The Inaugural Meeting of the EMBS International Conference on BHI Meets in China

By Cecilia Chan and Carmen C.Y. Poon

On 5–7 January, more than 420 world leaders and attendees representing approximately 40 countries/regions from academia, industry, and government gathered for the inauguration meeting of the IEEE Engineering in Medicine and Biology Society (EMBS) International Conference on Biomedical and Health Informatics (BHI) in the Shenzhen Convention and Exhibition Center, Shenzhen, China. Health informatics has been listed by the U.S. National Academy of Engineering as one of the 14 grand challenges for engineering of the 21st century, and BHI is a new special topic conference recently launched by the EMBS in this area. The conference, BHI, is named in conjunction with an EMBS flagship transaction, of which the title will soon be changed from *IEEE Transactions on Information Technology in Biomedicine* to *IEEE Journal of Biomedical and Health Informatics*, beginning in 2013.

Global Grand Challenge on Health Informatics

The BHI conference opened with a keynote lecture, "Development of Medical Devices: China's Perspective," given by Director General Xian-En Zhang of the Department of Basic Research, Ministry of Science and Technology of China (Figure 1). Zhang discussed the growing need, progress, and development of medical devices in China. He described the medical device industry as an "innovation-driven, interdisciplinary, and global competitive emerging strategic industry." Zhang pointed out that China, with a population of 1.37 billion, is the world's third largest medical device market after the United States and Europe, and "such demands are giving the researchers opportunities and challenges."

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Next, Prof. Bruce Wheeler of the Department of Biomedical Engineering at the University of Florida and president-elect of EMBS, in his keynote speech titled "Grand Challenge in Neural Engineering: Can We Forward Engineer a Living Brain?" shared his insights in the development of neuroengineering. Prof. Wheeler proposed the concept of forward engineering of the brain, which is "the design and construction of ever more complex living neural circuits that emulate brain function."

Prof. Cheuk-Man Yu, chair of the Department of Medicine and Therapeutics at the Chinese University of Hong Kong and a world-renowned cardiologist presented "How Technological Advancement Can Bridge Between Research and Clinical Cardiology." He discussed the pathology of heart failure and the clinical development of cardiac resynchronization therapy.

The fourth keynote lecture, "Cardiovascular Magnetic Resonance Imaging: From Morphology to Function," given by Prof. Guang-Zhong Yang, fellow of the Royal Academy of Engineering, director and founder of the Royal Society/Wolfson Medical Image Computing Laboratory of the Imperial College London, discussed the challenges and potential of cardiovascular imaging with high resolution in both time and space domains. "The future of cardiovascular magnetic resonance (MR) imaging is directed toward more targeted imaging and functional mapping, driven by the parallel development of molecular MR imaging of angiogenesis," he said.

The first day ended with a panel discussion on "Challenges of Health Informatics" led by Prof. Paolo Bonato (Harvard Medical School and Harvard-MIT Division of Health Sciences and Technology) and Prof. Shuming Nie (Emory University School of Medicine and Georgia Institute of Technology), joined by Prof. Ratko Magjarevic (University of Zagreb and president-elect of the International Federation for Medical and Biological Engineering), Prof. Atam P. Dhawan (New Jersey Institute of Technology), Prof. Toshiyo Tamura (Chiba University), and other keynote speakers (Figure 2). Prof. Dhawan provided insights on the future trends of engineering and biomedical sciences in medicine. He mentioned that the development of health informatics and point-of-care health-care technologies could eventually lead to personalized medicine. Then, Prof. Tamura addressed the health informatics strategies in Japan and illustrated the challenges in implementing health informatics into the public health system. These challenges include the maintenance of the law, social insurance system, and infrastructure.

FIGURE 1 Keynote speaker, Director General Xian-En Zhang (Basic Research Department at the Ministry of Science and Technology of China) gives his address on "Development of Medical Devices: China's Perspective."

The next two days of the conference were filled by oral and poster presentations on a variety of topics: "Wearable Sensors and Systems," "Body Sensor Networks," "Fall, Activity, and Posture Monitoring," "Assisted Living Technology and Smart Homes," "Brain Computer Interfaces," "Neuroinformatics," "Advances in Blood Pressure, Blood Flow Velocity Measurement, and Cardiopulmonary Research," "Cardiovascular Imaging and Modeling," "Image Segmentation, Registration, and Classification," "Real-Time Imaging, Image Processing, and Image Transmission," "Image Formation and Information Extraction," "Clinical Decision Support Systems," and "eHealth Systems."

This year's conference included a number of special sessions: "Round Table Discussion on Cardiovascular Health Informatics: Myocardial Infraction and Stroke Screen and Intervention Amongst Nations (MISSIoN)," chaired by Prof. Y.T. Zhang, and "Meet the IEEE-EMBS Editors" chaired by Prof. Andrew Laine. For the

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FIGURE 2 Panel discussion on "Challenges of Health Informatics." From left: Prof. Paolo Bonato, Prof. Atam P. Dhawan, Prof. Ratko Magjarevic, Prof. Toshiyo Tamura, Prof. Bruce Wheeler, Prof. Guang-Zhong Yang, and Prof. Shuming Nie.

special session on MISSIoN, medical experts Prof. Cheuk-Man Yu and Prof. Ru-Tai Hui (Beijing Fuwai Hospital) discussed the causes of the raising prevalence of cardiovascular diseases, and Prof. Milan Sonka discussed the advancement of ultrasound in vascular imaging for a more accurate diagnosis of cardiovascular diseases. Moreover, in the "Meet the IEEE-EMBS Editors" session, Prof. Andrew Laine discussed the plagiarism policy of EMBS, and Prof. Bruce Wheeler discussed the techniques for writing and presenting a scientific paper (Figure 3). In addition, as part of the BHI program, a preconference workshop on cardiovascular health informatics was held at the Chinese University of Hong Kong from 2 to 5 January, where local and international speakers including Prof. Michael R. Neuman from the Michigan Technological University delivered talks to more than 50 students and junior faculties of various background. Prof. Neuman's talk was on "Information for Informatics: Cardiac Biophysical Monitoring."

FIGURE 3 EMBS president and vice president with EMBS editor-in-chiefs (EiCs). From left: Michael R. Neuman (*IEEE Pulse*), Yuan-Ting Zhang (*IEEE Transactions on Information Technology in Biomedicine*), Michael P. Hughes (*IEEE Transactions on NanoBioscience*), Milan Sonka (*IEEE Transactions on Medical Imaging*), Robert J. Butera (past deputy EiC, *IEEE Transactions on Biomedical Circuits and Systems*), Bruce C. Wheeler (*IEEE Transactions on Biomedical Engineering*), Andrew Laine (vice president of EMBS publications), Metin Akay (*Biomedical Engineering Book Series*), Atam P. Dhawan (*IEEE Transactions on Biomedical Engineering Letters*), and Zhi-Pei Liang (EMBS president).

The grand challenges discussed during the BHI conference were exciting and encouraging, as new technological advances were reported, revealing the rapid development of the field. The conference provided an assessment of

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FIGURE 4 Attendees of the BHI conference in the Shenzhen Convention and Exhibition Center, Shenzhen, China.

the current state of research in the emerging interdisciplinary field of health informatics, showcasing several leading breakthroughs, and hosted profound panel discussions on articulating grand challenges and a path to progress toward these challenges (Figure 4). The photo of BHI 2012 in the Shenzhen Convention and Exhibition Center, Shenzhen, China, is shown in the opening art of this article. (Some of the conference attendees, including a number of invited speakers and the technical programme cochair, Prof. Carmen C.Y. Poon, are not photographed.)

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