

# MediTec 2016

## Combining doctors, engineers and computer scientists for better healthcare

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Long gone are the days when the healthcare sector of a country was solely managed by the medical practitioners. The requirements of a progressive world demand for technology and engineering to work in alliance within the medical precinct.

Recognising the need for this practice, the first International Conference on Medical Engineering, Health Informatics and Technology (MediTec 2016) – themed "Smart Systems for Healthcare" – was held at the School of Science and Engineering of United International University (UIU) on December 17-18, 2016. Prof. Dr. Abul Kalam Azad, Director General, Directorate General of Health Services was the chief guest and Prof. Dr. M. Rezwan Khan, Vice Chancellor of UIU was the chairperson of the opening ceremony. Dr. M. Anwar Ullah, Director and Joint Secretary, National Disabled Development Foundation under the Ministry of Social Welfare and Dr. AE Mohiuddin Osmani, Joint Chief, Health and Family Welfare Ministry were the special guests. Among others present at the opening ceremony was Prof. Dr. Chowdhury Mofizur Rahman, Pro-Vice Chancellor, UIU.

Prof. Dr. Abul Kalam Azad in his opening address emphasised on the importance of such a conference to reduce the gap between medical and engineering fields, strengthen multidisciplinary biomedical engineering research and help disseminate real life applications to improve healthcare and disabilities in Bangladesh. Dr. Azad also added that the expansion and evolution of a patient-doctor relationship could be stimulated by the proper usage of data collection. He reminded the guests how everyone has access to that one tool which could be manipulated for gathering information and data: the cell phone. A mobile app could channel emergency health-related information, or could be used to take a certain test, the results of which would be delivered to the doctor instantly.

He said "biomedical engineering and ICT – in health and

disabilities – have been a revelation in recent years in Bangladesh," as the accumulated contributions from students, professors and researchers have made people more aware and inquisitive simultaneously. He believed that the theories the conference will produce will go on to be effective for the real world as well.

The Vice Chancellor, Prof. M. Rezwan Khan, humbly highlighted UIU's constant efforts to conduct such educational programmes which he believed would benefit all. He was hopeful that the upshot of such conferences will catalyse the metabolism of related researches which is gradually gaining momentum.

The VC hoped that the healthcare sector of Bangladesh will experience a new frontier of growth and innovation from the dissemination and sharing of bright research ideas at MediTec 2016.

Dr. M. Anwar Ullah, Director of National Disabled Development Foundation, focused on the availability and economics of medical equipments and stressed on the need for modern and efficient apparatus. He added that a digital Bangladesh will need to incorporate developments in this sector as well.

With a view to contributing to the establishment of biomedical engineering for improving healthcare solutions, the Department of EEE had established Biomedical, IMage and Signals (BIMS) Research Group. The group is directed by Prof. Khawza I. Ahmed. The research focus includes "Brain Computer Interface", "ECG-PPG Based Health Monitoring for Major Depressive Disorder (MDD) Patients" and "Heart Rate Variability (HRV) Analysis on Diabetes Patients". As a result, BIMS Group has published eleven papers in international journals and conferences. The group is also maintaining international collaborations with universities and healthcare providers from Australia, Greece and UAE.

For a debutant conference, MediTec generated an overwhelming response as confirmed by technical chairs; an impressive 103 research papers were submitted – all of which were sent to the technical reviewing committee. Out of those,

40 papers were selected and all of the selected participants were asked to present their papers throughout the two-day event. These selected papers would also be published in the IEEE Digital Library.

The selected papers went through further meticulous scrutiny in order for the selection of the best papers among



Authors of winning research papers with distinguished guests at the closing ceremony

which the position of the IEEE EMBS Bangladesh Chapter Best Paper Award was shared by two teams. The respective papers are: "An Improved Algorithm for Sorting Chromosomes by Inverted Block-interchanges Based on Permutation Group", which was produced by Afrida Tabassum, Wali Mohammad Abdullah, Najia Manjur, Rehnuma Islam, Ashfaque Ahmed, Shourav Imtiaz Morshed, Rizia Iqbal Tinni, Kazi Lutful Kabir and Muhammad Nazrul Islam, along with, "An Application of Wavelet-based Maximum Entropy on the Mean in Channel

Optimization for BCI", the writers of which were Md. Shakhawat Hossain, Simanto Saha, Md. Ahsan Habib, Abdullah Al Noman, Takia Sharuddin and Khawza Ahmed. The two teams shared prizemoney worth BDT 10,000.

The first paper proposes a unique way of identifying the transformational sequence undertaken by genomes while the



latter adopts a new method to improve the Brain Computer Interface (BCI) system.

The team with the research paper, "Range Adaptation of Wireless Power Transfer Systems for Biomedical Applications", received the United International University Best Paper Award, the prize money of which was BDT 15,000. The researchers were Siddique Kabir, Khan A. Wahid Morshed, Rizia Iqbal Tinni, Kazi Lutful Kabir and Muhammad Nazrul Islam, along with, "An Application of

Wireless Power Transfer (WPT), which otherwise renders a lax in the system.

The paper that took the biggest award of the event was titled "Pressure Transfer Function for Aorta Model in Cardiovascular Simulator – Feasibility Study of Wearable Central Blood-Pressure Gauge", and was the brain-child of Kyoji Nakajo, Yudai Komori, Shuji Takahashi, Kazuhiko Motegi, Yoichi Shiraishi and Hiroshi Miyashita. The thesis focused on the importance of blood-pressure gauge which can be worn and this can be made possible due to the development in electrical engineering sector. The authors bagged the Dr. Fatema Rashid Best Paper Award and a cheque worth BDT 20,000.

The conference held a diverse range of plenary sessions which included 10 keynote speeches from reputed professionals emerging from the fields of biomedical engineering – from professors and scientists who have gained their knowledge and expertise from eminent universities at home and abroad. A unique body of topics were covered by the discussants among which were biometric imaging and early stage cancer detection, automated tools to teach older adults proper social engagement skills and the application of computers in radiation therapy to name a few.

The conference came to an end on December 18 with the closing and award giving ceremony where S. M. Ashraful Islam, Additional Secretary and Executive Director of Bangladesh Computer Council (BCC) was the chief guest and Prof. Subhagata Choudhury, Director, Lab Services, BIRDEM, was the special guest.

S. M. Ashraful Islam, addressed in his closing ceremony speech that MediTec 2016 will create a platform for interaction among engineers, doctors and biologists as well as other health professionals to identify problems and develop sustainable solutions to improve healthcare and disabilities services in Bangladesh.

Dr. Khondaker Abdullah Al Mamun, Chair of Meditec 2016, mentioned in his closing remarks how Bangladesh had made a late start in this field compared to the West. He said, "Upon returning to Bangladesh, I realised that there are experts in the engendering fields and brilliant doctors in their own sectors, so why not bring them together on a cer-

tain platform?" That was how the inception of MediTec occurred.

He added how the papers they received were excellent in quality and stressed on the need to have similar events which would give Bangladesh the necessary kick start in order to bridge the gap of years with the status quo in US or Canada or even the Middle East. He is the Director of Advanced Intelligent Multidisciplinary Systems Lab (AIMS Lab) which is operating in UIU and is currently working on a number of research projects to improve healthcare and disabilities services through mobile applications which includes an app that detects Parkinson's disease.

The concept of regulatory bodies for diagnostic machines is missing from Bangladesh, he pointed out; the diminishing effect of machine makes it redundant after a certain threshold point, at which, those should be replaced. However, in Bangladesh, these are somehow repaired and sent to the rural areas where the efficiency of the medical reports comes under scrutiny. As a matter of fact, the performing ability of every machine deteriorates. He asked, "If we can have regular check-ups for cars and other machines, why not for these equipments which can save lives?"

Doctors are dependent on diagnostics just the way patients are dependent on doctors. UIU has successfully realised that and tried to participate and contribute with this initiative focusing on "Smart Systems for Healthcare". The event concluded with Dr. Khondaker Abdullah Al Mamun, expressing his gratitude towards all the sponsors which included Medtronic, United Hospital, Siemens Healthineers, and others. He continued to praise the response and support from foreign universities from USA, Canada, Australia, Europe, and so on.

Curtains came down on MediTec 2016 with a promise to do its part in helping Bangladesh push through the limits in this sector and a special mention of a workshop inclining towards neuroscience research that will be conducted next year with support from International Brain Research Organization (IBRO).

PHOTOS: DARSHAN CHAKMA



Prof. M. Rezwan Khan, VC of UIU  
Prof. Dr. Abul Kalam Azad, Chief Guest, Inauguration Ceremony

**ADVANCED INTELLIGENT MULTIDISCIPLINARY SYSTEMS LAB (AIMS LAB), UNITED INTERNATIONAL UNIVERSITY**

Worldwide Biomedical Engineering (BME) research advanced to a new height. With the development of cutting-edge technology, healthcare delivery systems improved a lot in the range from preventive care to diagnostic and treatment as well as saving human life. It has also opened the doors for research opportunities to identify problems and inventing solutions, especially to develop low cost solutions that is affordable in developing countries. In recent years, BME has been one of the top notch research and development fields in the world. However, Bangladesh lacks BME education, research and professional development, especially utilization of Technology in Healthcare and Disabilities. To address the need United International University (UIU) established Advanced Intelligent Multidisciplinary Systems Lab (AIMS Lab).

In 2014, Dr. Khondaker A. Mamun (Associate professor of CSE, UIU) initiated AIMS Lab to foster BME research and development in Bangladesh. The vision of its research is to investigate problems and develop innovative technological solutions that could potentially improve quality of life, and more importantly make a significant contribution in the scientific arena. AIMS Lab conducts research on Intelligent Systems for Medical Intervention, Biomedical Signal Processing and Pattern Recognition, Human Machine Interface (HMI), Brain Machine Interface (BMI) and Mobile Technology for Healthcare and Rehabilitation applications.

**Brain Machine Interface (BMI)**

Direct communication channel between Brain and computer

**AIMS Lab**  
Advanced Intelligent Multidisciplinary Systems Lab

Last two years, AIMS lab initiated more than ten research projects, among them some projects got several recognition and funds from ICT Division, Bangladesh Computer Council, Access to Information (A2I) and International Brain Research Organization (IBRO). Notable research project of AIMS Lab includes CMED, a cloud-based medical system for regular health monitoring to prevent health risk and reduce healthcare cost. CMED won awards in GP Accelerator and SeedsStarWorld. Autism Barta, an automatic autism screening tool to use in Bangladesh. Boite Chai, a communication aid for assisting non-verbal kids. In addition to these, PVDoc (Parkinson Virtual Doctor), a mobile based Parkinson's disease screening system. AIMS Lab has research collaborations with the local and international research institutes in USA, Canada, UK, China, Thailand, India and Bangladesh. From the establishment, AIMS Lab has published more than 35 peer reviewed international journal and conference papers and invented a number of E-Health service delivery architecture for countries with low resource setting. AIMS Lab is committed to make an impact in our society through research, innovation and development.

PHOTOS: DARSHAN CHAKMA

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