NANYANG TECHNOLOGICAL UNIVERSITY

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NTU breakthrough in neuroscience research
- Novel software enables 3D visualisation and data processing of human brain activity

Researchers from Nanyang Technological University (NTU) have developed a novel software which enables 3D visualisation and data processing of human brain activities. This is a critical breakthrough in understanding how the human brain works. A better understanding of the human brain is an important area of research as neurological disorders ranging from epilepsy to Alzheimer disease affect up to one billion people worldwide, with as many as 6.8 million resulting deaths[1].

Currently, doctors rely on electroencephalogram, or EEG, in the diagnosis of seizures and other neurological disorders. An EEG is a graphic record of brain waves representing electrical activity in the brain. Changes within EEG records reflect changes in brain activities, although current technology does not allow these changes to be measured.

The NTU breakthrough enables a novel 3D visualisation of the EEG and provides the capability of rapidly processing the brain activity data within a matter of minutes. NTU's software thus allows doctors to quantify the EEG changes and hence predict changes in brain activity.

With this invention, doctors will then be able to make better assessment and diagnosis of their patients' conditions. The clinical applications of the software are enormous. For example, one of the potential applications is in the forecasting of epileptic seizures.

Other potential applications include: understanding the magnitude of emotions in patients, development of special therapies involving visual, music and olfactory stimuli that allow curing deceases of psychosomatic origin, identifying

[1] WHO report: Neurological disorders: Public health challenges (February 2007).

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music that provoke aggressiveness or provide a calming effect on individuals, etc.

This breakthrough was achieved by a multi-disciplinary NTU research team comprising faculty from three of its engineering schools – Associate Professor Vladimir Kulish from School of Mechanical and Aerospace Engineering, Assistant Professor Olga Sourina from School of Electrical and Electronic Engineering, and Associate Professor Alexei Sourin from School of Computer Engineering. The team has already published research papers on this breakthrough in international journals and is now looking for interested medical partners to conduct clinical testing and industry partners to commercialise the invention.

Says Assoc Prof Kulish, project leader of the research team: *"Our team is pleased to have developed this breakthrough invention. But we are more excited at the possible applications that this could mean in diagnosis and analysis of neuro-related illnesses and medical conditions. Our next step is to bring our breakthrough from the lab to clinical trials, where its actual benefits could be felt by patients. We look forward to working with interested medical partners to make this a reality."*

This breakthrough builds on NTU's strengths in engineering research and demonstrates a continued focus on research that meets real-world needs.

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About Nanyang Technological University

Nanyang Technological University (NTU) is a research-intensive university with globally acknowledged strengths in science, engineering, business, humanities, arts and social sciences. The university is located in a garden campus in western Singapore, tracing its roots back to 1955.

NTU has 4 colleges comprising 12 schools. The College of Engineering comprises six schools focused on technology and innovation. Its research output ranks among the top four in the world. The College of Science pushes the boundaries of Singapore's life sciences initiatives. The Nanyang Business School (the College of Business) offers one of the world's top 100 MBA programmes. The College of Humanities, Arts, & Social Sciences boasts Singapore's first professional art school offering degree courses in art, design and interactive digital media, the Humanities and Social Science School, and the Wee Kim Wee School of Communication and Information, a top journalism and media school in Asia.

The 13th school, S Rajaratnam School of International Studies, was inaugurated on 1 Jan 2007. An important component of this autonomous school is the Institute of Defence and Strategic Studies, long recognised as a world authority on strategic studies and terrorism.

NTU is also home to the internationally-acclaimed National Institute of Education, Singapore's only teacher-training institute.

NTU has in place multi-country programmes and initiatives with established institutions worldwide. Key partners include MIT, Stanford University, Cornell University, Caltech, University of Washington, Carnegie Mellon University in USA, Peking University, Shanghai Jiaotong University, Waseda University, Indian Institute of Technology in Asia, Cambridge University, Imperial College and Swiss Federal Institute of Technology in Europe.

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