



Carry Forward

IFMBE NEWS

International Federation of Medical and Biological Engineering
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REVIEW



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EDITORIAL

Carry Forward



Kang-Ping LIN
News Editor, IFMBE

14 issues of IFMBE News have been published since I served as the IFMBE News editor appointed by Prof. Herbert F. Voigt after the General Assembly meeting at Munich, Germany in 2009. I would like to express my gratitude to the editor assistants, Ms. Chieny Kao and Ms. Brenda Chang for issues No.85-90 and Ms. Xiahong Weng for issues No.91-98; in particular, Ms. Weng has always provided suggestions for improvement, including content format and subject connotation, for prompt news reports, complete activity records and characteristics of global diversity.

We are also grateful to Prof. Monique Frize, the Chair of WiBME, Yadin David and Saide Calil, the past Chair and Chair of CED, who have been involved enthusiastically, providing the latest reports for each issue. Regarding the long term plans of Asian-Pacific Activities Working Group, I would like to express my gratitude to Prof. Ichiro Sakuma, the Chair of APAWG, and Siew Lok Toh who have

continued to foster visiting young scholars and have made complete reports of every meeting since 2009. In addition, the News has obtained continued support from Prof. Martha Zequera Diaz in Latin America, Prof. Nicolas Pallikarakis in Europe, Prof. Luis Kun in North America who have provided me with instant updates which offered us the opportunity to stay connected with the global community of medical and biological engineering. Therefore, a series of feature columns spotlighting special topics and specific regions, like Africa, Latin America, Asia Pacific and Europe have been designed to provide a window of perspective to the many affiliations on reunion around the globe.

It is most worthy of mention that the seasonal News contains worldwide reports of academia activities sponsored or endorsed by IFMBE, each Federation committee meeting, and annual working status, which are streamlined to not only deliver attentive information directly, but also increase overall brand awareness of the Federation. IFMBE News has been an E-newsletter since 2011, special thanks to Ms. Fong Lee, our IFMBE website administrator who made this possible. In addition, I would like to also thank the IFMBE Officers, Prof.



EDITORIAL

Herbert F. Voigt, Prof. Rakto Magjarevic, Prof. James Goh, Prof. Shankar Krishnan and Prof. Marc Nyssen. The News have made complete reports regarding IFMBE global development strategies and cooperation projects, such as collaborations and exchange activities of ICSU and WHO, and detailed description of IFMBE organization instructions. The latest and the most complete information has been promptly announced due to their efforts.

This June, IUPESM World Congress will be hosted in Toronto, Canada, in which IFMBE members will meet up and participate academia

discussions including parallel sessions on elections. In this issue of the News, we covered lists of IFMBE Awards prizewinners, and the nominations of the assigned nominators and nominees for elections. We look forward to another successful year of IUPESM Word Congress.

From Munich to Beijing to Toronto, IFMBE News carried forward its mission, stepping into the next period. It is a platform that welcomes participation and feedback from each and every member, to help shape a better IFMBE News that meets needs and expectations.





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From President



Ratko Magjarević
President, IFMBE

Dear colleagues,
Nearly three whole years passed since the latest gathering of biomedical engineers, medical physicists, physicians and various scientists and professionals with interests in health and health care at the World Congress in Medical Physics and biomedical engineering held in Beijing, China in June 2012. Each and every World Congress is a chance for the Federation and for all IFMBE affiliates to review their achievements in those three years and to have a closer look into the future of biomedical engineering and health care: which are the hottest topics in research, what can be expected from research results and from innovative development in the field, which are the new emerging technologies and what impact may be expected from them in medicine and health care, what are the highest needs in health care recognized by current care givers, how to make BME the education up-to-date and more efficient. Three-annual World Congress of

IUPESM, IOMP and IFMBE more and more take a shape of important health policy stakeholders meeting, in addition to their scientific content. I would like to point out the collaboration with the World Health Organization (WHO) in involving biomedical engineers and their organizations in planning of improving health by technology and in co-organization of events based on research, development and application medical technology and medical devices in health care. Both, IFMBE and WHO are involved in organization of the WHO-PAHO / IFMBE CED / ACCE HTM Seminar in conjunction with this World Congress 2015. IFMBE was present at the 2nd Forum on Medical Devices which was held in Geneva in November 2013. Also, IFMBE strongly supported preparing of the latest resolution on Health Technology Assessment voted in at the 67th WHA in May 2014.

The World Congress is also an important social event where the Federation presents awards to distinguished scientists who contributed to biomedical engineering and science. This year, Professor Chwee Teck Lim is awarded the IFMBE Zworykin Award and Professor Karin Wandrell the IFMBE Otto Schmitt award. For the first time, the newly introduced IFMBE John

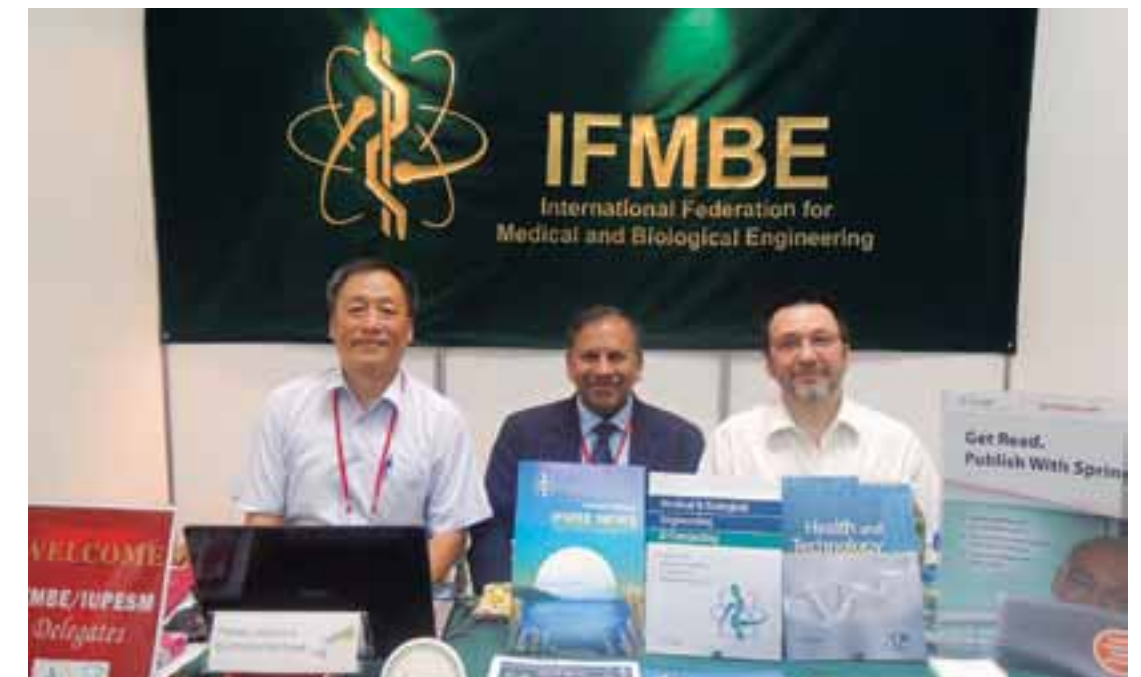


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Hopps Distinguished Service Award is going to be presented at the Opening Ceremony of the World Congress. The Award winner is Professor Robert Nerem. The Laura Bossi Award was introduced on the proposal of the Women in Biomedical Engineering Committee in the period between two Congresses. This year, the Awardee is Professor Alice Noble. IUPESM awards one biomedical engineer with the IUPESM Award of Merit. The award winner this year is Professor Fumihiko Kayija. With congratulations to all award winners, I am inviting you to the World Congress and to the Awards Presentation Celebration.

At the World Congress, there will be elections for IFMBE Officers, Administrative Council members and Divisions boards. The information on Nominees has been published and I was able to see that there are a lot of excellent nominees who are for sure going to lead the Federation with wisdom and power in years to come. Make sure that the delegates of your society are present at the IFMBE General Assembly to give their vote in the ballot.

Looking forward to seeing you at the greatest biomedical engineering event – World Congress on Medical Physics and Biomedical Engineering 2015 in Toronto!





IFMBE Nominations for 2015 Election



Herbert F. Voigt
Professor, Biomedical Engineering, Boston University
President, IUPESM
Past-President, IFMBE
Chair, IFMBE Nominating Committee

The IFMBE Nominating Committee has reviewed the applications of nomination to an IFMBE Office. Below are names under the office for which she/he is a candidate. All of the elections will be held at the WC 2015 in Toronto this June. All of the elections, except for the Council of Societies Chair, will be held at the IFMBE General Assembly. The election for Chair of the Council of Societies will be at the Council's meeting. Nomination's biography, statement and photo will be placed on the IFMBE website and published in below.

IFMBE Officers nominations	
President-Elect Nominees	Shankar M. KRISHNAN, USA Raphael LEE, USA
Secretary General Nominees:	Kang-Ping LIN, Chinese Taipei Mario Forjaz SECCA, Portugal
Treasurer Nominees	Marc NYSSSEN, Belgium
IFMBE AC Member Nominations (Elect 3 members (from all Regions) for 6-year term)	Panagiotis D. BAMIDIS (Panos), Greece Igor LACKOVIC', Croatia Subrata SAHA, USA Siew-Lok TOH, Singapore Bruce C. WHEELER, USA Marjan HUMMEL, Netherlands
Healthcare Technology Assessment Division (HTAD) Member Nominations	Mario MEDVEDEC, Croatia Lennart PHILIPSON, Sweden Kallirroi STAVRIANO, Greece

Clinical Engineering Division (CED) Member Nominations	Abdul BASIT, England Zhivko BLIZNAKOV, Bulgaria Giuseppe FICO, Spain Thomas M. JUDD, USA Paolo LAGO, Italy Mikael PERSSON, Sweden Mladen POLUTA, South
IFMBE Honorary Life-Membership (HLM) Nominations	Makoto KIKUCHI, Japan Ákos JOBBÁGY, Hungary Depei LIU, China Antonio Fernando Catelli Infantsi, Brazil Gerhard Artmann, Germany Joseph Barbenel, UK Laura M. Roa, Spain Miguel Cadena Méndez, Mexico Monique Frize, Canada Per Ask, Sweden
Council of Societies (CoS) Chair Nomination	Monique FRIZE, Canada Andrei LINNENBANK, Netherlands

IFMBE Officers nominations

President-Elect Nominee



Name: Shankar M. Krishnan
Affiliated Society: International Federation for Medical and biological Engineering
Current Position (in Affiliated Society): Secretary-General
Current Profession: Chair, department of BME, Professor Wentworth Institute of Technology, Boston

Brief Biography

Dr. Shankar Krishnan has over thirty years of broad spectrum international professional experience in biomedical engineering education, research and development, medical product design, clinical engineering, and project management. He served in management positions in academia, medical



devices industry, and hospitals. He has held faculty appointments in Illinois, Miami, Singapore, and Boston. He is the founding Director of BME Department and an endowed chair professor at WIT in Boston. At NTU in Singapore, he was founding Director of the BME Research Center and founding Head of the Bioengineering Division. He worked in R&D at Coulter, hospital design and operations management at Bechtel for Healthcare megaprojects, and as Assistant Director at Massachusetts General Hospital, a teaching affiliate of Harvard Medical School. Dr Krishnan has numerous publications and has given invited talks at several international conferences. During the past 11 years, he has significantly contributed to development of new activities of IFMBE worldwide and to the overall welfare of IFMBE. He keeps active memberships in IEEE EMBS, AAMI, BMES, and ASEE. He was selected to Phi Kappa Phi and Sigma Xi honor societies, and is a Fellow of AIMBE. He was a member of a team which received the CIMIT Kennedy Innovation Award.

Position Statement

During my eleven years of service with IFMBE, I have been successful in enhancing networking among multinational members and delegates and facilitating pertinent activities. My extensive international experience working in four different countries has helped me to understand and appreciate concerns from all Constituent Societies and work towards cohesive actions to achieve positive outcomes. I will continue to strive towards effective execution of our Federation's mission, strengthen existing bonds, and seek and

create new and growing relationships across the globe. I have cherished the experiences and fond memories at various IFMBE-affiliated regional and international conferences, meetings, and World Congress events. An opportunity to provide my services to IFMBE as the President will be great honor. I will be pleased to work with the great teams of motivated members actively involved in the broad spectrum of medical and biological engineering, promote collaborations among Constituent Societies, initiate and support new projects addressing emerging challenges in BME, form new alliances, identify and strengthen realizable avenues for growth and sustainability in the BME community, nurture and mentor new leaders, and strive to make my share of contributions towards accomplishment of the present and future goals of IFMBE aimed at improving human health globally.

President-Elect Nominee



Name: Raphael C. Lee, MD, ScD, DSc, FACS
Affiliated Society: American Institute for Medical and Biological Engineering (AIMBE)
Current Position (in Affiliated Society): Past-President and Fellow
Current Profession: Russell Professor of Surgery, Medicine and Biomechanics

Brief Biography

Dr. Lee is a surgeon and biomedical engineer. He holds the Paul and Allene Russell Professorship at The University of Chicago. His research areas include molecular biomechanics of trauma, molecular chaperone engineering, and reconstructive surgery while on the faculties of



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Harvard, MIT and Chicago. This has resulted in three biotechnology companies with two FDA approved products. He directed a WHO sponsored program to determine the health economic impact of Chernobyl on Belarus. Dr. Lee served as President of: Society for Physical Regulation in Biology and Medicine, American Institute for Medical and Biological Engineering (AIMBE), The Drexel 100. Consistently ranked among "America's Top Physicians" and "Top 1% of Plastic Surgeons". Dr. Lee has received many awards including American College of Surgeons Schering Scholar, MacArthur Fellow, a Searle Scholar, and election to IAMBE and the National Academy of Engineering (USA). He has been elected Fellow of: American Association of Plastic Surgeons, IEEE-EMBS, BMES, AIMBE and AAAS. He is recipient of the James Barrett Brown Award from the American Association of Plastic Surgeons for "Advancing the field of Plastic Surgery"; the American Electrical Power Association Award for "Advancing Electrical Safety and Health". He has been named distinguished alumnus by three universities.

Position Statement

The International Federation for Medical and Biological Engineering (IFMBE) has important responsibilities in its unique role as international coordinator, consensus builder and communicator of multinational solutions to global environment, biological and medical challenges. Success in this role has never been more important than it is today. It is increasingly clear that the participation

of bioengineers is essential to achieve practical and sustainable solutions. IFMBE has now moved substantially toward achieved the basic organization structure to engage biomedical engineering resources where they are needed across the globe. My basic priorities are to support IFMBE's strategic agenda and goals as well as work to strengthen IFMBE's partnership with WHO, UNEP, UNESCO, and other major NGO global health organizations to achieve sustainable solutions to biomedical challenges. IFMBE must also assist in development of regional alliances to address regional problems. Closure collaboration with medical educators is essential to future biomedical engineers and physicians. IFMBE must support training of more biomedical engineers that will be involved in future global medical and biological ecosystem challenges. IFMBE must become a resource for regional training in disadvantaged areas. IFMBE needs to develop its infrastructure to support these efforts.

Secretary General Nominee



Name: Kang-Ping Lin, Ph.D.
Affiliated Society: Taiwanese Society of Biomedical Engineering
Current Position (in Affiliated Society): Past-President
Current Profession: Distinguished Professor, Chung-Yuan Christian University, Taiwan

Brief Biography

Kang-Ping Lin obtained his Ph.D. degree in 1994 at the University of California, Los Angeles (UCLA) in Biomedical Physics. He is Distinguished Professor



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of Electrical Engineering at Chung-Yuan Christian University, Taiwan. He served as Director of Medical Device Technology Division of the Biomedical Engineering Center in Industrial Technology Research Institute in Taiwan (2000~2004). He was the president of Taiwanese Society of Biomedical Engineering (2007~2010) and the Editor-in-Chief of the Journal of Medical & Biological Engineering (1999~2007). He is now the Director of Technology Translation Center for Medical Device in his university (2011~now), and the Board member of Taiwanese Society of Molecular Imaging (2009~2015). He has several roles in IFMBE including the Chair of Publication Committee and Publicity Committee, the Co-Chair of Asia Pacific Working Group Committee, and the Editor of IFMBE Newsletter from 2009 to now. His research interests include handheld medical devices, physiological signal processing, and medical image processing. His current research topics include capillary blood velocity measurement, microcirculation images, and hemodynamic data analysis. In the field of medical devices, he has also focused on integration of industry, academia and medicine oriented towards being homecare, small, simple and low-energy consumption.

Position Statement

I have participated in IFMBE meetings, Committees, Working Groups and the IFMBE NEWS for five+ years. I represented IFMBE at the 2012 WHO annual meeting, attended the IFMBE strategic planning meeting for reforming the organization, and hosted the 9th APCBME conference. I am co-chair of Asia Pacific

Working Group (APWG) that fosters exchanges among young BME scholars in Asia-Pacific countries. APWG and I initiated the student medical-device design competition at the 9th APCBME. By participating in IFMBE activities, including MEDICON, CLAIB, APCBME and IUPESM-WC, I have established good connections to our BME colleagues worldwide. I propose expanding AP's experiences to Latin America, Africa and Europe to reinforce BME education and cooperation among young scholars. I also propose creating films/animations for our website illustrating modern BME technologies. In addition, I propose a small grants program for encouraging BME students worldwide to design innovative medical devices for use in developing countries with the design reports prepared as a manuscripts for publication in MBEC and HTA journals. I would be sincerely grateful if these works and ideas could be accepted as my plans under IFMBE President's direction for the position of Secretary-General and thus promoting the development of the IFMBE in the world.

Secretary General Nominee



Name: Mario Forjaz Secca
Affiliated Society: SPEB (Portuguese Society of Biomedical Engineering)
Current Position (in Affiliated Society): President
Current Profession: Associate Professor of Biophysics

Brief Biography

Born 1957 in Mozambique, finishing High School



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there. In Sussex University, England, obtained B.Sc., 1977, D.Phil., 1983, both in Physics, and 4 years Post Doc. Then gave up job, sold everything, and spent 8 months touring the world to think and learn what not learned from formal education.

In 1986 appointed Physics Assistant Professor at Universidade Nova, Lisboa, becoming Biophysics Associate Professor in 2005. In 2001 created one of the first two undergraduate courses in Biomedical Engineering in Portugal and was its coordinator until 2014.

Main research interests are Medical Imaging (Magnetic Resonance Imaging), Biomechanics and Brain. President of the Portuguese Society of Biomedical Engineering since 2006. One international patent of a Biomedical device. Actively involved with IFMBE since 2006: 2008-2012, Chairman of the Societies Committee; 2011-... Chairman of the Working Group on Developing Countries, 2012-2018 member of the Administrative Council, and member of several committees. Involved in a training program in Central Hospital of Maputo, Mozambique (2011-2106). Active member of ISMRM, ESMRMB and Portuguese Society of Biomechanics. Member of Superior Council of Grupo Entrepasto (Portuguese group of companies covering 4 countries and over 2500 employees). Speaks Portuguese, English, Spanish, French, Italian and basic Swedish.

Position Statement

In 2006, as President of the Portuguese Society, I became involved in IFMBE, through the Secretaries

Committee and in 2008 was elected its Chairman, beginning a 7 year period of heavy involvement with IFMBE. Believing the Secretaries Committee was not aptly named I proposed the change of name to Societies Committee, approved in 2011, remaining its Chairman until 2012. In 2011 I was heavily involved in the proposal for the restructure of IFMBE, with the creation of the Council of Societies to give it its due importance and I strongly defend the regional groups. In 2011 I was appointed Chairman of the Developing Countries WG, promoting BME in the less favoured countries in connection with WHO. In 2012 I was elected a member of the AC and have been a member of several committees. I strongly support broadening IFMBE's reach to all areas around the world, in particular Africa and Middle East, and will do my best to achieve that. I believe IFMBE is more than a scientific society and emphasis should be put on education and the profession. I will continue to promote IFMBE's ideals with the same fervor and strongly defend its positions on BME around the world.

Treasurer Nominee



Name: Marc Nyssen
Affiliated Society: BSMBEC
Current Position (in Affiliated Society): Secretary General
Current Profession: Professor Medical Informatics

Brief Biography

Marc Nyssen obtained his PhD. degree in 1983



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at the Free University Brussels in Electrical Engineering. Currently he is Professor of Medical Informatics at Free University Brussels (VUB). From early on his research interests have focused on information technology and its applications in healthcare. He has pioneered several initiatives that today are taken as defaults. As an example, he is the co-founder of the "Belgian Unix systems Users Group" associated with the EurOpen European federation of national user groups. The BUUG introduced and ran the EUnet network, Belgium's first Internet connection between 1986 and 1994. His is interested in different aspects of the computerized production lines, mainly for the scientist, with emphasis on network communication aspects. Image processing related hardware and software systems and eHealth, i.e. medical Internet applications and Electronic medical records are examples of areas where he has contributed. Currently he is responsible for a Belgium wide project which consists of the introduction of electronic medical prescriptions in Belgium. He is also coordinator of the Flemish inter-university masters in Biomedical Engineering and in Medical data management, a member of the Belgian "Health telematics Commission" and Chairman of VLIRUOS, the Flemish university council responsible for academic cooperation projects, worldwide. As National Secretary of the Belgium IFMBE Affiliate he has represented Belgium in the International Federation for Medical and

Biological Engineering (IFMBE) from the early 90's onwards. He is co-founder and Secretary General of the Belgian National Committee on Biomedical Engineering within the Belgian Royal Academy of Sciences and Fine Arts. Currently he is a member of IFMBE Administrative Council.

Position Statement

IFMBE needs activities to establish our leadership in the field: therefore I will do my utmost, as a member of the Officers team, to encourage the expansion of the Federation and to consolidate our activities world-wide, in all aspects covered by our multi-disciplinary field.

Administrative Council (AC) Member Nominations



Name: Panagiotis D. Bamidis (Panos)
Affiliated Society: Hellenic Society of Biomedical Technology (ELEBIT)
Current Position (in Affiliated Society): Treasurer
Current Profession: Assist. Prof. Medical Physics Lab, Medical School, Aristotle University of Thessaloniki, Greece

Brief Biography

Panos Bamidis is Assistant Professor in the Lab of Medical Physics, Medical School, Aristotle University of Thessaloniki, Greece, where he has founded and is leading four research groups: Assistive Technologies and Silver Science; Medical Education Informatics; Applied and Affective Neuroscience; and Health Services Research. He has co-ordinated four large European projects (www.meducator.net; www.longlastingmemories.eu, www.epblnet.net).



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eu, www.childrenhealth.eu); principal investigator for a number of national and international funded projects. In 2009 was awarded the Prize of the University's Research Committee for the best record in funded research projects among young academic staff. Publications: 90 international refereed journal papers, >280 international peer reviewed conference papers, several book chapters/edited conference proceedings, 3 books and over some 480 citations (h-index=12). Referee in >25 journals, and Guest Editor in >12 journal special issues. Member of the Administration Boards for: Society of Applied Neuroscience (SAN); Greek Federation of Alzheimer's Associations and Related Disorders; Innovation Zone of Thessaloniki; Hellenic Biomedical Engineering Society (ELEBIT, Treasurer since 2008, represents ELEBIT in EAMBES Societies Division). He was the Chairman/Organiser of six international conferences (iSHIMR2001, iSHIMR2005, MEDICON2010, GASMA2010, SAN2011, MEI2012); Conference Producer of Medical Education Informatics Conferences and Spring School Series. He has organized MEDICON2010 but also several national events under the auspices of IFMBE, and is a member of IFMBE's Conference Committee.

Position Statement

I have been involved with IFBME activities since 2008. Having successfully organized one of the main regional IFBME events back in 2010 (MEDICON 2010) I have become aware of many of the IFBME responsibilities/visions. Throughout all these years I have inspired numerous young

students in Greece and beyond to become members of the national IFBME societies, present work at IFMBE conferences, apply for Young Investigators Awards and get involved with the organization of IFBME events. My vision is to further inspire and attract young scientists' attention to get involved with the Society and its events. My experience and involvement with funded research and scientific and professional collaborations around the globe will guarantee that IFMBE's work is well disseminated and well emphasized in the international research agendas. My literacy with social media and my capacity with publications/publicity activities will play a pivotal role in modernizing any future Publication & Publicity strategy of IFMBE as well as its wide dissemination. My involvement in the Boards of other societies will facilitate IFBME's inter-disciplinary role and cross domain collaboration. Finally, my experience with innovative services establishment may initiate a new role of IFBME, that is activating its young members towards innovative entrepreneurship and fund raising.



Name: Igor Lacković
Affiliated Society: Croatian Medical and Biological Engineering Society
Current Position (in Affiliated Society): President
Current Profession: Associate Professor, University of Zagreb, Faculty of Electrical Engineering and Computing

Brief Biography

Igor Lacković obtained his Ph.D. in Electrical Engineering from the University of Zagreb in



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2004. In 2003 he was visiting researcher at the University of Ljubljana. Between 2004 and 2007 he held a post-doctoral position in the Department of Electronic Systems and Information Processing at the University of Zagreb. He served as an Assistant Professor from 2007 to 2011, and in 2011 he became Associate Professor in the same department. He teaches courses and conducts research in the field of biomedical engineering. His main research interests are focused on electric field interaction with biological tissue including electroporation-based drug and gene delivery, bioimpedance spectroscopy and related instrumentation development. He is author of more than 60 publications including textbooks, chapters, journal articles and conference papers. Dr. Lacković is serving as IFMBE Proceedings Series Deputy Editor. In 2014, he served as the Conference Chair of the 6th European Conference of the IFMBE. He is the president of Croatian Medical and Biological Engineering Society since 2013. From 2009 to 2013 he has served as the Chair of Engineering in Medicine and Biology Chapter of the IEEE Croatia Section. He received several awards including "Vera Johanides" award from the Croatian Academy of Engineering.

Position Statement

My first contacts with IFMBE officers were in 2000 as I was a member of the Organizing Committee of the 9th Mediterranean IFMBE Conference (MEDICON 2001) that took place in Pula, Croatia. Gradually, I gained a working knowledge

of the IFMBE and its fields of interests, activities, mission, organizational structure and strategic directions. I have taken part in numerous IFMBE sponsored events including World Congresses, regional and international conferences and meetings. Currently I am serving as IFMBE Proceedings Series Deputy Editor (2013-2015). In 2014, I served as the Chair of the 6th European Conference of the IFMBE (MBEC 2014) held in Dubrovnik, Croatia.

An opportunity to serve the IFMBE as an AC member will be a great honor. I will do my best to contribute positively to the decision-making process of the IFMBE in matters that relate to current and long term objectives of the IFMBE. I have the ability to listen, analyze, think creatively, and work well with people, individually and in a group, with tolerance of differing views. I believe I have the experience and the enthusiasm to serve the IFMBE members well, and to continue to make a positive contribution to the goals of IFMBE.



Name: Subrata Saha
Affiliated Society: Am. Inst. Med. Biol. Eng. (AIMBE)
Current Position (in Affiliated Society): Chair of International Committee
Current Profession: Director of Biomedical Engineering Program and Research Professor, SUNY Downstate Medical Center, Brooklyn NY.

Brief Biography

Dr. Subrata Saha is presently the Director of Musculoskeletal Research and Research



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Professor in the Department of Orthopaedic Surgery & Rehabilitation Medicine at SUNY Downstate Medical Center in Brooklyn, New York. Dr. Saha received a BS in Civil Engineering from Calcutta University in 1963, an MS in Engineering Mechanics in 1969 from Tennessee Technological University, and Engineering and PhD degrees in Applied Mechanics from Stanford University in 1972 and 1974, respectively. He has been a faculty member at Yale University, Louisiana State University Medical Center, Loma Linda University, Clemson University, and Alfred University. Dr. Saha has received many awards from professional societies, including Orthopedic Implant Award, Dr. C. P. Sharma Award, Researcher of the Year Award, C. William Hall Research Award in Biomedical Engineering, Award for Faculty Excellence, Research Career Development Award from NIH, and Engineering Achievement Award. He is a Fellow of The Biomedical Engineering Society (BMES), The American Society of Mechanical Engineers (ASME), and the American Institute for Medical and Biological Engineering (AIMBE). Dr. Saha is the founder of the Southern Biomedical Engineering Conference Series. He also started the International Conference on Ethical Issues in Biomedical Engineering. Dr. Saha has published over 100 papers in journals, 35 book chapters and edited volumes, 347 papers in conference proceedings, and 84 abstracts. His research interests are bone mechanics, biomaterials,

orthopedic and dental implants, drug delivery systems, rehabilitation engineering, and bioethics. Dr. Saha is presently the Editor-in-Chief of the Journal of Long-Term Effects of Medical Implants and Ethics in Biology, Engineering and Medicine: An International Journal.

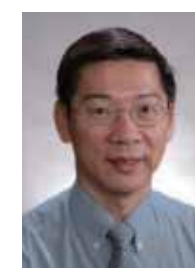
Position Statement

As a member of the AC of IFMBE, I shall strive to increase the member of countries that are affiliated with IFMBE. I shall also try to increase the visibility and outreach of IFMBE by organizing sessions and Panel Discussions at various national and international conference. For instance, I organized the biomaterials sessions and a symposium on Ethical Issues in Medical Physic and Biomedical Engineering at the Biomedical Engineering and Medical Physics World Congress in Beijing, China, in 2012, that was Co-sponsored by IFMBE. Similarly as the chair of the Bioethics Committee of IFMBE, I also organized a Panel Discussion on Ethics in Biomedical Engineering at the IEEE Ethics Conference in Chicago, USA, in 2014. For many years I have been organizing the bi-annual International Conference on Ethical Issues in Biomedical Engineering that have been co-sponsored by IFMBE I am organizing the next such conference entitled International conference on Ethics in Biology, Engineering and Medicine (ICEBEM 2015) that will be held in Brooklyn, New York, 24-26 April 2015 and will be co-sponsored by IFMBE. I am also developing a universal Code



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of Ethics for Bioengineers as an important task of the Bioethics Committee of IFMBE.



Name: Siew-Lok TOH
Affiliated Society: Biomedical Engineering Society (Singapore)
Current Position (in Affiliated Society): Vice President
Current Profession: Academia

Brief Biography

Education:

1974: BSc (1st Class) in Mechanical Engineering, University of Strathclyde, UK

1980: PhD in Mechanical Engineering, University of Strathclyde, UK

Working Experience:

- Deputy Head (Education & Student Affairs), Dept of Bioengineering, Faculty of Engineering
- Senior Project Engineer, Babcock Power Ltd., U.K.
- Project Engineer, Babcock Power Ltd., U.K.
- Asst Project Engineer, Babcock Power Ltd., U.K.

Membership to Professional Societies:

- Founding Member, Biomedical Engineering Society (Singapore)
- Member, Institute of Mechanical Engineering, UK
- Member, American Society of Mechanical Engineers, USA
- Member, World Association of Chinese

Biomedical Engineers

- Member, Institution of Engineers, Singapore

Official Positions in Professional Societies

- Vice President, Biomedical Engineering Society (Singapore)
- Member, Steering Committee of Asian Committee for Experimental Mechanics
- Secretary of the International Federation for Medical and Biological Engineering (IFMBE)

Working Group for Asia-Pacific Activities

- Member of the International Federation for Medical and Biological Engineering (IFMBE)

Education & Accreditation Committee and Nominating Committee

Position Statement

As the Secretary of the IFMBE Working Group for Asia Pacific Activities, I have been very active in organising activities such as the Asia Pacific Research Networking Fellowship (APRNF) since its inception in 2006 during the WC2006 in Seoul, S Korea. The main objective of the APRNF is to bring young researchers from the IFMBE-affiliated national biomedical engineering societies of the Asia Pacific region together, providing them with excellent opportunities to travel together to a couple of countries in the Asia Pacific to network and showcase their research work. Since WC2006, I had organised the subsequent APRNF during WC2009 in Munich and WC2012 in Beijing. Feedback from these young researchers had been very positive and they had benefitted not only scientifically but culturally from each other.



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I also organised the first IFMBE-Sponsored-Asian-Pacific Medical Device Design Competition in October 2014 in conjunction with the 9th Asian-Pacific Conference on Medical and Biological Engineering in Taiwan. The focus of the competition was on the design of a low-cost medical device to improve healthcare in resource-scarce communities.

I believe that the above two activities which I had organised have brought benefits to our members in the BME communities. Given the opportunity, I would like to share my experience with other regional groups in IFMBE with the hope that there will be more closer interactions and collaborations between regional groups on a more regular basis.



Name: Bruce C. Wheeler
Affiliated Society: IEEE EMBS
Current Position (in Affiliated Society): Past President
Current Profession: Professor of Biomedical Engineering, University of Florida

Brief Biography

Bruce Wheeler moved to the University of Florida in 2008, serving as Acting Chair of the Department of Biomedical Engineering (2009-12) and co-authoring the proposal for the BS BME degree program. While at Illinois (1980--2008) he wrote the proposal for the BS, MS, PHD and Department of Bioengineering and served as Founding / Interim Head from (2005-08). He was also Professor of Electrical and Computer Engineering (including

Associate Head), the Beckman Institute, and a chair of the Neuroscience Program. In 2015 he moves to the University of California at San Diego as Adjunct Professor of Bioengineering.

He served as President of the IEEE Engineering in Medicine and Biology Society and also as Editor in Chief of the IEEE Transactions on Biomedical Engineering. Prof. Wheeler's research interests lie in the application of electrical engineering methodologies to neuroscience. His work influenced neural spike sorting technologies, microelectrode array recording from brain slices, and the use of lithography to control cells, especially neurons, in culture. His work aims at basic science understanding of the behavior of small population of neurons.

He is a Fellow of IAMBE, AAAS, IEEE, AIMBE and BMES.

Position Statement

My experience helping to improve the interactions of the IFMBE and the IEEE EMBS has been very positive. This includes especially the agreement to cooperate in yearly alternating biomedical and health informatics (BHI) conferences. By extension there are other conferences and activities where the IFMBE umbrella organization can work collaboratively with IEEE EMBS to provide a greater range and quality of conferences and related activities for the increasing number of biomedical engineers world wide. Clearly other affiliated IFMBE societies offer excellent conferences that Administrative Council should continue to endorse and strengthen, thereby enhancing the reach of the constituent societies.



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The IFMBE publishes journals, proceeding and books; my experience as a journal editor and my more general knowledge of scientific publication issues should be a plus for the IFMBE in a time of changes brought about by open access, electronic publishing, and a rapidly growing biomedical engineering publication market.

There is more potential to be exploited in linking, via IFMBE, the constituent societies with large intergovernmental organizations, such as the World Health Organization. I would welcome the opportunity to serve toward this end.

Healthcare Technology Assessment Division (HTAD) Member Nominations



Name: Marjan Hummel
Affiliated Society: The Netherlands Society for Biophysics and Biomedical Technology
Current Position (in Affiliated Society): Member
Current Profession: Assistant professor at the University of Twente in the Netherlands

Brief Biography

Marjan Hummel is an Assistant Professor in DEcision support for Design Engineering (DEciDE) in Healthcare. She is affiliated with the Department of Health Technology and Services Research at the University of Twente in the Netherlands. With a Master's degree in Technical Business Engineering and a Doctoral degree in Medical Sciences, Marjan has a multidisciplinary background. She has developed a line of research on health technology assessment (HTA) of medical devices in their early

stages of development. Within this field of early HTA, she is an acknowledged expert on Multi-Criteria Decision Analysis (MCDA). In her MCDA studies, she chaired and supervised various expert panels, composed of biomedical engineers and medical specialists, to assess technologies prior to their clinical introduction in health care. Examples of the medical devices she assessed include gene technology, nanotechnology, imaging technology, heart pumps, and robotics. Her HTA studies supported decisions on design engineering (various industrial and academic organizations), allocation decisions of research grants (e.g. Health Council, the Netherlands), and reimbursement decisions (e.g. IQWiG, Germany). She has taught diverse courses in early HTA for Master students in Biomedical Engineering, Technical Medicine and Health Science. She has published her HTA studies involving biomedical engineers in various international peer-reviewed journals.

Position Statement

In my view, the expertise of biomedical engineers is often too incrementally applied in HTA studies on medical devices. Therefore, in my HTA research I actively promote the involvement of biomedical engineers in 1) identifying relevant performance criteria of medical devices, 2) providing data about the performance of medical devices, 3) assessing the performance of medical devices, and 4) generating ideas for improving the performance of medical devices. In short, I regard the expertise of biomedical engineers to be essential for all stages of HTA.



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I would be honoured to help the HTA Division in achieving its objectives through my solid methodological expertise in assessing medical devices, through my experience in facilitating discussions between engineers and medical specialist in HTA on the value of medical devices to healthcare, and through my experience in teaching methods for HTA to engineers. I am driven to organize meetings between biomedical engineers, medical specialists and other researchers in HTA, to present research on the involvement of biomedical engineers in HTA at international conferences, as I did at the FBME conference in Croatia, to publish these studies in international peer-reviewed journals, and to educate biomedical engineers in methods for early HA.



Name: Mario Medvedec
Affiliated Society: Croatian Medical and Biological Engineering Society
Current Position (in Affiliated Society): Vice President
Current Profession: Clinical Biomedical Engineer; Adjunct Professor

Brief Biography

since 2013 vice-president of the Croatian Society for Medical and Biological Engineering
since 2012 lecturer at Faculty of Science, University of Zagreb, Croatia
since 2009 member of the Executive Committee, Croatian Society for Medical and Biological Engineering; member of the Clinical Engineering Division Board, International Federation for Medical and Biological Engineering
2006 Ph.D. in clinical dosimetry, radionuclide

therapy and radiation protection, School of Medicine, University of Zagreb, Croatia
since 2003 lecturer and mission expert of the International Atomic Energy Agency (IAEA)
since 2002 lecturer at Health Polytechnic, Zagreb, Croatia
since 2000 peer reviewer of the Journal of Nuclear Medicine
since 1995 research scientist in national and international research & development projects
1995 M.Sc. in biomedical measurement techniques and computing, Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia
since 1990 clinical biomedical engineer, Division of Biophysics, Department of Nuclear Medicine and Radiation Protection, University Hospital Centre Zagreb and University of Zagreb School of Medicine, Zagreb, Croatia
1989 - B.Sc. in radiocommunications and professional electronics, Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia
1983 - graduated from High School of Mathematics and Informatics, Zagreb, Croatia
1964 - born in Zagreb, Croatia

Position Statement

If I were elected as a member of the IFMBE Healthcare Technology Assessment (HTA) Division, I would do my best to plan, introduce, promote, organize, establish, coordinate, investigate, develop and improve all possible activities of biomedical engineering community within clinical and academic environments at the local, national, regional and international levels, in order to assist in and support



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optimal and harmonized decisionmaking processes related to healthcare technologies.
In particular, I would focus my efforts towards the initiation of the new project of web-based electronic dictionary/encyclopaedia and the international journal on Clinical Engineering and Health Technology Assessment (CEHTA), together with all HTA-related efforts aiming advanced synergetic collaboration and communication with individual medical and other health professionals and/or their associations nation-, region- or world-wide for the maximal benefit of patients.



Name: Lennart Philipson
Affiliated Society: Swedish Society for Medical Engineering and Physics
Current Position (in Affiliated Society): Member of the board
Current Profession: Medical device consultant

Brief Biography

Lennart Philipson is an electrical and biomedical engineer from Chalmers university of technology, Gothenburg Sweden. He also has a Ph. D. and the degree associate professor (docent) in biomedical engineering from Linköping university, Sweden.
His research career started with 18 years of clinical neurophysiology at Örebro university hospital. This period was interrupted by a year as a visiting research engineer at Northwestern university in Chicago.
Following the time at the hospital Dr. Philipson moved to Örebro university where he headed the department for science and technology for seven years. After this period in academia Lennart moved to

the Swedish Medical Products Agency (MPA) where he directed the medical devices sector for nine years. After MPA Dr. Philipson moved back to research and academia serving as the research director at Örebro county council, this position included strategic responsibilities for the research at three hospitals, primary care, psychiatry, dentistry and rehabilitation. After serving the Örebro county council for four years Dr. Philipson, on January 1st 2015, started his own medical device consulting company. Lennart Philipson has published 32 presentations (oral and posters at scientific symposia, conferences and workshops) and has 27 published papers in international scientific journals.

Position Statement

Medical devices are becoming increasingly important for modern medical care. IFMBE has the leverage to help promoting the position of the medical and biological engineering sector and in that way help building a more efficient and safer medical and health care for everyone. I would be happy to support the IFMBE by contributing with my experience from the medical engineering sector.



Name: Kallirroi Stavrianou
Affiliated Society: Hellenic Society for Biomedical Technology (ELEVIT)
Current Position (in Affiliated Society): Member
Current Profession: Post Doc Researcher, Biomedical Engineer, University of Patras, Greece

Brief Biography

Kallirroi Stavrianou was born in Athens, she received her Diploma in Physics in 2001, her



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MSc Degree in Biomedical Engineering in 2003 and her PhD Degree in Biomedical Engineering in 2007, from the University of Patras, Greece. Currently she is a post-doc researcher at the Biomedical Technology Unit (BITU), Laboratory of Medical Physics, University of Patras, Greece. Her scientific interests are Clinical Engineering and Health Technology Assessment and during the last decade she has been working mainly on Biomedical Equipment Management, Medical Devices Vigilance and Patient Safety. During the last 15 years she has been a member of several Conference organising committees held in Greece, she has been involved in National and European projects and she has more than 15 publications in international peer-reviewed journals and conference proceedings. She has collaborated with the Institute of Biomedical Technology (INBIT) in Patras for many years and gained a lot of experience in Clinical Engineering and Medical Device Management. She is a member of the Hellenic Society for Biomedical Technology (ELEVIT). She speaks fluently English and very well French and Italian. She is very fond of travelling and very sociable.

Position Statement

Kallirroi Stavrianou has been interested in Health Technology Assessment since the beginning of her academic studies. HTA has always been her choice of interest and her PhD is entitled: "Health Technology Assessment of home hemodialysis, study of the factors that affect its adoption and

evaluation of Greek hemodialysis patient's quality of life".

She has attended many IFMBE conferences over the years. She is also appointed as a Journal Manager of the open access International Journal of Clinical Engineering and Health Technology Assessment (CEHTA) which is a joint initiative of the Clinical Engineering and Health Technology Assessment Divisions of the IFMBE. As an administrator she will try to maintain the highest possible quality in organising and running CEHTA, that will be of great importance for both IFMBE Divisions.

If she is honoured with an HTAD membership, she will dedicate herself to the fulfilment of the goals the HTA Division has set with enthusiasm and persistence.

Clinical Engineering Division (CED) Member Nominations



Name: Basit Abdul
Affiliated Society: IPEM, UK
Current Position (in Affiliated Society): Member
Current Profession: Medical Equipment Manager

Brief Biography

I am Medical Equipment Manager at Queen Mary's Hospital, Sidcup, UK which is a part Oxleas NHS Foundation Trust. I am an electronics engineer by training and completed, in 2009, an MSc in Medical Electronics and Physics at Queen Mary, University of London. Currently, I am also



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studying a part time MSc degree in Healthcare Leadership. It is joint programme developed by KPMG, Manchester Business School, University of Birmingham and NHS Leadership Academy. I have more than 7 years of engineering and team management experience comprising of 5 years of medical equipment maintenance and management in the NHS, 7 months of engineering teaching and 2 years of handling technical developments in industry as assistant technical manager.

Technical Skills and Knowledge:

- WHO Medical Device Technical Series (Regulation, Assessment, Management, R&D)
- Medical Devices – QMS – Requirements for Regulatory Purposes (BS EN ISO 13485:2012)
- DB2014 - Managing Medical Devices
- BS/EN60601-1 'Medical Electrical Equipment' Medical Equipment Service & Management Software:

Concept - Evolution® FM, Planet FM, GE Asset Plus, E-Quip, Ansur and Optim

Position Statement

I believe that clinical engineers can provide answers to the major questions related to affordable healthcare and patient safety worldwide. At the moment, full potential of clinical engineers is not being utilized. We, as clinical engineers, are not fully represented at decision making either at clinical or financial platforms.

This impacts the financial rewards in terms of salaries compared to other clinical roles. Side by side, clinical engineering career path also needs serious attention to create a fair standard worldwide.

I believe I can help taking clinical engineering career to next level through the help and support of IFMBE and its members. I hope I will be given a chance to prove my potential and achieve my ambitions through working in the IFMBE team.



Name: Zhivko Bliznakov
Affiliated Society: Bulgarian Society of Biomedical Physics and Engineering - BSBPE
Current Position (in Affiliated Society): Member
Current Profession: Senior researcher, Technical University of Varna, Bulgaria

Brief Biography

Zhivko Bliznakov was born in Varna, Bulgaria, in 1973. He received his diploma in Electrical Engineering in 1996 from the Technical University of Varna - Bulgaria. He received his MSc Degree in Biomedical Engineering in 1998 and his PhD Degree in Biomedical Engineering in 2003 from the University of Patras - Greece.

Currently, Zhivko Bliznakov is a senior researcher and he collaborates actively with the Department of Electronics, Technical University of Varna - Bulgaria, the Biomedical Technology Unit, Laboratory of Medical Physics, University of Patras - Greece and the Institute of Biomedical



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Technology - Greece. He is an author of more than 50 publications in international peer-reviewed journals and conference proceedings. He has more than ten years of teaching experience in the field of Medical Technology Management, Clinical Engineering, Medical Device Vigilance and Patient Safety. During the last decade, he has been actively involved in a large number of National and European projects. His main scientific interests comprise Biomedical Technology Management, Clinical

Engineering, Medical Devices Vigilance and Patient Safety, Medical Equipment Management Software Systems, Biomedical Engineering Education. Other research interests include Image Processing, Digital Tomosynthesis, Monte Carlo Simulations, and Breast Phantom Modelling.

Position Statement

I am a self-motivated person, able to produce high quality work, both independently and within a group. An important aspect of my personality is my determination to resolving problems and completing tasks. I am persistent and thorough, with responsibility to deliver solid outcomes. I am a self-responsible person with a strong sense of commitment. If elected, I will bring to the CED of IFMBE my experience in the field of Biomedical Engineering, specifically in Management of Biomedical Technology and Clinical Engineering, as well as, my knowledge in the recent developments in Education and Training of Biomedical Engineers in the wide European Area, nowadays.

I will work towards promotion of the CED on the International level and increase of the real active members; enhancement of links and collaboration of the CED with other National and International Organizations in the same field, both in developing and developed countries. I am open minded and always eager for new knowledge and challenges. I believe my involvement in the CED activities will have a positive impact and it will contribute towards the implementation of CED mission and objectives.



Name: Giuseppe Fico
Affiliated Society: SEIB – Sociedad Española de Ingeniería Biomédica
Current Position (in Affiliated Society): Member
Current Profession: Researcher in the Life Supporting Technologies group at Universidad Politécnica de Madrid, Madrid, Spain.

Brief Biography

Giuseppe Fico is M.Sc. in Electronic Engineering since 2005, Università degli studi di Napoli Federico II (Italy), and Mast. in Biomedical Engineering, Universidad Politécnica de Madrid (Spain), since 2007. He is expert in applying engineering and information technology methods to health and wellbeing. He is manager of international research projects and initiatives in the health sector. He is teacher of specialized courses in biomedical engineering and strategic coordinator of the health area at Life Supporting Technologies (LST) group of the Universidad Politécnica de Madrid. His research focuses on ICT for Health,



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Ageing Well and Inclusion, with special attention to chronic disease management and diabetes. He is representing LST-UPM in the European Innovation Partnership on Active and Healthy Ageing, in the Action Group A1 Prescription and Adherence to medical plans, acting also as group coordinator and leader of the Empowerment subgroup. He has a strong and long collaboration with Medtronic Iberica, as expert in eHealth applied to integrated care for the Hospital Solution Unit. He is author of more than 30 publications in scientific journals, book chapters and conferences (<http://orcid.org/0000-0003-1551-4613>).

Position Statement

I will contribute to the activities of the division with a proactive and positive attitude. I would like to help increasing the awareness about the importance of the clinical engineer in the health care revolution that is taking place since the last decade.

This is something I am doing in the European Innovation Partnership on Active and Healthy Aging, in the Adherence to Treatment and Integrated Care Action Groups, together with patient associations, research academies, industries, authorities and policy makers. The Clinical Engineer must contribute to generate products and services for efficiency in clinical management, facilitate the involvement of the individual in the management of health and continue contributing with innovation to the unsolved clinical problems. Key points for the development of the clinical engineer's role will be:

1) improving diagnostic and therapeutic capacity; 2) benchmark, visibility and exploitation of the medical information; 3) optimization of the operative and care process; 4) management of chronic patients; 5) support to the scientific development. The Clinical Engineer will be a "facilitator" for the structural transformation of the healthcare system and, through technological innovations, will contribute adding "transversality" to traditional vertical processes, and continuity of health care services out of traditional hospital settings.



Name: Thomas M. Judd
Affiliated Society: American College of Clinical Engineering
Current Position (in Affiliated Society): Advocacy Committee Chairman, International Committee Member
Current Profession: National clinical engineering role in large US health system

Brief Biography

In a 36-year-career and certified in clinical engineering (CE), quality, and health information, since 2006 Tom Judd has been National Project Director, Clinical Technology, Kaiser Permanente (KP), helping to transfer device-electronic health record (EHR) integration solutions across KP's 40 hospitals and 600 clinics serving 9.5M patients, and on its medical device integration and wireless governance groups.

He leads health technology (HT) evaluations at KP's Garfield Innovation Center, speaks nationally on these topics, and serves on AAMI medical device standards committees www.aami.org.



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Previously, he was Quality and Safety director for KP Georgia (1994-2006), a CE in local, national, and global roles (1979-1994), a Navy jet pilot and engineering faculty member at the Naval Academy. He has a BS and MS in Aerospace Engineering, and completed graduate work in Biomedical Engineering.

He has been a WHO HT consultant in 40 developing countries since 1989, and serves on or advises nonprofit boards that serve Central Asia, Africa, Eastern Europe, and Latin America for healthcare issues.

Tom is a founding member of the American College of Clinical Engineering - and its advocacy chair since 2010. He has served on the HIMSS Davies Enterprise EHR award since 2010, and was highlighted by HIMSS in 2012.

Position Statement

I look forward to possible service on behalf of IFMBE-CED. I have had the privilege of starting/helping lead CE professional societies at the local (1980), state (1985) and national/global (1990) level in my career.

One global example: As Chairman of US CCE Board of Examiners (1987-1989) and as US CEs struggled with our identity, I read the WHO 1986 meeting http://apps.who.int/iris/bitstream/10665/62426/1/WHO_SHS_NHP_87.5.pdf?ua=1 where it notes 40% of example country's device assets were wasted, 5 times greater than medicines' annual cost. This was a call to action for CEs to help address in

a collaborative manner, with best practices and assisting implementation in different cultures. Yadin David, Bob Morris, Frank Painter, and I – then coauthored a working paper for 1989 WHO meeting. The 1990 ACCE formation provided the platform for action, and ACCE's Advanced CE Workshops ACEWs were begun in 1991. 25 years later, there have been over 50 ACEWs affecting about 70 countries, with nearly 100 ACCE members as faculty. ACCE today boasts about 25% global members.

Another example: I have facilitated regular collaboration meetings with WHO, CED, ACCE, and HTF since 2009 to help drive both separate and aligned activities, eg, the 2010 ACEW Reunion with WHO involving 30 countries.



Name: Paolo Lago
Affiliated Society: Associazione Italiana Ingegneri Clinici AIIC
Current Position (in Affiliated Society): Delegate to the international relationships of the association
Current Profession: Director of the Clinical Engineering Department of San Matteo Hospital in Pavia (Italy)

Brief Biography

Born in Genova, 1962, I live and work in Pavia. Graduated in Electronic Engineering, PhD in Electronics and Information Technology, I was then Research Professor of Bioengineering at the University of Pavia and now Director of the Clinical Engineering Department of San Matteo Hospital in Pavia. Lecturer about Biomedical Instrumentation for the Faculty of Medicine



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and the Master in Clinical Engineering of the University of Pavia.

Member of the Commission for Bioengineering of the Order of Engineers of the Province of Milan and Pavia, I participate to the editorial board of the magazine "Hospital Technology".

Founding member of SIHTA, Italian Society of Technology Assessment, and member of HTA International. Member of the Italian Association of Clinical Engineers since 1995, and within the Board since 1996, I was appointed President in 2000 and 2002. I serve now as delegate to the international relationships of the association. Member of IFMBE CED as Elected from 2006 to 2012 and now as Collaborator.

I published more than sixty scientific papers and obtained two patents in the field of optical and electronic instrumentation for biomedical signal processing.

I participate in many cooperation projects with emerging countries especially regarding the use of refurbished medical technology.

Position Statement

Having already served as an elected member of the CED I have an established network of relationships within the Division and the whole IFMBE and I would put this at disposal of the CED to contribute to its further development for the progress of the profession of clinical engineers worldwide.

Moreover, my role as a delegate to the international relationships of the Italian Clinical

Engineers Association (AIIC) allows me to develop relationships with different international institutions (WHO, ECRI Institute, etc.) and I would put this at service for CED.

My experience in the field of HTA would also be useful as a possible link with this important component of the clinical engineering profession and could help develop synergies with the HTA Division of IFMBE and other stakeholders (hospital administrators, clinicians, patients, companies).

A particular strength that makes me confident to be able to contribute significantly to the CED activities is the support I have from the working group structured by AIIC for the international activities of the association; therefore my possible role in the CED would not be a strictly individual position, but rather the expression of a team that would actively support me and the whole CED.



Name: Mikael Persson
Affiliated Society: Swedish Society for Medical Engineering and Physics
Current Position (in Affiliated Society): Scientific Secretary, Member of the board, Head of Scientific board
Current Profession: Professor, Head of Division, Entrepreneur

Brief Biography

Mikael Persson received his MSc and PhD degree from Chalmers University of Technology, Göteborg, Sweden, in 1982 and 1987, respectively. In 2000 he became professor in Electromagnetics and in 2006 he became



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Professor in Biomedical Electromagnetics both at the Department of Signal and Systems, at Chalmers University of Technology. Between 2007 and 2010 he was the Head of Division of Biomedical engineering, Department of Signals and Systems. Since 2010 he is the head of the main research interests include electromagnetic diagnostics, monitoring and treatment, microwave system design. He is author/ co-author of more than 200 refereed journal and conference papers. Biomedical engineering is increasingly important for modern medical care. IFBME is in the position and has the responsibility to help promoting the biomedical engineering sector and in that way help building a more efficient and safer medical and health care for everyone.

I would be happy to support the IFBME on this journey.



Name: Mladen Poluta
Affiliated Society: Biomedical Engineering Society of South Africa
Current Position (in Affiliated Society): None
Current Profession: Academia (positions at Universities of Cape Town and Pretoria)

Brief Biography

After working in the medical device industry and in an academic hospital setting, I joined the Department of Biomedical Engineering (see <http://www.bme.uct.ac.za>) at the University of Cape Town in 1987 and established the Healthcare Technology Management program (see www.uct.ac.za) in 1999, the only one of its kind in the African Region and for which I remain director/convenor. I am also affiliated with the Graduate School of Technology Management at the University of Pretoria (see <http://www.up.ac.za/graduate-school-of-technologymanagement>). I have served in an advisory capacity and as consultant for the World Health Organization and other national and international bodies, including the South African Department of Health and the Council for Scientific and Industrial Research (CSIR). My interests span the assessment, innovation, application and management of healthcare technologies and related infrastructure, as well as optimisation of public sector healthcare delivery in resource-scarce settings and TB-related airborne infection control. I previously served as Chair of the IFMBE's Working Group for Developing Countries and as CED board member and also as council member of the IFMBE and the South African biomedical engineering and clinical engineering societies, and am currently on the board of the IFMBE's DHTA.

Position Statement

I have long believed that the IFMBE is uniquely structured and positioned to play a major role – on the international stage at both global and regional levels – across the life-cycle of healthcare technologies, from innovation to assessment, application and management. I have a particular interest in promoting an integrated approach to life-cycle management of healthcare technologies, especially in resource-scarce settings. I am also passionate about advancing

Position Statement

I have long believed that the IFMBE is uniquely structured and positioned to play a major role – on the international stage at both global and regional levels – across the life-cycle of healthcare technologies, from innovation to assessment, application and management. I have a particular interest in promoting an integrated approach to life-cycle management of healthcare technologies, especially in resource-scarce settings. I am also passionate about advancing



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clinical engineering and related healthcare technology assessment and management in the African Region. After more than 30 years of professional involvement at national, regional and international levels I believe I have valuable insights that can serve and support the work of the CED specifically and the IFMBE and IUPESM more generally.

Nominations for IFMBE Honorary Life-Membership (HLM)



Name: MAKOTO KIKUCHI
Affiliated Society: JSMBE (Japanese Society for Medical and Biological Engineering)
Current Position (in Affiliated Society): Honorary member
Current Profession: President of Japan Association for the Advancement of Medical Equipment

Brief Biography

Prof. Makoto Kikuchi has made extensive contributions to the development of the bioengineering profession worldwide through his extensive professional activities and service with the government. He has also extensive experience in working with industry partners. In recognition of his contribution and leadership, he was elected for the initiative member to start up the Strategy Planning Committee of the METIS (Medical Engineering Technology Industrial Strategy) Consortium in Japan since 2001, and has continued to hold that position up to this moment. From April, 2015 he will be appointed the Project Director of Japan Agency for Medical Research and Development. Makoto Kikuchi served as an International Federation

for Medical and Biological Engineering (IFMBE) Administrative Council member (1991-1997), Co-Chair and Chair of the Secretaries Committee (1988-1997), Chair of the New Initiatives Working Group (1997-2003), member of the Finance Committee (2000-2009), Nominating Committee (2000-present), Division for Health Care Technology Assessment (1991-1997), and the Working Group for Asian-Pacific Activities (1997-2009). He served as the Vice-president (2003-2006) and President (2006-2009) of IFMBE. His memberships and board positions in national academic societies included: Vice-president of the Japanese Society for Medical and Biological Engineering (JSMBE), and President of the Japan Society for Laser Surgery and Medicine (JLSLM).



Name: Ákos JOBBÁGY, Ph.D., D.Sc., full professor
Affiliated Society: Hungarian BME Society (Biomedical Engineering Section of the Hungarian Scientific Society for Measurement and Automation)
Current Position (in Affiliated Society): President
Current Profession: Professor, Chair of the Department, Vice-rector for Education

Brief Biography

Prof. Akos Jobbagy dedicated his professional life to science and biomedical engineering and more than ten years to IFBME. His engagement in the Hungarian BME Society and IFMBE made large impact on Biomedical Engineering science and education. Akos was serving as an AC member of the IFMBE from 2006 to 2012. He was the Chair of the fifth the European IFMBE Conference held



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in Budapest in 2011 and was Honorary Co-chair of the sixth the European IFMBE Conference Dubrovnik in September 2014. He was also a member of the different Committees of IFMBE and IUPESM sponsored conferences Chair of OFMBE Secretaries' Committee and an active member of different IFMBE bodies. Currently, he is chairing the IFMBE Conference Committee. He was the editor of the proceedings of the fifth the European IFMBE Conference these proceedings are listed among 25 most downloaded Springer books. Prof. Akos Jobbagy graduated Electrical Engineering from Budapest University of Technology and Economics in 1975. He defended his PhD thesis in 1995 at the same University. In 2007, he received Doctorate from the Hungarian Academy of Sciences. Since then, he worked as a professor at the University, and in 2011 he became the head of the Department for Measurement and Information System, and from 2012 he serves as the Vice rector for Education at the Budapest University of Technology and Economics.



Name: Depei Liu
Affiliated Society: Chinese Society of Biomedical Engineering
Current Position (in Affiliated Society): Past president
Current Profession: Professor of National Laboratory of Medical Molecular Biology, Institute of Basic Medical Sciences, Chinese Academy of Medical Sciences (CAMS) & Peking Union Medical College (PUMC).

Brief Biography

Dr. De-Pei Liu is a professor at State Key Laboratory of Medical Molecular Biology, Institute

of Basic Medical Sciences, Chinese Academy of Medical Sciences (CAMS) & Peking Union Medical College (PUMC). He graduated with a Ph.D. from CAMS & PUMC in 1986, completed his Postdoctoral Fellowship at University of California, San Francisco, and was promoted to Professor of CAMS & PUMC in 1992. Dr. Liu's research expertise is molecular mechanisms of cardiovascular diseases, gene regulation and gene therapy. He has investigated the multi-level gene transcriptional regulation and targeted gene correction using the canonic hemoglobin gene clusters as model system. His recent series work on SIRT family has discovered the beneficial effect and the working mechanisms of caloric restriction on cardiovascular system. Till now, he has published more than 200 original research articles and invited reviews, which have been cited more than 3000 times. He has received three items of awards of Advance of Science and Technology, the Ministry of Health, P.R.China and one item of award of the National Natural Sciences. He is also a member of Chinese Academy of Engineering, member of Institute of Medicine of the National Academies, USA, and member of Third World Academy of Sciences. Professor Depei Liu served in the IFMBE Administrative Council for two terms of office from 2003-2009. He was the Chair of the World Congress in Medical Physics and Biomedical Engineering which was held in Beijing, China, in June 2012. He is also a member of the IUPESM Administrative Council.



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Name: Antonio Fernando Catelli Infantsi
Affiliated Society: SOCIEDADE BRASILEIRA DE ENGENHARIA BIOMÉDICA
Current Position (in Affiliated Society): Past president
Current Profession: Universidade Federal do Rio de Janeiro, Instituto Alberto Luiz Coimbra de Pós Graduação e Pesquisa de Engenharia, Programa de Engenharia Biomédica

Brief Biography

Fernando Infantsi Graduated in Electronic Engineering from the Mauá School of Engineering (1971), he got his master's degree in Biomedical Engineering from the Federal University of Rio de Janeiro (1975) and Ph.D. in Electrical Engineering from Imperial College of Science Technology Medicine University of London (1986). He is currently Professor of Engineering Coordination of Post Graduate Programs, professor at the Federal University of Rio de Janeiro, member of the Brazilian Society of Biomedical Engineering, member of the Administrative Committee of the Regional Council of Biomedical Engineering for Latin America, Body Member editorial of IEEE Transactions on Biomedical Engineering, Member of the editorial board of Medical Engineering and Physics, editorial board member of the Brazilian Journal of Biomedical Engineering, Member of the editorial board of the Journal of Neurology, Administrative Council Member of The International Union for Physical and Engineering Sciences in Medicine. He has a large expertise in Biomedical Engineering with special interest in: Epidemiology,

Pattern Recognition, and Biological Signal Processing. Fernando Infantsi was serving as an Administrative Council member of the IFMBE for three terms of office and he left a significant mark on the policy and activities of the Federation. His activities and wisdom in the policy matters of IFMBE, in particular in matters of IFMBE Statutes, first as a member and currently as the Chair of the IFMBE Constitution and Bylaws Committee, left an indelible trace in the policy and in the organization of the Federation.



Name: Prof. Dr. Gerhard Artmann
Affiliated Society: DEUTSCHE GESELLSCHAFT FÜR BIOMEDIZINISCHE TECHNIK E.V.
Current Position (in Affiliated Society): IFMBE – Chair of the WG for Cellular and Stem Cell Engineering
Current Profession: Chair Center of Competence in Bioengineering, Aachen, Germany

Brief Biography

Gerhard M. Artmann graduated in Physics from the University of Dresden in 1974, accomplished his PhD in Physics in 1988 at the RWTH Aachen. His Habilitation (Dr. sc.) in 1998 promoted him for a professor position at his current university. He chairs the Institute for Bioengineering with key expertise in Bioengineering, Physics, Chemistry, Biology, Microbiology, Genetics, Cell Biology, Biochemistry, and Biomechanics. Internationally he chairs the IFMBE working group Cell and Stem Cell Engineering for a number of years. In September 2014, Artmann organized and chaired the 9th



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International Conference on Cell and Stem Cell Engineering held in Aachen, Germany. He worked for several years with Prof. Y.C. Fung und Prof. Shu Chien, UCSD, USA. In 1993, he was guest professor at the Fudan University and in 1998, Advisory Professor at the Chongqing University, China. He became Adjunct Professor at the Drexel University, Philadelphia, in 2004 and at the University College London in 2007. His scientific work was published in various peer reviewed international journals. He published the book "Bioengineering in Cell and Tissue Research", Springer 2008 and "Engineering Stem Cells" in 2011.



Name: Joseph Barbenel
Affiliated Society: Institute of Physics and Engineering in Medicine (IPEM)
Current Position (in Affiliated Society): Fellow
Current Profession: Emeritus Professor, University of Strathclyde and Research Fellow, University of Glasgow School of Medicine

Brief Biography

DEGREE

Doctor of Philosophy (Bioengineering)
University of Strathclyde 1979

MAIN RESEARCH AREAS OF INTEREST

Biomedical systems and materials, particularly the natural body cells, tissues and organs.

Interactions between mechanical and biological effects. Biomaterial development and evaluation.

PUBLICATIONS IN INTERNATIONAL REFERRED JOURNALS: 109

BOOKS

5 (55 chapters in other books)

MEMBER OF INTERNATIONAL SOCIETIES

EAMBES, Past Chair, Div of Societies

IFMBE, Chair of Constitution & Bylaws Committee

IUPESM, Member of Administrative Council

International Faculty for Artificial Organs, Professor

MAIN ACTIVITIES

1960: Dental House Surgeon, London Hospital, London U.K.

1960 - 62: Lieutenant/Captain, Royal army dental Corps, Malaya

1962 - 63: General Dental Practice, London

1963 - 66: Student, University of St. Andrews

1966 - 67: Student, Bioengineering Unit, University of Strathclyde

1967 - 69: Lecturer, Department of Dental Prosthetics, Dental School and Hospital, University of Dundee

1970 - 2001: Bioengineering Unit, University of Strathclyde

Head of Department (1992-98)

Vice Dean (Research) Faculty of Engineering (1997-2001)

DISTINCTIONS

Fellow of: Inst of Physics, Inst of Biology, Inst of Physics and Engineering in Medicine, Royal Society of Edinburgh

President's Medal, Society of Cosmetic Scientists (1994)



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Inaugural Paul Beiersdoft Lecture, ISBS Zurich (1996)

Lifetime Achievement Award, European Pressure Ulcer Advisory Panel, 2002

Founding Fellow, EAMBES



Name: Laura M. Roa
Affiliated Society: Spanish Society of Biomedical Engineering (SEIB) Current
Position (in Affiliated Society): Past President
Current Profession: Full Professor, University of Seville

Brief Biography

Laura M. Roa is Full Professor of Systems and Automatics Engineering at the University of Seville. Her research topics link physiology, computational modeling, systems engineering, and ICT. Her earliest contributions were focused on the application of system dynamics approaches to the modeling of physiological systems, being recognized for the development of diagnostic evaluation procedures and resuscitation therapies for critically burned patients, or the optimization of dialysis dosage in end-stage renal disease. Her research profile has been widely influenced by the ICT revolution, with interests that have evolved with the paradigms of personalized and preventive medicine, and including topics such as multi-scale computational modeling, systems biology, smart biomedical sensors for mHealth, bioelectromagnetics, ambient-assisted living,

or the interoperability of eHealth systems. She has authored over 350 scientific contributions, including papers in national and international journals, peer-reviewed papers in conference proceedings, book chapters and patents. As a scholar, she has supervised 10 PhD Thesis and a number of Degree and MSc Thesis. Her ability to lead multidisciplinary workgroups, with the collaboration of both biomedical engineers and MDs, is availed by her participation as principal investigator in over 20 R&D projects. Prof. Roa has been a prime mover in the expansion and promotion of Biomedical Engineering in the international scene, and especially in Europe and Spain. She participated in the inception of EAMBES and she has belonged to the Executive Committee of the Spanish Society of Biomedical Engineering since 1984, serving in the positions of Secretary General, President, and currently Past President. She has served in the program committees and scientific committees of over 50 international conferences co-sponsored by the IFMBE and other scientific societies. She was the Conference Chair and the Editor of the Proceedings of the XIII Mediterranean MBE Conference held in Seville in 2013. Prof. Roa is a Fellow of the International Academy for Medical and Biological Engineering Sciences (IAMBES), Founding Fellow of EAMBES, Fellow of the IEEE, Fellow of the American Institute for Medical and Biological Engineering (AIMBE), and a member of the Royal Medical Academy of Seville, Spain.



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Name: Miguel Cadena Méndez
Affiliated Society: SOCIEDAD MEXICANA de INGENIERÍA BIOMÉDICA
Current Position (in Affiliated Society): Past President of CORAL (Consejo Regional en Ingeniería Biomédica para América Latina
Current Profession: Profesor-Investigador de la Universidad Autónoma Metropolitana, Mexico City, Mexico

Brief Biography

Miguel Cadena studied Engineering in Communications and Electronics at the National Polytechnic Institute in Cd. De Mexico. He earned a Master's degree in Electrical Engineering with specialization in Biomedical Engineering, Washington University in St. Louis Missouri, USA. Currently, he is a Research Professor at the Universidad Autónoma Metropolitana, Iztapalapa (UAM-I) from 1974 to date with secondment to the Department of Electrical naval engineering in the area of research in Biomedical Engineering and Instrumentation Research Center and Medical Imaging in Cd. of Mexico. He is the Founder of the undergraduate and graduate in Biomedical Engineering program in 1974 and 1982, respectively, in the UAM-I. He is also a co-author of 5 textbooks specialized in the fields of medical instrumentation and digital processing of biomedical signals. M. Cadena was first Vice President and then President of the Mexican Society of Biomedical Engineering in 1994-1997. He was President of CORAL (Regional Council of Biomedical Engineering for Latin America associated with the IEEE-EMBS and IFMBE) in 2008-2010. M. Cadena contributed a lot to building close relationship of IFMBE and CORAL and he is an active member of the IFMBE Industry Working Group.



Name: Monique Frize
Affiliated Society: CANADIAN MEDICAL & BIOLOGICAL ENGINEERING SOCIETY
Current Position (in Affiliated Society): IFMBE AC regional rep North America
Current Profession: Professor Emerita, School of Electrical Engineering and Computer Science, University of Ottawa

Brief Biography

Prof. Monique Frize is Professor in Systems and Computer Engineering, Carleton University, with a joint appointment in School of Information Technology and Engineering, University of Ottawa. Monique is well known to the IFMBE members as the Chair of the IFMBE Women in Biomedical Engineering Committee. She has organized events discussing the position of women in BME and in engineering generally on numerous conferences, and her work has already been recognized by Honorary Membership in Women in Science & Engineering (W.I.S.E.) and by Advocacy Award by Women in Trades and Technology (WITT). In the organization of the World Congress on Medical Physics and Biomedical Engineering, to be held in Toronto, Canada in 2015, Monique is deeply involved in the Scientific Committee and in the Program Committee. Monique is representative of the Northern American societies affiliated to the IFMBE in the IFMBE Administrative Council.



Name: Per Ask
Affiliated Society: Swedish Society for Medical Engineering and Physics (MTF)
Current Position (in Affiliated Society): None
Current Profession: Professor



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Brief Biography

Professor Per Ask has headed the Division of Physiological Measurements at the Department of Biomedical Engineering, Linköping University, Sweden since 1999 and became a full professor in 1989. His research is modeling driven flow estimation using ultrasound and bioacoustic techniques, mainly with cardiovascular applications. In 1983 he founded the Cardiovascular Dynamics Research Group together with professors Bengt Wranne (cardiology) and Dan Loyd (fluid dynamics). This group has reached international recognition and its research has proliferated. Today the group consists of a faculty of about 15 biomedical engineering and medical researchers at different departments and divisions with extensive international activities. He maintains long lasting research cooperation with Stanford University including mutual exchange of researchers. The research on model driven flow estimation using ultrasound and bioacoustic techniques is combined with biomedical optics research. The division is deeply involved in the Vinnova funded NIMED center of excellence for research cooperation with industry. They are part of the SSF funded (1998-2004) Cortech network of excellence for cardiovascular engineering research. Professor Ask is an author or co-author of about 250 publications, most of them in international journals or proceedings in the field of biomedical engineering. He was the Scientific secretary for the Swedish Association for Medical Engineering and Physics, 2003- , Board Member 1981-1982, 2003-2014. Prof. Per Ask is the Chair of the IUPESM's Union Journal Committee.

Council of Societies (CoS) Chair Nomination



Name: Monique Frize
Affiliated Society: CANADIAN MEDICAL & BIOLOGICAL ENGINEERING SOCIETY
Current Position (in Affiliated Society): Regional representative CoS for North America
Current Profession: Distinguished Research Professor (retired, Carleton University)

Brief Biography

Monique Frize is Distinguished Research Professor at Carleton University and Professor Emerita at University of Ottawa since 2010. She was Professor of Biomedical Engineering at both universities (1997-2010) and Chair for women in science and engineering (1997-2002). In 1989, Monique was Professor of Electrical Engineering and Chair of women in engineering for Canada at University New Brunswick. A clinical engineer between 1971 and 1989, Monique was first Chair of the IFMBE Clinical Engineering Division (1985-1990), a member of the IFMBE clinical engineering working group (1980-1985) and member of several IFMBE and IUPESM committees in the past several years, including WC1976 and WC2015. Monique published over 250 articles in peer refereed journals and proceedings and 5 books. She received an electrical engineering degree from U. of Ottawa, MPhil from Imperial College (UK), MBA from U. de Moncton and a doctorate from Erasmus (Netherlands). Monique received 5 honorary degrees and was inducted as Officer of the Order of Canada (1993), a Fellow of the Canadian Academy of Engineering (1992), a Fellow of Engineers Canada (2010) and Gold



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Medal recipient of Professional Engineers Ontario (2010). She is a Fellow of CMBES (2014) and EMBS (2012) and a Life Fellow of EMBS (2015).

Position Statement

The Council of Societies is a new concept with the potential to improve communications greatly between the IFMBE and its Affiliated Societies. Strong leadership will be needed to create the channels of communication. It will be important for Societies to share their regional news, their conferences and special events, best practices, and other aspects they wish to share with other Societies. On the other hand, IFMBE can share information on its sponsored events, reports from Committees and Task Groups, request contact persons for special group work, or administer surveys that are important for the advancement of the field of Biomedical Engineering. Our four regions are quite different in some aspects and much can be learned by sharing information and knowledge between them. There are common features and differences that will build a strong international organisation if all collaborate through the Council of Societies. It should become the communication channel between Societies and the IFMBE.

With my previous experience on various committees and organisations, I am prepared to put a lot of effort into developing these communications channels and ensuring that all regions are heard at the Administration Council and vice versa, that regions hear what is happening at IFMBE.



Name: Andre Linnenbank
Affiliated Society: The Netherlands' Society for Biophysics and Biomedical Engineering
Current Position (in Affiliated Society): Board Member
Current Profession: Academia

Brief Biography

Dr Linnenbank has a Msc in Physics (University of Amsterdam 1989) and a PhD in Medicine (University of Amsterdam 1996). He worked at various positions as a researcher at the Academic Medical Center from 1989 till 2014. At the moment he has a part time position as a Teacher at the Technical University of Delft. He has been active in the IFMBE since 1994. Serving on various committees (WGDC, WiMBE) and since 2012 as the founding Chair of the Council of Societies.

Since 2013 he is also the Secretary General of the EMBES.

Position Statement

There are many issues that are common to many countries (legislation, status of BME, funding opportunities). With the help of the Regional Group Representatives I hope to be able to discuss and possibly solve the issues that are common to a region or to the BME society in the entire world.



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IFMBE Awards 2015

Introduction

The IFMBE maintains an awards program to recognize every three years on the occasion of the World Congress individuals for their contributions to Biomedical Engineering. Three awards will be given out during WC2015 in Toronto: (1) the Zworykin Award, named after the IFMBE Founder President Professor V. K. Zworykin; (2) the Otto Schmitt Award; (3) the IFMBE John A. Hopps Distinguished Service Award. The selection of awardees is made by the IFMBE Awards Committee.

IFMBE Zworykin Award



Chwee Teck Lim
Provost's Chair Professor
Dept of Biomedical Engineering
& Mechanobiology Institute
National University of Singapore

Microfluidic Technologies for Disease Diagnosis, Therapeutics & Personalized Medicine

Abstract: Our blood comprises ~5 billion cells in one milliliter with red blood cells (RBCs) accounting for >99% of all cellular components suspended in protein-rich plasma. Besides blood constituents, pathogenic microorganisms or diseased cells can also be present in blood for certain diseases, which can present possible

routes for disease detection, diagnosis and therapy. However, the presence of the large number of RBCs complicates removal of pathogens in blood as well as makes disease diagnosis such as detection of rare circulating tumour cells (CTCs) in blood of cancer patients extremely challenging. Here, we address these issues and demonstrate that physical biomarkers such as the unique size and deformability of diseased cells can be effectively used for their detection and separation from blood by using microfluidics. We do this by leveraging on the many inherent advantages of microfluidics such as high sensitivity and spatial resolution, short processing time and low device cost. We developed a suite of microfluidic biochips that exploit the principles of cell size/deformability-based separation as well as inertial focusing to perform high throughput continuous detection and separation of diseased cells. These simple, efficient and cost-effective microfluidic platforms will be imperative in realizing point-of-care (POC) diagnostics and invaluable for many downstream clinical and biological applications as well as personalized treatment.

Biography: Prof Chwee Teck Lim is a Provost's Chair Professor at the Department of Biomedical Engineering and also a Principal Investigator at the Mechanobiology Institute at the National



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University of Singapore. His research interests include mechanobiology of human diseases and the development of microfluidic biochips for disease detection and diagnosis. Prof Lim has authored more than 260 peer-reviewed papers (including 36 invited/review articles) and delivered more than 250 invited talks. He is currently on the editorial boards of 12 international journals. He has also co-founded four startups and an incubator that commercialize the technologies developed in his lab. Prof Lim and his team have won more than 40 research awards and honors including the university's Outstanding Researcher Award, Outstanding Innovator Award and TiE50 Award (Silicon Valley) in 2014, Credit Suisse Technopreneur of the Year Award, Wall Street Journal Asian Innovation Award (Gold), TechVenture Most Disruptive Innovation Award, Asian Entrepreneurship Award (First Prize) in 2012, President's Technology Award and the TechVenture Rising Star Innovator Award in 2011 and the IES Prestigious Engineering Achievement Award in 2010.

IFMBE Otto Schmitt Award



Karin Wårdell
Karin Wårdell, Department of
Biomedical Engineering, Linköping
University, Sweden

Neuro-engineering for navigation, intervention and implementation in neurosurgery

Abstract: Neurosurgery and neuro-intensive

care are clinical areas in which highly specialized interventional, navigational and monitoring techniques are imperative for patient care and improved health in the society. The overall aim of our research is to develop and evaluate new methods and techniques for radical improvement of navigation, intervention and monitoring in neurosurgery. Topics of special interest are deep brain stimulation (DBS), optical techniques for intraoperative neuronavigation, brain microcirculation as well as the integration and translation of the new tools and methods for clinical use. In the DBS research we have developed a patient-specific modelling and simulation concept for investigation of the electric field around active DBS-contacts. This allows for visualization of the relative electric field changes in relation to the patient's anatomy by using MRI together with superimposed atlas structures. The simulation method has proven useful for clinical evaluations of movement and speech in Parkinson's disease and is now also introduced for new DBS-indications and brain targets. During the talk examples of both optical application in neurosurgery as well as projects related to DBS will be presented.

Biography: Karin Wårdell, is Professor of Biomedical Engineering and Head of the Biomedical Instrumentation & Neuro-Engineering Group at the Department of Biomedical Engineering, Linköping University, Sweden. She received the PhD-degree in Biomedical Instrumentation from Linköping Institute of Technology in 1994. Present research



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interests are directed towards Biomedical Systems for Diagnostics and Therapy; Deep Brain Stimulation; Neuronavigation, Laser Doppler Techniques, Optical Spectroscopy, Microcirculation, and Clinical Implementations. Her international experience involves research visits at Yale Medical School, USA; University of New South Wales, Australia; RWTH Aachen University, Germany and FHNW, Switzerland as well as participation in EC-projects. She has more than ten years of experience in working with biomedical industry partners, mainly through the Swedish Competence Centre NIMED and NovaMedTech. She was one of the co-founders of Lisca AB a company marketing laser Doppler perfusion imagers. She is a fellow of IAMBE and EAMBES.

IFMBE John Hopps Award



Robert M. Nerem
Georgia Institute of Technology
Atlanta, USA

Medical and Biological Engineering:

Celebrating the Past, Envisioning the Future

Abstract: Over the past half century engineers have made enormous contributions to both an increased understanding of biology and biological mechanisms and to improvements in clinical treatments. For these many contributions by engineers and physical scientists, there is much to celebrate. From the study of blood flow,

to the role of hemodynamics in atherosclerosis and the role of the vascular endothelium, to the development of new medical devices, to regenerative medicine and stem cell technology, the contributions of the medical and biological engineering community have had a major impact. This includes everything from advances in pacemakers to continuing efforts to understand "the rules of life" that determine cell function. As one further envisions the future, although the application of engineering to the medical area will continue to be important, such new areas as energy, the environment, and food will be an expanded part of medical and biological engineering. Already we are seeing an industrialization of biology with the biomanufacturing of chemicals today becoming a significant element of the economy of the U.S. and there are efforts focused on creating biological machines, ones that might not even exist in nature. Over the past half century the International Federation of Medical and Biological Engineering (IFMBE) has had a major leadership role, and in the world of the future, IFMBE will have to evolve its role in order to provide the leadership necessary for the global community.

Biography: Dr. Nerem joined Georgia Tech in 1987 as the Parker H. Petit Distinguished Chair for Engineering in Medicine. He is an Institute Professor Emeritus, and he was the founding Director of the Parker H. Petit Institute for Bioengineering and Bioscience, a research institute established in 1995 to bring biochemistry, bioengineering, and biology



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faculty together so as to create a “convergent,” interdisciplinary culture. Dr. Nerem received his Ph.D. in 1964 from Ohio State University and is the author of more than 200 publications. Over the years he has served the community in a variety of ways. This includes his extensive involvement with the International Federation for Medical and Biological Engineering (IFMBE), serving as President from 1988 to 1991 and being the Founding President of the International Academy for Medical and Biological Engineering from 1997-2000. He also was the President of the International Union for Physical and Engineering Sciences in Medicine from 1991 to 1994. Dr. Nerem was the Founding President and is a Fellow of the American Institute for Medical and Biological Engineering (AIMBE). He has served on the advisory boards of

a number of companies including startups, and from 2000 to 2003 he was a member of the FDA Science Board. From 2003 to 2006 he was a part-time Senior Advisor for Bioengineering in the National Institute for Biomedical Imaging and Bioengineering at the National Institutes of Health. In 1988 Dr. Nerem was elected to the National Academy of Engineering (NAE) and in 1992 to the Institute of Medicine of the National Academy of Sciences. In 1994 he was elected a Foreign Member of the Polish Academy of Sciences, in 1998 a Fellow of the American Academy of Arts and Sciences, and in 2006 a Foreign Member of the Swedish Royal Academy of Engineering Sciences. In 2008 Dr. Nerem was selected by NAE for the Founders Award, and in 2011 he was made an IFMBE Honorary Life Member.



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Report on the activities of the International Academy of Medical and Biological Engineering



Roger D. Kamm
IAMBE Chair

Introduction: The Charter and Responsibilities of the IAMBE

As stated in the Bylaws:

“The Academy is a part of IFMBE, responsible to the IFMBE General Assembly and its Administrative Council, and operates under the auspices of the IFMBE Constitution and Bylaws. The Academy is established by IFMBE for the following purposes.

1. The Academy is to conduct programs, which will serve to encourage young people entering the field and their development in the early stages of their career.
2. The Academy, upon request of the IFMBE Administrative Council, also shall serve as a resource for IFMBE and its various units. The Academy’s activities will be carried out by individuals honored by their election as Fellows as described later in this Article. Thus, there is a third purpose of the Academy.
3. The Academy is to honor individuals who have distinguished themselves in the field of medical and biological engineering.

The philosophy underlying the establishment of the Academy by IFMBE is that those who have distinguished themselves in the field have a special responsibility to help those entering the field.”

Election of New IAMBE Fellows

One of the primary responsibilities of the IAMBE is to identify individuals who have made significant contributions to our profession.

uring these past few years, the Membership Committee, consisting of the following members (Jean-Louis Coatrieux, Olaf Doessel, Shmuel Einav, Ross Ethier, Bin He (Chair), Peter Hunter, Dov Jaron, Zhi-Pei Liang, Laura Roa, Karin Wardell, Yuan-Ting Zhang) prepared a slate from which 14 new fellows were elected. See below.

A New IFMBE/IAMBE Early Career Award

In the past, the IAMBE has recognized individuals who in the early stages of their career, had already made significant contribution to our profession. These awards had been funded through a private company with the assistance of Peter Niederer. Following the meeting in Beijing, we decided that we should make this award permanent, and fund it with help from the IFMBE. A proposal was formulated in the summer of 2014, for the IFMBE/IAMBE Early Career Award, and submitted to the IFMBE Governing Committee for consideration. The award was approved, and we are pleased to have 3 recipients this year. Review of the award applications was conducted by our Award Committee: Peter Niederer – chair, Laura Roa Romero, Lian Zhi-Pei, James Goh, Dov Jaron. recipients of the award are:

- Asia Pacific: Carmen Chung-Yan Poon
- Europe & Africa: Liesbet Laura Jo Geris
- North America: Aysegul Gunduz

Interim meetings of the IAMBE

One meeting was held since the last World Congress, at the MEDICON 2013 conference in Seville, on Thursday, 26 September, 2013. 17 Fellows attended the meeting, and a dinner was held to celebrate the occasion. At the business meeting, the selection of 7 new Fellows to be inducted in Toronto in 2015 was announced.

Election of the New Governing Committee

An election was held this year, leading up to the



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2015 meeting. Nominations were collected and confirmed by the Nominations Committee (Niilo Saranummi – Chair, Jean-Louis Coatrieux, Dov Jaron, Yuan-Ting Zhang), which prepared the slate for voting. Results of the election are as follow. (Note that the offices of Chair and Past Chair had been predetermined, as is our policy.)

Chair	Peter Hunter, New Zealand
Chair Elect	Bin He, USA
Past Chair	Roger Kamm, USA
Secretary	David Elad, Israel
Members at Large:	Metin Akay, USA
	Walter Chang, Chinese Taipei
	Yongmin Kim, South Korea
	Laura Roa, Spain

Upgrade of IAMBE Website

At our meeting in Beijing, 2012, it was noted that the IAMBE webpage had not been updated, and that many fellow profiles were outdated or missing. This led to a major effort, largely on the part of Bin He, to collect the needed information and update the website. This update is now complete.

Activities at the World Congress on Medical Physics and Biomedical Engineering in Toronto, 2015

In response to the recent call from the IFMBE past president, Herbert Voigt, a session was organized in which the past and current Chairs of the International Academy of Medical and Biological Engineering of the IFMBE will present their individual perspectives on the topic of Global Challenges. The tone of the session will be set by an Opening Presentation by Robert Nerem on “Bioengineering in the 21st Century”. This will be followed by presentations on a variety of topics addressing global challenges from different perspectives including device technologies, information technologies, and innovative uses of physiological modeling. Speakers will include:

- Fumihiko Kajiya (Kawasaki University of Medical Welfare and Kawasaki Medical School, Japan)
- Roger Kamm (Massachusetts Institute of Technology, USA)
- Robert Nerem (Georgia Technological

Institute, USA)

- Niilo Saranummi (VTT Technical Research Centre of Finland, Finland)

Other activates planned for Toronto include:

- Early Career Award Recipient Presentations
- Governing Council meetings
- General Assembly Meeting
- Fellows Dinner

New Fellows

Ki H. Chon, ‘14, University of Connecticut, USA

In recognition of the development of novel algorithms for characterizing nonlinear and time-varying properties of physiological systems

David Elad, ‘13, Tel Aviv University, Israel

In recognition of seminal contributions in Respiratory Biomechanics and Nasal airflow, his pioneering studies in Reproductive Bioengineering, his pioneering educational programs and his clinical contributions in pre-implantation embryo transport, and breastfeeding mechanics

Amit Gefen, ‘14, Tel Aviv University, Israel

In recognition of contributions to tissue and cellular biomechanics

Song Li, ‘14, University of California Berkeley, USA

In recognition of his outstanding contributions to stem cell engineering, mechanobiology and tissue engineering and his excellent services and leadership in bioengineering education and academic society

Kang-Ping Lin, ‘13, Chung-Yuan Christian University, Chinese Taipei

In recognition of contributions in industry, the nominee has established a medical device company, developed a series of handheld ECG, and successfully distributed the products in Asia, Europe, and north American

De-Pei Liu, ‘13, Chinese Academy of Medical Sciences & Peking Union Medical College, China

In recognition of significant contributions to the research of the molecular mechanisms of



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cardiovascular diseases and the regulation of gene expression

Shuming Nie, ‘13, Emory University and the Georgia Institute of Technology, USA

In recognition of distinguished contributions to the development of bioconjugated quantum dots (QDs) and surface-enhanced Raman scattering (SERS) nanoparticles for biological and medical applications

Xiaochuan Pan, ‘13, University of Chicago, USA

In recognition of pioneering and outstanding contributions to the theory, algorithms and biomedical applications of tomographic imaging

Jos Vander Sloten, ‘14, Katholieke Universiteit Leuven, Belgium

In recognition of innovative, patient specific analysis and design of orthopedic implants and for the use of robot-assisted surgery to optimize surgery and patient safety

Fong-Chin Su, ‘13, National Cheng Kung University, Chinese Taipei

In recognition of contributions in: pastic reaching; thumb kinematics; directional shear flow; endothelial cellapoptosis; slip on body center of mass; neural network gait patterns; re-education biofeedback hand stroke; Medical Device Innovation Center, NCKU

Toshiyo Tamura, ‘14, Osaka Electro-Communication University, Japan

In recognition of his development of wearable biomedical sensors and unobtrusive monitoring for the elderly

Robert T. Tranquillo, ‘14, University of Minnesota, USA

In recognition of outstanding contributions to cardiovascular tissue engineering research

Bruce C. Wheeler, ‘14, University of Florida, USA

In recognition of outstanding contributions to neuroengineering research and bioengineering education

Guang-Zhong Yang, ‘13, Imperial College London, UK

In recognition of pioneering contributions in medical imaging and medical robotics

IAMBE New Governing Council (2015 – 2018)



Peter Hunter, New Zealand
Chair

Peter Hunter’s major research interests encompass modeling many aspects of the human body using specially developed computational algorithms and an anatomically and biophysically based approach which incorporates detailed anatomical and microstructural measurements and material properties into the continuum models. He is currently a Professor of Engineering Science and Director of the Bioengineering Institute at the University of Auckland, co-Director of Computational Physiology at Oxford University and holds honorary or visiting Professorships at a number of Universities around the world.



Bin He, USA
Chair Elect

Bin He is an internationally renowned authority on functional source imaging and neuroengineering. He is Distinguished McKnight University Professor of Biomedical Engineering, Medtronic-Bakken Endowed Chair for



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Engineering in Medicine, director of Institute for Engineering in Medicine, director of Center for Neuroengineering, director of NSF IGERT Neuroengineering Training Program, and director of NIH Neuroimaging Training Program at the University of Minnesota, Twin Cities. Dr. He has made seminal research contributions to the fields of functional imaging and neuroengineering. His research interests include brain source imaging, multimodal functional neuroimaging, brain-computer interface, cardiac electrophysiological tomography, and electrical impedance imaging.



Roger Kamm, USA
Past Chair

Roger D. Kamm is the Cecil and Ida Green Professor of Biological and Mechanical Engineering at the Massachusetts Institute of Technology (MIT). Kamm's research aims to understand the fundamental nature of how cells sense and respond to mechanical stimuli, and to employ the principles revealed by these studies to seek new treatments for vascular disease and cancer, and to develop tissue constructs for drug and toxicity screening. Current research interests can be grouped into three broad categories: microfluidics, cellular rheology and molecular mechanics.



David Elad, Israel
Secretary

David Elad is a Professor of Biomedical Engineering at Tel Aviv University since 1985. David pioneered computational studies of biofluid transport phenomena in the nasal cavity in the late 80's. In the early 90's he established a comprehensive research program in bioengineering of human reproduction, both at Tel Aviv University. He developed his expertise in the fields of Respiratory Biomechanics and Reproductive Bioengineering, from complete organs all the way to the cellular levels.



Metin Akay, USA
Members at Large

Metin Akay 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,



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symposiums and workshops regarding emerging technologies in biomedical and healthcare engineering. 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.



Walter Chang, Chinese Taipei
Members at Large

Walter H. Chang is currently the professor/director of the Department of Biomedical Engineering/Center for Nano Bioengineering at Chung Yuan Christian University (CYCU), Taiwan. Dr. Chang's areas of interest in research are Nano Biotechnology, Cellular and Molecular Imaging, Biomechanics, Medical Ultrasound, Biomedical Optics, and Bone Tissue Engineering.



Yongmin Kim, South Korea
Members at Large

Yongmin Kim is President of Pohang University of Science and Technology (POSTECH). Dr. Kim has devoted much of his professional career to education and research in medical imaging

and computing, ultrasound systems, distributed diagnosis & home healthcare, and computer architecture. He is a passionate educator and entrepreneur with the heart of benefiting humanity with science and technology.



Laura Roa, Spain
Members at Large

Laura M. Roa is full professor of Control Systems Engineering and Automation at the University of Seville in Spain. Dr. Roa's research topics link different disciplines, including physiology, mathematical modeling, systems engineering and integration of information technologies. Her research activities have covered development of computational models for complex physiological systems, the design of intelligent algorithms for clinical applications, dosing the therapies for burn and renal patients using optimal control techniques, and information technologies and communications applied to telemedicine, homecare technologies and accessibility for elderly and disabled people. Her current research lines are focused on multiscale computational modeling for the detection of biological and pathological events, Smart devices for assisted living environments, Integration Architectures for health and social services, and Development of electromagnetism methods and techniques applied to solve bionanotechnologies problems.



IFMBE/IAMBE EARLY CAREER AWARDS: for Young Faculty / Research Institution Members

Introduction

The new IFMBE/IAMBE Early Career Award (ECA) highlights the commitment of the IFMBE to support and encourage promising young researchers at an early stage in their career. Likewise, young researchers in private research institutions or industry research groups are invited to apply. In so doing, IFMBE intends to strengthen the long-term basis and development of BME at the university as well as at the private research institution/industry level. Particular emphasis is given to countries with a low economic background, and to geographical diversity. The Award consists of a certificate and a monetary award. Awards are given at each IFMBE World Congress to one individual from each of the following four geographic regions: North America, Central & South America, Europe & Africa, Asia-Pacific. The monetary price awarded to the ECA awardees by the IFMBE is in the amount of 3,000 USD. The awardee shall cover the travel costs and the costs of stay during the presentation at the World Congress. IFMBE will request the IFMBE event organizers to waive the registration fee for the awardees. The IFMBE Administrative Council will review the amount of the monetary award every three years.

In my capacity as the Chair of the IAMBE, we have made our selection, and solicited abstracts

from the three recipients. They are:

1. Asia Pacific: Carmen Chung-Yan Poon
2. Europe & Africa: Liesbet Laura Jo Geris
3. North America: Aysegul Gunduz

Please find below the information regarding the IAMBE/IFMBE Early Career Award:

The Human Tic Detector: Responsive Deep Brain Stimulation for the Treatment of Tourette Syndrome



Aysegul Gunduz
Department of Biomedical
Engineering, University of Florida,
USA

Abstract: Tourette Syndrome (TS) is a neurodevelopmental disorder characterized by undesired motor and vocal tics. Deep brain stimulation (DBS) is an emerging therapy for the treatment of many neurological disorders, including severe TS through the electrical stimulation of deep brain nuclei. Two patients with Tourette's Syndrome was implanted at University of Florida (UF) Shands Hospital with two bilateral subdural 4-contact cortical strip electrodes and two bilateral 4-contact subcortical depth electrodes with the aim of capturing tic-related physiology. The depth electrodes were



placed bilaterally within the centromedian nucleus of the thalamus (Cm) and the cortical subdural strips were placed bilaterally over the premotor (PM) and primary motor (M1) cortices. Local field potentials (LFP) from the depth electrodes, electrocorticograms (ECoG) from the cortical electrodes, and electromyograms (EMG) from electrodes placed over the forearm and cheeks were recorded intra-operatively while the patients were awake and extra-operatively for 6 months. We sought to discover the neural correlates of tics as related to TS and to differentiate them from voluntary movements and from imitated tics. Our results suggest that pathological activity presents itself in the Cm as sharp deviations from baseline. This observation was different than what was observed in voluntary movements, which were associated with contralateral cortical activity but not thalamic activity. Our findings may lead to the real-time detection of tics, and pave the way for the development of responsive stimulation paradigms.



Biodata: Aysegul Gunduz received the B.S. (2001), M.S. (2003) and Ph.D. (2008) degrees in electrical engineering from Middle East Technical University, Ankara, Turkey; North Carolina State

University, Raleigh, NC; and University of Florida, Gainesville, FL, respectively. From 2009 to 2011, she was a postdoctoral fellow of neurology at Albany Medical College and a visiting scientist in the Division of Translational Medicine at the Wadsworth Center, NY State Department of Health, Albany, NY. Since 2012, she has been an Assistant Professor with the J. Crayton Pruitt Jr Family Department of Biomedical Engineering, University of Florida and the Director of the Brain Mapping Laboratory. Her research focuses on the development of diagnostic and therapeutic tools for understanding and treating neurological disorders. Her research is funded by NIH, NSF and Michael J. Fox Foundation for Parkinson's Research.

Mobile Health: A Therapeutic Wireless Capsule Endoscopic System



Carmen C. Y. Poon
Department of Surgery, Prince of
Wales Hospital,
The Chinese University of Hong
Kong, Hong Kong

Abstract: Mobile health (m-Health) and sensing technologies are core technological drivers for precision medicine (p-Medicine). Traditionally, wearable biomedical sensors and systems were thought to be used on the body surface. Recent technological advancements, however, have opened up a new era for wearing sensors inside the human body non-invasively, a research direction subtly but distinctively differ from the



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invasive implantable systems. In this paper, a therapeutic wireless capsule endoscopic system is proposed. Different from the conventional wireless capsule endoscopes (WCE), which are mostly passive devices with only a single function of image capturing, the proposed system is designed with a novel inflatable module that attempts to stop bleeding by tamponade effect inside the GI tracts. In future, it is anticipated that in-creasing number of novel systems, which can be adhered to or travel through the endoluminal cavities of the human body, will be designed to carry out various therapeutic functions or to deliver drugs, i.e. forming a closed-loop system as a body sensor network.

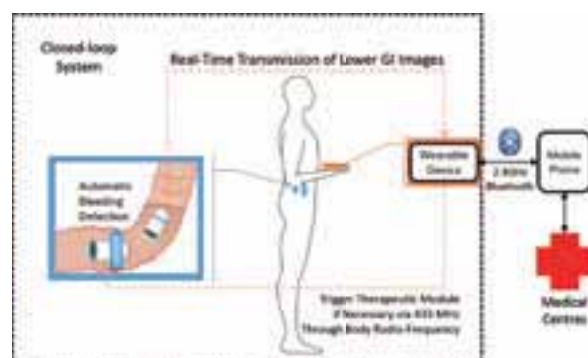


Fig. 1. Overview of the closed-loop system based on a real-time therapeutic wireless capsule and a body sensor network for treating gastroin-testinal haemorrhage in the small bowel.

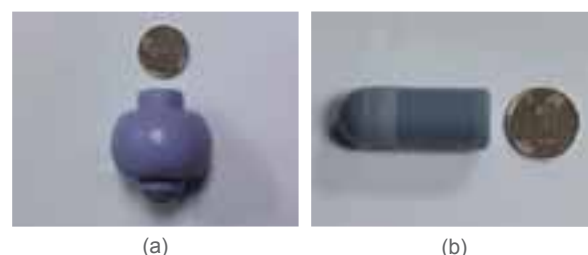


Fig. 2 (a) an inactive capsule endoscope; (b) an activated capsule endoscope with the balloon inflated.

Biodata: Carmen C. Y. Poon graduated from the Engineering Science (Biomedical) Program at University of Toronto (U of T) and obtained her master degree from a collaborative program offered by the Institute of Biomaterials & Biomedical Engineering and Department of Electrical & Computer Engineering, U of T. She completed her Ph.D. in Electronic Engineering (Biomedical) at the Chinese University of Hong Kong, where she is now an Assistant Professor at the Department of Surgery. Carmen is a Senior Member of IEEE, one of the three Asia-Pacific representatives of the Administrative Committee (AdCom) of IEEE Engineering in Medicine and Biology Society (2014-2016) and the Vice Chair of the Technical Committee of Wearable Sensors and Systems of the Society. Since 2009, she serves as the Managing Editor of IEEE TRANSACTIONS ON INFORMATION TECHNOLOGY IN BIOMEDICINE, which has been retitled to IEEE JOURNAL OF BIOMEDICAL AND HEALTH INFORMATICS in 2013. She also served as Guest Editor for a number of prestigious international journals on biomedical technology, including the IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING. Her research interests include wearable, ingestible and implantable sensors and systems, body sensor network, tele-medicine and mobile health technologies, surgical and medical robots, public health informatics and bioinformatics.



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Computational bone tissue engineering: from carriers and culture to clinics



Liesbet Geris
Biomechanics Research Unit,
University of Liège, Belgium
Prometheus, skeletal tissue
engineering, KU Leuven, Belgium

Abstract: One of the major challenges in tissue engineering and an essential step towards successful clinical applications is the translation of biological knowledge on complex cell and tissue behavior into predictive and robust engineering processes. Computational modelling can contribute to this, among others because it allows to study the biological complexity in a more quantitative way. Computational tools can help in quantifying and optimizing micro-environmental signals to which cells and tissues are exposed and in understanding and predicting the biological response under different conditions.

A wide variety of model systems has been presented in the context of tissue engineering ranging from mechanistic models (hypothesis-based) over gene network models to empirical models (data-driven), targeting processes at the intracellular over the cellular up to the tissue level. Each model system has its own benefits and limitations which delineate the context in which it can be used. Whereas mechanistic models are used as in silico tools to design new therapeutic strategies and experiments, empirical models are used to identify, in large data sets,

those in vitro parameters (biological, biomaterial, environmental) that are critical for the in vivo outcome.

In this presentation I will show a number of examples of these models (cfr figure 1). The first one being that of biomaterial design. In order to optimize bioceramics-based biomaterials for bone tissue engineering, we have developed models simulating the degradation of the biomaterials upon in vivo implantation, as well as the influence the degradation products have on the local biology. Extensive screening experiments have guided the model formation. In turn, the model is used to predict the bone formation capacity of bioceramics-based biomaterials in combination with a specific cell source.

For the culture of tissue engineering constructs composed of cells and carriers, bioreactors are used. In order to follow-up the biological events occurring inside the bioreactor, computational models are of great help. We have developed a model capable of simulating neotissue growth in perfusion bioreactors, including the influence of scaffold geometry, fluid flow, oxygen and lactate on the speed of growth.

A last example will briefly touch upon the possibilities of computational models in assessing the in vivo effect of specific treatment strategies for bone regeneration. We have developed a model of in vivo bone regeneration with a thorough description of the role of angiogenesis and we are currently testing the effect of a variety of patient properties (defect size, type of trauma, congenital problems) on the regeneration outcome.



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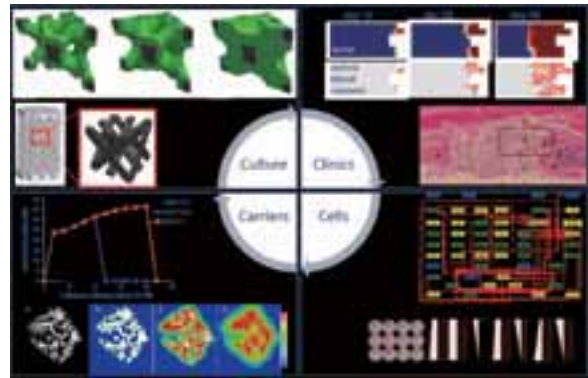


Figure 1: Classification of in silico models by their contribution to the basic building blocks of regenerative medicine. Cell: a gene regulatory network for chondrogenic differentiation is shown, along with a comparison between experimental (pale pink) and simulation (black) results for the hypertrophic phenotype. Carrier: prediction of calcium dissolution from calcium phosphate-based carrier (bottom, unpublished results, courtesy of V. Manhas) and prediction of optimal cell-carrier combinations for various initial cell densities (cm⁰). Culture: neotissue (green)

growth in a porous titanium scaffold (grey/black). Clinics: simulation of blood vessel formation in a large defect in mice.

Biodata: Liesbet Geris is professor in Biomechanics and Computational Tissue Engineering at the universities of Liège and Leuven (Belgium). Her research interests encompass the mathematical multi-scale modeling of bone regeneration in tissue engineering applications. She works in close collaboration with experimental and clinical researchers. She is the author of 45 peer-reviewed papers (h-index 18), 8 book chapters and over 80 full conference proceedings and abstracts. She is the editor of 2 Springer-Verlag books on computational modeling in tissue engineering and biology. She has received a number of scientific awards including an ERC starting grant in 2011. She is co-chair of the Young Academy of Belgium (Flanders).



REPORT FROM IFMBE: Committees & Regions

Laura Bassi Award 2015 for Outstanding Female Researcher

Introduction

The Laura Bassi award is presented by IFMBE every three years at the World Congress. The Laura Bassi award will be given to a senior female biomedical engineer for outstanding research contributions in the field of medical and biological engineering. The criteria for nominations include innovation and outstanding research contributions to medical and biological engineering. The awardee will receive prize money of 2500 euros as well as travel funds to attend the World Congress 2015 in Toronto where the award will be presented. The awardee will be required to make a scientific presentation in the area of the awardee's expertise at the World Congress. Nominations may be made by IFMBE entities, affiliated member societies, or any individual member of the constituent societies. Nominees must be members of an IFMBE affiliated organization. Confirmed nominees will submit a Curriculum Vitae that includes a brief (half-page maximum) biography and a photo. Nominators will provide a maximum one-page write-up on the significant contributions of the nominee made in relation to the criteria stated above.



Alison Noble,
Director, Institute for Biomedical
Engineering,
Fellow of St Hilda's College,
Oxford University, UK

Alison Noble OBE FREng is the Technikos Professor of Biomedical Engineering in the Oxford University Department of Engineering Science, Director of the Institute for Biomedical Engineering (IBME), and a Fellow of St Hilda's College, Oxford. She is a Fellow of the IET, a Fellow of the MICCAI Society, and a Fellow of the Royal Academy of Engineering. She is also the current President of the MICCAI Society. She was awarded an OBE for services to Science and Engineering in the Queen's Birthday Honours list in June 2013.

Professor Noble received a DPhil in computer vision in 1989 from the University of Oxford. Her thesis made key contributions to the theory of (nonlinear) morphological filters and image segmentation. During this period she held a Dee scholarship (1986-7) and IBM scholarship (1987-89) from St Hugh's College, Oxford. From



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1989-1994, Professor Noble was a research scientist at the GE Corporate Research and Development Center, Schenectady, NY, USA - now the GE Global Research Center, Niskayuna, NY, USA) where her research interests were in manufacturing applications of image understanding for industrial inspection and process monitoring, principally using visual and X-ray imaging. During this 5 year period, she filed several patents, and was involved in 3 major technology transfer projects to GE Divisions, for which she received 2 Whitney Gallery awards for technical achievement.

She joined the Department of Engineering Science in the University of Oxford as a University Lecturer in 1995 and quickly moved up the ranks to become a Professor in 2002 (at that time the youngest electee in the department). Early achievements also included being the first biomedical engineer in the UK to receive a 5yr MRC Career Establishment award. In 2012, she became the Director of the Oxford Institute of Biomedical Engineering.

Professor Noble is a founding director of the Biomedical Image Analysis (BioMedIA) Laboratory, a multi-disciplinary research group working in the area of biomedical imaging and image analysis, an important sub-discipline of

modern biomedical engineering. She heads a large research activity in cardiovascular image analysis, women's health imaging (obstetrics and perinatal care) and microscopy image analysis. Professor Noble has published around 300 publications. She has supervised 37 PhD students to successful completion, with 17 further DPhil students currently under her sole or co-supervision. She is on the Journal Editorial Advisory Boards of Medical Image Analysis (Elsevier), Ultrasound in Medicine and Biology (Elsevier), and the International Journal of Computer Vision. Alison has combined academic research with technology translation throughout her career. Her most recent venture is as a co-founder and CTO of Intelligent Ultrasound Ltd, spun-out from the her laboratory in 2012, which focuses on software solutions to make medical ultrasound a simpler and effective technology to use in existing and new areas of healthcare.



REPORT FROM IFMBE: Committees & Regions

Clinical Engineering Division (CED) : Clinical Engineering Awards

Yadin David

Introduction

To fill gap in global recognition of Clinical Engineering professionals who have made outstanding contributions to the field of Clinical Engineering, IFMBE/Clinical Engineering Division created, for the first time, recognition program led by its newly created CED Awards Committee. This program consists of recognizing significant contributions and promoting outstanding achievements in three categories:

A) Clinical Engineer Individual Award

This award recognizes an individual who has made outstanding regional or international contributions to the field of Clinical Engineering.

B) Clinical Engineering Teamwork Award

This award recognizes an individual or a group that has fostered and facilitated cooperation between clinical technology managers and other members of the healthcare field, to successfully achieve outstanding impact on the clinical engineering field.

C) Best Clinical Engineering Article Award

This award recognizes an individual or a group that stood out for writing the best clinical

engineering article, published in IFMBE Conferences Proceedings and Journals, providing an innovative research contribution that results in progress in clinical engineering.

Nominees are individuals/team who have demonstrated outstanding achievements in research, education or service provision for the benefit of the Clinical Engineering field, made significant enhancements to the interests and activities of the IFMBE/CED Board or the profession, or effected extraordinary accomplishments that enhance health and quality of life for people worldwide. Following review by the Awards Committee the selected awardees for 2015 are:

A) Clinical Engineer Award

Adriana Velazquez Berumen, Sr. Advisor and Focal Point on Medical Devices Policy, Access and Use Unit, World Health Organization, Geneva, Switzerland.

With almost 30 years of experience in Biomedical Engineering, Adriana is the senior adviser on medical devices at the World Health Organization,



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where she has been working since 2008, and leading the work to improve access to safe, affordable, quality and appropriate medical devices. She coordinates the development of the Medical Devices Technical Series publications and all projects related with priority medical devices for clinical applications in maternal, new born, and non-communicable diseases, among others.

She is Mexican Biomedical Engineer with postgraduate degree in Clinical Engineering in USA. Previous to join WHO she was the founding and Director General of the National Centre for Health Technology Excellence (CENETEC) in the Ministry of Health in Mexico, where she had more than 15 years' experience as clinical engineer in private and public hospitals in Mexico. Mrs. Vealquez Berumen tirelessly uses her international position to facilitate collaboration and promote education and training opportunities for clinical engineers in resource poor region of the world.

B) Clinical Engineering Teamwork Award



Kun ZHENG, Sr. Engineer, Director of Informatics and deputy director of Clinical Engineering,

Children's Hospital, Zhejiang University School of Medicine, and vice chairman, Chinese College of Clinical Engineers, Chinese Doctor's Association, Hangzhou, China.

Mr. Zheng Kun obtained his B.Sc. in biomedical engineering and Master Degree in administration & management. In addition he completed Fellowship in biomedical engineering at the Ohio State University and obtained certification as a clinical engineer. For the past 30 years he supported and organized numerous cross-disciplines events and served as an oral interpreter and English translator, to facilitate the networking across languages and cultural differences. He translated many English professional manuscripts into Chinese including ECRI Institute's Health Device Journal and the Ziken book series. He provided nearly 100 on-site translations for various clinical engineering lectures delivered by many English speaking biomedical engineering experts and professors, including the on-going Certification of Clinical Engineers' program in China from year 2005 until present. He assisted in joint training programs about medical device relevant to incidents investigation. He contributes greatly to organize or assist in organizing many professional conferences and training courses on both national and provincial level. And he is a constant keynote speaker in various profession conferences held in China, including a presentation he delivered



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in Taiwan's Annual Symposium on Biomedical Engineering and Technology in 2013. He received awards for papers published and serves as a strong advocate for international and regional professional collaboration.



Lorenzo LEOGRANDE Technical and Administrative Manager at the Health Department Directorate of the University General Hospital, Rome, Italy and President of the Italian Association of Clinical Engineers.

Between 1999 – 2006, Dr. Leogrande completed his under graduate and graduate degrees in academic areas focusing on healthcare technology assessment, management and clinical engineering.

He is Founding Member of the Italian Association of Health Technology Assessment and serves as a Professor of Clinical Engineering and Health Technology Assessment in graduate level program with particular reference to the value of investments strategic planning. He is highly focused on improving the cooperation,

collaboration and open communication among the various Italian organizations working both in the clinical engineering and medical devices fields. He strategically set up, within his team, dedicated working groups for each "Clinical Engineering" area in order to successfully and duly promote and spread the "Clinical Engineering" culture in Italy. Among other projects, he developed a partnership with those Italian Institutions and Government Bureaus directly or indirectly involved in the healthcare technology. He also cooperates with strong insight on guidance developing International Institutions, including IFMBE and others, with the aim of increasing the overall national awareness on the subject. He is the author of several papers published by related journals, columnist in scientific journals, and demonstrates good organizational, coordination and problem-solving skills.

C) Best Clinical Engineering Article Award

The nomination for this award is open for submission until June 30, 2015.

This award and the Clinical Engineering Teamwork Award will be presented at the First International Clinical Engineering and Health Technology Management Congress scheduled to be held this coming October in Hangzhou, China (www.icehtmc.com).



REPORT FROM IFMBE: Committees & Regions

Asian Pacific Research Networking (APRN) Fellowship

Siew-Lok TOH

Introduction

Since the IUPESM World Congress in 2006 in Seoul, South Korea, the IFMBE Asia-Pacific Working Group had been organising the Asian Pacific Research Networking Fellowship with the following aims:

1. To develop strong long-term collaboration and cooperation among member countries in the Asia Pacific region;
2. To identify and encourage greater participation of young Biomedical Engineers in the IFMBE Asia-Pacific Working Group and also IFMBE at large;
3. To mentor and train young Biomedical Engineers for leadership in IFMBE Asia-Pacific Working Group and also IFMBE at large and
4. To ensure leadership renewal program is in place.

This year at the IUPESM World Congress 2015 which will be held in Toronto, Canada from 7th to 12th June 2015, the IFMBE Asia-Pacific Working Group will continue the APRN "tradition" of providing four young researchers with the invaluable opportunity to network and discuss about their research. The 4 BME researchers are

- (a) **Dr. Thomas Ming Hung Lee**, The Hong Kong Polytechnic University, Hong Kong
- (b) **Dr. Akihiro Yamada**, Tohoku University, Sendai, Japan
- (c) **Dr. James Chen Yong Kah**, National University of Singapore, Singapore
- (d) **Dr. Chih-Chung Huang**, National Cheng Kung University, Taiwan

For them, the networking starts one week before the IUPESM World Congress 2015 where they will first meet in Taiwan and then Japan before travelling together to Toronto. The national BME societies in Taiwan and Japan will host these researchers and social and technical activities have been arranged for them. In Toronto, there will be a technical session entitled "Innovative Biomedical Engineering Research in Asia" in which the 4 researchers will be presenting their research. This session will be held on 9 June 2015 from 10.30am to 12.00 noon (venue to be advised). The titles and abstracts of their presentations are appended below.



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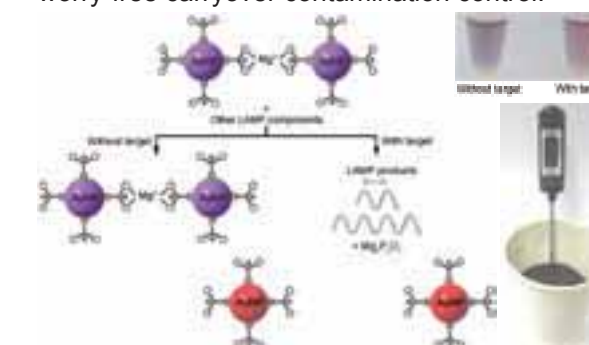
Functionalized gold nanoparticles for point-of-care nucleic acid detection



Thomas Ming Hung Lee
Interdisciplinary Division of
Biomedical Engineering,
The Hong Kong Polytechnic
University, Hong Kong

Abstract: Gold nanoparticles (AuNPs) have been extensively investigated for colorimetric detection of nucleic acid. This is enabled by the unique interparticle distance-dependent optical property of AuNPs. The solution color for monodispersed particles appears red (for widely used 13 nm AuNPs) but turns purple upon aggregation due to a red-shift in the surface plasmon resonance absorption band. Until now, all the reported platforms are not practical for point-of-care testing. To address this, our group developed a new platform by incorporating 11-mercaptoundecanoic acid-modified AuNPs (MUA-AuNPs) into loop-mediated isothermal amplification (LAMP). When added into the LAMP reaction mixture, MUA-AuNPs aggregated as a result of ion-templated chelation between the carboxyl groups and magnesium ion (Mg^{2+} , which plays an indispensable role in LAMP reaction as an enzyme cofactor). The solution color changed from red to purple. In the presence of a specific target DNA sequence, the LAMP reaction occurred and pyrophosphate ion ($P_2O_7^{4-}$) was generated as a reaction by-product. The chelated Mg^{2+} was then extracted by $P_2O_7^{4-}$, leading to

the deaggregation/redispersion of the MUA-AuNPs and the solution color turned red. This new platform possesses all the ideal features for point-of-care testing, including simple preparation and operation, low cost, high sensitivity, and worry-free carryover contamination control.



Biodata: **Dr. Thomas Lee Ming Hung** received his BEng, MPhil, and PhD degrees in Chemical Engineering from The Hong Kong University of Science and Technology (HKUST) in 1998, 2000, and 2003, respectively. From 2003 to 2006, he worked as Research Associate at New Mexico State University, Arizona State University, and HKUST. In August 2006, he joined The Hong Kong Polytechnic University as an Assistant Professor in the Department of Health Technology and Informatics. He was then transferred to the Interdisciplinary Division of Biomedical Engineering in April 2012 and promoted to Associate Professor in July 2014. He currently serves as the program leader of the BSc in Biomedical Engineering. Dr. Lee's research focuses on point-of-care biomolecular testing, colorimetric and electrochemical biosensing, and biomedical nanotechnology.



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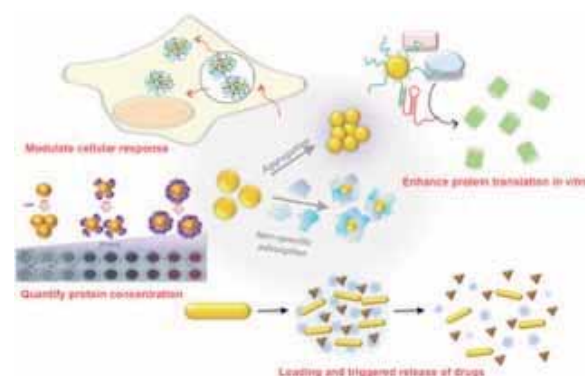
Biomedical Engineering at the Nanoscale: the Inspiration We can Draw from Endogenous Systems Interactions to Design the Nano-Bio Interface



James Chen Yong Kah
Department of Biomedical
Engineering, National University of
Singapore, Singapore

Abstract: Nanomedicine can be described as biomedical engineering on the nanoscale where we seek to apply intelligent design to tackle health challenges. The last decade has seen tremendous growth in this field as studies on the various applications of nanotechnology in medicine and biotechnology form a sizeable aspect of modern day research. Biomedical applications of these nanoparticles have been reported in four major areas, namely, drug delivery, disease diagnostics, imaging and therapeutic applications as an outcome of man's ingenious design on the nanoscale. Nature's intelligent design has also created a range of endogenous biomolecules that exist in the same size regime as nanoparticles. In biology, however, there are numerous examples of biomolecular systems that far surpass any man-made machine in terms of efficiency, precision, and complexity. Natural endogenous biomolecules such as DNA and proteins often self-assemble, or interact with other biomolecules in order to perform their naturally intended function. Most often, these interactions between biomolecules are useful, if not critical, to the survival of the organism. In a similar manner, nanoparticles also demonstrate a high propensity to interact with other biomolecules to form the nano-bio interface. Intelligent design of this nano-bio interface is therefore crucial to the functionality of nanoscale systems in biology. In

this talk, I will show how we can draw inspiration from nature and design appropriate nano-bio interface formed from DNA, proteins and peptides to probe and control biology in at least four ways: (1) to enhance efficiency of protein translation in vitro; (2) tune cellular response; (3) to enable loading and trigger release of drugs; and (4) to develop a cost-effective and instantaneous biomolecular assay. I will also be sharing some of our current research that involves understanding and engineering the nano-bio interface in molecular and cell biology.



Biodata:

Dr. James Kah Chen Yong received his B.Eng. with first class honors in Electrical Engineering and subsequently completed his Ph.D. (2009) both from National University of Singapore (NUS). Prior to joining the faculty at NUS in 2012, James was a Postdoctoral Fellow in the Department of Biological Engineering at the Massachusetts Institute of Technology (MIT) and had previously taught in Temasek Polytechnic as a Lecturer. He is currently a Principal Investigator in the Nanomedicine&Nanorobotics Laboratory at NUS Department of Biomedical Engineering. His current research interests focus on understanding the nano-bio interface and developing nanodevices with smart interface strategies to effectively probe and modulate biological processes for diagnostic and therapeutic applications.



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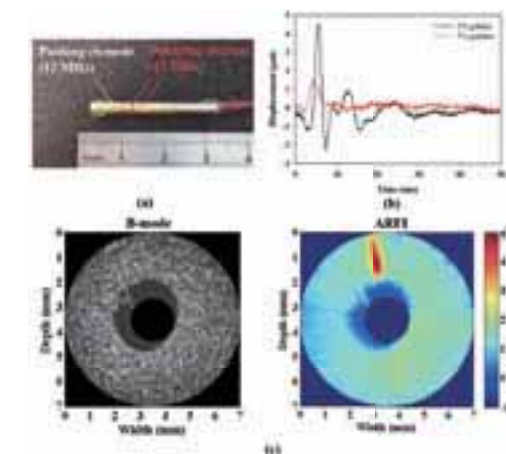
High Frequency Ultrasound Elastography and its Biomedical Applications



Chih-Chung Huang
Department of Biomedical
Engineering,
National Cheng Kung University,
Taiwan

Abstract: It is well known that the mechanical properties of soft tissues, such as elasticity, viscosity, and mechanical impedance, change depending on the conditions of tissues, for instance disease and age, hence the mechanical properties may give useful information in medical diagnosis. Several ultrasound elastographs have been proposed to measure the mechanical properties of tissue quantitatively, such as sonoelastographic image, shear wave image, and acoustic radiation force impulse image. However, the image resolutions of above elastographs are insufficient due to their operational ultrasound frequency. It remains difficult to estimate the mechanical properties of smaller organs and tissues using current elastographs. Therefore, the high frequency ultrasound elastographs based on acoustic radiation force impulse imaging and shear wave imaging were proposed in our Lab to assess the mechanical properties of some micro-structure tissues, such as cornea, plaque, and vessel wall. In cornea study, a 50 MHz high frequency acoustic radiation force impulse (ARFI) imaging system were built for mapping the hardness of cornea. A dual frequency ultrasonic transducer was designed for this objective. The outer 10 MHz element was used to push the fibers in cornea and the inner 50 MHz element was used to detect the displacement of cornea. The experiments were carried out using artificial porcine cornea and a new algorithm for high frequency ARFI imaging was established. In plaque study, a 40 MHz shear wave imaging

system was built for measuring the elastic properties of blood clots. Furthermore, we applied our high frequency ARFI imaging and shear wave systems into intravascular ultrasound (IVUS). A concept of combining the high frequency ARFI and shear wave technology on IVUS for assessing the mechanical properties of thrombus and vessel was proposed in present study.



Biodata:

Dr. Chih-Chung Huang was born in Taiwan. He received the B.S., M.S., and Ph.D. degrees in Biomedical Engineering from Chung Yuan Christian University, Chung-Li, Taiwan, in 2002, 2003, and 2007, respectively. From 2006 to 2007, he worked at NIH Resource Center for Medical Ultrasonic Transducer Technology at the University of Southern California, Los Angeles, USA as a Visiting Researcher where he was engaged in research of high frequency ultrasound imaging and development of new acoustic methods for cataract diagnosis. In 2008, he joined the Department of Electrical Engineering, Fu Jen Catholic University, Taiwan as an Assistant Professor. In 2012, Dr. Huang was promoted as an Associate Professor. Currently, he is a faculty member at Department of Biomedical Engineering, National Cheng Kung University, Taiwan. His research interests include ultrasonic tissue characterization, blood flow measurement, high frequency ultrasound, and ultrasonic instrument for medical applications, etc



REPORT FROM IFMBE: Committees & Regions

Hemodynamic function of Fontan circulation mechanical assistance in Fontan circulation animal experimental model



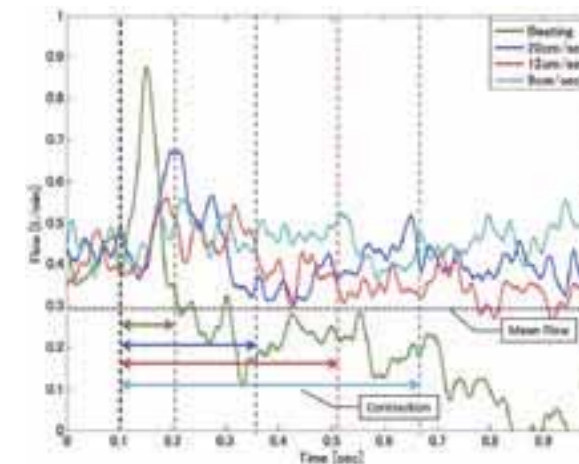
Akihiro Yamada
1Institute of Development, Aging and Cancer, Tohoku University, Japan.

Abstract: Fontan procedure is selected the final palliative surgical operation in pediatric patients with serious congenital heart diseases. After Fontan procedure, there is non-pulsatile flow in the pulmonary circulation called Fontan circulation. We focused on the additional pulsatility in the Fontan circulation for the pulmonary flow assistance for congenital heart failure patients. In order to promote the pulsatility in the flow that infuses the lungs, we implemented an original mechanical contractile device which promotes flow pulsatility. Then we have been developing a circulatory support device with the function of peristaltic contraction for the promotion of an efficient assistance for Fontan circulation using shape memory alloy fibers. The structure of the device was a mechanically contraction from the outside of the extracardiac conduit. The device consisted the 16 units of the shape memory alloy actuators in parallel arrangement. In this study, we developed the animal experimental model for in vivo examination of the Fontan circulation assist device for the pre-clinical research. And also, we examined the hemodynamics function in the device driving by the animal experimental

model. The animal experimental model was constructed in four adult goats (45.8 ± 15.6 kg). The right heart bypass of inferior vena cava (IVC) to pulmonary artery (PA) was constructed by using extracardiac conduit (Dacron, D = 18mm, Boston Scientific Corporation, USA). The vascular tape was indwelling in IVC and right atrium (RA) anastomosis for clamping. And the left ventricular assist device (LVAD, Gyro Pump C1E3, Kyocera Medical Corporation, Japan) was connected to the apex to reduce the left ventricular load. Rotational speed of the LVAD was set to 1400rpm. The right heart bypass circulation could be created by the IVC-RA clamping. IVC and PA pressure rose to 15mmHg during clamping. The device could be mounted easily to the conduit in the thoracic cavity. The pulsatile flow could be generated in the pulmonary circulation by the device contraction. In the faster peristaltic contractile speed, the device could be generated larger pulsatile flow waveform. The animal experimental model could be constructed to reproduce the hemodynamic of Fontan circulation by using LVAD. In our model, it was represented to steady flow in the bypass circulation. In the pulmonary circulation of the experimental model, the flow fluctuation was included by heart beat and respiratory variation. For the further investigation to more effective assistance, it is considered to require the control method including synchronization with the heart beat or respiration. We examined the function of the device in the animal experimental model. And it was indicated that the pulsatility by the device could be generated pulsatile flow in device implantation.



REPORT FROM IFMBE: Committees & Regions



Biodata:

Dr. Akihiro Yamada was born in Japan. He received the B.S. degrees in Biomedical Engineering from Osaka Institute of

Technology, Osaka, Japan, in 2010, and the M.S., and Ph.D. degrees in Biomedical Engineering from Tohoku University, Sendai, Japan, in 2012, and 2015, respectively. From 2014 to present, he worked at Institute of Development, Aging and Cancer, Tohoku University as Research Fellow of the Japan Society for the Promotion of Science. His research interests include artificial organs, ventricular assist device, shape memory alloy, congenital heart disease, and, electrical engineering for medical devices, etc. He is a member of Japanese Society for Artificial Organs, Japanese Society for Medical and Biological Engineering, IEEE, and Japan Society for Simulation Technology.



IFMBE Asia Pacific Working Group meeting at APCBME 2014



REPORT FROM IFMBE: Committees & Regions

Workshop on Heavy Metals Sponsored by Peruvian INS-PUCP-IUPESM held in Lima on 7-8 May 2015

Herbert F. Voigt and Rossana Rivas



On 7 May 2015, in the Biomedicine Auditorium of the National Institute of Health in Chorrillos, Lima, Peru, Dr. Ernesto Gozzer Infante, Head of the Peruvian Instituto Nacional de Salud (INS), opened the 1st International Course on Technology Transfer for Epidemiological and Public Health Research on Heavy Metals.

Peru has a growing heavy metal toxicity problem among its population because of informal mining practices: legal and illegal. In the case of the mercury¹ it finds its way into the water supplies poisoning fish and then the people who eat the fish. In addition, the mercury/gold/earth amalgams are burned to extract the gold while mercury vapors pollute the air. But mercury (Hg) is not the only problem; lead (Pb), cadmium (Cd) and arsenic (As) are also leading causes of concern in

Peru², the exchanges and research are specially interesting for the Latin America region.

According to Dr. Bruce Lanphear³ in the USA, 100% of children are found to have Pb in their blood; 89% have Hg. Other toxins include organophosphate pesticides, PCBs, BPA and PBDEs. These materials are what Dr. Philippe Grandjean, head of the Environmental Medicine Research Unit at the University of Southern Denmark, calls "Brain Drainers"⁴. They are brain drainers because they chip away at IQ scores of the children affected.

Speakers in the Workshop were Dr. Laura Borgel Aguilera, University of Chile, Dr. Christopher Frederickson, CEO NeuroBioTex, Inc., Dr. A. J. Attar, President of Appealing Products, Inc., Dr. Patricia Fabian, Boston University School of Public Health, Dr. Herbert Voigt, IUPESM and PhD (c) Rossana Rivas, Pontifical Catholic University of Peru. The partnership of a National Institute of Health, a Private University, Pontifical Catholic University of Peru (PUCP) and an International Union (IUPESM) of the International Council for Science (ICSU) is an excellent example of cooperation in an area of international concern. The partnership will seek additional ways it can address heavy metal toxicity in Peru and in other countries.

¹ Ashe, K. (2012). Elevated mercury concentrations in humans of Madre de Dios, Peru. PLoS one, 7(3), e33305.

² Astete, J., Gastañaga, M. D. C., Fiestas, V., Oblitas, T., Sabastizagal, I., Lucero, M., ... & Suarez, M. (2010). Enfermedades transmisibles, salud mental y exposición a contaminantes ambientales en población aledaña al proyecto minero Las Bambas antes de la fase de explotación, Perú 2006. Revista Peruana de Medicina Experimental y Salud Pública, 27(4), 512-519.

³ Video: Little Things Matter: The Impact of Toxins on the Developing Brain <https://www.youtube.com/watch?v=E6KoMAbz1Bw&feature=youtu.be>
<https://www.youtube.com/watch?v=DbIB2CA4jcA> (Spanish sub-titles)

⁴ Grandjean, P. Only one chance. How environmental pollution impairs brain development, 2013.



REPORT FROM IFMBE: Committees & Regions

First day: 7 May 2015

Opening Remarks	Dr. Ernesto Gozzer Infante – Institutional Head of INS Dra. Pepi Patron – Vice-Chancellor for Research PUCP Dr. Herbert F. Voigt – President, IUPESM; Boston University Partners
Opening Remarks	Advances in Research on Heavy Metals and its Impact on Public Health Med. Jonh Astete Cornejo – CENSOPAS - INS
Roundtable	State of Exposure to Heavy Metals in Peru Moderator: Phys. Gastañaga María del Carmen Ruiz – CENSOPAS <ol style="list-style-type: none"> Review of the Status of the Impact of Exposure to Heavy Metals in Peru Dr. Rosa Burgos Aliaga – DGSP - MINSA. Epidemiological Monitoring of Heavy Metals Ms. Laura Nayhua Gamarra – DGE MINSA.
Keynote Presentation	Neurodevelopment and Heavy Metal Exposure in Pediatric Population: Trends in Research and Mitigation Strategies Dra. Patricia Fabian – Boston University School of Public Health
Keynote Presentation	Exposure and Lead Poisoning Med. Gastañaga María del Carmen Ruiz – CENSOPAS - INS
Keynote Presentation	Research Recommendations Toxicity (acute effects) and Possible Interventions. Dra. Laura Borgel Aguilera – Universidad de Chile
Roundtable	Research on Heavy Metals in Peru Moderator: Representative OGITT <ol style="list-style-type: none"> Research Priorities for Peru Heavy metals: Problems to Solve. Med Hector Collantes Lazo – CENSOPAS - INS Social Determinants of exposure to heavy metals. Psych. Iselle Sabastizagal Vela – CENSOPAS

Second day: 8 May 2015

Roundtable	Technology for Research on Heavy Metals Moderator: QF. Arturo Ramírez Erazo, CENSOPAS <ol style="list-style-type: none"> Commercial Devices for Detection of Heavy Metals: Need and Use in Remote Areas. Dr. Herbert F. Voigt – President IUPESM; Biomedical Engineering, Boston University Portable Detection Device. Dr. Christopher J. Frederickson – CEO & CSO, NeuroBioTex, Inc. Technologies Used in CENSOPAS. Chem. Manuel Chavez – CENSOPAS
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REPORT FROM IFMBE: Committees & Regions

Second day: 8 May 2015	
Keynote Presentation	Measuring, Mapping and Identification of Heavy Metals in Various Sources of Pollution. A. James Attar, Ph.D. – President, Appealing Products, Inc.
Keynote Presentation	Technology Management and Technology Assessment Research Institutions Rossana Rivas, MSc PhD (c) – Executive Director, Technopole Health CENGETS PUCP
Roundtable	Ethical, Intercultural and Political Dissemination of Results and Evidence Generated by Research Aspects of Heavy Metals. Moderator: Representative OGITT Exhibition of perspectives: <ul style="list-style-type: none"> • Representative Ethics Committee of the INS • Dr. Diana Cordano – Representative of the Ombudsman • Representative of Directorate General of Education, Culture and Environmental Citizenship – Ministry of Environment • Mag Tesania Velasquez – Director of Social Responsibility - PUCP
Roundtable	Strategies to Reduce & Eliminate Exposure to Heavy Metals in Peru Moderator: Phys. Jonh Astete Comejo, CENSOPAS Exhibition Review <ul style="list-style-type: none"> • Strategies to Mitigate and Reduce the Incorporation of Heavy Metals A. James Attar, Ph.D. – President, Appealing Products, Inc. • Strategies to Reduce Exposure at Community Level and Child Population Mary Patricia Fabian, Sc.D. – Boston University School of Public Health • Strategies and Criteria Chile, Germany and ILO among others Dr. Laura Borgel Aguilera – Universidad de Chile • Mr. Juan Narciso Chavez – Representative of the Ministry of Environment • – Representative CENSOPAS
Closing Remarks	Dr. Ernesto Gozzer Infante – Institutional Head of INS Dra. Pepi Patron – Vice-Chancellor for Research PUCP Dr. Herbert F. Voigt – President, IUPESM; Boston University Partners



FEATURE COLUMN

Developing Undergraduate Biomedical Engineering Programs: Challenges and Solutions



Shankar Krishnan
Secretary General, IFMB

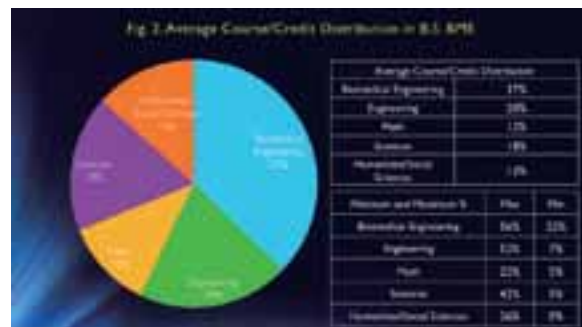
Medical Systems have become increasingly complex and have been embracing fast-paced technological breakthroughs. Biomedical engineering (BME) plays a significant role in advancing medical technologies and healthcare delivery, thus creating substantial demands for biomedical engineers globally. The increased needs for biomedical engineers trigger greater requirements for engineers with multidisciplinary expertise in research, design, development, manufacturing, operations, compliance and regulatory affairs. The training of future biomedical engineers is indeed a major challenge for educators worldwide. The objective of this presentation is to identify the challenges and propose feasible solutions to train future biomedical engineers especially at the undergraduate level to meet the growing industrial demands and reap the resultant rewards. Designing a comprehensive baccalaureate biomedical engineering training program within the typical four years is certainly challenging.

Several factors need to be taken into account in designing undergraduate academic curricula such as the breadth and depth of biomedical engineering coverage, relative emphasis on theory and practice, the focused efforts required for graduation and main career paths. Basic foundations in mathematics, sciences and engineering are essential to prepare for the core courses in BME. For experimental and project work, students need to be provided with well-equipped laboratories and faculty with relevant theoretical expertise and practical experience. A general model of undergraduate BME curriculum is provided in Figure 1. Suitable BME elective courses must be included in synchrony with the emerging healthcare needs thus flooding challenges in the overall program design. An average course/credit distribution for B.S. (BME) programs at universities in different nations is shown in Figure 2.





FEATURE COLUMN



The solutions to aforementioned biomedical engineering curricula design challenges can be achieved by designing a general or track-based site-specific B.S. degree curriculum model, coupled with incorporation of coop/internship. Industry or Hospital based training complements on-campus learning with real life experience, as shown in Figure 3. Subsequent to graduation, continuing education available in multitudes of technology-facilitated forms is essential. Special efforts are to be made to recruit and retain dedicated progressive faculty and to seek funding for labs, projects, and research. The program should evolve with continuous improvement implementing newer pedagogical approaches, utilization of emerging technologies in teaching and learning, project-based and collaborative learning, online and hybrid instructions to meet the requirements specified by appropriate regional and/or international accreditation boards. The author's experience at numerous organizations in four countries strongly supports the high probability of success resulting from site-specific BME programs in synchrony with advances in technology, market demands, and societal needs.



The rewards of comprehensive BME programs are multi-faceted and substantial leading to positive and significant impact as talented BME workforce will continue to develop and function at the international level. A subset of the graduates would pursue advanced studies in engineering as well as professional degrees such as medicine, law, and business. Professional organizations such as IFMBE, IEEE, BMES, ASEE, etc., contribute to networking and dissemination of current problems and innovative solutions. With continued participation and collaboration by the stakeholders in academia, industry, government agencies, and non-governmental organizations, future Biomedical Engineers will be trained to provide the healthcare industry with effective technological solutions leading to improved diagnosis, therapy, and rehabilitation, ultimately bettering the lives of people globally, which is the main mission of biomedical engineers.



FEATURE COLUMN

The Changing Face of Patient Safety and Clinical Engineering



Monique Frize
Distinguished (Research)
Professor, Systems and Computer
Engineering, Carleton University,
Canada
Professor Emerita, School
of Electrical Engineering and
Computer Science, University of
Ottawa, Canada

In the Ladies' Home Journal in 1971, Ralph Nader claimed there were 1200 electrocutions due to micro-shocks in US hospitals every year. This led to the hiring of a few clinical engineers in the USA and Canada to ensure the electrical safety of patients. My own position was created in 1971 large part due to this reason at Notre-Dame Hospital in Montreal. As first priority, a biomedical technologist and I tested every medical device in this 1200 bed hospital. However, it soon became apparent that much of my work consisted of technology management in which patient safety was one aspect. The late 1960s and early 1970s saw the appearance of Clinical Engineering Departments (CEDs) in the United States and Canada, and clinical engineering services within medical physics departments in the United Kingdom. Another early model still present today, particularly in the UK and Nordic countries was a University-based biomedical program which also delivers clinical engineering services to affiliated hospitals. The field of clinical engineering expanded rapidly in the 1980s in many industrialized nations. In developing countries, clinical engineering appeared in the late 1980s and early 1990s, except in countries like India

and Brazil where they sprung up in the 1970s and early 1980s.

A second factor that helped the field to develop was the rapid proliferation of medical technologies in the 1980s. A 1988 survey of CEDs which I carried-out in several western nations revealed that, although there was some difference in the level of involvement in the various functions, most CEDs were involved in: pre-purchase consultation, drawing specifications and requirements, analysis of quotations and making recommendations based on criteria established with potential users; corrective and preventive maintenance; incoming inspections when equipment is delivered; training of the users on safe and effective use of new devices. Some functions were performed by medical technologists and others by clinical engineers. The study found that half of the CEDs did not think that their work was receiving recognition and some were not consulted prior to equipment purchases in their institution. This study led to the development of a model describing a desirable level of involvement in technology management and of the resources needed to accomplish these tasks (see Frize 1988, 1990). Other later surveys found similar results (see Glouhova, 1999).

In the 1970s and the remainder of the 20th century, patient safety was mostly focused on electrical safety, macro-shocks and micro-shocks and electromagnetic interference (EMI) to medical devices. For example, EMI could stop the proper functioning of a pacemaker, or an apnea monitor,



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potentially resulting in the death of the patient. However, following the Institute of Medicine's (IOM) publication "To Err Is Human: Building a Safer Health System" in 2000, the focus on patient safety took centre stage once again, but in a much broader manner than in previous decades. The IOM report estimated that 44,000 to 98,000 deaths occurred each year in US hospitals due to medical errors and estimated the national cost of preventable adverse events to be between 17 and 29 billion dollars a year. IOM suggested that half of the adverse events were due to medical error and were preventable. In Canada, a study showed that adverse events occurred in 7.5% of patients in 2004, and of these, 36.9% were considered highly preventable; 5.2% resulted in permanent disability, and 20.8% in death. Studies have now been performed in many other countries with similar results.

In response to these studies, a number of measures have been taken to minimize adverse events and medical errors in hospitals. These include implementation of information technology (IT) solutions, applying human factor engineering, technology planning and management, and error reporting and analysis. The use of IT in health care is still a relatively new area but has a high potential to decrease medical errors. IT systems include electronic health records (EHR), physician order entry systems (POES), clinical decision-support systems (CDSS), electronic results reporting systems, patient-centred decision-support systems, and telemedicine.

The lack of proper technology planning has been an issue in past years. Decision makers in healthcare facilities often make purchase decisions based on limited information and find out later that important options were omitted or that there were incompatibility issues. Ill-conceived technology

solutions also lead to patient safety issues after the device is placed into service.

Human factors engineering can significantly reduce adverse events. Issues leading to an inadequate health care system include the mismanagement of patients, communication issues, staff shortages, responsibility confusions, distractions and interruptions, long wait times, and long work hours. These systemic failures need to be addressed in order to improve the work flow. The human factors approach for organizations involves focusing on understanding the needs of all users, the required tasks, environmental constraints, people skills and knowledge in order to come up with a better work flow. One of the changes that can be implemented using human factors engineering includes decreased hand-offs. A reduction of the number of hand-offs or people involved with the treatment of a single patient can reduce errors.

Patient safety has always been an important responsibility for CEDs, but the breadth of issues covered changed dramatically over the years, from electrical-focused safety in the early days, to the additional concern of adverse events and medical errors. With the advent of Electronic Health Records and Clinical Decision-Support Systems, a new role emerged for clinical engineers and researchers, working together to integrate IT solutions into patient care. Clinical Engineers have a unique opportunity, as a result of their training and skill set, to move into the role that will match the hospital needs and operational condition and have a real impact on minimising errors and adverse events in their health care institution.

Note: This article is a short extract (updated) from an article published in Proceedings of MEDICON 2010.



COMING EVENT

7th WACBE World Congress on Bioengineering 2015

6th-8th July 2015, Singapore

<http://www.wacbe2015.org>



Hosted by the Biomedical Engineering Society (Singapore), and the Department of Biomedical Engineering, National University of Singapore, the WACBE World Congress on Bioengineering 2015, will be held from 6th to 8th July 2015 in Singapore.

The World Association for Chinese Biomedical Engineers (WACBE) organises this World Congress biannually. The past congresses have brought together many biomedical engineers from over the world to share their experiences and views on the future development of biomedical engineering. The 7th WACBE World Congress on Bioengineering 2015 in Singapore will continue to offer such a networking platform for all biomedical engineers.

The Congress will cover all related areas in bioengineering and special symposia will be arranged. Apart from the scientific programme including invited plenary and keynote speeches, special symposia, free paper presentations and product exhibition, there will also be student activities and social events for accompanying spouses.

We look forward to welcoming you at WACBE 2015!

Savio Woo Distinguished Lecture Speake



Kam W. LEONG
Professor of Biomedical Engineering
Columbia University, USA

Plenary Speakers



Hsueh-Chia CHANG
Bayer Professor of Engineering
Director, Center for Microfluidics and
Medical Diagnostics
Department of Chemical and Biomolecular
Engineering
University of Notre Dame, USA



Guang-Zhong YANG
Director and Co-founder of the Hamlyn
Centre for Robotic Surgery
Deputy Chairman of the Institute of Global
Health Innovation
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Michael SHEETZ
Director, Mechanobiology Institute
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Dept of Biological Sciences, National
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Professor, Dept of Biological Sciences,
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Systems Medicine for the Delivery of Better Healthcare Services

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Aim and Scope

Medical and Biological Engineering and Computing cover complementary disciplines that hold great promise for the advancement of research and development in complex medical and biological systems. Research and development in these areas are impacting the science and technology by advancing fundamental concepts in translational medicine, by helping us understand human physiology and function at multiple levels, by improving tools and techniques for the detection, prevention and treatment of disease. Medicon 2016 provides a common platform for the cross fertilization of ideas, and to help shape knowledge and scientific achievements by bridging complementary disciplines into an interactive and attractive forum under the special theme of the conference that is Systems Medicine for the Delivery of Better Healthcare Services. Keeping this objective in mind, Medicon 2016 solicits original contributions in the following non-exclusive tracks.

Tracks

- T.1 Biomedical Signal Processing
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- T.3 Bioinstrumentation, Biosensors & Bio-Micro/ Nano Technologies
- T.4 Bioinformatics, Computational Biology and Systems Biology
- T.5 Biomechanics, Robotics and Rehabilitation
- T.6 Therapeutic and Diagnostic Systems, Devices and Technologies & Clinical Engineering
- T.7 Healthcare Information Systems & Telemedicine
- T.8 Technologies for Active Ageing & Wellbeing
- T.9 Biomedical Engineering Education & Society

Important Dates

- Proposals for workshops or special sessions: Aug 10, 2015
- Paper Submission: Sep 15, 2015
- Paper Notification: Nov 30, 2015
- Camera-ready paper: Dec 22, 2015

Paper Submission

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work. Papers should be submitted electronically (through Medicon 2016 web site) in PDF format and should conform to IFMBE Proceedings template (single-spaced, double-column, 10-point font size, 4 to 6 pages).

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Looking forward to meeting you in 2016.





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