



The **IEEE Engineering in Medicine and Biology Society** advances the application of engineering sciences and technology to medicine and biology, promotes the profession, and provides global leadership for the benefit of its members and humanity by disseminating knowledge, setting standards, fostering professional development, and recognizing excellence.

The field of interest of the IEEE Engineering in Medicine and Biology Society is the application of the concepts and methods of the physical and engineering sciences in biology and medicine. This covers a very broad spectrum ranging from formalized mathematical theory through experimental science and technological development to practical clinical applications. It includes support of scientific, technological and educational activities.

#### **PUBLICATIONS**

IEEE PULSE Magazine  
Transactions on Biomedical Engineering  
Transactions on Information Technology in Biomedicine  
Transactions on Neural Systems and Rehabilitation Engineering  
Transactions on Medical Imaging  
Transactions on NanoBioscience  
Transactions on Computational Biology and Bioinformatics  
Transactions on Biomedical Circuits and Systems  
Reviews on Biomedical Engineering

#### **ELECTRONIC PRODUCTS**

EMBS Electronic Resource

#### **CONFERENCES**

Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)  
IEEE EMBS Special Topic Conference on Neural Engineering (NER)  
International Symposium on Biomedical Imaging (ISBI)  
International Conference on Biomedical Robotics and Biomechatronics (BIOROB)  
International Conference on Rehabilitation Robotics (ICORR)

#### **SUMMER SCHOOLS Sponsored by EMBS**

International Summer School on Biomedical Imaging  
International Summer School on Biomedical Signal Processing  
International Summer School on Biocomplexity  
International Summer School on Information Technology in Biomedicine

**Engineering in Medicine and Biology Society**  
445 Hoes Lane, Piscataway, NJ USA 08854  
Telephone: +1 732 465 6460 Fax: +1 732 465 6435  
Email: [emb-exec@ieee.org](mailto:emb-exec@ieee.org) Website: [www.embs.org](http://www.embs.org)



**ENGINEERING IN MEDICINE AND BIOLOGY SOCIETY**



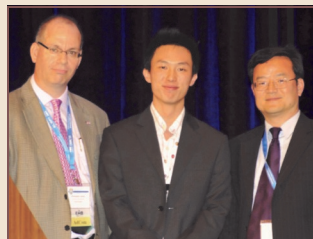
**1 SEPTEMBER 2010**

**BUENOS AIRES | ARGENTINA**



## STUDENT PAPER COMPETITION 2009 AWARD WINNERS

For outstanding student achievement on a level of international competition in the field of Biomedical Engineering. The three most outstanding student competitors at the Annual International Conference of the EMBS are recognized based on the quality and presentation of their research. The First, Second and Third Place winners receive \$300, \$200, and \$100 respectively.



### FIRST PLACE *PENG DU*

AUCKLAND BIOENGINEERING INSTITUTE  
NEW ZEALAND

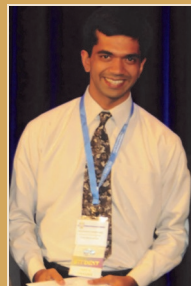
*Automated Detection  
of Gastric Slow Wave Events  
and Estimation of  
Propagation Velocity Vector  
Fields from Serosal  
High-Resolution Mapping*



### SECOND PLACE *MARCUS YIP*

MASSACHUSETTS INSTITUTE  
OF TECHNOLOGY  
USA

*A Flexible Pressure Monitoring  
System for Pressure Ulcer  
Prevention*



### THIRD PLACE

***SUBRAMANIAM VENKATRAMAN***  
UNIVERSITY OF CALIFORNIA BERKELEY  
USA

*Exploiting the 1/f Structure of Neural Signals for the  
Design of Integrated Neural Amplifiers*

***JUSTIN BAKER***  
UNIVERSITY OF UTAH  
USA

*Multi-Scale Recordings for Neuroprosthetic  
Control of Finger Movements*



2010

## Student Paper Competition

### GEOGRAPHIC FINALISTS

**ARASH A. FOMANI**  
**UNIVERSITY OF WATERLOO**  
**CANADA**

3D Microbes for Deep Brain Stimulation  
and Recording

NORTH AMERICA

**OLGAC ERGENEMAN**  
**SWISS FEDERAL INSTITUTE OF TECHNOLOGY**  
**ETH ZURICH**  
**SWITZERLAND**

Oxygen Sensing Using Microrobots

EUROPE

**JAVED FAIZAN**  
**UNIVERSITY OF NEW SOUTH WALES**  
**AUSTRALIA**

Linear Parameter Varying System Based Modeling  
of Hemodynamic Response to Profiled  
Hemodialysis

ASIA PACIFIC

**EDUARDO GIRALDO**  
**UNIVERSIDAD TECNOLÓGICA DE PEREIRA**  
**COLUMBIA**

Estimation of Dynamic Neural Activity Using a  
Kalman Filter Approach Based on Physiological  
Models

LATIN AMERICA



2010

## Student Paper Competition OPEN FINALISTS

**Marcos Bolanos**, Michigan State University, USA

*Graph Analysis of Neuronal Interactions for the Error-Related Negativity*

**Brian D'Alessandro**, New Jersey Institute of Technology, USA

*Multispectral Transillumination Imaging of Skin Lesions for Oxygenated and Deoxygenated Hemoglobin Measurement*

**Charmaine Demanuele**, University of Southampton, UK

*Slow Neuronal Oscillations in the Resting Brain vs Task Execution: A BSS Investigation of EEG Recordings*

**Justin Haldar**, University of Illinois, USA

*Label-Free High Resolution Imaging of Live Cells with Deconvolved Spatial Light Interference Microscopy*

**April Khademi**, University of Toronto, Canada

*Edge-Based Partial Volume Averaging Estimation for FLAIR MRI with White Matter Lesions*

**Roberto Fabio Leonarduzzi**, Universidad Nacional de Entre Rios, Argentina

*Wavelet Leader Based Multifractal Analysis of Heart Rate Variability During Myocardial Ischaemia*

**Wei Li**, Fraunhofer Institute for Biomedical Engineering, Germany

*On-Chip Integrated Lensless Microscopy Module for Optical Monitoring of Adherent Growing Mammalian Cells*

**Silvia Muceli**, Aalborg University, Denmark

*Multichannel Surface EMG Based Estimation of Bilateral Hand Kinematics During Movements At Multiple Degrees of Freedom*

**Abhishek Rege**, Johns Hopkins University, USA

*Imaging Microvascular Flow Characteristics Using Laser Speckle Contrast Imaging*

**Suvimol Sangkatumvong**, University of Southern California, USA

*Time-varying Analysis of Autonomic Control in Response to Spontaneous Sighs in Sickle Cell Anemia*

**Rina Zelmann**, McGill University, Canada

*Automatic Detector of High Frequency Oscillations for Human Recordings with Macroelectrodes*

## Best New Student Branch Chapter or Club Award

### INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR STUDENT CLUB

The EMB Student Club was started in April 2009 at the School of Medical Science & Technology, a constituent unit of IIT Kharagpur. The Club is supported by IEEE Kharagpur Section, and is an activity partner with the IEEE Student Branch of IIT Kharagpur.

Undergraduate and graduate students constitute the majority of the members of this club. Non-university students and institute staff can also join the club as members. Medical practitioners and researchers from networked institutions and research centers have also been granted membership on request.

The main goal is to create a sustainable synergy between students and researchers. The members of the Club have diverse educational backgrounds including engineering, technology, medicine and basic sciences. The Club aims at providing a unified platform for intellectual interchange of ideas, providing educational outreach to researchers in medical technologies, incorporating the value of networking, and creating awareness about IEEE and EMBS activities.

The activities of the club include Membership Promotion, Communications, Education, Professional Development, Community Service and Social Activities. Additionally, the club has initiated three programs: PEER (Peer to Peer Education in Engineering & Research), the Video Library, Women in Engineering (WIE).

PEER is a forum for interaction between active researchers working in the areas of interest to EMBS. This program has attracted participation of professionals and noted academicians from several institutions. The activities of PEER are organized through guest lectures and video conferencing. The Video Library program makes the workshops and guest lectures available online.

The Club organized a workshop on "Low Power Embedded Systems and its Medical Applications," which was attended by participants from several states of India. Along with the IEEE Student Branch of IIT Kharagpur, the EMB Club co-organized "Engineering the Future Day - IEEE 125 Years Celebrations" and a field trip to Interim Test Range (DRDO), Chandipur. The co-sponsorship was extended to the "Technology in Healthcare" Track and Plenary sessions at IEEE TechSym 2010, a flagship annual symposium of the IEEE Student Branch at IIT Kharagpur. In terms of community service, we organized a health camp and a book donation in collaboration with the Lions Club and SMST Society, IIT Kharagpur.

The Club has ceaselessly worked to achieve the vision and mission that led to its inception, and has shown exceptional qualities both for inclusive and exclusive growth within its initial year of operation.

### ExCom



CLUB CHAIR | SUBHAMOY MANDAL

### Workshop



### PEER Talk



### Website

[ewh.ieee.org/sb/kharagpur/iit/embs](http://ewh.ieee.org/sb/kharagpur/iit/embs)





# Outstanding Performance Award

STUDENT BRANCH CHAPTER OR CLUB

## Wake Forest University Student Club

The Wake Forest University EMBS student club, located in Winston-Salem, North Carolina, was founded in 2005 by just a handful of students. The club has since flourished and is growing every year. With 26 student members, the WFU-EMBS club is very active in the Winston-Salem community and partakes in numerous events, including

harvesting vegetables at a community garden, collecting canned goods, and participating in 5K runs to benefit the local Second Harvest food bank and Habitat for Humanity. This past spring, the club raised over \$450 to host a craft day at Brenner Children's Hospital. This was a successful event that was highly rewarding for the club and greatly appreciated by the children.

CLUB CHAIR | KAREN JOYCE



The club also organizes numerous student events throughout the year to promote the club. These include a new student welcome event in the fall, Halloween pumpkin carving, a Thanksgiving potluck, ice cream socials, and a social gathering during the department recruitment weekend. The WFU-EMBS club also hosts events to promote professional development, including IEEE Webinars and faculty talks from various departments of the university. Presentations at local high schools about current research activities further promotes engineering and the sciences in the community. Additionally, the club has strong ties to the local Winston-Salem IEEE chapter. Each month, student club members attend Winston-Salem IEEE chapter meetings, where professionals from the greater Winston-Salem area are invited to give presentations. Students also participate in these meetings by giving presentations related to their research. As more students begin to graduate, the WFU-EMBS has initiated an alumni relations program. This is

designed to promote networking between alumni and current students. In the coming years, the Wake Forest EMBS club looks forward to promoting professional development and interacting with each other and the community in fun, innovative ways. The club is looking forward to the upcoming academic year.

### Website

[ewh.ieee.org/sb/winston\\_salem/wfubmc](http://ewh.ieee.org/sb/winston_salem/wfubmc)



### PRIOR AWARDEES

2009: Univ of Connecticut Student Branch Chapter  
2008: Cairo University Student Branch Chapter  
2007: Bombay Student Branch Chapter at TSEC  
2006: Univ of Connecticut Student Branch Chapter  
2005: Student Branch Chapter at BUPT  
2004: North Dakota State University Student Club

## IEEE Transactions on Biomedical Engineering OUTSTANDING PAPER AWARD

### *Encoding Frequency Modulation to Improve Cochlear Implant Performance in Noise*

TBME, vol. 52, no. 1, pages 64-73, January 2005

### Authors

Kaibao Nie, Ginger S. Stickney, Fan-Gang Zeng

*Drs. Nie, Stickney and Zeng have shown a result of fundamental importance for the encoding of speech information for cochlear implant users. In particular they show that to hear well in noisy conditions, which is most of the time, it is greatly advantageous to use not only amplitude modulation, the classical approach, but also frequency modulation in determining how to stimulate via the cochlear implant electrodes. The authors report very substantial improvement in speech understanding with their strategy.*

*The authors' affiliation at the time of publication:  
University of California-Irvine, USA*

A monetary award of \$500 USD will be given each author group and individual certificates of merit will be given to each author.



# IEEE Transactions on Information Technology in Biomedicine

## OUTSTANDING PAPER AWARDS

### *Implementation of a Real-time Human Movement Classifier Using a Triaxial Accelerometer for Ambulatory Monitoring*

TITB, vol. 10, no. 1, pages 156-167, January 2006

#### Authors

Dean M. Karantonis, Michael Narayanan, Merryn J. Mathie,  
Nigel H. Lovell, and Branko G. Celler

*This paper presents the implementation of a real-time classification system for human movements based on a single, waist-mounted triaxial accelerometer unit. The major advance proposed by the system is to perform the vast majority of signal processing onboard the wearable unit using embedded intelligence, e.g., to distinguish between periods of activity and rest, recognize the postural orientation of the wearer, detect events such as walking and falls, and provide an estimation of metabolic energy expenditure.*

*The authors' affiliation at the time of publication:*  
University of New South Wales  
Sydney, Australia

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### *A Wearable Health Care System Based on Knitted Integrated Sensors*

TITB, vol. 9, no. 3, pages 337-344, September 2005

#### Authors

Rita Paradiso, Giannicola Loriga, and Nicola Taccini

*This paper presents a wearable and comfortable health monitoring system named WEALTHY. Developed based on fabric sensors, electrodes and connectors as well as advanced signal processing and modern telecommunication techniques, the system can simultaneously acquire several biomedical signals (i.e. electrocardiogram, respiration and activity) with quality comparable to a standard monitoring system.*

*The authors' affiliations at the time of publication:*  
MILIOR S.p.A. & SMARTEX s.r.l.  
Prato, Italy

A monetary award of \$500 USD will be given each author group and individual certificates of merit will be given to each author.



# IEEE Transactions on Neural Systems and Rehabilitation Engineering

## OUTSTANDING PAPER AWARDS

### *An Improved P300-Based Brain-Computer Interface*

TNSRE, vol. 13, no. 1, pages 89-98, March 2005

#### Authors

Hilit Serby, Elad Yom-Tov, and Gideon F. Inbar

*This paper is about a novel, high accuracy/high efficiency brain-computer interface system (5.45symbols/min transmission with accuracy of 92.1%) that can be useful in advancing current rehabilitation therapies, smart prosthetics etc. The technology described in this work exploits the so called P300 peak of event-related brain potentials (ERP) as a medium for communication.*

*The authors' affiliation at the time of publication:*  
Technion-Israel Institute of Technology  
Israel

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### *Patient-Cooperative Strategies for Robot-Aided Treadmill Training: First Experimental Results*

TNSRE, vol. 13, no. 3, pages 380-394, September 2005

#### Authors

Robert Riener, Lars Lunenburger, Saso Jezernik,  
Martin Anderschitz, Gery Colombo, and Volker Dietz

*This paper describes novel "patient-assistive" techniques to robot-aided rehabilitation of neurological disorders. The application of robotics and automation technology can serve to assist, enhance, evaluate, and document neurological and orthopedic rehabilitation. The described method enables the patient increased freedom of movement, help improves the patient contribution by visual feedback, while allowing the robot to adapt to the existing abilities of the patient.*

*The authors' affiliation at the time of publication:*  
Swiss Federal Institute of Technology  
Zurich, Switzerland

A monetary award of \$500 USD will be given each author group and individual certificates of merit will be given to each author.



## IEEE Fellows

CONGRATULATIONS TO THE 2010 ELECTED EMBS MEMBERS

**Raj Acharya**, The Penn State University, USA

*“for contributions to biomedical imaging and bioinformatics”*

**Dawant Benoit**, Vanderbilt University, USA

*“for contributions to biomedical image analysis and image guided medical interventions”*

**Theodore Berger**, University of Southern California, USA

*“for contributions to nonlinear systems modeling of neural tissue and development of neural prostheses”*

**Laurent Cohen**, CNRS, France

*“for contributions to computer vision technology for medical imaging”*

**Dominique Durand**, Case Western Reserve University, USA

*“for contributions to the understanding of electromagnetic fields of human neurology”*

**Long-Sheng Fan**, National Tsing Hua University, USA

*“for contributions to Micro Electro-Mechanical Systems”*

**Arthur Johnson**, University of Maryland, USA

*“for leadership in bioengineering education”*

**Takamaro Kikkawa**, Hiroshima University, Japan

*“for contributions to interconnect technologies for integrated circuits”*

**Andrew Laine**, Columbia University, USA

*“for contributions to wavelet applications in digital mammography, and ultrasound image analysis”*

**Tor Lande**, University of Oslo, Norway

*“for contributions to low-power subthreshold circuit design”*

**Rodolphe Sepulchre**, Université de Liège Institut Montefiore, Belgium

*“for contributions to nonlinear systems”*

**Jie Tian**, Chinese Academy of Sciences, China

*“for contributions to medical image processing, pattern recognition, and molecular imaging”*

**Steven Wright**, Texas A&M University, USA

*“for contributions to parallel magnetic resonance imaging methods and systems”*

2010 EMBS

## Technical Award

### *Xiaochuan Pan*

**“FOR SIGNIFICANT CONTRIBUTIONS  
TO MEDICAL IMAGING”**

**Dr. Xiaochuan Pan's** research interest centers on imaging science and its biomedical applications. He received his B.S. in Physics from Beijing University in 1982, M.S. in Physics from Institute of Physics and Graduate School of Academia Sinica in 1985, and M. S. and Ph.D. in Physics from The University of Chicago in 1988 and 1991, respectively. Dr. Pan is currently a full Professor with tenure in the Department of Radiology, Department of Radiation and Cellular Oncology, the College, the Committee on Medical Physics, and the Cancer Research Center at The University of Chicago. He has authored more than 300 journal and proceeding papers, and is a Fellow of AIMBE, IEEE, OSA, and SPIE. He has served, and is serving, as a chair, a regular member and/or grant reviewer for numerous funding agencies and foundations, including NIH and NSF, and is currently an Associate Editor for several leading journals in the field, including *IEEE Transactions on Medical Imaging*, *IEEE Transactions on Biomedical Engineering*, and *Physics in Medicine & Biology*. Dr. Pan has served, and is serving, as conference program chair, theme chair, session chair, and technical or scientific committee member for international conferences such as Conferences of IEEE Biomedical Engineering, IEEE Medical Imaging, RSNA, and AAPM.



**Dr. Pan was nominated for  
the award by  
Dr. Atam Dhawan, NJIT**



## Technical Award

### *Kenji Sunagawa*

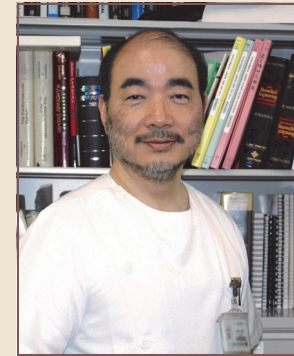
**“FOR SIGNIFICANT CONTRIBUTIONS TO  
CARDIOVASCULAR ENGINEERING”**

**Dr. Kenji Sunagawa** received his M.D. and Ph.D. from the Kyushu University, Fukuoka, Japan. He joined the Department of Biomedical Engineering and Division of Cardiology at Johns Hopkins in 1978 and promoted to the faculty in 1980. He joined the Division of Cardiovascular Medicine at Kyushu University in 1983. From 1990 to 2004, he chaired the Department of Cardiovascular Dynamics and directed the Division of Cardiology at the National Cardiovascular Center in Osaka. Since 2004, he has been the Chief of Cardiovascular Medicine at the Kyushu University Hospital. He also serves as the Chairman and Professor of Research Institute of Angiocardiology at the Graduate School of Medical Sciences, and Dean of Digital Medicine Initiative at the Kyushu University.

Dr. Sunagawa has made major research contributions to cardiovascular medicine. In the early 80s, he demonstrated that ventricular elastance is remarkably insensitive to loading conditions, and established the concept of ventricular-arterial coupling. Ventricular elastance and ventricular-arterial coupling have become classic concepts and are now taught at medical schools worldwide.

Dr. Sunagawa has extensively applied engineering principles to the quantitative analysis of cardiovascular regulation. Those quantitative analyses led him to the development of bionic cardiology. In the body every cell, tissue, organ, or system operates coherently, and this requires a well-developed neuro-humoral communication infrastructure. Hence if we could implement similar mechanisms into artificial devices, they would function more like parts of native physiological systems. Dr. Sunagawa calls such devices *bionic systems*. He developed a neurally regulated artificial pacemaker in 1996. The success of the bionic pacemaker led him to develop an artificial bionic baroreflex system in 1999. Following those investigations, Dr. Sunagawa applied the bionic technology in treating heart failure. Instead of letting the brainstem control the heart, he implanted a small device attached to the cardiac vagal nerve to control the autonomic tone of the heart. The bionic treatment markedly improved survival. Bionic treatment will inspire more intricate applications in the 21st century.

Because of these contributions, Dr. Sunagawa received major awards including the Paul Dudley White Lectureship Award, one of the most prestigious Award of American Heart Association, in 2000 and the Isaac Starr Lectureship Award of the Cardiovascular System Dynamics Society in 2000. He has been a fellow of Japanese College of Cardiology, American Heart Association, American College of Cardiology and European Society of Cardiology. He is President of Cardiovascular System Dynamic Society since 2006. He is a member of board of directors of Japanese Society of Medical and Biological Engineering and The Japanese Society of Internal Medicine. He is also a senior member of IEEE, and has been serving as a member of AdCom of Engineering in Medicine and Biology Society since 2005.



**Dr. Sunagawa was nominated  
for the award by  
Dr. Atam Dhawan, NJIT**

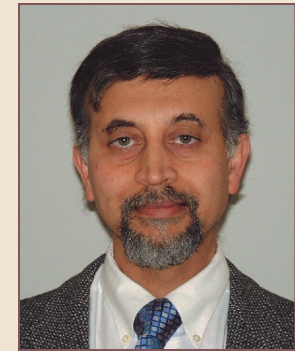
## Technical Award

### *Nitish V. Thakor*

**“FOR SIGNIFICANT CONTRIBUTIONS TO  
NEUROENGINEERING”**

**Dr. Nitish V. Thakor** is a Professor of Biomedical Engineering, Electrical and Computer Engineering, and Neurology at Johns Hopkins University. He currently he directs the Laboratory for Neuroengineering at Johns Hopkins University, School of Medicine. He has established and managed the Laboratory for Medical Instrumentation and Neuroengineering at the Johns Hopkins School of Medicine with the aim of carrying out interdisciplinary and collaborative engineering research for basic and clinical neurosciences. His technical expertise is in the areas of neural diagnostic instrumentation, neural signal processing, optical and MRI imaging of the nervous system, micro and nanoprobes for neural sensing, brain computer interface and neural prosthesis. He carries out research on hypoxic-ischemic brain injury and traumatic brain injury in basic experimental models and also directs collaborative technology development programs on monitoring patients with brain injury in neurocritical care settings and the development of next generation neurally controlled upper limb prosthesis. His research is currently funded by the NIH, NSF and DARPA and other sources. He has published 190 refereed journal papers, edited one book, and generated 6 patents. Dr. Thakor also actively participates in translational activities having co-founded 3 medical device companies.

He is the Editor in Chief of *IEEE Transactions on Neural and Rehabilitation Engineering*. He is the Director of a Neuroengineering Training program funded by the National Institute of Biomedical Imaging and Bioengineering, a multi-disciplinary and collaborative training program for doctoral students. He has supervised more than 50 graduate students and as many post doctoral fellows and research faculty over more than two decades and placed them at major academic and industrial positions internationally. He has organized and chaired dozens of special conferences, workshops and theme and symposia and national and international conferences, given more than 25 keynote or plenary talks, and has been invited to participate in or chair workshops and vision/strategic planning meetings by NIH, NSF and DARPA. Dr. Thakor is a recipient of a Research Career Development Award from the National Institutes of Health and a Presidential Young Investigator Award from the National Science Foundation, and is a Fellow of the American Institute of Medical and Biological Engineering, IEEE and Founding Fellow of the Biomedical Engineering Society. He is also a recipient of the Centennial Medal from the University of Wisconsin School of Engineering and a Distinguished Alumnus Award from Indian Institute of Technology, Bombay, India. He is an Honorary Member of the Alpha Eta Mu Beta Biomedical Engineering student Honor Society.



**Dr. Thakor was nominated for  
the award by  
Dr. Shanbao Tong,  
Shanghai Jiao Tong  
University**

## Early Career Achievement Award *Dario Farina*



**Dr. Dario Farina** (M'01–SM'09) received the M.Sc. degree in Electronics Engineering from Politecnico di Torino, Turin, Italy, in 1998, and Ph.D. degrees in Automatic Control and Computer Science in 2001 and in Electronics and Communications Engineering in 2002 from the Ecole Centrale de Nantes, Nantes, France, and Politecnico di Torino. From 2002 to 2004, he was a Research Assistant Professor at Politecnico di Torino. From 2004 to 2008, he was an Associate Professor of Biomedical Engineering at Aalborg University, Aalborg, Denmark, where since 2008, he has been a Full Professor of Motor Control and Biomedical Signal Processing and the Head of the Neural Engineering and Neurophysiology of Movement Research Group.

He is a member of the Editorial Boards of the *Journal of Neuroscience Methods* and the *Journal of Electromyography and Kinesiology*. He is an Associate Editor of *IEEE Transactions on Biomedical Engineering* and an Associate Editor of *Medical & Biological Engineering & Computing*.

His current research interests include signal processing applied to biomedical signals, electrophysiology, modeling of biological systems, neural control of movement, neurorehabilitation engineering, and brain–computer interfaces. In these areas he has authored or coauthored more than 190 papers in peer-reviewed journals and more than 200 among conference papers/abstracts, book chapters and encyclopedia contributions. Prof. Farina is the Vice-President of the International Society of Electrophysiology and Kinesiology (ISEK).

Dr. Farina was nominated for the award by  
**Dr. Sergio Cerutti,**  
Politecnico di Milano

**“FOR OUTSTANDING CONTRIBUTIONS IN BIOMEDICAL SIGNAL PROCESSING AND ELECTROPHYSIOLOGY WITH FUNDAMENTAL APPLICATIONS IN THE STUDY OF NEURAL CONTROL OF MOVEMENT AND IN MOTOR REHABILITATION”**

### PRIOR AWARDEES

2009: *Silvestro Micera*  
2008: *Ali Khademhosseini*  
2007: *Tejal Desai*  
2006: *Alejandro Frangi*  
2005: *Stephen Boppert*  
2004: *Susan Hagness*  
2003: *Paolo Vicini*  
2002: *Dorin Panescu*  
2001: *David Beebe*  
2000: *James Collins*  
1999: *Zhi-Pei Liang*  
1997: *Metin Akay*  
1996: *Joan E. Sanders*  
1995: *Atam P. Dhawan*  
1993: *Rory A. Cooper*  
1992: *Yitzhak Mendelson*  
1991: *Blake Hannaford*  
1990: *Janie M. Fouke*  
1988: *Yongmin Kim*  
1986: *George V. Kondraske*  
1985: *K. Kirk Shung*

## Distinguished Service Award *Yongmin Kim*



**Dr. Yongmin Kim**, after receiving his Ph.D. degree from the University of Wisconsin, joined the University of Washington as a faculty member in 1982. From 1999 to 2007, he was Professor and Chair of Bioengineering. Currently, he is Professor of Bioengineering, Professor of Electrical Engineering, and Adjunct Professor of Radiology and Computer Science and Engineering. From 2004 to 2007, he was Hunter and Dorothy Simpson Endowed Chair in Bioengineering.

His research interests include medical imaging and computing, ultrasound systems, distributed diagnosis and home healthcare, and computer architecture. Dr. Kim and his research group have made 85 inventions that have led to more than 60 patents, transferred the invented technologies to industry with 27 licenses, and helped commercialization of these technologies. He has more than 450 research publications.

He has served on Steering Committee of *IEEE Transactions on Medical Imaging* for 10+ years. He has been member of the Editorial Board of Proceedings of the IEEE, IEEE TBME, IEEE TITB, IEEE Press series, and Annual Reviews of Biomedical Engineering. He was awarded the 1988 Early Career Achievement Award of IEEE/EMBS (Engineering in Medicine and Biology Society) and 2003 Ho-Am Prize in Engineering. In 2005, he received Distinguished Achievement Award from University of Wisconsin.

He was Program Chairman of 1989 IEEE EMBS Conference and Chair of SPIE Medical Imaging Image Display Conference from 1990 to 1999. He was Symposium Chair of SPIE Medical Imaging from 1998 to 2001. He was Conference Co-Chair of 2009 IEEE EMBS Conference in Minneapolis. He has been consultant to Texas Instruments, Intel, MITRE, Siemens, Hitachi, Fujitsu, Canon, Samsung, and many other organizations. He has been member of the External Advisory Board for Cleveland Clinic Foundation, University of Wisconsin, University of Utah, University of Florida, POSTECH and KAIST. He has been IEEE/EMBS distinguished lecturer and Chair of Distinguished Lecturer Committee in 1997–1998 and Awards Committee in 2001–2002. From 1992 to 2006, he was ABET program evaluator for computer engineering and bioengineering. He served on IEEE Fellow Committee from 1998 to 2001. He was Chair of IEEE/EMBS Fellows Committee. He served on IEEE Awards Board and IEEE TAB Periodicals Committee. He served on IEEE/EMBS Administrative Committee for many years. He was President of IEEE/EMBS in 2005 and 2006.

Dr. Kim is Fellow of IEEE, American Institute for Medical and Biological Engineering, and International Academy for Medical and Biological Engineering.

Dr. Kim was nominated for the award by  
**Dr. Bin He,**  
University of Minnesota

**“FOR OUTSTANDING CONTRIBUTIONS TO BIOMEDICAL ENGINEERING EDUCATION, THE PROFESSION, AND FOR DISTINGUISHED SERVICE AND LEADERSHIP TO THE EMB SOCIETY”**

### PRIOR AWARDEES

2009: *John W. Clark Jr.*  
2008: *Henrietta Galiana*  
2007: *Nathalie Gosset*  
2006: *Yuan-Ting Zhang*  
2005: *Jose Principe*  
2004: *John Enderle*  
2003: *Christian Roux*  
2002: *Swamy Laxminarayan*  
2001: *Metin Akay*  
2000: *Jack Iverson*  
1999: *Jean-Louis Coatrieux*  
1998: *Susan M. Blanchard*  
1996: *Michael R. Neuman*  
1995: *Charles Robinson*  
1994: *Barry Feinberg*  
1993: *Eli Fromme*  
1992: *Swamy Laxminarayan*  
1990: *Alvin Wald*  
1983: *Eli Fromme*





2010 EMBS

## Professional Career Achievement Award

### *Mark Kroll*

**Dr. Mark Kroll** began his biomedical career as a student research aide at Medtronic at age 18 in 1970. He retired from full time work in 2005 as Chief Technology Officer and Senior VP from St. Jude Medical, Inc.'s main division, which is the second largest manufacturer of cardiac rhythm management products. St. Jude was twice named as a "Top 50" performing large company by BusinessWeek during his tenure. Dr. Kroll now sits on three public and seven private boards. In addition, he holds the academic appointments of Adjunct Professor of Biomedical Engineering, California Polytechnic University and Adjunct Professor of Biomedical Engineering, University of Minnesota.

Dr. Kroll earned his B.S. in Mathematics and M.S. and Ph.D. in Electrical Engineering from the University of Minnesota. Later he received an M.B.A. from the University of St. Thomas. His research specialty is the effects of electricity on the human body and he is the discoverer of the "burping" effect explaining biphasic defibrillation waveforms. Dr. Kroll holds over 300 issued U.S. patents and has been honored by U.S. Patent and Trademark Office as prolific inventor. He is the most prolific inventor of medical devices in the world. All ICDs sold have at least one licensed Kroll patent. Over 1 million human beings have his patents in their bodies.

Dr. Kroll is a Senior member of IEEE and has been listed in Who's Who In Science And Engineering since 1992. Unusual for a nonphysician, he was awarded "Fellow" recognition by the American College of Cardiology. Dr. Kroll is also a fellow of the Heart Rhythm Society and the co-author of four books: Implantable-Cardioverter Defibrillator Therapy; Cardiac Bioelectric Therapy; TASER® Conducted Electrical Weapons; Physiology, Pathology and Law; and Electrical Injuries: Medical and Bioengineering Aspects.

Dr. Kroll has lectured in over 30 countries on topics including defibrillation, invention process, electrical safety, and medical device startups.

#### PRIOR AWARDEE

2009: Dorin Panescu

Dr. Kroll was nominated for the award by  
Dr. Dorin Panescu,  
NewCardio, Inc.

"FOR HARNESSING THE  
POWER OF THE CHARGE  
'BURPING EFFECT' INTO THE  
DESIGN OF BIPHASIC  
DEFIBRILLATION  
WAVEFORMS AND  
EXTENSIVE CONTRIBUTIONS  
TO THE CLINICAL SUCCESS  
OF DEFIBRILLATORS"



2010 EMBS

## Academic Career Achievement Award

### *Robert S. Langer*

**Dr. Robert S. Langer** is the David H. Koch Institute Professor (there are 14 Institute Professors at MIT; being an Institute Professor is the highest honor that can be awarded to a faculty member). Dr. Langer has written approximately 1,050 articles. He also has approximately 750 issued and pending patents worldwide. Dr. Langer's patents have been licensed or sub-licensed to over 220 pharmaceutical, chemical, biotechnology and medical device companies. He is the most cited engineer in history.

He served as a member of the United States Food and Drug Administration's SCIENCE Board, the FDA's highest advisory board, from 1995 -- 2002 and as its Chairman from 1999-2002. Dr. Langer has received over 180 major awards including the 2006 United States National Medal of Science; the Charles Stark Draper Prize, considered the equivalent of the Nobel Prize for engineers and the 2008 Millennium Prize, the world's largest technology prize. He is also the only engineer to receive the Gairdner Foundation International Award; 72 recipients of this award have subsequently received a Nobel Prize. Among numerous other awards Langer has received are the Dickson Prize for Science (2002), Heinz Award for Technology, Economy and Employment (2003), the Harvey Prize (2003), the John Fritz Award (2003) (given previously to inventors such as Thomas Edison and Orville Wright), the General Motors Kettering Prize for Cancer Research (2004), the Dan David Prize in Materials Science (2005), the Albany Medical Center Prize in Medicine and Biomedical Research (2005), the largest prize in the U.S. for medical research, induction into the National Inventors Hall of Fame (2006), the Max Planck Research Award (2008) and the Prince of Asturias Award for Technical and Scientific Research (2008). In 1998, he received the Lemelson-MIT prize, the world's largest prize for invention for being "one of history's most prolific inventors in medicine." In 1989 Dr. Langer was elected to the Institute of Medicine of the National Academy of Sciences, and in 1992 he was elected to both the National Academy of Engineering and to the National Academy of Sciences. He is one of very few people ever elected to all three United States National Academies and the youngest in history (at age 43) to ever receive this distinction.

Forbes Magazine (1999) and Bio World (1990) have named Dr. Langer as one of the 25 most important individuals in biotechnology in the world. Discover Magazine (2002) named him as one of the 20 most important people in this area. Forbes Magazine (2002) selected Dr. Langer as one of the 15 innovators world wide who will reinvent our future. Time Magazine and CNN (2001) named Dr. Langer as one of the 100 most important people in America and one of the 18 top people in science or medicine in America (America's Best). Parade Magazine (2004) selected Dr. Langer as one of 6 "Heroes whose research may save your life." He received his Bachelor's Degree from Cornell University in 1970 and his Sc.D. from the Massachusetts Institute of Technology in 1974, both in Chemical Engineering.



Dr. Langer was nominated for the award by  
Dr. Ali Khademhosseini,  
MIT

"FOR OUTSTANDING  
LEADERSHIP IN TISSUE  
ENGINEERING, DRUG  
DELIVERY, BIOMATERIALS,  
AND MICRO- AND  
NANOTECHNOLOGIES FOR  
REGENERATIVE MEDICINE"

#### PRIOR AWARDEES

2009: Sergio Cerutti  
2008: Roger Barr  
2007: Jose Principe  
2006: Jean-Louis Coatrieux  
2005: Ewart Carson  
2004: Michael R. Neuman  
2003: Ante Santic  
2002: Willis J. Tompkins  
2001: John G. Webster  
2000: Max Schaldach  
1999: Fernand A. Roberge  
1997: J. Lawrence Katz  
1996: Max E. Valentinuzzi  
1995: Floyd Dunn  
1994: Wilson Greatbatch  
1993: John M. Reid  
1992: Edwin L. Carstensen  
1991: Walter Welkowitz  
1990: Richard J. Johns  
1988: R. Stuart Mackay  
1987: Otto Schmitt  
1986: Leslie A. Geddes  
1985: David B. Geselowitz





## CHAPTER AWARD DESCRIPTIONS

### OUTSTANDING CHAPTER AWARD

Presented annually to an EMBS Chapter who demonstrates achievement in member development and delivering services to members of an EMBS chapter during the previous calendar year. Achievement is based on activities, community outreach and promotion of EMB (website and newsletters). The award recipient receives an Honorarium of \$1,000 USD and travel reimbursement of up to \$1,000 USD for a Chapter representative to attend the EMBC awards dinner.

### BEST NEW CHAPTER AWARD

Presented annually to a new EMBS Chapter (within the first 12 months of Chapter formation) who demonstrates outstanding activities, community outreach and promotion of EMB (website and newsletters). The award recipient receives an Honorarium of \$500 USD and travel reimbursement of up to \$1,000 USD for a Chapter representative to attend the EMBC awards dinner.

### OUTSTANDING PERFORMANCE AWARD FOR STUDENT BRANCH CHAPTER OR CLUB

Presented annually to an EMBS Student Branch Chapter or Club who demonstrates achievement in promoting student interest and involvement in biomedical engineering during the previous calendar year. Achievement is based on activities demonstrating initiative; innovation and creativity; areas of progress and improvement; significant impact in biomedical engineering education; and contributions to the profession. The award recipient receives an Honorarium of \$500 USD and travel reimbursement of up to \$1,000 USD for a Chapter/Club representative to attend the EMBC awards dinner.

### BEST NEW STUDENT BRANCH CHAPTER OR CLUB AWARD

Presented annually to an presented annually to a new EMBS Student Branch Chapter or Club (within the first 12 months of formation) who demonstrates activities demonstrating initiative, innovation, and creativity; areas of progress and improvement; significant impact in biomedical engineering education; and contributions to the profession. The award recipient receives an Honorarium of \$300 USD and travel reimbursement of up to \$1,000 USD for a Chapter/Club representative to attend the



## ACHIEVEMENT AWARD DESCRIPTIONS

### EARLY CAREER ACHIEVEMENT AWARD

Presented annually to an individual who has made significant contributions, technologically or theoretically, to the field of Biomedical Engineering within ten years of completion of his or her highest degree. These contributions must represent meritorious achievement, exemplary technical contribution, or educational contribution to the field as evidenced by innovative research, design, product development, patents or publications. The award recipient receives an Honorarium of \$1,000 USD and travel reimbursement of up to \$1,500 USD to attend the EMBC awards dinner.

### DISTINGUISHED SERVICE AWARD

Presented annually to individuals who have made significant service contributions to the EMB Society. These contributions must represent uncommon dedication, and a record of exemplary service to the EMB society. The work cited could have appeared in the form of service as an EMBS Officer, AdCom member, editor, associate editor or society member. The award recipient receives an Honorarium of \$1,000 USD and travel reimbursement of up to \$1,500 USD to attend the EMBC awards dinner.

### ACADEMIC AND PROFESSIONAL CAREER ACHIEVEMENT AWARDS

Each presented annually to an individual who has made significant contributions through a distinguished career of twenty years or more in the field of Biomedical Engineering, as an educator, researcher, developer or administrator. These contributions must represent meritorious achievement and exemplary technical, educational, or administrative accomplishments in the field. Any past or present member of the IEEE and EMBS who has not been a voting member of AdCom in the past two years is eligible. The award recipients each receive an Honorarium of \$2,500 USD and travel reimbursement of up to \$1,500 USD to attend the EMBC awards dinner.

### TECHNICAL AWARD

Recognizes outstanding achievements, contributions, or innovations in any area of bioengineering by an individual or group of individuals. Up to five awards will be selected each year. The awards will be presented at the Awards Ceremony held during the Annual Conference of IEEE EMBS. Each winner will receive a plaque, an honorarium of \$1,500 and up to \$1,500 in travel expenses to attend the EMBC awards dinner.

### WILLIAM J. MORLOCK AWARD

Established in 1960 by the family of William J. Morlock to give recognition to a qualified person with an original contribution involving important application of electronics techniques and concepts to the solution of biomedical problems. The award has not been presented since 1980; however, 2009 marks the first year of new award recipients. The award recipient receives an Honorarium of \$3,000 USD and travel reimbursement of up to \$2,000 USD to attend the EMBC awards dinner.