Plenary Lectures

"Advances (Innovations) in Neurotechnology "

Tuesday 12 November 2013

10:30-11:00

Imperial room

Chair: Prof. Dimitrios Koutsouris

Prof. Metin Akay
Founding Chair, John S Dunn Endowed Chair Professor, Department of Biomedical Engineering, Cullen College of Engineering, University of Houston, Houston, TX, USA

Abstract

Neural Engineering is a new discipline which unites engineering, computer science, physics, chemistry, and mathematics with cellular, molecular, cognitive and behavioral neurosciences, to understand the organizational principles and underlying mechanisms of the biology of neural systems, and to study the behavior dynamics and complexities of neural systems in nature. Therefore, it deals with many aspects of basic and clinical problems associated with neural dysfunction including the representation of sensory and motor information, the electrical stimulation of the neuromuscular system to control the muscle activation and movement, the analysis and visualization of complex neural systems at multi-scale from the single-cell and to the system levels to understand the underlying mechanisms, the development of novel electronic and photonic devices and techniques for experimental probing, the neural simulation studies, and the design and development of human-machine interface systems and artificial vision sensors and neural prosthesis to restore and enhance the impaired sensory and motor systems and functions from gene to system.

Furthermore, the neuroscience has become more quantitative and information-driven science since emerging implantable and wearable sensors from macro to nano and computational tools facilitate collection and analysis of vast amounts of neural data. Complexity analysis of neural systems provides physiological knowledge for the organization, management and mining of neural data by using advanced computational tools since the neurological data are inherently complex and non-uniform and collected at multiple temporal and spatial scales. The investigations of complex neural systems and processes require an extensive collaboration between biologists, mathematicians, physicists, computer

scientists and engineering to improve our understanding of complex neurological process from system to gene.

To highlight this emerging discipline, we devote this talk to the recent advances in neural engineering.

Curriculum Vitae

Metin Akay received his B.S. and M.S. in Electrical Engineering from the Bogazici University, Istanbul, Turkey in 1981 and 1984, respectively and a Ph.D. degree from Rutgers University in 1990. He is currently the founding chair of the new Biomedical Engineering Department and the John S. Dunn professor of biomedical engineering at the University of Houston. He has played a key role in promoting biomedical education in the world by writing and editing several books, editing several special issues of prestigious journals, including the Proc of IEEE, and giving several keynote and plenary talks at international conferences, symposiums and workshops regarding emerging technologies in biomedical engineering.

He is the founding editor-in-chief of the Biomedical Engineering Book Series published by the Wiley and IEEE Press and the Wiley Encyclopedia of Biomedical Engineering. He is also the editor of the Neural Engineering Handbook published by Wiley/IEEE Press and the first steering committee chair of the IEEE Trans on Computational Biology and Bioinformatics.

He established the IEEE EMBS Special Topic Conference on Neural Engineering. He is also the chair of the IEEE EMBS Neuroengineering Technical Committee. He was the program chair of the International IEEE EMBS 2001 and the co-chair of the International IEEE EMBS 2006 and the program co-chair of the International IEEE EMBS 2011 and the IEEE EMBS Point-of-Care Health Technologies (POCHT) 2013.

He currently serves on the advisory board of several international journals including the IEEE T-BME, IEEE T-ITIB, Smart Engineering Systems etc. and furthermore serves on several NIH and NSF review panels

Dr. Akay is a recipient of the IEEE EMBS Early Career and Service awards as well an IEEE Third Millenium Medal and is a fellow of IEEE, the Institute of Physics (IOP), the American Institute of Medical Biological Engineering(AIMBE) and the American Association for the Advancement of Science (AAAS). His Neural Engineering and Informatics Lab is interested in developing an intelligent wearable system for monitoring motor functions in Post-Stroke Hemiplegic Patients and detecting coronary artery disease. In addition, his lab is currently investigating the effect of nicotine on the dynamics of ventral tegmental area (VTA) dopamine neural networks.

"Implantable Microsystems for the Management of Trauma"

Tuesday 12 November 2013

08:00-08:30

Imperial room

Chair: Prof. Dimitrios Lymberopoulos

Prof. Anthony Guiseppi–Elie
Sc.D., FAIMBE Professor,
Clemson University, USA

Abstract

Continued high morbidity and complications due to trauma related hemorrhage underscores the importance of efforts to fully understand the temporal progression of molecular physiologic events needed to bring life-saving changes to practice. The current state of trauma diagnostics emphasizes vital signs and stat metabolic biomarkers. Tachycardia and hypotension are markers of hemorrhagic shock in decompensated trauma patients. Base deficit has been predicative of injury severity at hospital admission. Tissue oxygen saturation has been predicative of onset of multiple organ dysfunction syndrome (MODS). Blood potassium levels increase with onset of hemorrhagic shock. Lactate is a surrogate for tissue hypoxia and its clearance predicts mortality. Insulin resistance and attendant triage glucose measurements have been shown to be specific in predicting major injuries. No vital sign has yet to be proven effective as an independent predictor of trauma severity. Implantable point-of-care (POC) analytical microsystems are being developed for use by first responders to allow for rapid, continual monitoring of glucose and lactate via dual responsive amperometric enzyme biosensors, tissue acidosis via impedimetry and VO2 via voltammetry. Minimally invasive multi-analyte monitoring biochips have the potential to explore areas still unexplored in the realm of trauma physiology.

Curriculum Vitae

Anthony Guiseppi-Elie is Professor of Chemical and Biomolecular Engineering, Bioengineering, Electrical and Computer Engineering and Director of the Center for Bioelectronics, Biosensors and Biochips at Clemson University. He is Founder and Scientific Director of ABTECH Scientific, Inc., a near-patient biomedical diagnostics company. He holds the Sc.D. in materials science and engineering from MIT, the M.Sc. in chemical engineering from the University of Manchester Institute of Science and Technology (UMIST) and the B.Sc. (First Class Honors) with majors in Analytical and Applied Chemistry from the University of the West Indies (UWI). His research interests are in engineered bioanalytical microsystems in

the service of human health and medicine. Dr. Guiseppi-Elie has published over 120 archival scientific papers (2369 citations, h-factor = 26), 31 book or proceedings chapters, holds 8 US and foreign patents, has given in excess of 200 invited lectures/colloquia, and has co-organized and lead 30 national and international scientific workshops, symposia and conferences. Prof. Guiseppi is an Associate Editor of Biomedical Microdevices and a member of the editorial boards of Biomedical Microdevices, The Journal of Bioactive and Compatible Polymers, NanoBiotechnology, Applied Biochemistry and Biotechnology . Dr. Guiseppi is a Fellow of AIMBE, senior member of IEEE, a lifetime Member of AIChE and holds memberships in RSC, AAAS, ACS, MRS and BMES. At Clemson University Prof. Guiseppi teaches engineering materials, biological transport phenomena, biomolecular engineering, biosensors and bioelectronics, and nanobiotechnology.

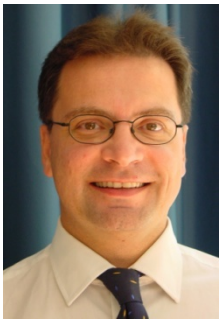
"Emerging trends for decentralized e-health services in smart cities"

Sunday 10 November 2013

19:30-20:00

Imperial room

Chair: Prof. Dimitrios I. Fotiadis



Mr. Anastasius Gavras
Steering board member of the FI-PPP
Member of the editorial board of the Eurescom, Germany

Abstract

Societies globally are undergoing fundamental and unprecedented demographic changes. Similarly cities are experiencing intrinsic structural changes. Today many nations in Europe and worldwide are facing the impact of these challenges that in some cases exhibit interactions that amplify the effects. Governments and local authorities are seeking for solutions by setting policies to mitigate the anticipated effects. In some cases information and communications technologies (ICT) can support such policies by providing the infrastructure for the implementation and provisioning of various services to citizens in an effective and cost efficient way and at the same time enable citizen participation. Among various dimensions that typically are associated with smart cities, like mobility, environment, living, etc. the integration of health care is a primary objective since the cost of health care is currently increasing faster than the GDP in most countries. Europe has mobilized a significant part of its industry in a Public-Private-Partnership on Future Internet (FI-PPP), which is a European program for Internet-enabled innovation. The FI-PPP will accelerate the development and adoption of Future Internet technologies in Europe, advance the European market for smart infrastructures, and increase the effectiveness of business processes through the Internet.

In this context the FI-STAR project establishes early trials of services and applications in the health care sector by building on top of Future Internet Technologies developed in the program. The project's ambition is to augment smart cities infrastructures by creating a sustainable ecosystem for all user groups in the global health care and adjacent markets based on FI-PPP specifications. FI-STAR is a unique opportunity to deliver standardized and certified software including a safe, secure and resilient platform, taking advantage of all Cloud Computing benefits and guaranteeing the protection of sensitive and personal data.

The presentation will provide an insight on the current status and the anticipated future trends for decentralized e-health services in smart cities.

Curriculum Vitae

Anastasius Gavras has more than 20 years of professional experience in academic and industry research. He joined Eurescom, the leading organization for managing collaborative R&D in telecommunications, more than 12 years ago as program manager, focusing on the areas of management of networks & systems, security and middleware. In these areas he has managed a large number of studies and projects on topics which are of concern to the Eurescom member community of European telecom network operators and the European telecom industry at large. He has served as coordinator of several RTD projects under the European framework programs and has experience in standardization among others in OMG and ITU-T for which he has served as rapporteur.

His current interests are large scale testbed federations for enabling future Internet research and experimentation among others in the context of the Public-Private Partnership on Future Internet (FI-PPP). In the context of the FI-PPP he is the project co-ordinator of an early trial project in the health sector. Furthermore he is interested in innovation on top of future Internet platforms and the evolution of the future networks in general. He is a steering board member of the FI-PPP and is actively involved from their inception, both in the Future Internet Assembly (FIA) and the Future Internet Research and Experimentation (FIRE) initiative. He is author or co-author of several papers and articles in the area and is co-editor of all four FIA books so far. He is member of the editorial board of the Eurescom mess@ge magazine and has authored several articles for the magazine, typically with a techno-socio-economic dimension.

"Wellness, Disease and Public Health Informatics: Multidimensional Global Threats with Local Impact"

Wednesday 13 November 2013

11:00-11:30

Imperial room

Chair: Prof. Manolis Tsiknakis

Prof. Luis Kun

IEEE Fellow - Distinguished Visitor CS / SSIT William Perry, Center for Hemispheric Defense Studies at the National Defense University, USA

Abstract

As national economies around the world struggle and society realizes that wellness may be a better cost-effective way to deal with healthcare; prevention of disease will certainly become a center of attention. Aside from genetics, at the macro level, Public Health in particular, offers many new avenues for biomedical engineers. Information is key and due to our "islands of excellence", the perception we have under different crisis situations, does not allow us to reach real solutions to complex problems such as human health. Because of it I advocate for an interoperability among trans-disciplines, multi-disciplines and inter-disciplines. This approach allows us to avoid getting solutions that focus on partial knowledge of the problem and therefore getting a solution that does address all parts of an "interdependent" system. This type of complex situations cannot afford wrong decisions since it can ruin an individual's life or a nation's security, many times through irreversible damage. The information we daily receive including and related to diseases, cures, and accidents influences our perceptions. In turn these perceptions influence greatly decision making and because of those many experts that specialize in a very deep but yet narrow field, outcomes of their actions may create a bigger problem. From a worldwide perspective, everything is connected and yet disconnected. This translates into a very high cost and from a futuristic vision implies that the biggest problems society will face relate to fulfill necessities for access to clean water, food, medications and energy. A holistic systems approach is needed and proposed because of the global economy, where data mining, Knowledge Management and Geographical Information Systems are some of the emerging tools with great impact.

Curriculum Vitae

Luis Kun is IEEE-USA Founding Chair of the: Electronic Health Record and High Performance Computers and Communications WG; the Bioterrorism and Homeland Security WG; and the

Critical Infrastructure Protection Committee. As a Distinguished Fellow at the CDC he wrote the IT Strategic Vision for the National Immunization Program; he was also the Senior IT advisor for the Agency for Healthcare Policy and Research highly responsible for the Telemedicine portion of the Balanced Budget (for homecare of the elderly) signed by President Clinton in August 1997. He worked for IBM for 14 years where he developed the first health PC applications, and was involved on telemedicine, PACS, Point of Care and Expert Systems. Luis Kun is a Fellow of IEEE and the American Institute of Medical and Biological Engineering. He is on the Board of many Committees and Journals and is the Editor in Chief of Springer's Journal on Health and Technology. He was on the Board of Governors of IEEE Computer Society and is on the BOG of IEEE Society for Social Implications of Technology and the International Federation of Medical and Biological Engineering (IFMBE). Luis Kun received his BSEE, MSEE and Ph.D. in Biomedical Engineering from the University of California at Los Angeles (UCLA).

"An Overview of M-Health Medical Video Communication Systems"

Monday 11 November 2013

08:00-08:30

Imperial room

Chair: Prof. Michalis Zervakis

Prof. Constantinos S. Pattichis
Department of Computer Science,
University of Cyprus, Cyprus

Abstract

Significant technological advances over the past decade have led m-health systems and services to a remarkable growth. It is anticipated that such systems and services will soon be established in standard clinical practice. M-health medical video communication systems progression has been primarily driven by associated advances in video coding and wireless networks technologies. Responsive, reliable, and of high-diagnostic quality systems are now feasible, and build on compression ratios and error resilience tools found in current state-of-the-art video coding standards, linked with low-delay and high-bandwidth communications facilitated by new wireless systems. To achieve this however, these systems need to be diagnostically driven. In other words, both encoding and transmission need to adapt to the underlying medical video modality's properties, for maximizing the communicated video's clinical capacity. Moreover, the proper mechanisms should be developed that will guarantee the quality of the transmitted clinical content. Current video quality assessment (VQA) algorithms are unsuccessful to replicating clinical evaluation performed by the relevant medical experts. Clearly, there is a demand for new clinical VQA metrics. This lecture reviews medical video communication systems. It highlights past approaches and focuses on current design trends and future challenges. It provides an insight to the most prevailing diagnostically driven concepts and the challenges associated with each system component, including pre-processing, encoding, wireless transmission, and quality assessment. It discusses how exploiting high efficiency video coding (HEVC) standard, together with the emergence of 4G wireless networks, is expected to deliver the m-health medical video communications systems that will rival in hospital examinations. The latter, linked clinical VQA that will correlate with clinical ratings is expected to aid the adoption of such systems and services in daily clinical practice.

Curriculum Vitae

He is currently Professor with the Department of Computer Science of the University of Cyprus. His research interests include ehealth and mhealth, medical imaging, biosignal analysis, life sciences informatics, and intelligent systems. He has published 78 refereed journal and 186 conference papers, and 27 chapters in books in these areas. He is Co-Editor of the books M-Health: Emerging Mobile Health Systems, and of the Ultrasound and Carotid Bifurcation Atherosclerosis, published by Springer in 2006, and 2012 respectively. He was Guest Co-Editor of 11 journal Special Issues including the more recent ones on Atherosclerotic Cardiovascular Health Informatics, and Citizen Centered e-Health Systems in a Global Health-care Environment, of the IEEE Trans. on Information Technology in Biomedicine. He was General Co-Chairman of the IEEE 12th International Conference on BioInformatics and BioEngineering (BIBE2012), and the IEEE Information Technology in Biomedicine (ITAB09). Moreover, he serves as Distinguished Lecturer of the IEEE EMBS, an Associate Editor of the IEEE Journal of Biomedical and Health Informatics, and on the Editorial Board of the Journal of Biomedical Signal Processing and Control. He is a Fellow of IET, and Senior Member of IEEE.

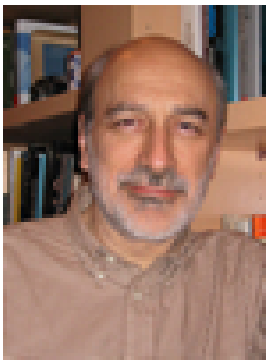
"Somatosensory Brain Machine Interfaces"

Wednesday 13 November 2013

08:30-09:00

Imperial room

Chair: Prof. Aristotelis Chatziioannou



Prof. Jose C. Principe
Computational NeuroEngineering Laboratory
University of Florida, Gainesville, USA

Abstract

In the future use of Brain Machine Interfaces (BMIs) it will be important to bring to the subject the feeling of touch when the robotic device grabs an object in the external world under the brain control of the subject. We are now developing the modelling and signal processing infrastructure to implement a somatosensory BMI by stimulating the Thalamus and producing in the primary sensorymotor cortex a response that mimics the normal stimulation felt by the subject. This talk will present the adaptive inverse control scheme and the spike kernel models that we are developing and some preliminary results.

Curriculum Vitae

Jose C. Principe is Distinguished Professor of Electrical and Biomedical Engineering at the University of Florida, Gainesville, where he teaches advanced signal processing and machine learning. He is BellSouth Professor and Founding Director of the University of Florida Computational Neuro-Engineering Laboratory (CNEL). His research interests are centered in advanced signal processing and machine learning, Brain Machine Interfaces and the modeling and applications of cognitive systems. He has authored 5 books and more than 200 publications in refereed journals and book chapters, and 450 conference papers. He has directed 72 Ph.D. dissertations and 67 Master theses. Dr. Principe is an IEEE, AIMBE and IAMBE Fellows a recipient of the INNS Gabor Award, the IEEE Neural Network Pioner Award, the Engineering in Medicine and Biology Society Career Achievement Award, the IEEE Computational Intelligence Society Neural Network Pioneer Award, and Honorary doctor degrees from Universita Mediterranea, Italy, University of Maranhao Brasil, and Aalto University, Finland. He is Editor in Chief of the IEEE Reviews on Biomedical Engineering, Past Editor-in-Chief of the IEEE Transactions on Biomedical Engineering, current ADCOM member of the IEEE CIS society, IEEE Biometrics Council, and IEEE BME society, member of the Technical Committee on Machine Learning for Signal Processing of the IEEE Signal Processing Society; member of the College of Fellows of the International Neural Network Society, and

Past President of the INNS. He is also a former member of the Scientific Board of the Food and Drug Administration.

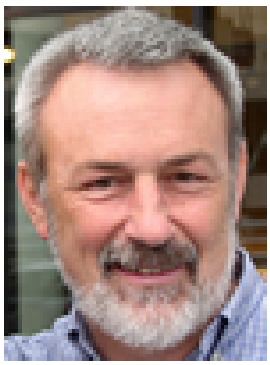
"Brain on a Chip: From Patterns to Circuits with Information Transfer"

Tuesady 12 November 2013

12:30-13:00

Imperial room

Chair: Prof. Konstantina S. Nikita



Prof. Bruce Wheeler
Department of Biomedical Engineering,
University of Florida, Gainesville, USA
IEEE EMBS President

Abstract

The wild idea that nerve cells grown in culture could have reliable computational function, while still a wild idea, is closer to reality than is reasonable to expect, thanks to applications of both engineering and applied biology. The metaphor works both ways: applications of more traditional engineering technologies - signal processing, electronics, microlithography, materials science - make possible the controlled growth, recording, and stimulation of nerve cells. In turn the goal is to design, construct, test, and utilize - in short to engineer - a working biological construct. This work has progressed to where we are constructing circuits using microtunnels that mimic the classic memory circuit of the hippocampus.

Collaborator: Dr. GJ Brewer, SIU School of Medicine, Springfield IL. Support: NIH.

Curriculum Vitae

Bruce Wheeler is a Professor in the Pruitt Family Department of Biomedical Engineering at the University of Florida. For four years he served as the Acting Department Chair and was co-author of the new undergraduate degree program. From 1980 to 2008 he was with the University of Illinois at Urbana-Champaign, including Professor and Founding and Interim Department Head of the Bioengineering Department. He was also a Professor of Electrical and Computer Engineering and the Beckman Institute, a former Associate Head of ECE, and a former chair of the Neuroscience Program. He was the Editor in Chief of the IEEE Transactions on Biomedical Engineering and is now President of the IEEE Engineering in Medicine and Biology Society. He is a Fellow of the IEEE and AIMBE. He received the B.S. degree from MIT and later the M.S. and Ph.D. in Electrical Engineering from Cornell. Prof. Wheeler's research interests lie in the application of electrical engineering methodologies, signal processing and microfabrication, to the study of the nervous system, including the microlithographic control of the patterns of growth of neurons in vitro so as to permit

stimulation and recording with microelectrode arrays. Hopefully this work will lead to better understanding of the behavior of small populations of neurons and lead to better insights into the functioning of the brain. He also has had involvement in algorithm development for directional hearing aids.

"Systems Genetics: Experimental and Computational Challenges"

Sunday 10 November 2013

19:00-19:30

Imperial room

Chair: Prof. Dimitrios I. Fotiadis

Prof. Robert W. Williams
UT-Oak Ridge National Laboratory Chair in Computational Genomics, Center for Integrative and Translational Genomics, Department of Anatomy and Neurobiology, University of Tennessee Health Science Center, Memphis USA

Abstract

The analysis of human disease has profited enormously from systematic application of reductionist methods. But as we learn more about biological systems, we realize that health and disease are due to complex networks of interactions across multiple levels. Simple systems often do not provide robust results or reliable predictions. Systems genetics is a new hybrid of genetics and systems biology that models the consequences of genetic variation and the impact of environmental perturbations on biological processes and disease risk.

In this talk I describe key experimental and computational systems needed for systems genetics. Experimental and replicable populations of isogenic lines of mice that incorporate the same level of genetic complexity as humans are a key requirement. These new murine Reference Populations or families promise to revolutionize our ability to deliver personalized and predictive health care to humans over the next 100 years. Constructing and testing complex biological models is a computational and sociological challenge. I will review some of the latest progress we and other groups are making on building open on-line computational services for systems genetics.

Curriculum Vitae

Robert W. Williams received a Ph.D. in physiology at UC Davis and did postdoctoral work in neurobiology at Yale. He is the Director of the Center for Integrative and Translational Genomics and holds the UT Oak Ridge National Laboratory Governor's Chair in Computational Genomics. Williams is a past president of the International Society for Behavioural and Neural Genetics and founding director of the Complex Trait Community (www.complextrait.org). He is editor-in-chief of Frontiers in Neurogenomics, and serves on the editorial boards of Genes, Brain & Behavior, Neuroinformatics, Mammalian Genome,

Molecular Vision, European Journal of Anatomy, Alcohol, BiomedCentral Neuroscience, the Journal of Biomedical Discovery and Collaboration, and Behavior Genetics. One of Williams' more notable recent contributions is in the field of systems biology and systems genetics. He and his research group have built GeneNetwork (www.genenetwork.org), an online resource and data analysis toolset used widely by the genetics and molecular biology research communities.

"Challenges and Opportunities in Cardiovascular Health Informatics"

Monday 11 November 2013

12:00-12:30

Imperial room

Chair: Prof. Konstantina S. Nikita

Prof. Yuan-Ting Zhang
Director of Joint Research Center for Biomedical Engineering at EE,the Chinese University of Hong Kong, Hong Kong, China.
Director of the Key Lab for Health Informatics of Chinese Academy of Sciences (HICAS) at SIAT, Shenzhen, China.

Abstract

"Advance health informatics" has been identified by the US National Academy of Engineering as one of 14 grand challenges for engineers in the 21st century. Health informatics deals with systematically the acquisition, transmission, processing, storage, retrieval, and use of information for human health. It can greatly enhance the quality, efficiency and cost-effectiveness of medical care and rapidly provide the response to widespread public health emergencies. Information acquisition is considered as the first crucial step in health informatics. This talk will discuss the challenges and opportunities in cardiovascular health informatics with the focus on the aspects of unobtrusive and wearable medical devices. The development of an unobtrusive and wearable cuff-less blood pressure device will be used as an example to illustrate ways of addressing some of these challenges. The potential applications for the unobtrusive monitoring of vulnerable patients with acute cardiovascular diseases will be examined. Future prospects such as flexible electronics for unobtrusive and wearable medical devices will also be presented.

Curriculum Vitae

Dr. Yuan-Ting Zhang is currently the Director of Joint Research Center for Biomedical Engineering and Professor of Department of Electronic Engineering at the Chinese University of Hong Kong (CUHK), Hong Kong, China. He serves concurrently the Director of the Key Lab for Health Informatics of the Chinese Academy of Sciences (HICAS) at SIAT, Shenzhen, China. He is the first Head of the Division of Biomedical Engineering at CUHK and the founding Director of the CAS-SIAT Institute of Biomedical and Health Engineering. Dr. Zhang was elected to the AdCom of IEEE Engineering in Medicine and Biology Society (EMBS) in 1999 and became previously the Vice-President of the IEEE-EMBS in 2000. He served as the Technical Program Chair and the General Conference Chair of the 20th and 27th IEEE-EMBS Annual International Conferences in 1998 and 2005, respectively. He also served on IEEE

Medal on Innovations in Healthcare Technology Award Committee and IEEE Fellow Elevation Committee. He severed on the editorial boards of several international journals in biomedical engineering such as the Editor-in-Chief of IEEE Transactions on Information Technology in Biomedicine (T-ITB). Dr. Zhang serves currently on the Fellow Membership Committee of the International Academy of Medical and Biological Engineering, IEEE-EMBS Technical Committee on Information Technology in Biomedicine, HK-ITC Projects Assessment Panel, , the IEEE-EMBS Summer School Steering Committee, the BSN Steering Committee, and the Editor-in-Chief of IEEE Journal of Biomedical and Health Informatics (J-BHI) which was retitled from T-ITB in Jan., 2013. Dr. Zhang's current research interests include wearable medical devices, body sensor networks, physiological modeling, neural engineering, cardiovascular health informatics, and m-u-p-Heath technologies. He has authored and co-authored over 400 scientific publications in BME and filed over 30 patents, some of which have been successfully licensed for commercialization. His research work has won him and his students/teams numerous honors/awards including the best journal paper awards from IEEE-EMBS, best conference paper awards from IFMBE, and the Grand Award in e-Health at the Asia-Pacific ICTAAC in Melbourne in 2009. He is the recipient of the IEEE-EMBS outstanding service award in 2006. Dr. Zhang holds the fellowships from the International Academy of Medical and Biological Engineering (IAMBE), the Institute of Electrical and Electronics Engineers (IEEE), and the American Institute of Medical and Biological Engineering (AIMBE) in recognition of his outstanding contributions to the development of wearable medical devices and mobile health technologies. Dr. Zhang completed his undergraduate and Master Degree studies in 1976 and 1981, respectively, in telecommunication from Department of Electronics of Shandong University and was conferred a Ph.D. in electrical engineering at the Institute of Bioengineering from the University of New Brunswick in 1990.