A Five-Day GIAN Course on
Technology-driven approaches for Neurodevelopmental and Neurodegenerative Disorders
26th – 30thth March, 2022

Overview of Course

According to the World Health Organisation (WHO) Neurodegenerative and Neurodevelopmental disorders are the two biggest challenges to the world public health. This is because none of them is curable and therefore is the root cause for life-long mental and cognitive problems as well as leading to a number of physiological complicacies. Recent researches showed that to tackle these conditions the most effective way is to shift to a "proactive" healthcare approach where these conditions are identified at a very early stage even before their physical/behavioral manifestation and start intensive intervention from that stage which could lead to mitigation of 80% of the adverse symptoms. Unfortunately, there is no biological evidence-based screening tool exists for such a very early diagnosis at this moment.

Recent advances in sensor technology, signal processing and Artificial Intelligence (AI) combined with new biological knowledge has shown serious promise to develop such screening tool and intervention systems that is mass deployable both in and out-of-clinic environment and thereby radically changing the treatment process of these "untreatable" conditions. Since this is currently a field of intense research, the relevant cutting-edge knowledge is yet to be widely disseminated amongst the general research and medical community. This course will bridge that gap by holistically addressing the biological and technological amalgamation that may be pivotal for such system development. We expect that this will initiate new research in India which will be highly beneficial for Indian population health

Course Contents

- Neurodegenerative and Neurodevelopmental disorders: a closed-loop possible architecture for predictive diagnosis and management
- Fundamentals of Brain monitoring modalities: advantages and disadvantages
- Modelling information propagation in brain: from biology to circuit theory
- Introduction to Brain connectivity: graphtheoretic representation of information propagation mechanism in brain.
- Brain connectivity analysis using HERMES and Brain Connectivity Toolbox (BCT)
- Signal processing and **AI** frameworks for brain connectivity driven early diagnosis and prognosis
- Application of signal processing for EEG signal analysis
- Real-time hardware architectures for brain signal analysis
- Computer gaming-based intervention and a case study

About The Institute and Warangal

National Institute of Technology (formerly known as Regional Engineering College), Warangal is the first among RECs setup as joint venture of the Government of India and State Government. Over the years the institute has established itself as a premier Institution imparting technical education of a very high standard leading to the B.Tech, M.Tech and Ph.D. Degrees in various specializations. With a view to give further impetus to the technological education, the Central Govt. upgraded the RECs into NITs.

Warangal is known for its rich historical and cultural heritage. It is situated at a distance of 140 Km. from Hyderabad. NIT campus is 3 km. away from Kazipet railway station and 15 km. away from the Warangal railway station. The local weather during Dec is pleasant. The average temperature is about 25-30^{0}C during day and about 20^{0}C during night.

About The Department

The Department of ECE offers an undergraduate program in Electronics and Communication Engineering, and three Postgraduate programs in Electronic Instrumentation, VLSI system design and

Advanced Communication Systems. The department of ECE has been offering two courses: (i) IoT and Usecases (ii) Communications for Smart cities iii) Machine learning

About GIAN Course

MHRD, Govt. of India has launched an innovative program titled "Global Initiative of Academic Networks (GIAN)" in higher Education, in order to garner the best international experience. As part of this, internationally renowned Academicians and Scientists are invited to augment the Country's academic resources, accelerate the pace of quality reforms and elevate India's scientific and technological capacity to global excellence.

Who can participate?

This program is open to the Students at all levels (UG/PG/Ph.D) of CSE, ECE, EEE and Biomedical engineering and Engineers from Industry.

How to Register?

Stage-1: Web Portal Registration:
Visit http://www.gian.iitkgp.ac.in/GREGN/index and **create login** User ID and Password. **Fill up** the blank registration form and do **web registration** by **paying** Rs. 500/- online through Net /Debit/Credit card. This provides the user with life time registration to enrol in any number of GIAN courses offered.

Stage-2: Course Registration:
Login to the **GIAN portal** with the **user ID** and **Password**

already created in **Stage-1**.

Click on Course Registration option at the top of Registration form. **Select** the Course titled "Technology-driven approaches for Neurodevelopmental and Neurodegenerative Disorders" from the list and **click** on **Save option**. **Complete** your registration by clicking on '**Confirm Course'**.

REGISTRATION FEE:

Faculty (Internal & External) and Scientists from R&D Labs	Rs. 2000
Persons working in Industry/ Consultancy firms	Rs. 4,000/-
Students & Research Scholars • Without award of Grade • With award of Grade	Rs.1,000/- Rs.1,500/-
Students from abroad	$ 50
Faculty/Scientists/Industry Persons from abroad	$ 100

Selection and Mode of Payment:

Selected candidates will be intimated through e-mail. They have to remit the necessary course fee to the Bank as per the details given below

Account Name: GIAN NITW
Account No: 62447453600
Bank: State Bank of India
Branch: REC Warangal (NIT Campus)

Branch Code: 20149
IFSC: SBIN0020149
MICR Code: 506002030
SWIFT Code: SBININBBH14

For any queries, please contact the coordinator. This course shall be conducted in **ONLINE** mode as per Ministry of Education (MoE) guidelines.

Address for Correspondence

Dr. B. Lakshmi
Coordinator

Department of Electronics & Communication Engineering
National Institute of Technology,
Warangal 506004, Telangana, INDIA

The Faculty:

International Expert:

Prof Koushik Maharatna is a Chair in Signal Processing Systems Design in the Department of Electronics and Computer Science (ECS), University of Southampton, UK. He leads the next generation. remote healthcare system design research in the ECS.

Prof. Koushik has developed several remote **healthcare systems in the area of monitoring Cardiovascular diseases, Stroke rehabilitation and cognitive impairment** in **young children**. These systems were successfully trialed in **four major European hospitals**.

Prof Koushik research interests include **biomedical signal processing algorithm deign, machine learning and VLSI circuit design. Prof Koushik Maharatna** has made pioneering contributions in the fields of VLSI circuits and systems design, biomedical signal processing and machine learning and healthcare technology and mathematical modelling of biological systems. Prof. Koushik Maharatna received € 2.5 M European Commission funded research grants in the area of remote healthcare systems development to develop 7 successfully trialled automated tools for diagnostics and analysis of clinical data in the fields of cardiovascular disease monitoring, stroke rehabilitation and neurodegenerative diseases. These tools are currently being used in 5 European hospitals. He has published over 130 scientific articles in high-impact journals and conferences.

Host Faculty/Coordinator

Dr. B. Lakshmi is an Associate Professor in the department of E.C.E, NIT Warangal. Her research areas include **Digital IC Design**, **Embedded System Design, FPGA Design**, **VLSI Architectures**, **Internet of Things** and **Deep learning.**

Important Dates

Last date for Receiving Application: 19th March 2022
Last date for intimation to participants by email: 20th March 2022
Course Dates: 26th - 30th March 2022