academia Sinica, Taiwan. He also holds joint appointments as Associate Professor of Biological Science and Technology (National Chiao-Tung University), Department of Computer Science and Engineering (National Ocean University), Genome and Systems Biology degree program (National Taiwan University), and Taiwan International Graduate Program (Academia Sinica). Dr. Tsai received BA, MS, and Ph.D. degrees in Computer Science and Information Engineering from National Taiwan University, Taiwan. His primary research interests are bioinformatics, regulatory mechanisms, metagenomics, and evolutionary algorithms. His recent research activities are mainly on regulatory mechanisms. He integrates computing techniques, statistical methods, and data from high-throughput biological experiments to construct regulatory networks, particularly in baker's yeast, *Saccharomyces cerevisiae*.

Technical Session D1-W1-T3: Medicine/Public Health/Biotechnology/Bioinformatics (3)

Characterization of transcription factor and microRNA regulatory networks involved in myelination

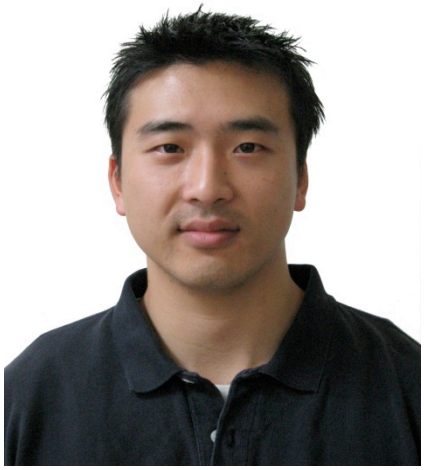
Li-Wei Chang (聖路易華盛頓大學章立維博士)

Research Instructor, Department of Pathology and Immunology
Washington University in St. Louis

ABSTRACT

Myelination is the formation of myelin sheath around axons by Schwann cells and is a critical process involved in neural development. Disruption of myelination is associated with several neural diseases of both the peripheral and the central nervous system. While several genes have been shown to play important roles in myelination, including myelin proteins Pmp22, Mbp and Mpz, and transcription factors Nab1, Sox10, and Egr2, the genetic programs that govern the regulation of these myelination genes are still unclear. Furthermore, while many microRNAs have been shown to be involved in many biological functions and complex human diseases, few microRNAs has been found to coordinate myelination. The regulatory targets of these microRNAs have not been characterized and studied. To solve these problems, we have performed mRNA and miRNA expression profiling experiments and developed an integrated, bioinformatic approach to infer transcriptional and miRNA regulatory networks involved in myelination. Using a previously developed statistical model for genome-wide regulatory sequence analysis, regulatory targets of transcription factors and microRNAs were characterized based on the enrichment of regulatory sequence elements. Furthermore, promoter sequences and transcriptional regulators of primary microRNAs were also predicted. These computational predictions were combined with mRNA and miRNA expression profiles in Schwann cells and highly confident regulatory interactions between transcription factors, microRNAs, and genes were identified and summarized in regulatory networks. Key regulators in this network were furthered validated by experimental methods. Together, these results provide detailed information about the transcriptional and miRNA regulation in Schwann cells.

BIOGRAPHY



Technical Session D1-W1-T3: Medicine/Public Health/Biotechnology/Bioinformatics (3)

Integrating Bioinformatics Technologies with Biomedical Research by Collaborative Consulting Model

Yaoyu E. Wang (波士頓達納法伯癌症研究所王耀煜博士)

Bioinformatics Analyst II, Center for Cancer Computational Biology,
Dana-Farber Cancer Institute
450 Brookline Ave, Boston, MA 02215, USA
Email: yewang@jimmy.harvard.edu

ABSTRACT

The advancement of high-throughput experiment and sequencing technologies has brought exponential growth in the amount of biomedical data over the last decades, and the rate of growth will continue to rise as the cost for generating data drops. A major challenge today facing the biomedical research as whole is the limited, and often constrained, availability of bioinformatics and information technology resources for collaboration to truly understand the data being generated as well as those available in the public domain. The Center for Cancer Computational Biology (CCCB) was designed under a collaborative consulting model to bring bioinformatics and high-throughput technology more broadly accessible to the biomedical research community. In contrast to traditional grant based long term collaboration, the model provides project specific bioinformatics consultation that allows for higher organizational dynamics as well as research efficiency. In this talk I will discuss the application of collaborative consulting model in biomedical research settings and describe brief specific collaborative cases that result into further understandings of the functional role of Cyclin D1 in cancer and the natural control of HIV in long term non-progressors.

BIOGRAPHY

Originated from Ping-Tung, Taiwan, Dr. Yaoyu E. Wang received dual bachelor degrees in biological science and computer science from Carnegie Mellon University in Pittsburgh. Dr. Wang then undertook graduate work at Boston University, where he became interested in applying quantitative methods to study questions in protein evolution. He earned his PhD in Bioinformatics in 2007 with his thesis on computational methods for identifying therapeutic targets against highly mutable pathogens. In 2007, Dr. Wang joined the Ragon Institute of MGH, MIT, and Harvard as Research Fellow, where he studied HIV genome evolution in patients with different rate of disease progression.

Previously, he worked at the Center for Advance Genomic Technology of Boston University and the Division of Molecular Informatics of Pfizer Discovery Technology Center. He joined the Center for Cancer Computational Biology at Dana-Farber Cancer Institute as Bioinformatics Analyst in 2009. Since then he has been collaborating with both academic and industrial research laboratories on developing statistical and computation methods to analyze high throughput biomedical data to study disease areas such as HIV, diabetes, cancers, and autoimmune diseases.

Technical Session D1-W1-T3 :Medicine/Public Health/Biotechnology/Bioinformatics (3)

Precise mapping for bisulfite sequencing in generating DNA methylation profiles

Pao-Yang Chen (加州大學洛杉磯分校陳柏仰博士)

Postdoctoral Fellow, Department of Molecular, Cell and Developmental Biology
University of California, Los Angeles
Address: 3165 S Sepulveda Blvd Apt 204, Los Angeles, CA, 90034, USA
Email: paoyang@gmail.com

ABSTRACT

Epigenetic regulation, such as cytosine DNA methylation, is important in gene regulation. Precise measurements of genome-wide DNA methylation at single base resolution have only recently become possible with next generation based bisulfite sequencing (BS-seq). However, aligning bisulfite converted reads remains technically challenging. Here we introduce our bisulfite aligner, BS Seeker, to accommodate single end and paired end mapping. We further propose RRBS-Seeker for mapping reads that are generated
from reduced representation bisulfite sequencing (RRBS). By mapping synthetic RRBS reads against the enzyme-digested fragments, RRBS-Seeker yields a higher mapability and a higher accuracy than mapping the reads directly against the genome. To demonstrate the use of BS Seeker we use it in the analysis of comparing methylomes from human embryonic stem cells. For RRBS mapping we mapped six mice RRBS lanes. The result reveals lower methylation levels in mice of mothers with caloric restrictions; suggesting the nutrition intake in parents may alter the epigenetic profiles of offspring.

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.

Technical Session D1-W2-T3: New Materials Science and Engineering, Nanotechnology (3)

Session Organizer & Chair

Jung-Tsung Shen (聖路易華盛頓大學電機暨系統工程學系沈榮聰教授)

Assistant Professor, Washington University in St. Louis
Address: One Brookings Dr., St. Louis, MO 63130
Email: jushen@gmail.com

BIOGRAPHY

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, Professor Shen 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.

Professor Shen's primary research interest is in exploiting device potential and new material concepts enabled by the capability of manipulating light at subwavelength scales.

Technical Session D1-W2-T3: New Materials Science and Engineering, Nanotechnology (3)

Nanophotonic Emitters for Future Communication, Energy, and Health Care

Pei-Cheng Ku (密歇根大學安娜堡分校電機系古培正教授)

Assistant Professor, Department of Electrical Engineering and Computer Science, University of Michigan
1301 Beal Ave, Ann Arbor, Michigan, USA
Tel: +1-734-764-7134, Fax: +1-734-763-9324
Email: peicheng@umich.edu

ABSTRACT

Compact, solid-state light emitters play an enabling role in today's telecommunication networks, solid-state lighting, and biomedical devices. As the trend of the technology moves toward being smaller, more versatile, more energy-efficient, and more cost effective, it is critical to be able to control and manipulate light-matter interaction at an unprecedented level, i.e. at a much smaller length scale ($<<\lambda$), spanning a wider spectral range ($\Delta\lambda$), down to a single-photon level, and up to a terahertz bandwidth. Using state-of-the-art nanofabrication facilities and the combination of top-down and bottom-up approaches, researchers have been able to narrow the gap toward the above goals. Nanoscale lasers and light-emitting diodes have emerged in recent years. In this talk, we will present our latest efforts in this direction. We will present three types of nanophotonic emitters including semiconductor nanoring lasers, single-quantum-dot emitters, and emitters exhibiting ultrasmall ($<<10^{-18}$ m^3) focusing volumes. We will also discuss the potential applications of these devices in on-chip interconnect, quantum information, medical diagnosis, and biomedical science.

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-W2-T3:New Materials Science and Engineering, Nanotechnology (3)

Organic and Inorganic Nanocrystal Thin Film Solar Cells

Hsiang-Yu Chen (美國國家可再生能源實驗室陳香妤博士)

Postdoc, National Renewable Energy Laboratory
1617 Cole Blvd, Golden, CO 80401 USA
Tel: 303-384-764
Email: hsiangyc@gmail.com

ABSTRACT

Two of the most attractive materials that are actively being researched for inexpensive and potentially flexible photovoltaics (PV) are colloidal quantum dots (QDs) and conducting polymers, which can be deposited with solution-based techniques such as spin, spray, dip coating or roll-to-roll processing. In this talk, the current status and challenges of thin film solar cells based on these two materials will be presented and discussed.

BIOGRAPHY

Education:

2006–2009	Ph.D., Materials Science and Engineering, University of California, Los Angeles.
2002–2004	M.S., Physics, National Central University, Taiwan.
1997–2001	B.S., Chemistry, National Tsing Hua University, Taiwan.

Work and Research Experience:

Postdoctoral Researcher, National Renewable Energy Laboratory	Jan 2010–Present
Assistant Director of R&D, Solarmer Energy Inc.	Nov 2009–Dec 2009
Intern, Solarmer Energy Inc.	May 2009–Aug 2009
Research Assistant, UCLA	2006–2009
Research Assistant, UC-Irvine	2005–2006
Engineer, Nanya Technology Corporation, Taiwan	2005
Research Assistant, National Central University, Taiwan	2004
Teacher, National Chu Tung Senior High School, Taiwan	2001–2002

Selected Publications:

H. Y. Chen, J. Hou, S. Zhang, G. Yang, Y. Yang, Y. Wu, and G. Li, "Polymer solar cells with enhanced open circuit voltage and efficiency," Nature Photonics, 3, 649 (2009).

H.Y. Chen, J. Hou, A.E. Hayden, H. Yang, K.N. Houk, and Y. Yang, "Silicon atom substitution enhances interchain packing in a thiophene-based polymer system," Adv. Mater., 22, 371 (2010).
H.Y. Chen, M.K.F. Lo, G. Yang, H.G. Monbouquette, and Y. Yang, "Nanoparticle-assisted high photoconductive gain in polymer-fullerene matrix," Nature Nanotechnology, 3, 543 (2008).

Awards:

2009–2011	The Link Foundation Energy Fellowship Honorable Mention Recipient
2008	SPIE Scholarship Award
2008	The Russell & Sallie O'Neill Graduate Scholarship in Engineering & Applied Science, provided by UCLA Faculty Women's Club

Technical Session D1-W2-T3:New Materials Science and Engineering, Nanotechnology (3)

Electromechanical Stability of Nanocrystalline Silicon Thin Film Transistors Made on Colorless Polyimide Foil Substrates

I-Chun Cheng (台灣大學電機工程學系陳奕君教授)

Graduate Institute of Photonics and Optoelectronics
and Department of Electrical Engineering
National Taiwan University
Email: ichuncheng@cc.ee.ntu.edu.tw

ABSTRACT

Hydrogenated nanocrystalline silicon (nc-Si:H) has been considered as one of the candidate materials for flexible electronic applications. They can be obtained by plasma enhanced chemical vapor deposition (PECVD) at low temperature, which is the industrial standard technique for fabrication of large-area electronics. In this work, nc-Si:H thin film transistors (TFTs) made on colorless polyimide foil substrates are demonstrated. Because the on-plastic TFTs must keep functioning during and after mechanical flexing, I will discuss their electrical performance and DC and AC gate-bias stability under the influence of various mechanical tensile strain levels in the talk.

BIOGRAPH

I-Chun Cheng received her B.S. and M.S. degrees in Mechanical Engineering at National Taiwan University in 1996 and 1998, respectively. In 2004, she received a Ph.D. degree in Electrical Engineering from Princeton University and became a research associate at Princeton University. Since 2007 she has joined Department of Electrical Engineering and Graduate Institute of Photonics and Optoelectronics at National Taiwan University as an assistant professor. She has primarily worked in the field of novel silicon thin film technology, metal oxide thin film technology, and flexible large-area-electronics.

Technical Session D1-W2-T3:New Materials Science and Engineering, Nanotechnology (3)

Nanostructured Group IV Elements for Energy Storage

Bingqing (B. Q.) Wei (德拉瓦大學機械工程系魏秉庆教授)

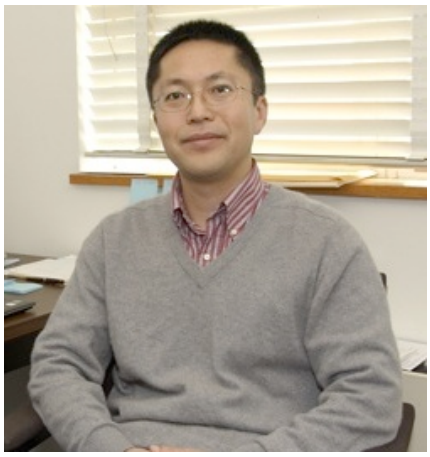
Department of Mechanical Engineering, University of Delaware
Newark, DE 19176, USA
Email: weib@udel.edu

ABSTRACT

Electricity storage is a growing challenge among a broad range of renewable energy sources. The development of high-energy storage devices has been one of the research areas of top most importance in recent years and rechargeable batteries and/or electrochemical capacitors (supercapacitors) are anticipated to be the primary sources of power for modern-day requirements in portable electronic devices, satellites, and electric vehicles, etc. Most recently, flexible/stretchable electronics have attracted considerable attention and have opened the door to many important applications that current, rigid electronics cannot achieve. In order to accommodate these needs, power source devices must be flexible and stretchable in addition to their high energy and power density, light weight, miniaturization in size, and safety requirements.

Research in the development of new materials and new structures for energy storage applications is an ongoing pursuit. Nanomaterials and nanostructures such as carbon nanotubes (CNTs) have been full of surprises since their emergence and this trend continues. Utilizing CNTs for various energy storage applications such as electrodes in lithium ion batteries and supercapacitors are under close scrutiny because of the promising electrochemical performance of such nanomaterials. Most recently, there has been growing interest in Si nanostructures because of their tremendous potential for applications in lithium ion batteries. In this presentation, I will report our research efforts in assembling 2-D CNT macrofilms using chemical vapor deposition method and their applications for different supercapacitors, such as stretchable supercapacitors and high-temperature supercapacitors. I will also discuss electrochemical properties of different Si nanostructures, such as wavy Si nanostructures and a tandem structure of thin porous silicon film on CNT, as electrode materials for lithium ion battery applications.

BIOGRAPHY



Dr. Bingqing (B. Q) Wei received his Bachelor's degree (1987), M.S (1989), and Ph.D. (1992) in Mechanical Engineering from Tsinghua University, China. His research expertise lies in nanomaterials and nanotechnology. His recent research focuses on controllable synthesis of macroscale nanotube architectures with 1-, 2-, and 3-dimensions; physical, chemical, electrochemical and mechanical property characterizations of nanotubes; and nanotube device applications.

Dr. Wei is promoted to a Full Professor in the summer, 2011 after serving as an Associate Professor in the Department of Mechanical Engineering at the University of Delaware since January 2007. He was an Assistant Professor in the Department of Electrical & Computer Engineering and Center for Computation & Technology at Louisiana State University from 2003 to 2007. He had worked as a research scientist at Rensselaer Polytechnic Institute, Department of Materials Science and Engineering and Rensselaer Nanotechnology Center from 2000 to 2003. Dr. Wei was a visiting scientist for Max-Planck Institut für Metallforschung, Stuttgart, Germany in 1998 and 1999. He was a faculty at Tsinghua University in Beijing from 1992 to 2001.

Dr. Wei is a member of The Materials Research Society (MRS), The Electrochemical Society (ECS), The International Society for Optical Engineering (SPIE), The American Chemical Society (ACS), and The American Society of Mechanical Engineering (ASME). His scholarly achievements in the field of nanomaterials and nanotechnology and, particularly in the research of carbon nanotubes are fully reflected from his 180 papers published in refereed international journals, including Nature and Science, more than 95 scientific conference presentations and 90 plus invited talks and seminars in academia and industry worldwide. His research work has been cited more than 6700 times by peer scientists with h-index of 44 and has also been highlighted many times in scientific journals, web journals and public media.

Technical Session D1-W3-T3: C4I(3): Broadband Technologies, Cloud Computing, Supercomputing and Smart Home

Session Organizer & Chair

Jia-Yu (Tim) Pan (美國谷歌公司潘家煜博士)

Software Engineer, Google Inc., U.S.A.
Science and Technology, National Cheng Kung University
Address: 1600 Amphitheatre Parkway, Mountain View, CA 94043, U.S.A.
Email: jiayu.pan@gmail.com

BIOGRAPHY

Jia-Yu Pan is a software engineer at Google, Inc. He has received three best paper awards from the conferences ICDM 2006, ICDM 2005, and PAKDD 2004. His research interests include anomaly detection, data mining methods, clustering techniques, and WWW technology. He received his Ph.D. degree from Carnegie Mellon University. He has served on the program committee of several conferences and has organized several workshops, most recently the Multimedia Data Mining Workshop to be held in conjunction with the ACM KDD 2011 conference.

Technical Session D1-W3-T3: C4I(3): Broadband Technologies, Cloud Computing, Supercomputing and Smart Home

Compressive Bidding for Wireless LAN Medium Access Control

Tsung-Han Lin (哈佛大學林宗翰)

Ph.D. Candidate in Computer Science
School of Engineering and Applied Sciences
Harvard University
Email: thlin@fas.harvard.edu

ABSTRACT

Recent advance in compressive sensing enables efficient information gathering in distributed systems. In light of this, we propose a medium access control protocol for wireless LAN that builds on the idea of compressive bidding. The proposed compressive bidding MAC (CB-MAC) exploits the sparse structure in bidding where often only a few bids are significant. By having the bidders (i.e., client stations) send out bids in random projections, the auctioneer (i.e., central coordinator) can recover significant bids by receiving a relatively small number of messages, rather than checking through every individual bidder. This results in highly efficient bid collection. Correspondingly, in CB-MAC, a central coordinator (e.g., an access point) can utilize compressive bidding to effectively schedule channel access for stations in a WLAN. We show that CB-MAC can address challenging problems in distributed wireless MAC protocols. Through simulations, we show that CB-MAC naturally solves the hidden terminal problem, achieves better short-term fairness, and supports proportional QoS. We present a prototype implementation of CB-MAC on a software radio platform and show the feasibility of analog compressive bidding.

BIOGRAPHY

I'm a 3rd-year PhD student in computer science at Harvard University, working with Prof. H.T. Kung. Generally my research interest lies in wireless networking. In particular, I have worked on topics including wireless UAV networking, network coding, RF localization, and wireless sensor networks. Recently I am into applications and algorithms for compressive sensing. Prior to coming to Harvard, I got my M.S. and B.S. from National Taiwan University both in electrical engineering. I worked with Prof. Polly Huang and Prof. Hao-hua Chu at Network and Systems Laboratory.

Technical Session D1-W3-T3: C4I(3): Broadband Technologies, Cloud Computing, Supercomputing and Smart Home

Make the Web Faster Through Cloud Routing

Coach Wei

CEO, Yottaa Inc
2 Canal Park 5th Floor
Cambridge, MA 02141
Email: coach@yottaa.com

ABSTRACT

Let's face it, the web is still too slow. Though Internet connectivity has been improving, the complexity of web applications and the volume of web traffic increased many more times. How many times have you abandoned a site because it took forever to load?

This session talks about the recent movement to make the web faster, covering Google, W3C, startups and the grassroots community. In particular, the session shows how cloud computing offers new innovative ways to do things previously not possible before at an Internet scale. This session is not intended to be a technical deep dive. Rather, it is intended for attendees who are not necessarily computer scientists.

BIOGRAPHY

Coach Wei is co-founder and CEO of Yottaa, a web performance optimization company.

Besides Yottaa, Coach is also Chairman of Nexaweb Technologies, a Boston based company he founded in 2000 that pioneered Rich Internet Applications and enterprise web 2.0. He raised over $20MM venture capital for Nexaweb, built a global team, grew the revenue from zero to multi-million dollar and achieved over 7,000 global deployments. Before Nexaweb, Coach designed software for managing storage networks at EMC Corporation.

Coach is a frequent speaker on technology, industry trends and startup ecosystem. He also serves on advisory boards of Boston area startups. He received various awards for his work on Ajax, Rich Internet Application and Entrepreneurship, such as "Interactive Experience Award" 2005 and "Boston Top 40 under 40" 2007.

Coach obtained his master's degree from MIT, holds six patents and maintains a blog on startups, web 2.0 and entrepreneurship at http://www.coachwei.com.

Technical Session D1-W3-T3: C4I(3): Broadband Technologies, Cloud Computing, Supercomputing and Smart Home

Human Centered Software Design for Multi-Modal Sensing Smart House

Hen-I Yang

Postdoc Researcher, Iowa State University
B20 Atanasoff Hall, Department of Computer Science,
Iowa State University, Ames, IA 50011, USA
Email: hiyang@iastate.edu

ABSTRACT

As more software moves from system centric towards human centric paradigm, the software engineering practice must evolve accordingly. A human centered software engineering (HCSE) process built upon the Situ framework is proposed to enable software to be individualized for each user. By identifying users' intentions and responding to the current situations and contexts, software systems can determine and exhibit the appropriate behaviors. HCSE process would introduce considerable paradigm shift to every single phase of the traditional software engineering practice. Essentially, it enables the software systems, in real time, to collect and identify new requirements, to evolve its implementation to meet the user's intentions, and to validate if the user has been satisfied. In addition, we describe an intelligent environment based on a smart home laboratory, capable of aggregating a wide range of multi-modal sensory inputs and providing the necessary information, that is designed to support the HCSE process.

BIOGRAPHY

Hen-I Yang is a post-doc research scientist in the Department of Computer Science of the Iowa State University. His research areas include service computing and pervasive computing, with focus on intelligent environments such as smart homes. Current research interests include programming models and middleware for intelligent environments, as well as utilizing AI techniques on sensor data for user modeling. Yang received his PhD in computer engineering from the University of Florida.

Technical Session D1-W3-T3: C4I(3): Broadband Technologies, Cloud Computing, Supercomputing and Smart Home

Current status and trend in Supercomputing

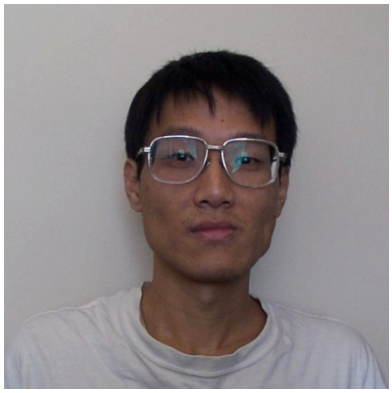
Charng-Da Lu (纽约州立大學水牛城分校呂長達博士)

Computational Scientist, Center for Computational Research, SUNY at Buffalo
Address: 701 Ellicott St, Buffalo, NY 1420, USA
Email: charngda@buffalo.edu

ABSTRACT

As supercomputers scale to hundreads of thousands CPU cores, there are many technical hurdles to overcome. One of the foremost issues is power consumption and efficiency. Another is software which can scale in accordance with the growth of hardware. In this talk I would like to give an overview of exciting development and trend in Supercomputing, and the project our center is contributing and collaborating within the Supercomputing community.

BIOGRAPHY



Charng-Da Lu obtained his PhD in Computer Science (with a concentration on high-performance computing) and MS in Mathematics from University of Illinois at Urbana–Champaign in 2007. He then worked as a quantitative software developer in a New York financial firm until 2010. Since June 2010, he is a Computatioanl Scientist at the Center for Computational Research at SUNY at Buffalo, focusing on design and implementation of application kernels and benchmarks for the NSF-funded TeraGrid Technology Audit project.

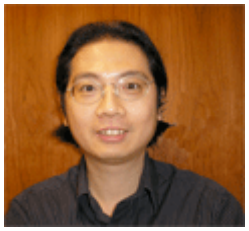
Technical Session D1-W1-T4: Medicine/Public Health/Biotechnology/Bioinformatics (4)

Session Organizer & Chair

Dr. Yi-Hsiang (Sean) Hsu (哈佛醫學院許益祥教授)

Harvard University
Email: yhh5402@gmail.com

BIOGRAPHY



Dr. Yi-Hsiang Hsu is an Assistant Professor in Medicine, Harvard Medical School, Beth Israel Deaconess Medical Center and Hebrew SeniorLife Institute for Aging Research. He also directs the High Performance Computing System Lab at Institute for Aging Research. Dr. Hsu is a statistical geneticist who has extensive experience with the genetic fields using genome-wide association approach (GWAS), linkage and candidate gene association methods to find genes associated with musculoskeletal disorders, osteoporosis, cancers, type 2 diabetes and drug response of blood pressure to hypertensive medications. Dr. Hsu also involved in the statistical method development for GWAS, such as multivariate GWAS methods and to study the pleiotropic effects on skeletal and energy metabolisms. Dr. Hsu has experience using systems biology approaches to integrate GWAS, genomics, trascriptomics, proteomics and metabolomics resources for better understanding relationships between the biological components that work together to drive a complex pathophysiological process of common diseases across signal pathways, organisms and even species on a global scale.

Technical Session D1-W1-T4: Medicine/Public Health/Biotechnology/Bioinformatics (4)

Gene Set testing, Stem cells and Breast cancer

Di Wu

Postdoctoral fellow, Harvard University
Department of Statistics, Science Center, 1 Oxford Street, Cambridge, MA
Tel: +1-617-496-9297, Fax: +1-617-496-8057
Email: dwu@fas.harvard.edu

ABSTRACT

A gene set test is a differential expression analysis in which a p-value is assigned to a set of genes as a unit. Gene set tests are valuable for increasing statistical power, organizing and interpreting results, and for relating expression patterns across different experiments.

Breast cancer is a heterogeneous disease with at least 6 major subtypes. We have the microarray data of 4 cell subpopulations in normal human mammary gland, including stem cell enriched cells, luminal progenitor, mature luminal and stromal cells. I will demonstrate how we identify the cell of origin for breast cancer subtypes using this data and publically available data.

A variety of bioinformatics methods are used, including defining gene signature scores for each sample and some novel gene set testing methods. The rotation gene set test, ROAST, overcomes the limitation of sample size and inter-gene correlation. Other two gene set tests, ROMER and Camera are developed to test different statistical hypotheses.

BIOGRAPHY

She started her POSTDOCTORAL FELLOW jointly in the department of statistics and the medical School, Harvard University early April 2011. The primary location is Department of Statistics, Science Center, 1 Oxford Street, Cambridge, MA. Before she did her PhD in 2007, she worked as a BIOSTATISTICIAN in the Center for Cancer Research of Monash Institute of Medical Research, Australia, for half year of 2006. She continued this job part time after becoming a PhD student until moving to Boston. She worked as a RESEARCH ASSISTANT in molecular biology laboratories from 2002 to 2006, in the Comprehensive Cancer Center and the department of pathology, Case Western Reserve University, Cleveland, OH, as well as in Shanghai Institute of Biochemistry, Chinese Academy of Science from 1998 to 2001. The major publications include finding cell of origin for breast cancer subtypes in Nature Medicine 2009, the mammary cell type conservation between mouse and human in Breast Cancer Research2009, and the gene set testing method ROAST particularly for small-complex designs 2010. She is interested in developing statistical bioinformatics and biostatistics software, particularly for genomic data (microarray, epigenetics, GWAS) and data integration. From the biological point of view, she is interested in research of cancer, stem cells and autoimmune diseases. She is currently working on eQTL mapping.

Technical Session D1-W1-T4: Medicine/Public Health/Biotechnology/Bioinformatics (4)

Medical genetics: using Pedigrees to Characterize the Founder Structure of a Closed Population

Woei-Jyh (Adam) Lee (美國國家衛生院李偉智博士), Ph.D.

Fellow, National Institutes of Health
8600 Rockville Pike, Bethesda, Maryland 20894, U.S.A.
Tel: +1-301-496-9293, Fax: +1-301-480-2290
Email: adamlee@ncbi.nlm.nih.gov

ABSTRACT

The software PedHunter 1.0 was released in 1998 to solve optimal pedigree connection problems and other problems related to pedigree construction, verification, and analysis. PedHunter 2.0 released in 2010 supports 50 queries in four categories and provides seven utility programs including pedigree trimming and pedigree renumbering. PedHunter was initially designed to search the Anabaptist Genealogy Database (AGDB), which is described below. PedHunter has also been used to construct genealogies for linkage and haplotype analysis on Hutterite families, an Icelandic population, a Southern Italy population, and a Northern Italy population.

There have been several versions of AGDB based on three genealogy sources and multiple updates. AGDB version 5.0 (AGDB5), containing 539,822 individuals and 136,214 marriages, was created in 2010. Several groups have used AGDB in their research on rare and common diseases. Although AGDB contains no explicit phenotype data, lifespan can be inferred when both birth and death dates are available. Several studies on lifespan using AGDB have established that lifespan is heritable, that lifespan may be associated with other implicit traits, and that lifespan can be associated with experimentally measured traits.

Using PedHunter 2.0 to query AGDB5, we quantified the extent to which the Old Order Amish (OOA) are a closed population ideal for elucidating the role of genetic variation. Specifically, we quantified the number of founders and their genetic contribution to ~34,000 presumed living Lancaster County, Pennsylvania OOA individuals born in 1930-2000.

BIOGRAPHY

Woei-Jyh (Adam) Lee received his BS degree from the Department of Computer Science and Information Engineering at the National Taiwan University in 1993, and his MS degree from the Department of Computer Science at the New York University in 1998. He received his PhD degree from the Department of Computer Science at the University of Maryland at College Park in 2008.

He worked on distributed objects and fault tolerance at AT&T Labs - Research in 1997. He focused on network software and management at Bell Laboratories Research, Lucent Technologies, from 1998 till 2000. He visited Integrated Media Systems Center at the University of Southern California specializing in continuous media streaming and multimedia networking from 2002 to 2003. He also contributed in protein domain parsing and boundary prediction at the National Cancer Institute from 2004 to 2005. He is currently a fellow at the National Center for Biotechnology Information, National Library of Medicine, National Institutes of Health, USA. He is also affiliated with the Center for Bioinformatics and Computational Biology and the Institute for Advanced Computer Studies at the University of Maryland.

Dr. Lee's research interests include bioinformatics, computational biology, systems biology, genomics and genetics, information integration, data management and mining, and literature-based discovery. He has two US Patents and is a member of the ISENG.

Technical Session D1-W1-T4: Medicine/Public Health/Biotechnology/Bioinformatics (4)

Using Modeling and Simulation on Personalized Medical Decision Support and Comparative Effectiveness Research

Chih-Lin Chi (哈佛醫學院紀志霖博士)

Postdoctoral Research Associate
Laboratory for Personalized Medicine
Center for Biomedical Informatics
Harvard Medical School
Email: Chih-Lin_Chi@hms.harvard.edu

ABSTRACT

This work presents results associated with drugs with narrow therapeutic window, such as warfarin, requiring intensive individualized care. Treatment protocols are designed to reduce the risks of treatment for the population. We proposed a novel modeling-and-simulation method that integrates published treatment protocols and optimization approach to intelligently determine a low-risk protocol based on an individual's clinical and genetic factors. In addition to personalized treatment protocol, the application of this method to comparativeness effectiveness research will be discussed.

BIOGRAPHY

Technical Session D1-W1-T4:Medicine/Public Health/Biotechnology/Bioinformatics (4)

Energy Restriction as an Antitumor Target of Thiazolidinediones

Shuo Dennis Wei (哈佛醫學院魏碩博士)

Postdoctoral Research Fellow
Department of Medicine
Beth Israel Deaconess Medical Center
Harvard Medical School
Email: swei2@bidmc.harvard.edu

ABSTRACT

Cancer cells gain growth advantages in the microenvironment by shifting cellular metabolism to aerobic glycolysis, the so-called Warburg effect. There is a growing interest in targeting aerobic glycolysis for cancer therapy by exploiting the differential susceptibility of malignant *versus* normal cells to glycolytic inhibition, of which the proof-of-concept is provided by the *in vivo* efficacy of dietary caloric restriction and natural product- based energy restriction-mimetic agents (ERMAs) such as resveratrol and 2-deoxyglucose in suppressing carcinogenesis in animal models. Here, we identified thiazolidinediones as a novel class of ERMAs in that they elicited hallmark cellular responses characteristic of energy restriction, including transient induction of Sirt1 (silent information regulator 1) expression, activation of the intracellular fuel sensor AMP-activated protein kinase, and endoplasmic reticulum stress, the interplay among which culminated in autophagic and apoptotic death. The translational implications of this finding are multifold. First, the novel function of troglitazone and ciglitazone in targeting energy restriction provides a mechanistic basis to account for their peroxisome proliferator-activated receptor γ-independent effects on a broad spectrum of signaling targets. Second, we demonstrated that Sirt1-mediated up-regulation of β-transducin repeat-containing protein-facilitated proteolysis of cell cycle- and apoptosis-regulatory proteins is an energy restriction-elicited signaling event and is critical for the antitumor effects of ERMAs. Third, it provides a molecular rationale for using thiazolidinediones as scaffolds to develop potent ERMAs, of which the proof-of-principle is demonstrated by OSU-CG12. OSU-CG12, a peroxisome proliferator-activated receptor γ-inactive ciglitazone derivative, exhibits 1- and 3-order of magnitude higher potency in eliciting starvation-like cellular responses relative to resveratrol and 2-deoxyglucose, respectively.

BIOGRAPHY

Technical Session D1-W1-T4: Medicine/Public Health/Biotechnology/Bioinformatics (4)

Local Raster Scanning with Atomic Force Microscopy and its Application in Biology and Drug Development

Peter Chang (張以全)
PhD Candidate, Mechanical Engineering
School of Engineering, Boston University
Email: tsyuen@gmail.com

ABSTRACT

Atomic Force Microscopy (AFM) has been widely used in research to biological systems for its ability to measure with nanometer accuracy and pico-Newton sensitivity. Current commercial AFM systems are often used as an imaging device to provide visual feedback to researchers in the field. This imaging is done through a raster scanning pattern, and often take minutes to create a satisfactory result. This temporal resolution is not applicable to help study dynamic biological systems, thus we represent an alternative scanning pattern that automatically track and follow bio-inspired polymers in order to speed up the imaging process.

BIOGRAPHY

Peter I-Tsyuen Chang is currently a PhD Candidate at Boston University's Mechanical Engineering Department, under the advise of Prof. Sean B Andersson researching in the field of Controls in Nano-Scale Imaging. Before joining BU, he has been a Staff Research Assistant at Nation Taiwan University's HydroTech Research Institute, and a Thermal Engineer at Delta Electronics. He received both his MS and BS at National Taiwan University's Engineering Science and Ocean Engineering Department.

Technical Session D1-W2-T4: New Materials Science and Engineering, Nanotechnology (4)

Session Organizer & Chair

Yu-Bin Chen (成功大學機械系陳玉彬教授)

Assistant Professor, Department of Mechanical Engineering; Center for Micro/Nano Science and Technology, National Cheng Kung University
Address: No.1, University Road, Tainan City 701, Taiwan
Email: ybchen@mail.ncku.edu.tw

BIOGRAPHY

Technical Session D1-W2-T4: New Materials Science and Engineering, Nanotechnology (4)

Ultra-low-power nonlinear optical devices

Jung-Tsung Shen (聖路易華盛頓大學電機暨系統工程學系沈榮聰教授)

Assistant Professor, Washington University in St. Louis
Address: One Brookings Dr., St. Louis, MO 63130
Email: jushen@gmail.com

ABSTRACT

In this talk, I will describe some of recent research in my group on ultra-low-power nonlinear optical devices. In particular, I will first discuss a high-efficiency single-photon frequency convertor that can up- or down-convert the frequency of single photons, with a quantum efficiency close to 1. I will then discuss a realization of a photon diode. Photon diodes act as a unidirectional valve that permits photons to pass through in only one direction but not the reverse. The non-reciprocal device addresses the fundamental challenges of providing signal isolation and to suppress parasitic reflection of photons between quantum optical devices for on-chip integration.

BIOGRAPHY

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, Professor Shen 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.

Professor Shen's primary research interest is in exploiting device potential and new material concepts enabled by the capability of manipulating light at subwavelength scales.

Technical Session D1-W2-T4:New Materials Science and Engineering, Nanotechnology (4)

Optimization of Glass Radiative Properties for Energy-Saving with Two-dimensional Gratings

Yu-Bin Chen (成功大學機械系陳玉彬教授)

Assistant Professor, Department of Mechanical Engineering; Center for Micro/Nano Science and Technology, National Cheng Kung University
Address: No.1, University Road, Tainan City 701, Taiwan
Email: ybchen@mail.ncku.edu.tw

ABSTRACT

Modern buildings have widely used the glass for its diaphaneity and esthetics. The energy-saving glass not only holds both mentioned advantages but also largely reduces unwanted infrared radiation into the buildings to save energy for air conditioning. Moreover, the ideal energy-saving glass is expected to block harmful ultraviolet radiation, diminish reflected stray light, and even enhance visible transmittance to save illumination cost. Those objectives are intrinsically wavelength-selective radiative properties, which can be realized with embedded subwavelength structures within the glass.

This work is thus going to propose an efficient way of designing profiles of two-dimensional nanoscale gratings inside glass and numerically demonstrate its tailored radiative properties. The employed numerical algorithm is the Rigorous Coupled-Wave Analysis [1] for obtaining radiative properties while the optimization method is the Genetic Algorithm [2]. Both reflectance and transmittance spectra of the developed glasses will demonstrate their attractiveness in energy-saving. The shading coefficient according to the International Standard – ISO9050 [3] will provide further quantitative supports after comparing those of commercially-available glasses. This work is hoped to offer an alternative way of developing energy-saving glass as well as other devices with wavelength-selective radiative properties.

BIOGRAPHY

Technical Session D1-W2-T4:New Materials Science and Engineering, Nanotechnology (4)

Professor Hong Yang

Department of Chemical Engineering
University of Rochester

Technical Session D1-W3-T4: Broadband Technologies and Multimedia Services, Cloud Computing and Cyber Security

Session Organizer & Chair

Tsung-Han Lin (哈佛大學林宗翰)

PhD Candidate in Computer Science
School of Engineering and Applied Sciences
Harvard University
Email: thlin@seas.harvard.edu

BIOGRAPHY

Tsung-Han Lin is a Ph.D. candidate in Computer Science of Harvard University. He has received his B.S. and M.S. degree in the Department of Electrical Engineering, National Taiwan University. His research interests include wireless networks, compressive sensing, wireless networking for unmanned aerial vehicles (UAVs), and wireless sensor networks.

Technical Session D1-W3-T4: Broadband Technologies and Multimedia Services, Cloud Computing and Cyber Security

A Simple Queueing Network Model of Mobility in a Campus Wireless Network

Yung-Chih Chen (麻州大學安默斯特分校陳勇志)

PhD Candidate in Computer Engineering
Electrical and Computer Engineering Departme
University of Massachusetts Amherst
Email: yungchih@cs.umass.edu

ABSTRACT

Although wireless networks have become ubiquitous, surprisingly few models of user-level mobility have been developed and validated against traces of measured user behavior. In this paper, we develop a simple, parameterized, open queueing network model of user mobility among access points in a campus network. Using CRAWDAD traces of user- access-point affiliation over time, we compare model-predicted performance with the performance actually observed in the traces, and find that such a simple queueing model can indeed be used to accurately predict a number of performance measures of interest.

BIOGRAPHY

Yung-Chih Chen is a Ph.D. candidate in the department of Computer Science at the University of Massachusetts at Amherst. He obtained his B.S. degree from Computer Science department in National Tsing Hua University, Taiwan, in 2004. Before joining UMass Amherst, he worked for a year at the Institute of Information Science in Academia Sinica, Taiwan. He is now a member of Computer Networks Research Group, led by Prof. Jim Kurose and Prof. Don Towsley. His research interests include mobility modeling and performance evaluation.

Technical Session D1-W3-T4: Broadband Technologies and Multimedia Services, Cloud Computing and Cyber Security

Making Virtual More Realistic: from a Computer Graphics Perspective

Wen-Chieh Lin (交通大學資訊工程學系林文杰教授)

Assistant Professor, National Chiao Tung University
Hsinchu City, Taiwan
Email: wclin@cs.nctu.edu.tw

ABSTRACT

Computer graphics techniques have been a driving force for digital entertainment in recent years. They have been applied to special effects, computer animation, computer games, virtual reality, augmented reality, etc. Among these applications, creating a realistic virtual world or mixing virtual objects into a real scene have been the common goals. In my presentation, I'll introduce some of my research projects that aim to make virtual things look more realistic, ranging from realistic rendering, such as texture modeling and manipulation in images and videos, rendering surface details using texture database, real-time translucent rendering; to realistic animating, such as physics-based walking animation, generating rich and realistic rising up motions. Beyond realistic rendering, I'll also show a non-photorealistic rendering system that can render virtual objects in artistic styles by resembling brush strokes in paintings. Finally, I'll briefly discuss how visual perception studies can benefit the evaluation and improvement of computer graphics techniques by introducing our recent work on texture saliency modeling and attention-based high dynamic range imaging.

BIOGRAPHY

Wen-Chieh Lin received the BS and MS degrees in control engineering from National Chiao Tung University, Hsinchu, Taiwan, in 1994 and 1996, respectively, and the PhD degree in robotics from Carnegie Mellon University, Pittsburgh, in 2005. Since 2006, he has been with the Department of Computer Science, National Chiao Tung University, as an assistant professor. Dr. Lin's research interests include computer graphics, computer animation, and computer vision. In recent years, he works on near-regular texture analysis and manipulation, real-time translucent rendering, texture-based non-photorealistic rendering, optimized parameterization for bidirectional texture function modeling, physics-based character animation, and perception-based graphics. Some of his current research projects include attention-based high dynamic range imaging, visual saliency modeling for textures, generating rising up motions, and balance control for virtual characters. He is a member of the IEEE and the ACM and also a founding member of Taipei ACM SIGGRAPH.

Technical Session D1-W3-T4: Broadband Technologies and Multimedia Services, Cloud Computing and Cyber Security

The Goals and Challenges of Click Fraud Penetration Testing Systems

Jia-Yu (Tim) Pan (美國谷歌公司潘家煜博士)

Software Engineer, Google Inc., U.S.A.
Science and Technology, National Cheng Kung University
Address: 1600 Amphitheatre Parkway, Mountain View, CA 94043, U.S.A.
Email: jiayu.pan@gmail.com

ABSTRACT

It is important for search and pay-per-click engines to penetration test their click fraud detection systems, in order to find potential vulnerabilities and correct them before fraudsters can exploit them. In this talk, I will describe: (1) some goals and desirable qualities of a click fraud penetration testing system, based on our experience, and (2) our experiences with the challenges of building and using a click fraud penetration testing system called Camelot that has been in use at Google.

BIOGRAPHY

Jia-Yu Pan is a software engineer at Google, Inc. He has received three best paper awards from the conferences ICDM 2006, ICDM 2005, and PAKDD 2004. His research interests include anomaly detection, data mining methods, clustering techniques, and WWW technology. He received his Ph.D. degree from Carnegie Mellon University. He has served on the program committee of several conferences and has organized several workshops, most recently the Multimedia Data Mining Workshop to be held in conjunction with the ACM KDD 2011 conference.

Friday August 19th Opening Speech

Session Organizer & Chair

Lin-Shan Lee, PhD (李琳山院長)

Dean, College of Electrical Engineering and Computer Science
National Taiwan University
No. 1, Sec. 4, Roosevelt Rd., Taipei, 106, Taiwan, R.O.C.
Tel: +886-2-3366-3547
Email: lslee@cc.ee.ntu.edu.tw

BIOGRAPHY

Lin-shan Lee received a B.S. in Electrical Engineering from National Taiwan University in 1974, an M.S. and a Ph.D. in Electrical Engineering from Stanford University in 1975 and 1977, respectively. He has been a professor of Electrical Engineering and Computer Science of National Taiwan University (since1982), was a department head of the university (1982-1987), now serves as the dean of College of Electrical Engineering and Computer Science of the university (since 2009), and served as the chair of the Commission on Research and Development of the university (2002-2005). He holds a joint appointment with the Institute of Information Science of Academia Sinica as a research fellow, and was the director of the institute from 1991 to 1997. His research interests include various topics in digital communications such as digital transmission theory and signal processing for communications, as well as spoken language processing including speech recognition and transcription, text-to-speech synthesis, spoken dialogue, and spoken document understanding and retrieval.

He served on various positions of IEEE Communications Society, including regional chair for Asia Pacific (1994-1995), member of the Board of Governors (1994-1997), Vice President for International Affairs (1996-1997) and the Awards Committee chair (1998-1999). He was the Technical Program Chair of IEEE Global Telecommunications Conference (Globecom) 2002 at Taipei. He developed quite several earliest versions of Chinese spoken language processing systems in the world, including text-to-speech systems (since 1984), a natural language analyzer (1986), dictation systems (since 1991), spoken document retrieval systems (since 1997), and spoken dialogue systems (since 1998). He served as a Board member of International Speech Communication Association (ISCA) (2001-2009). He also served as the Distinguished Lecturer of IEEE Signal Processing Society (2007-2008), an associate editor of IEEE Signal Processing Magazine (2003-2006), a member of the Overview Paper Editorial Board of IEEE Signal Processing Society (since 2009), and the general chair of International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2009 at Taipei.

He was elected IEEE Fellow in 1992 with citation, "For Contributions to Computer Voice Input/Output Techniques for Mandarin Chinese and Engineering Education". He is the recipient of the National Chair Professorship of Taiwan, ROC in 2004 and 2007.

Friday August 19th Opening Keynote

Cultural Creative Industries vs. National Palace Museum

Dr. Kung-shin Chou (國立故宮博物院院長周功鑫博士)

Director, National Palace Museum
Republic of China (Taiwan)

BIOGRAPHY

Dr. Chou Kung-shin is the director of the National Palace Museum (NPM) in Taipei, Taiwan, where she started her career as a docent and then chief curator of the Exhibition department. During her tenure at the NPM, Dr. Chou organized numerous international exhibitions and initiated educational programs that had made distinguished contributions to Taiwan. In teaching and research, Dr. Chou specializes in Chinese art history and museology, publishing many academic and research papers on these topics. Since 1996, she had taught courses at the Graduate Institute of Library Information and Archive Studies at the National Chengchi University, lecturing on topics in museology, such as museum education, art history, museum management, museum exhibition. Dr.Chou received the Medaille de Chevalier de l'Ordre des Arts et des Lettres by the French Ministry of Culture in 1998. In 2002, she founded the Graduate Institute of Museum Studies at Fu Jen Catholic University and served as its director for six years. The Exhibition she organized in 2007 at the National Dr. Sun Yat-sen Memorial Hall titled *Art and Religion: a Special Exhibition of Italian Paintings of the Golden Age from the 14th to 17th Centuries* earned her a silver medal and a papal blessing certificate from Pope Benedict XVI. Dr. Chou received her Ph.D. in Art History and Archaeology at the University of Paris Sorbonne-Paris IV.

Plenary Session 1: New Media, Culture and Technology

Session Organizer & Chair

C.-C. Jay Kuo (南加州大學電機系郭宗杰教授)

Professor, University of Southern California
Director, Signal and Image Processing Institute (SIPI) and
Department of Electrical Engineering and Computer Science
Los Angeles, CA, USA
Tel: +0-000-000-0000, Fax: +0-000-000-0000
Email: cckuo@sipi.usc.edu

BIOGRAPHY

Dr. C.-C. Jay Kuo received the Ph.D. degree from the Massachusetts Institute of Technology in 1987. He is now with the University of Southern California (USC) as Director of Signal and Image Processing Institute and Professor of EE, CS and Mathematics. His research interests are in the areas of digital media processing, multimedia compression, communication and networking technologies, and embedded multimedia system design. Dr. Kuo is a Fellow of AAAS, IEEE and SPIE. Dr. Kuo has guided about 108 students to their Ph.D. degrees and supervised 23 postdoctoral research fellows. Currently, his research group at USC consists of around 30 Ph.D. students (see website http://viola.usc.edu), which is one of the largest academic research groups in multimedia technologies. He is a co-author of about 190 journal papers, 810 conference papers and 10 books. Dr. Kuo is Editor-in-Chief for the Journal of Visual Communication and Image Representation, and has served as Editor for 10 other journals. Dr. Kuo received the National Science Foundation Young Investigator Award (NYI) and Presidential Faculty Fellow (PFF) Award in 1992 and 1993, respectively. He was an IEEE Signal Processing Society Distinguished Lecturer in 2006, a recipient of the Okawa Foundation Research Award in 2007, the recipient of the Electronic Imaging Scientist of the Year Award in 2010 and the holder of the 2010-2011 Fulbright-Nokia Distinguished Chair in Information and Communications Technologies.

Plenary Session 1: New Media, Culture and Technology

World Culture and Heritage is One-click Away! Have We Fully Explored the Potentials of New Media and Technology?

Professor Ching-chih Chen
(全球連結與合作董事長陳劉欽智教授)
(美國波士頓西蒙斯學院榮譽教授)

President, Global Connection and Collaboration, Inc.
Professor Emeritus of Simmons College
Email: chingchih.chen@simmons.edu

BIOGRAPHY

Dr. Ching-chih Chen is a consultant and speaker to over 40 countries. She became Professor Emeritus of Simmons College, Boston in June, 2010 and has since become President of a non-profit organization, Global Connection and Collaboration, Inc. In September, 2010, she was named Honorary Chair Professor of National Tsing Hua University in Hsinchu, Taiwan. She is the author/editor of more than 35 books and over 200 journal articles in areas of new information technologies, such as global digital libraries, multimedia technology, digital imaging, interactive videodisc technology, global information infrastructure, information management, and information resources, etc. She produced the award winning interactive videodisc and multimedia CD entitled The First Emperor of China, supported by the US National Endowment for Humanities (NEH). She has led two major National Science Foundation / International Digital Library Projects (IDLP): (1) Global Memory Net, a global image digital library and gateway to the world cultural, historical, and heritage multimedia resources, with collaborators from different part of the world, and this project has also led to World Heritage Memory Net in partnership with the UNESCO's World Heritage Center, and (2) International Collaboration to Advance User-oriented Technologies for Managing and Distributing Images in Digital Libraries. She is also co-PI, with Prof. Raj Reddy of Carnegie Mellon University, of the China-US Million Book Digital Library Project.

An elected Fellow of the American Association for the Advancement of Science (1985), she was appointed by President Clinton in February 1997 to serve as a member of the U.S. President's Information Technology Advisory Committee (PITAC). PITAC was established by a new Presidential Executive Order. Under both Presidents Clinton and Bush during 1997 to December 2002, she co-chaired the PITAC Subcommittee on International Issues, and was a member of the PITAC Subcommittees on Next Generation Internet (NGI) and IT*2 Initiative Review; and Panels on Digital Divide, Digital Library, Learning of the Future, and Individual Security. She also chaired the PITAC's activity on Digital Divide for Smaller Institutions. During 1987 to 2001, Dr. Chen was Chief Organizer of a series of 12 International Conferences on New Information Technology (NIT) in many continents of the world. The outcome of NIT '99 (Taipei) and NIT'2001 (Beijing) are the two-volume books related to the development of Global Digital

Libraries – IT and Global Digital Library Development (1999) and Global Digital Library Development in the New Millennium: Fertile Ground for Distributed Cross-Disciplinary Collaboration (2001).

She served as an Honorary Professor of several universities, including Tsinghua University in and University of Hainan, China. From September 2010 she was appointed as an Honorary Chair Professor of the National Taiwan University in Hsinchu. Active in the digital library area, she was the co-Chair of the 4th ACM/IEEE Joint Conference on Digital Libraries (JCDL) held in Tucson, Arizona in June 2004. She was on the Advisory Board of DELOS (the European Digital Network for Excellence), serving as the US Co-Chair of the NSF/DELOS Working Group in Digital Imagery for Significant Cultural, Historical and Heritage Materials, and served as the co-editor for the Journal of Digital Library's Special Issue on Multimedia Contents in Digital Libraries (February 2006).

A sought-after international speaker in over two dozen countries, she has delivered keynote speeches and made presentations at numerous international conferences including those in countries like Argentina, China, Croatia, France, Germany, India, Italy, Japan, Korea, Latvia, Mexico, Morocco, Russia, Spain, Singapore, South Africa, Swaziland, Taiwan, Thailand, UK, Vietnam, etc.

She has been on the advisory board of several national digital library projects; she served as a consultant to OCLC for its Global Digital Initiative in 2005 (http://www.oclc.org/news/releases/200520.htm). She is a recipient of over twenty major awards since 1970. Since 2006, two major awards given to her were the coveted LITA/OCLC Kilgour Award from the Library Information Technology Association in June 2006 (http://www.ala.org/ala/mgrps/divs/lita/litaresources/litascholarships/kilgour06.cfm), and the American Library Association's major Beta Phi Mu Award in June 2008 (http://www.ala.org/ala/newspresscenter/news/pressreleases2008/march2008/beta08.cfm). The broad-based societal impact of her R&D work has been significant, and for this global work, she received the International Peace Prize of the United Cultural Convention of the USA in June 2006 for better promoting intercultural understanding during this troubled time.

Plenary Session 1: New Media, Culture and Technology

How an Art Museum Develops its Cultural Creative Applications and Services

Yung-Cheng Hsieh (台灣藝術大學研究發展處研發長謝顒丞教授)

Professor, National Taiwan University of Arts
Director, Research and Development Office
No.59, Sec. 1, Daguan Rd. Banqiao Dist., New Taipei City 22058, Taiwan (R.O.C.)
Tel: +02-2272-2181#2266, Fax: + 02-8969-7515
Email ych@ntua.edu.tw

ABSTRACT

With the rapid advance of digital technology, digitalization of cultural assets through digital archival efforts has become quite commonplace. The principal objective of any digital archival effort is to ensure that after archiving of cultural resources through digitalization, the broadest horizon of practical applications can be made thereby enhancing the transmission of knowledge and sustainable preservation of culture. This study represents the fruits of a 2009 grant from Taiwan's National Science Council for a one-year project entitled "Embroidery Digital Archive Applications and Services in Taipei Community", further expanding the reach of the Taiwan e-Learning and Digital Archives Program (TELDAP) of Taiwan, while providing the means for sharing how digital archives reflecting traditional embroidery arts can support roving community outreach exhibits and classroom activities through creative do-it-yourself embroidery kits, extending the educational reach to help ensure digital resources can empower their maximal utility and efficacy as the community's living repository of digital arts. This project, "Embroidery Digital Archive Applications and Services in Taipei Community", reflects the TELDAP's initiative's efforts in conjunction with the ACT Media Lab team headed by Professor Dr. Yung-Cheng Hsieh at the National Taiwan University of Arts, representing the fruits of the project team's "The Promotion of Traditional Production Industry Through Archived Artworks" through digital content deliverables (such as e-books, educational CD-ROMs, and websites) affording practical outreach applications. The highly diverse professional team enjoys cooperation from the Hong-Gah Museum (a digital archival organization), Taipei City Zhongzheng Community College (providing expert consulting and guidance), Taipei Municipal Qingjiang Elementary School, Taipei Mingde Junior High School, Taipei School for The Hearing Impaired (for assistive device/accessibility user groups), and the Bear Mama company (artistic products producer), who contributed to collaboration for coursework and activities enabling systematic introduction of Taiwan's embroidery arts, through rejuvenation of previously unused archived embroidery pieces in digital contents, thereby realizing public humanities and aesthetics education; advancing the local culture of Taipei's Beitou District, stimulating the interest and encouraging the participation of local residents; empowering disadvantaged social group organizations with a secondary expertise, helping to bridge the urban-rural digital divide. In accordance with the research background explained above, this project encompassed four primary objectives: 1) In developing digital archival resource applications, to secure cooperative promotion of arts organizations with academia. (Arts Academia Alliances Advancing Archives); 2) Bridging the urban rural digital divide, ensuring the broadest reach and greatest impact for digital archives. (Digital Deployments Defeating Digital Divides); 3) Encouraging public participation, promoting public use of digital archives (Promoting Public Planning, Programming, Participation); 4) Empowering socially disadvantaged groups to develop a second-tier expertise (To aid their organizational effectiveness and reach) (Entrepreneurial Expertise Energizing Effective Empowerment). This paper examines methods of broadening and deepening digital archives' cultural, academic and industrial applications from the end-user perspective ensuring more efficacious use of digital archives through establishing stakeholder feedback mechanisms to achieve sustainable cultural transmission. The study relies on a real world case analysis to explore applications of authorized digital collection resources through multifaceted activities including development of assistive resource aids so that digital archives can achieve their maximal social utility, with a special emphasis on promotion of digital archive resources in the educational milieu. Finally, the research's extensive findings serve to lay firm roots for a successful template for digital archival community applications, with concrete conclusions and suggestions for future programs.

BIOGRAPHY

Dr. Yung-Cheng Hsieh is currently the Dean of Research and Development and Professor of Graphic Communication Arts Department at the National Taiwan University of Arts (NTUA) (http://gca.ntua.edu.tw/files/11-1000-10-2.php). He was the Chairperson of Department of Graphic Communication Arts between 2003 and 2010 and has been invited to international conferences and seminars related to graphic communication technology, digital archives, and printing technology every year. Dr. Hsieh earned both his B.S. and M.S. degree in Kansas and Missouri, and Ph.D. degree in Industrial Technology with Statistics minor from Iowa State University. He taught at Illinois State University before he began teaching at NTUA. As a Visiting Professor during the summer of 2008, he taught at Department of Printing & Packaging of Wuhan University in China. Dr. Hsieh also conducted researches with Industrial Technology Department of Appalachian State University (NC, USA) as a Distinguished Full Professor in the summer of 2009.

Dr. Hsieh specializes in graphic communication technology, digital archive and e-Learning, digital content development and application, applied statistics, experiment design, cultural creative industry. He received Silvius-Wolansky Award for outstanding research by the Iowa State University in 1997, Distinguished Research Award by National Science Council in 1999, Outstanding Professor in Industrial Technology Award by National Association of Industrial Technology of USA in 2002, The Research Excellence Award of NTUA in 2003 and 2006, and Top 100 Project Manager by Taiwan Project Management Association in 2008 and 2010 (Level D and C Certificate). He is the author of "Characteristics and Quality Specifications for Taiwan's Sheetfed Lithographic Industry", "Computer to Plate", "CD Waterless Offset Printing", "Archiving Art and Digitization", "Evaluation of Digital Archives", "Handbook of Digital Archiving Techniques and Processes", "The Print Attributes of Hybrid Screen Technology", etc. (Blog: http://actofntua.blogspot.com;
Facebook Group: http://www.facebook.com/group.php?gid=157218470967581)

For the past 10 years, Dr. Hsieh has written numerous articles for publications including more than 70 articles in peer-reviewed journals, more than 90 conference articles at national and international conferences, and more than 60 technical reports in the area of his interest. Dr. Hsieh also has received more than 50 grants from National Science Council, Council for Culture Affair, Ministry of Education, and other government and industrial agencies to assist the development of the graphic communication, digital content, and cultural creative industry in Taiwan.

Plenary Session 2: New Media, Entertainment Technology and Culture

Session Organizer & Chair

Yung-Cheng Hsieh (台灣藝術大學研究發展處研發長謝顒丞教授)

Professor, National Taiwan University of Arts
Director, Research and Development Office
No.59, Sec. 1, Daguan Rd. Banqiao Dist., New Taipei City 22058, Taiwan (R.O.C.)
Tel: +02-2272-2181#2266, Fax: + 02-8969-7515
Email ych@ntua.edu.tw

BIOGRAPHY

Dr. Yung-Cheng Hsieh is currently the Dean of Research and Development and Professor of Graphic Communication Arts Department at the National Taiwan University of Arts (NTUA) (http://gca.ntua.edu.tw/files/11-1000-10-2.php). He was the Chairperson of Department of Graphic Communication Arts between 2003 and 2010 and has been invited to international conferences and seminars related to graphic communication technology, digital archives, and printing technology every year. Dr. Hsieh earned both his B.S. and M.S. degree in Kansas and Missouri, and Ph.D. degree in Industrial Technology with Statistics minor from Iowa State University. He taught at Illinois State University before he began teaching at NTUA. As a Visiting Professor during the summer of 2008, he taught at Department of Printing & Packaging of Wuhan University in China. Dr. Hsieh also conducted researches with Industrial Technology Department of Appalachian State University (NC, USA) as a Distinguished Full Professor in the summer of 2009.

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Plenary Session 2: New Media, Entertainment Technology and Culture

Paradigm Shifts in Modern ICT Era and Future Trends

C.-C. Jay Kuo (南加州大學電機系郭宗杰教授)

Professor, University of Southern California
Director, Signal and Image Processing Institute (SIPI) and
Department of Electrical Engineering and Computer Science
Los Angeles, CA, USA
Tel: +0-000-000-0000, Fax: +0-000-000-0000
Email: cckuo@sipi.usc.edu

ABSTRACT

Information and communication technologies (ICT) have become more mature after its development for more than half a century. We are in a new era in which ICT research has shifted its focus from technology development to novel applications. For example, digital technologies have been widely applied to speech, audio, video and graphics in various commercial applications today. Furthermore, the availability of the broadband wired/wireless Internet infrastructure and the cloud computing facilities has changed the way of web-based services. This lecture will address the following four major paradigm shifts in this modern IT era:

- From the analog implementation to the digital implementation
- From PC-centric to cloud/network-centric
- From one-way broadcasting to two-way interaction
- From HW/SW/infra-structure provision to contents and value-added services

Driven by the broadband network and cloud computing infrastructure, ICT-enabled web services have become a phenomenon. Examples of them include: YouTube, Google Map, Wikipedia, Facebook, etc. Several common features of the new web services will be discussed. These services provide a scalable platform that allows a large number of users to participate in content creation and interact with each other. Each site is essentially a large database as well as a community. The success of these services lies in a workable business model such as on-line advertisement. More and more advertisements from the traditional media such as newspaper and audio/video broadcast programs are moving to the web-based advertisement due to its efficiency. Finally, the lecture will provide an outlook to future business opportunities and R&D directions.

BIOGRAPHY

Dr. C.-C. Jay Kuo received the Ph.D. degree from the Massachusetts Institute of Technology in 1987. He is now with the University of Southern California (USC) as Director of Signal and Image Processing Institute and Professor of EE, CS and Mathematics. His research interests are in the areas of digital media processing, multimedia compression, communication and networking technologies, and embedded multimedia system design. Dr. Kuo is a Fellow of AAAS, IEEE and SPIE. Dr. Kuo has guided about 108 students to their Ph.D. degrees and supervised 23

postdoctoral research fellows. Currently, his research group at USC consists of around 30 Ph.D. students (see website http://viola.usc.edu), which is one of the largest academic research groups in multimedia technologies. He is a co-author of about 190 journal papers, 810 conference papers and 10 books. Dr. Kuo is Editor-in-Chief for the Journal of Visual Communication and Image Representation, and has served as Editor for 10 other journals. Dr. Kuo received the National Science Foundation Young Investigator Award (NYI) and Presidential Faculty Fellow (PFF) Award in 1992 and 1993, respectively. He was an IEEE Signal Processing Society Distinguished Lecturer in 2006, a recipient of the Okawa Foundation Research Award in 2007, the recipient of the Electronic Imaging Scientist of the Year Award in 2010 and the holder of the 2010-2011 Fulbright-Nokia Distinguished Chair in Information and Communications Technologies.

Plenary Session 2: New Media, Entertainment Technology and Culture

Melodic Variations: Toward Cross-Cultural Transformation

Cheng-Zhi (Anna) Huang (哈佛大學黃成之)

PhD Candidate in Computer Science
School of Engineering and Applied Sciences
Harvard University

ABSTRACT

Culture nurtures unique musical styles, offering us rich palettes to augment our expressions for new experiences. Cross-cultural transformation is the process of recomposing music from one cultural musical style into another. Instead of attempting to find equivalences across cultures, I propose to approach cross-cultural transformation as a kind of theme and variation. This framework allows us to explicitly address the different levels of structure and to consider which musical elements to stay fixed and which to vary in a cross-cultural context.

In this talk, I will focus on melody and formalize the process of composing a cross-cultural theme and variation as a four-step process, which includes first "melodic reduction" and then "forward cross-cultural transformation" where the uncovered melodic progressions of the theme are mapped onto those idiomatic in the cultural style that carries the variation, and then "melodic elaboration" and "backward cross-cultural transformation" where the elaborated melodic surface of the variation is adjusted to strengthen its resemblance to the theme.

I illustrate the above processes by a case study of the melodic variations on two historically related zithers, the Chinese gu-zheng and the Japanese koto, as they exhibit structural similarities underneath their distinct melodic surfaces. I give a preliminary short example of a koto melody transformed onto the gu-zheng style.

BIOGRAPHY

Anna Huang is a composer and computer scientist based in Cambridge, Massachusetts, where she is currently a doctoral candidate at Harvard University. She is supported by a National Science Foundation Graduate Research Fellowship to explore how Artificial Intelligence can augment musical expressions through computer-assisted composition. Her compositions have won awards, including first prize in the San Francisco Choral Artists' young composer competition. She holds a master's from the MIT Media Lab, and a Bachelor of Music in Music Composition and also a Bachelor of Science in Computer Science, both from the University of Southern California. She grew up in Hong Kong where she learned to play the gu-zheng.

Friday August 19th Keynote Speech

Moderator

Lin-Shan Lee, PhD (李琳山 院長)

Dean, College of Electrical Engineering and Computer Science
National Taiwan University
No. 1, Sec. 4, Roosevelt Rd., Taipei, 106, Taiwan, R.O.C.
Tel: +886-2-3366-3547
Email: lslee@cc.ee.ntu.edu.tw

BIOGRAPHY

Lin-shan Lee received a B.S. in Electrical Engineering from National Taiwan University in 1974, an M.S. and a Ph.D. in Electrical Engineering from Stanford University in 1975 and 1977, respectively. He has been a professor of Electrical Engineering and Computer Science of National Taiwan University (since1982), was a department head of the university (1982-1987), now serves as the dean of College of Electrical Engineering and Computer Science of the university (since 2009), and served as the chair of the Commission on Research and Development of the university (2002-2005). He holds a joint appointment with the Institute of Information Science of Academia Sinica as a research fellow, and was the director of the institute from 1991 to 1997. His research interests include various topics in digital communications such as digital transmission theory and signal processing for communications, as well as spoken language processing including speech recognition and transcription, text-to-speech synthesis, spoken dialogue, and spoken document understanding and retrieval.

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He was elected IEEE Fellow in 1992 with citation, "For Contributions to Computer Voice Input/Output Techniques for Mandarin Chinese and Engineering Education". He is the recipient of the National Chair Professorship of Taiwan, ROC in 2004 and 2007.

Friday August 19th Keynote Speech

The Art of Tangible Bits

Professor Hiroshi ISHII

Muriel R. Cooper Professor of Media Arts and Science
Associate Director of MIT Media Laboratory
Head of Tangible Media Group, Media Lab
Massachusetts Institute of Technology

ABSTRACT

Our vision of Tangible Bits is carried out through an artistic approach. Whereas today's mainstream Human Computer Interaction (HCI) and Design research address functional concerns – the needs of users, practical applications, and usability evaluation – Tangible Bits is a vision driven by concepts. This is because today's technologies will become obsolete in one year, and today's applications will be replaced in 10 years, but true visions – we believe – can last longer than 100 years.

Tangible Bits seeks to realize seamless interfaces between humans, digital information, and the physical environment by giving physical form to digital information, making bits directly manipulable and perceptible. Our goal is to invent new design media for artistic expression as well as for scientific analysis, taking advantage of the richness of human senses and skills – as developed through our lifetime of interaction with the physical world – as well as the computational reflection enabled by real-time sensing and digital feedback.

Tangible Bits is an artistic vision that seeks to transform the way we see and interact with the world. I will present examples of Tangible Bits projects that were at once inspired by Art and are inspiring artists. They were presented and exhibited in Media Arts, Design, and Science communities including ICC, Ars Electronica, Centre Pompidou, Victoria and Albert Museum, Venice Biennale, ArtFutula, IDSA, ICSID, AIGA, ACM CHI, SIGGRAPH, UIST, CSCW.

http://tangible.media.mit.edu/

BIOGRAPHY

Hiroshi Ishii is a tenured Professor of Media Arts and Sciences, at the MIT Media Lab. He was named Associate Director at the Media Lab in May 2008. He co-directs Things That Think (TTT) consortium and directs Tangible Media Group. At the MIT Media Lab, he founded and directs the Tangible Media Group pursuing a new vision of Human Computer Interaction (HCI): "Tangible Bits." His team seeks to change the "painted bits" of GUIs to "tangible bits" by giving physical form to digital information.

Ishii and his team have presented their vision of "Tangible Bits" at a variety of academic, industrial design, and artistic venues (including ACM SIGCHI, ACM SIGGRAPH, Industrial Design Society of America, AIGA, Ars

Electronica, Centre Pompidou, and Victoria and Albert Museum), emphasizing that the development of tangible interfaces requires the rigor of both scientific and artistic review. A display of many of the group's projects took place at the NTT InterCommunication Center (ICC) in Tokyo in summer 2000. A three-year-long exhibition "Get in Touch" featured the Tangible Media group's work at Ars Electronica Center (Linz, Austria) from September 2001 through August 2004. He was elected to CHI Academy by ACM SIGCHI, and it was announced in CHI 2006 in Montreal.

Prior to MIT, from 1988-1994, he led a CSCW research group at the NTT Human Interface Laboratories, where his team invented TeamWorkStation and ClearBoard. In 1993 and 1994, he was a visiting assistant professor at the University of Toronto, Canada. He received B. E. degree in electronic engineering, M. E. and Ph. D. degrees in computer engineering from Hokkaido University, Japan, in 1978, 1980 and 1992, respectively.

http://ttt.media.mit.edu/
http://tangible.media.mit.edu/

Plenary Session 3: Creative Design, Digital Humanities

Session Organizer & Chair

Yung-Cheng Hsieh (台灣藝術大學研究發展處研發長謝顒丞教授)

Professor, National Taiwan University of Arts
Dir **Yung-Cheng Hsieh** ector, Research and Development Office
No.59, Sec. 1, Daguan Rd. Banqiao Dist., New Taipei City 22058, Taiwan (R.O.C.)
Tel: +02-2272-2181#2266, Fax: + 02-8969-7515
Email ych@ntua.edu.tw

BIOGRAPHY

Dr. Yung-Cheng Hsieh is currently the Dean of Research and Development and Professor of Graphic Communication Arts Department at the National Taiwan University of Arts (NTUA) (http://gca.ntua.edu.tw/files/11-1000-10-2.php). He was the Chairperson of Department of Graphic Communication Arts between 2003 and 2010 and has been invited to international conferences and seminars related to graphic communication technology, digital archives, and printing technology every year. Dr. Hsieh earned both his B.S. and M.S. degree in Kansas and Missouri, and Ph.D. degree in Industrial Technology with Statistics minor from Iowa State University. He taught at Illinois State University before he began teaching at NTUA. As a Visiting Professor during the summer of 2008, he taught at Department of Printing & Packaging of Wuhan University in China. Dr. Hsieh also conducted researches with Industrial Technology Department of Appalachian State University (NC, USA) as a Distinguished Full Professor in the summer of 2009.

Dr. Hsieh specializes in graphic communication technology, digital archive and e-Learning, digital content development and application, applied statistics, experiment design, cultural creative industry. He received Silvius-Wolansky Award for outstanding research by the Iowa State University in 1997, Distinguished Research Award by National Science Council in 1999, Outstanding Professor in Industrial Technology Award by National Association of Industrial Technology of USA in 2002, The Research Excellence Award of NTUA in 2003 and 2006, and Top 100 Project Manager by Taiwan Project Management Association in 2008 and 2010 (Level D and C Certificate). He is the author of "Characteristics and Quality Specifications for Taiwan's Sheetfed Lithographic Industry", "Computer to Plate", "CD Waterless Offset Printing", "Archiving Art and Digitization", "Evaluation of Digital Archives", "Handbook of Digital Archiving Techniques and Processes", "The Print Attributes of Hybrid Screen Technology", etc. (Blog: http://actofntua.blogspot.com;
Facebook Group: http://www.facebook.com/group.php?gid=157218470967581)

For the past 10 years, Dr. Hsieh has written numerous articles for publications including more than 70 articles in peer-reviewed journals, more than 90 conference articles at national and international conferences, and more than 60 technical reports in the area of his interest. Dr. Hsieh also has received more than 50 grants from National Science

Council, Council for Culture Affair, Ministry of Education, and other government and industrial agencies to assist the development of the graphic communication, digital content, and cultural creative industry in Taiwan.

Plenary Session 3: Creative Design, Digital Humanities

World Heritage for Digital Humanities: Sights in Creative Panophotography and Domoscopy

Mr. Tito Dupret

Hypermedia Director of Patrimonium-mundi.org
Université Laval, Québec, Canada

ABSTRACT

Digital humanities are breaking time and spaces. Time seems to be narrowing to constant instant and spaces are meant to become without borders. But while creating and multiplying new grounds of actions and observations, humanity remains a slow evolving specie. Mediology has theorized that in terms of mediaspheres : from the logo, grapho to the videosphere, all are being currently at hand to all and interrelating. Today we are entering the hypersphere. In this matter, this communication is about the proposal to bring the World Heritage sites to digital humanities. Tools explored are (1) the World Heritage List as a transhistorical geo-catalog to reach humanity, (2) panophotographies is used in situ in order to document cultural and natural heritage sites, and (3) domoscopy is studied in order to immerse visitors into a dedicated interactive heritage cosmos.

BIOGRAPHY

Since 2001, Tito Dupret has been documenting World Heritage sites in panophotographies. Featuring about 2500 immersive and interactive spherical images, today more than 250 cultural and natural sites are available online at <Patrimonium-mundi.org>. He is currently studying this work in order to measure its portability to the domes of planetariums.

Plenary Session 3: Creative Design, Digital Humanities

From Digital Archives to Digital Humanities

Professor Jieh Hsiang (台灣大學數位典藏中心主任暨台大資工系特聘教授項潔博士)

Distinguished Professor in Computer Science
Director, Research Center for Digital Humanities
National Taiwan University

BIOGRAPHY

Jieh Hsiang received his Ph.D. in computer science from the University of Illinois at Urbana Champaign in 1982 and taught at SUNY Stony Brook until 1998. He joint the Department of Computer Science of the National Taiwan University in 1993 and is currently a Distinguished Professor. He was NTU's University Librarian from 2002 to 2008, and has been the Director of the Research Center for Digital Humanities since 2008.

While Jieh Hsiang's earlier research had mainly been on automated reasoning, especially on term rewriting systems, he had been working on digital libraries and archives since late 1990s. In recent years his main research emphasis has been on digital humanities, with a focus on developed information technologies for historical research.

Jieh Hsiang is also a research fellow of the Institute for Information Sciences of the Academia Sinica, and a research fellow of the Advanced Institute for Social Sciences and Humanities of NTU, and the Director of NTU Press. He has authored over 150 papers and several books, and has received a number of research awards.

Plenary Session 4: Future Development

Session Organizer & Chair

Professor Ching-chih Chen
(全球連結與合作董事長陳劉欽智教授)
(美國波士頓西蒙斯學院榮譽教授)

President, Global Connection and Collaboration, Inc.
Professor Emeritus of Simmons College
Email: chingchih.chen@simmons.edu

BIOGRAPHY

Dr. Ching-chih Chen is a consultant and speaker to over 40 countries. She became Professor Emeritus of Simmons College, Boston in June, 2010 and has since become President of a non-profit organization, Global Connection and Collaboration, Inc. In September, 2010, she was named Honorary Chair Professor of National Tsing Hua University in Hsinchu, Taiwan. She is the author/editor of more than 35 books and over 200 journal articles in areas of new information technologies, such as global digital libraries, multimedia technology, digital imaging, interactive videodisc technology, global information infrastructure, information management, and information resources, etc. She produced the award winning interactive videodisc and multimedia CD entitled The First Emperor of China, supported by the US National Endowment for Humanities (NEH). She has led two major National Science Foundation / International Digital Library Projects (IDLP): (1) Global Memory Net, a global image digital library and gateway to the world cultural, historical, and heritage multimedia resources, with collaborators from different part of the world, and this project has also led to World Heritage Memory Net in partnership with the UNESCO's World Heritage Center, and (2) International Collaboration to Advance User-oriented Technologies for Managing and Distributing Images in Digital Libraries. She is also co-PI, with Prof. Raj Reddy of Carnegie Mellon University, of the China-US Million Book Digital Library Project.

An elected Fellow of the American Association for the Advancement of Science (1985), she was appointed by President Clinton in February 1997 to serve as a member of the U.S. President's Information Technology Advisory Committee (PITAC). PITAC was established by a new Presidential Executive Order. Under both Presidents Clinton and Bush during 1997 to December 2002, she co-chaired the PITAC Subcommittee on International Issues, and was a member of the PITAC Subcommittees on Next Generation Internet (NGI) and IT*2 Initiative Review; and Panels on Digital Divide, Digital Library, Learning of the Future, and Individual Security. She also chaired the PITAC's activity on Digital Divide for Smaller Institutions. During 1987 to 2001, Dr. Chen was Chief Organizer of a series of 12 International Conferences on New Information Technology (NIT) in many continents of the world. The outcome of NIT '99 (Taipei) and NIT'2001 (Beijing) are the two-volume books related to the development of Global Digital Libraries – IT and Global Digital Library Development (1999) and Global Digital Library Development in the New Millennium: Fertile Ground for Distributed Cross-Disciplinary Collaboration (2001).

She served as an Honorary Professor of several universities, including Tsinghua University in and University of Hainan, China. From September 2010 she was appointed as an Honorary Chair Professor of the National Taiwan University in Hsinchu. Active in the digital library area, she was the co-Chair of the 4th ACM/IEEE Joint Conference on Digital Libraries (JCDL) held in Tucson, Arizona in June 2004. She was on the Advisory Board of DELOS (the European Digital Network for Excellence), serving as the US Co-Chair of the NSF/DELOS Working Group in Digital Imagery for Significant Cultural, Historical and Heritage Materials, and served as the co-editor for the Journal of Digital Library's Special Issue on Multimedia Contents in Digital Libraries (February 2006).

A sought-after international speaker in over two dozen countries, she has delivered keynote speeches and made presentations at numerous international conferences including those in countries like Argentina, China, Croatia, France, Germany, India, Italy, Japan, Korea, Latvia, Mexico, Morocco, Russia, Spain, Singapore, South Africa, Swaziland, Taiwan, Thailand, UK, Vietnam, etc.

She has been on the advisory board of several national digital library projects; she served as a consultant to OCLC for its Global Digital Initiative in 2005 (http://www.oclc.org/news/releases/200520.htm). She is a recipient of over twenty major awards since 1970. Since 2006, two major awards given to her were the coveted LITA/OCLC Kilgour Award from the Library Information Technology Association in June 2006 (http://www.ala.org/ala/mgrps/divs/lita/litaresources/litascholarships/kilgour06.cfm), and the American Library Association's major Beta Phi Mu Award in June 2008 (http://www.ala.org/ala/newspresscenter/news/pressreleases2008/march2008/beta08.cfm). The broad-based societal impact of her R&D work has been significant, and for this global work, she received the International Peace Prize of the United Cultural Convention of the USA in June 2006 for better promoting intercultural understanding during this troubled time.

Plenary Session 4: Future Development – Part A

Towards Understanding the Ecology of Art History

Dr. Maximilian Schich

DFG Visiting Research Scientist from Germany & CCNR, Northeastern University

ABSTRACT

Within their work, art historians, archeologists, and their predecessors across centuries have accumulated large amounts of structured data, in the form of indices, inventories, catalogues, and databases. In addition more and more such structured data is published in places such as the Linked Open Data cloud or Freebase.com; extracted from unstructured sources such as Google Books or JSTOR; or accumulated by crowds in services such as Flickr or Facebook.

Meanwhile the multidisciplinary fields of complexity science in general, and complex network research in particular, provide more and more methods and tools that allow us to explore these data beyond the traditional limits of reference catalogues, printed books, or database interfaces. As a consequence, we are presented with an extraordinary chance to make significant progress in the key mission of art research, namely to uncover the morphology, ecology and evolution of cultural artifacts, understanding meso- as well as global-scale phenomena that characterize the complex system of culture.

Making use of this situation, my talk will unlock structured data collections ranging from simple bibliographies to complicated research databases as networks of complex networks between objects, persons, locations, time ranges and events. Highlighting surprising phenomena in these networks, I will make a convincing case for high-throughput approaches in art history, embed the datasets in question in a multidisciplinary universe of data, and show that even seemingly boring pieces of data can contain thrilling insights that are mission critical for our entire discipline.

BIOGRAPHY

Maximilian Schich is an art historian currently working as a Visiting Research Scientist at the Center for Complex Network Research at Northeastern University in Boston. In 2007, he received his Ph.D. on 'Reception and Visual Citation as Complex Networks'. His ongoing post-doctoral work on 'Complex Networks in Art History and Archaeology' has been funded by the Special Innovation Fund of the President of Max-Planck-Society, Prof. Albert-László Barabási, and since April 2009 by German Research Foundation. Besides, Maximilian looks back at over a decade of consulting experience, working with network data in art research - within Projekt Dyabola, Bibliotheca Hertziana (Max-Planck-Institute for Art History), the Glyptothek, and Zentralinstitut für Kunstgeschichte in Munich.

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Tel: 202-895-1930
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