

# Seminar on Brain Computer Interfaces

By Mr. Bertram Shi

Report by Mr. Alan Wong

This seminar on Brain Computer Interfaces was held on 25 March 2014. The speaker of this seminar was Professor Bertram Shi of the Department of Electronic and Computer Engineering at Hong Kong University of Science and Technology. He is the Director of Master of Science



programme in Electronic Engineering. Also, he is a member of the Human Language Technology and Automation Technology centers, and a Director of the Consumer Media Laboratory. He has conducted in-depth research on bio-inspired and neuromorphic engineering, analog VLSI and cellular neural networks, machine vision, and image processing. Recently, his

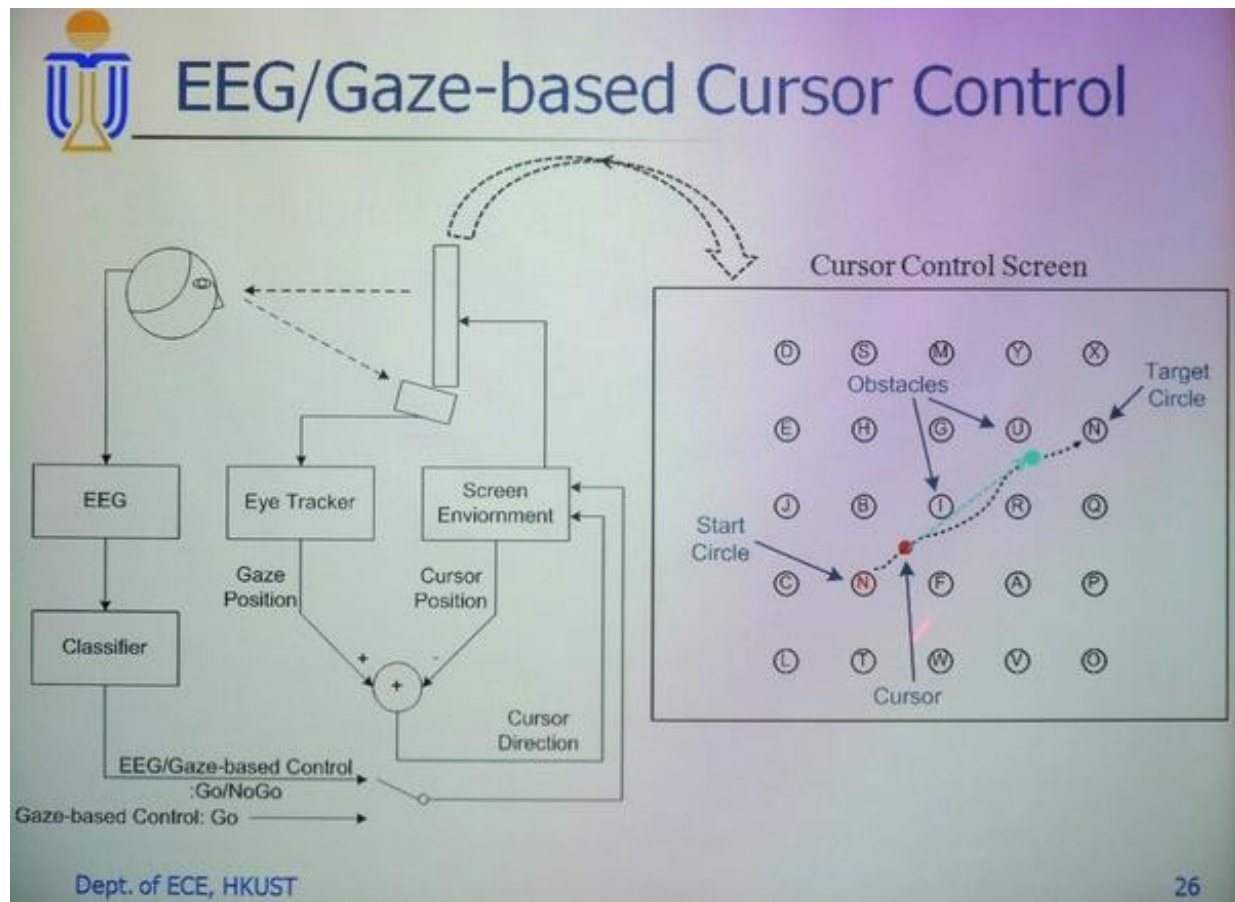
research team has been building large-scale neuromorphic implementations of functional models of visual cortical neurons, which use either mixed-signal custom VLSI chip, or embedded system designs which use DSP and FPGA chips. A total of 40 participants attended the seminar.



Professor Shi stated that Brain-Computer Interfaces (BCI) is a direct communication pathway between the brain and an external device. With the assistance of BCI, the brain can control the designated external device. BCI could be utilized to control a variety of devices, such as screen cursors, wheelchairs and robots. He further explained the difference between Electroencephalography

(EGG) based BCI and Gaze and the associated advantages and disadvantages. For example, EGG based BCI has limited communication bandwidth. In contrast, Gaze has high bandwidth,

but it suffers from Midas Touch Problem. The advantages are high temporal resolution (ms), low cost and relatively non-invasive. The disadvantages include low spatial resolution, signals depending upon activity of thousands neurons and activity deep in brain not being served.



Moreover, the Professor quoted that the pattern of Gaze “is dependent not only on what is shown on the picture but also on the problem facing the information that he hopes to gain from the picture” (Yarbus, 1967 ). He then introduced the applications of brain-computer interfaces, which include human computer interaction, computer gaming, usability testing for websites, advertising research, shopping research, psycholinguistics, psychology and neuroscience.

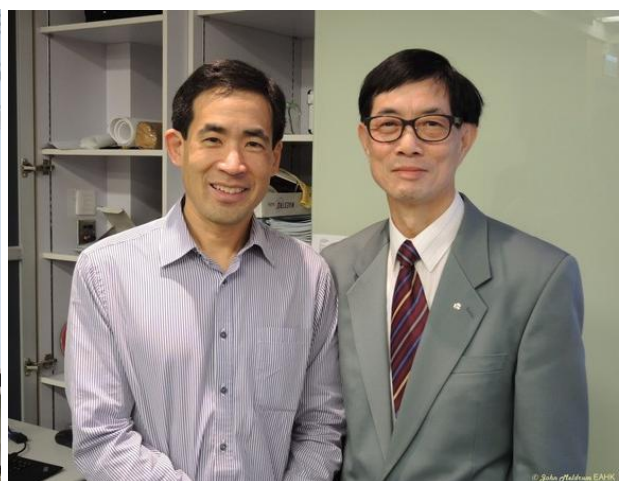


Professor Shi further disclosed that his team is developing the BCI technology. Based upon the integration of EGG and Gaze, they are developing a non-invasive brain computer interface. He aimed to develop a non-invasive brain computer to control robot arm so that the brain can directly control a robot to perform certain tasks like his body. He shared his research progress by demonstrating EGG based cursor control, which can be applied to robotic arm control. He also demonstrated Gaze based inference of target identity.



An interactive discussion session was held after the presentation. Members actively raised questions, such as the applications of brain computer interface, trend of its future development, etc.

This presentation provided participants a valuable opportunity to explore brain-computer interface and its potential in applications to improve human living. This interesting presentation was well received by the participants. We expressed our sincere appreciation to Professor Shi for his great efforts in delivering this topic, and a souvenir was presented to him at the end of the seminar.



A full set of photos and presentation slides are available at:

<https://www.facebook.com/media/set/?set=a.607850412635410.1073741865.346241825462938&type=1>