

## Lecture by

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## Development of portable Brain Computer Interface for medical applications

Brain-computer interface (BCI) systems have been designed for diverse applications, such as smart living, entertainment and medical applications. However, conventional BCIs rely on expensive commercial amplifier arrays and bulky computers. These factors inevitably drive up the cost, complexity, and setup time of BCI systems, while reducing their portability. Elderly people suffering from diseases like Parkinson's disease will have difficulty in movement. For such patients, to analyze their conditions, doctors may need their brain waves. The human brain function represents the status of whole body, our central nervous system (CNS) consists of neurons. The neuron transmits information on response to simulate, which is called as action potential, whose voltage is in-between -60 mv to 20 mv and the action potential remains for 5 to 10 Mill seconds. An Electroencephalogram (EEG) is a measurement of brain signal using scalp electrodes, the study of EEG waves are used in diagnosis neurological disorders and abnormalities in human body. EEG based brain-computer interfaces (BCI) have been studied since the 1970s.

Brain computer interface technology represents a highly growing field of research with diverse application systems. Currently, the main focus of BCI research lies on the clinical use, which aims to provide a new communication channel to patients with motor disabilities to improve their quality of life. Its contributions in medical fields range from prevention to neuronal rehabilitation for serious injuries. Mind reading and remote communication have their unique fingerprint in numerous fields such as educational, self-regulation, production, marketing, security as well as games and entertainment. It creates a mutual understanding between users and the surrounding systems. It is expected that BCI will become a routine clinical, assistive, and commercial tool for advanced EEG monitoring. Current BCI systems are not practical for use outside research laboratories due to their complicated setup/operation, prohibitive costs, and lack of portability.

This talk aims to present the techniques for the development of low-cost portable BCI system which can be carried anywhere.



**Dr. Jayakumari.J** is presently working as Professor, Department of Electronics and Communication Engineering, Mar Baselios College of Engineering and Technology, Nalanchira, Thiruvananthapuram, Kerala. She obtained her B.E (ECE) from M.S. University, Tirunelveli in 1994, M.Tech (Applied Electronics and Instrumentation) in 1998 and PhD (ECE) in 2009 from Kerala University. She have teaching experience of more than 23 years and research experience of 15 years . Her major areas of research interests include Wireless communication, coding techniques, brain signal and Image processing. She has published more than 75 papers in International Journals and Conferences. She is a senior member of IEEE, Fellow of IETE, IE (I) and CET (I), Chartered Engineer of IE (I) and Member, The Society of Digital Information and Wireless Communications (SDIWC). She is also an Academic Council member of the Council of Engineering and Technology (India).