JADAVPUR UNIVERSITY
COMPUTER AIDED DESIGN CENTRE
Faculty Council of Engineering and Technology
Kolkata - 700 032

Certificate course on

SAR Image Processing with Open Source Software

Synthetic-aperture radar (SAR) is a form of radar that is used to create two-dimensional images or three-dimensional reconstructions of earth's surface. SAR is used to obtain high-resolution images from broad areas of terrain. It is capable of operating under inclement weather conditions, day or night. Processing of SAR data is required to extract relevant features, such as vegetation, water, or built-up. Detection of such objects is based on the detection of locally bright pixels. However, SAR images are much more complex compared to optical images; and they cannot be interpreted visually until it goes through several processing steps.

This course has been designed to provide theoretical fundamentals of SAR, and processing of SAR data in open source software. This course will be appreciated by the research scholars, teachers, working persons, or others who want to be able to grasp the theory and processing of SAR data.

The CAD Centre is the pioneer institute in the field of Geoinformatics. It maintains a state-of-the-art infrastructure for its courses. The Centre has engaged highly experienced faculty members from academic sector as well as industry. Some of our faculty members are well known figures in the field of Geoinformatics and have published huge number of books, monographs, and research articles internationally.

Course Duration: 18 hrs

Class Duration: Theory Sessions: 2 hrs each; Practical Sessions: 2 hrs each

Eligibility: BE/BTech in Engineering or equivalent; BSc in any discipline; BA/B.Sc. in Geography/Environmental Studies; 3-years Diploma in Engineering. All should have knowledge of optical remote sensing.
Participants must have mobile devices running Android 4.0.3 or above; laptop/desktop computer with Windows; and stable internet connectivity. Google Meet should be preinstalled in the mobile device.

Syllabus:

Topics	No. of Theory Classes	No. of Practical Classes	Total No. of Classes
Introduction to radar imaging, frequency/wavelength, polarization, viewing geometry, spatial resolution of radar system, speckle, surface geometry, surface roughness, dielectric properties, airborne versus space-borne radars, radar systems, SAR Interferometry, ScanSAR, StripMap SAR, SpotLight SAR.	2	-	2
Visual image interpretation of radar images (tone, colour, shape, structure, size, speckle, antenna pattern, texture)	-	1	1
Open source software for SAR processing, open access hub for SAR data, downloading the software and data, SAR raw data, understanding metadata and SLC data, multilook processing, radiometric calibration (backscatter image), speckle filtering, terrain correction, importing and exporting data.	-	1	1
Radar polarimetry, polarimetric matrix generation, polarimetric speckle filtering, polarimetric decomposition, compact polarimetric simulation, generating different colour composites.	-	1	1
Coregistration, processing of hybrid polarized data, polarimetric decomposition, unsupervised classification, supervised classification.	-	1	1
Processing of scanSAR data (TOPS), applying orbit file, thermal noise removal, deburst, ocean wind speed and direction determination, oil spill detection, ship identification.	-	1	1
Radar Interferometry, understanding the interferometric image, generation of interferogram, phase filtering, phase unwrapping, phase to DEM, DEM editing, terrain correction.	-	1	1
Layer stack, Urban area detection, change detection (land-cover, forest, agriculture), glacier movement, multi-temporal averaging.	-	1	1
Total	2	7	9

Certificate: Completion certificate (in printed form) will be provided at the end of the course.