



PRESS RELEASE

IIT Mandi researchers invent a new technique to detect abnormal brain characteristics associated with Ischemic stroke

Link to the video bytes and additional pictures:

<https://fromsmash.com/Additional-Video-bytes-and-Pictures>

MANDI, 3rd May 2021: Innovators at the Indian Institute of Technology Mandi have invented a method to simultaneously study the variations in nerve functions and brain blood flow associated with brain disorders such as Ischemic stroke. The invented method helps in locating and classifying damaged sites (lesions) in the brain, brought about, or leading to neurological diseases.

Results of this study led by Dr. Shubhajit Roy Chowdhury, Associate Professor, School of Computing & Electrical Engineering, IIT Mandi, has been published in IEEE Journal of Translational Engineering in Health and Medicine and the team has been recently granted a US patent for the invention. Dr. Roy Chowdhury has collaborated with Dr. Abhijit Das, a neurologist from Institute of Neurosciences, Kolkata, and Dr. Anirban Dutta, an Assistant Professor in Restorative Neurorehabilitation from the Department of Biomedical Engineering, University at Buffalo, USA.

The IIT Mandi team's invention is based on the fact that intricate interactions between nerve cells (neurons) and blood vessels (vasculature), called the NeuroVascular Coupling (NVC) that regulates blood flow in the brain. Diseases such as Ischemic stroke adversely affect the NVC. NeuroVascular Uncoupling results in such cases, wherein, the nerve impulses do not trigger the required blood flow. Timely detection of NVC is critical for the prevention, diagnosis, and treatment of such diseases.

"Our method uses a multi-modal brain stimulation system to differentially stimulate different components of the neurovascular unit (NVU) and observes the resultant electrical nerve signals by EEG (electroencephalography) and blood flow by near Infrared spectroscopy (NIRS)," explained Dr. Chowdhury. In simpler terms, a benign electrical current is given to the brain through electrodes, and the responses of the brain in terms of nerve action and blood flow are simultaneously measured by Electroencephalography (EEG) and Near-infrared Spectroscopy (NIRS). While EEG and NIRS are already used independently, the prototype developed by IIT Mandi innovators



combines them into a single point-of-care unit to get a more accurate picture of the NVC. The data thus obtained are fed into mathematical models to detect problems in NVC, which can point to neurological diseases. In addition to detecting these abnormalities, this method can pinpoint the location at which the uncoupling exists, thereby providing a better handle on the problem area.

"The simultaneous assessment of nerve function and brain blood circulation would allow urgent treatment decisions to be made quickly in cases of stroke and hypertension," said the lead researcher. The developed device can also help in identifying the progress of diseases such as Parkinson's and can in fact predict occurrence of these diseases even before presentation of symptoms.

Surveys have shown that nearly 30 million people in India suffer from neurological disorders including epilepsy, stroke, Parkinson's disease, traumatic brain injuries, and neuroinfections. Neurosurgeons and hospitals in India have indeed made significant advancements in neurosurgical diagnosis and treatment. The invention by the IIT Mandi team takes diagnosis of neurological problems one step further and will help in better detection and treatment of these diseases.

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About IIT Mandi

Since the first batch of 97 students joined in July 2009, IIT Mandi has grown to currently host 125 faculty and 1,833 students who are enrolled in various programmes of studies in undergraduate, postgraduate and research programmes, and 1516 alumni. IIT Mandi is a fully residential campus with 1.4 lakh sq. m. buildings completed. It has a guest house with 88 rooms, a 750-seater Auditorium, campus school, sports complex and hospital.

IIT Mandi has four Academic Schools and three major Research Centers. The Schools are: School of Computing and Electrical Engineering, School of Basic Sciences, School of Engineering, and School of Humanities and Social Sciences. The Centers are: Advanced Materials Research Centre (AMRC; set up with an investment of Rs. 60 crores), Centre for Design and Fabrication of Electrical Devices (C4DFED; has Rs. 50 crores worth of fabrication tools), and BioX Centre (has acquired research equipment worth Rs. 15 crores). In 2017, the Department of Biotechnology, Government of India, selected IIT Mandi to lead the prestigious Rs. 10 crore FarmerZone® Project.

To cater to the growing and changing needs of the Indian industry and the aspirations of students, IIT Mandi has introduced 7 B.Tech., 7 M.Tech., 5 M.Sc., 4 Ph.D., 1 I-Ph.D and 1 M.A



programmes in the past 10 years. The unique, project-oriented B.Tech. curriculum is centred around its 4-year long Design and Innovation stream. From August 2019, IIT Mandi started 3 new and unique B. Tech. programmes in Data Science and Engineering, Engineering Physics, and Dual Degree in Bioengineering.

Since the inception of the Institute, IIT Mandi faculty have been involved in over 275 Research and Development (R&D) projects worth more than Rs. 120 crore. In the past 10 years, the Institute has signed a Memorandum of Understanding (MoU) with as many as 11 international and 12 national universities.

IIT Mandi Catalyst, the first Technology Business Incubator in Himachal Pradesh, has helped over 75 startups since 2017 and is changing both the industry profile and entrepreneurial mindset in the state. So far, Catalyst has secured external funding of Rs. 24 crores from various funding agencies. Enabling Women of Kamand Valley (EWOK) is another innovative programme run by IIT Mandi, which focuses on imparting skills training to rural women to enable them to start village-scale businesses.

IIT Mandi has been ranked no. 31 in the Engineering Institutions Category in the [India Rankings 2020](#) released by National Institutional Ranking Framework, Ministry of Education, Govt. of India. Apart from this, IIT Mandi is the only second-generation IIT to be featured at rank no. 7 in the Atal Ranking of Institutions on Innovation Achievements, of the Innovation Cell, Ministry of Education, Govt. of India.

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