A GIAN course on

Functional MRI: Methods and Applications for Medical Imaging

(October 22-26, 2018)

PATRON

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Course Contents:

1. Introduction to medical image modalities and medical image processing.
2. Physics Behind Magnetic Resonance Imaging, theory and concepts
3. MRI- Pulse sequences and artifacts
4. Introduction to MR imaging Hardware
5. Biophysical principle of functional MRI
6. Designing an fMRI experiment and Data Analysis
7. Statistical Analysis of fMRI data
8. Current Methods in fMRI
9. Clinical applications.

* Five problem solving sessions; (a) two sessions on identifying brain activation using actual fMRI data (b) one session on loading 3D and 4D MR data (c) one session on computation of MR image statistics (d) one session on medical image processing.

Overview of the Course:

This course is designed to teach participants how to design, analyze, and interpret functional Magnetic Resonance Imaging (fMRI) data. Due to its increasing popularity, a large number of investigators are collecting functional MRI data from healthy and clinical subjects. This course will provide a comprehensive discussion about the physics and engineering aspects of MRI and fMRI techniques along with the processing techniques for extracting useful information from fMRI data. Besides providing in depth knowledge about fMRI technique, this course will also provide basic understanding of the principles of other commonly used medical imaging modalities in clinical environment and basic medical image processing algorithms. A novelty of this course will be that actual data from a large study will be used to show the participant how to interpret the fMRI images. In the first part of the course, participants will be taught the principles of functional MRI, imaging hardware and how to design an experiment, along with the preliminary understanding of the other medical imaging modalities. In the second part, algorithms for medical image processing will be introduced and pre-processing as well as post-processing steps necessary for analysis of fMRI data, along with their relative advantages and disadvantages will be demonstrated. During this process, their software implementation will also be demonstrated. In the third part, clinical data will be used to demonstrate differences in brain function. In addition to learning about the basic principles of fMRI technique, the participants will have the unique opportunity to acquire hands on experience for analysis and interpretation of fMRI data using actual case studies. This course will be highly beneficial to students at all levels (B. Tech./M. Sc./M. Tech./Ph.D./Medical students) and aspiring researcher within the broad domain of signal, image and video processing.

Objectives of the Course:

Participants will learn and understand;

- Principles of Different Medical imaging modalities currently used in clinical environment such as MRI, Ultrasound (US) Imaging, X- ray Computed Tomography (CT) imaging, Positron Emission Tomography (PET) imaging etc.
- Basic algorithms for Medical Image processing.
- Physics and Engineering behind (fMRI)
- Biophysical Basis of fMRI
- Current Methods for analyzing fMRI
- Examples of practical problems and solutions on fMRI

The Faculty 	**Prof. Bharat Biswal** has completed his MS in Electrical Engineering from Michigan Technological University, MI in the year 1991. He obtained his Ph. D. in Biophysics under a joint program between the Biophysics Dept. at the Medical College of Wisconsin and the Biomedical Engineering Dept. at Marquette University on 1996. He is currently a Distinguished Professor in Biomedical Engineering and Professor of Radiology at New Jersey Medical School. He served as the chair of Department of Biomedical Engineering, New Jersey Institute of Technology from July, 2012 to June 2015. He has also recently co-founded the peer-reviewed journal Brain Connectivity and serves as a co-editor. He is a Fellow of AIMBE and since 2013 been cited by Thomson Reuters as a one of the most influential researchers in Neuroscience and Behavior. He has authored several frequently cited journal articles which are judged as highly influential papers in the field of MRI. He has several patents in his name. Currently, he is involved in six sponsored research projects funded by NIH and other sources. He helped create the 1,000 Functional Connectomes Project, which gathers functional brain imaging data from centers around the world and is the largest open source of fMRI data sets. The database includes information on 1,400 participants and have been downloaded more than 80,000 times.
	**Dr. Saugata Sinha** received his PhD degree in Imaging Science from Chester F Carlson Center for Imaging Science, Rochester Institute of Technology, USA in December 2014. He joined the Department of Electronics & Communication, Visvesvaraya National Institute of Technology, India as an Assistant Professor in 2015. Before completing his PhD, he worked as a Research Scientist in Govt. of India Research & Development Institute in the fields of Medical Electronics & Optoelectronics for three years. During his PhD, he worked with multiwavelength Photoacoustic imaging system to acquire ex vivo images of actual human patients. In 2012, he received a research grant for developing an acoustic lens based novel Ultrasound imaging system from Rochester Institute of Technology. He authored several original research articles in refereed journals and conferences of international reputes. His research interests include Medical image processing for cancer detection, Photoacoustic and Ultrasound imaging, Pattern recognition. He has been awarded Young Faculty Research Fellowship from Meity, GoI.
	**Dr. Vishal R. Satpute** received his PhD degree in Video surveillance from Department of Electronics and Communication Engineering, Visvesvaraya National Institute of Technology, Nagpur in the year 2015. He joined the Department of Electronics and Communication Engineering, Visvesvaraya National Institute of Technology, Nagpur in the year 2006 as assistant professor. His total teaching experience is more than 15 years and is working in the area of image processing, computer vision, bimoetrics, and IoT. He completed a research project funded by Board of Nuclear Sciences and Research (BRNS) for a project based on scale and illumination invariant human face recognition system. He authored several research papers in various conferences and journals. He worked as reviewer for various conferences and journals of repute. He has been awarded Young Faculty Research Fellowship from Meity, GoI.

Registration Fees:

Participants from abroad:	US $500/-	18% GST Included in the fees
Industry/ Research Organizations:	Rs. 5,000/-	
Academic Institutions (Faculty):	Rs. 3540/-	
Academic Institutions (Student)	Rs. 2360/-	
Academic Institutions (SC/ST Student)	Rs. 1770/-	

(Number of participants for the course will be limited to fifty)

- Students have to submit a letter from their institution/Valid Identity card as proof of full time student enrollment. SC/ST students will have to submit a valid Caste/Tribe Certificate.
- The above fees include all instructional materials, computer use for practical sessions, internet facility. The course fee is inclusive of 18% GST as per institute norm.
- Boarding, lodging and meal charges are not included in the fees. The participants will be provided single/shared accommodation in Institute Guest house/student hostel on payment basis.

Who Should Attend?

- Students at all levels (B. Tech./M. Sc./M. Tech./Ph.D./Medical students) and aspiring researcher within the broad domain of signal, image and video processing.
- Practicing engineers, computer scientists, information technologists, medical physicists, and data-processing specialists working in diverse areas such as communications, biomedical applications, and hospital information systems may find the course useful in their quest to learn advanced techniques for biomedical image analysis.
- Executives, researchers from medical imaging and instrumentation industry and government organization including R&D laboratories.
- Faculty from reputed academic institutions, medical and technical institutions.

How to Apply:

- Registration through GIAN portal (if not registered already): For participants both within and outside VNIT Nagpur, a one-time fee of Rs. 500/- will be charged for registration at the GIAN portal for all future courses in subsequent years.
  Login and Apply at **http://www.gian.iitkgp.ac.in/GREGN**
- After registering at GIAN portal, interested persons may apply in the format given herewith along with the registration fees, paid through a demand draft drawn in favor of "Director VNIT, VNIT Nagpur" and payable at Nagpur or through NEFT transfer. As the number of seats is limited, the candidates are advised to register early.

For NEFT transfer:	Name of the beneficiary: Director, VNIT	Branch Name: V.R.C.E. Nagpur
	Beneficiary Account Number: 10259420288	MICR Code: 440002005
	Bank Name: State Bank of India	Bank IFSC: SBIN0006702

NOTE: For NEFT transfers, all the transaction details are to be sent to the coordinator. For registration confirmation, the proof of payment of fees (a scanned copy of the Demand Draft/NEFT transaction details) along with the registration forms and .pdf copy generated at GIAN portal (if registered through GIAN portal) are to be emailed to the coordinators.

Contact Persons:

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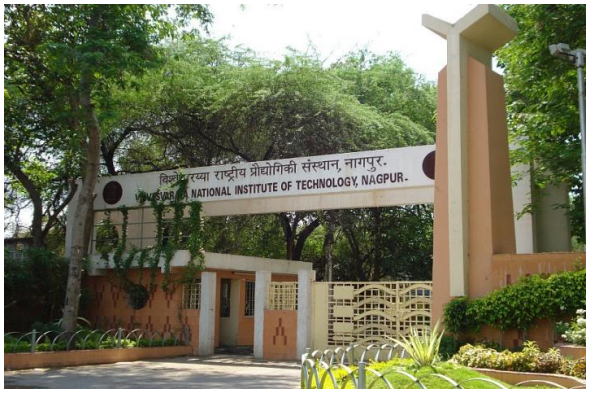
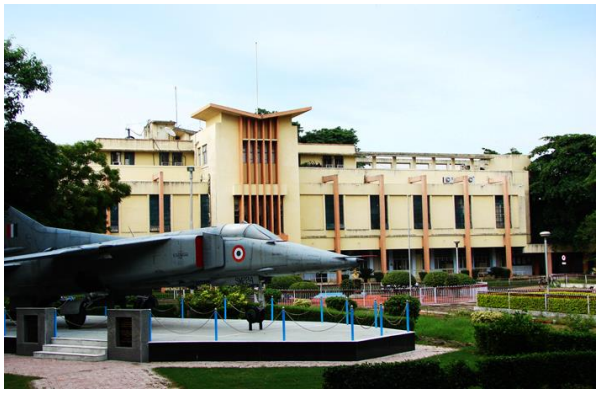
About VNIT:





Visvesvaraya National Institute of Technology, Nagpur is one of the thirty National Institutes of Technology in the country. The Govt. of India conferred on the Institute, the Deemed to be University status (under University Grants Commission Act, 1956 (3 of 1956)) with effect from 26th June 2002. Subsequently, the Central Govt. by Act of Parliament (National Institutes of Technology Act, 2007 (29 of 2007)) declared VNIT Nagpur as an Institute of National Importance along with all other NITs. The Act was brought into force from 15th August 2007. Earlier, the Institute was known as Visvesvaraya Regional College of Engineering (VRCE). It was established in the year 1960 under the scheme sponsored by Govt. of India and Govt. of Maharashtra. The college was started in June 1960 by amalgamating the State Govt. Engineering College functioning at Nagpur since July 1956. In the meeting held in October 1962, the Governing Board of the College resolved to name it after the eminent engineer, planner, and statesman of the country Sir M. Visvesvaraya. The prime objective of establishing Regional Engineering Colleges was to impart quality technical education throughout the country and foster national integration.

About ECE Department:

The Department of Electronics and Computer Science was created in 1994 from the Department of Electrical Engineering. Later, the Department of Electronics and Communication Engineering has been created in May 2014. It offers under-graduate program in Electronics and Communication Engineering and post-graduate program in Communication Systems Engineering. The department has well qualified and well motivated faculty members and support staff. There are more than 30 full time PhD students enrolled in the department in the areas of communication engineering, Image Processing, Embedded System Design, RF and Antenna Design. The laboratories are adequately equipped with state-of-the-art facilities. The department is undergoing vigorous growth in emerging areas of Embedded Systems, RF Testing and Communications. The department has been awarded Center of Excellence in Combedded Systems by MHRD (NPIU). The department is actively involved in R & D as well as consultancy projects and has collaborations with several industries, academic institutes, and R&D organizations in the country. As on date the department has research funds worth more than 15 crores.

About Nagpur:

The city of Nagpur is winter capitol of the industrious state of Maharashtra. Popularly known as Orange City, Nagpur bears a very soothing and enjoyable climate in the month of October. Nagpur is surrounded by five tiger reserves and now a days it has also been started being labeled as tiger capitol of the country. Nagpur is also named as Zero Mile City of the country as the zero milestone of India lies at the center of the city. The city is surrounded by religious places like Ramtek and historical places like Gandhi Ashram at Sewagram.

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REGISTRATION FORM

Please complete the details below and mail along with the registration fee to:

Dr. Vishal R. Satpute
ECE 010, Department of ECE
VINT, Nagpur 440010 (Maharashtra)

1. Name (in block letters): ……

2 Gender ✓ Male Female

3. Category: Academic/ Industry/ Student [For registration as student, please enclose a bonafide certificate from parent institution.]

4. Address: ……
……..…….

5. Tel. Nos (O, R, CP): ……

6. E-mail ID: ……..…….

7. Highest Academic Qualification: ……

8. NEFT Transaction Number: ……

Or Bank Draft Number: ……

9. Bank Name: ……...……..

Date: …… Amount: ……..……

Date: Signature