Bahrain Society of Engineers - TRAINING CENTRE
&
AF Academy, India

Presents

Training Workshop

Ground Penetrating Radar

(Data Acquisition, Processing, Interpretation & Advanced 3D Processing)

March 31 - April 01, 2019, Kingdom of Bahrain
Introduction:
Ground Penetrating Radar, also known as GPR, Georadar, Subsurface Interface Radar, Geoprobing Radar, is a totally non-destructive technique to produce a cross section profile of subsurface without any drilling, trenching or ground disturbances. Ground penetrating radar (GPR) profiles are used for evaluating the location and depth of buried objects and to investigate the presence and continuity of natural subsurface conditions and features.

Today GPR is being used for various applications like utility mapping, concrete inspection, archaeology, void detection etc., with very little understanding of technical aspects of this technique, leading to errors and misconceptions. The workshop aims to address many questions and challenges faced by users in varying soil conditions, especially in GCC region.

Objectives:
The incorrect and inappropriate use of GPR has over the years caused a great deal of damage to its reputation as a bona fide and reliable technology. The objective of this training workshop on GPR is to make the participants familiar with basic as well advanced data acquisition, data processing and interpretation techniques to derive maximum amount of information from data collected. After completing this course, user should be able to collect the GPR data, carry out basic as well as advanced data processing of data and interpret the results in a range of application areas.

Who Should Attend?
The workshop is meant for new as well as experienced users of GPR, and for professionals outsourcing the GPR work to contractors (to get best value for their money).

This 02 day training program will help professionals, engineers and geo-scientists dealing with shallow sub-surface investigation. The program is designed for new as well as experienced users of GPR equipment. The program will also help project owners hiring services of GPR surveys, enabling them understand capabilities and limitations of the method and derive maximum return on their investment on a GPR survey. The program is useful for individuals, organizations and professionals from following fields:

- Water, electrical, telecom, gas and other utility companies
- Construction/ Infrastructure organizations
- Trenchless companies
- Environment consultants/ contractors
- Army, Police, Para-Military forces and other law enforcement/ investigation agencies
- Concrete inspection agencies/ consultants/ contractors
- Road inspection authorities, vigilance officials
- Archaeological survey organizations
- Geologists, Hydro-geologists, Geophysicists and Civil Engineers
- Existing GPR users
- Fresh geophysicists/ engineers planning to pursue career in the field of GPR

Benefits:
The program will enable the participant to derive maximum information from GPR data and help them design the right GPR investigation program for a particular project requirement. It will also enable them to choose the right combination of antennas for varied geological conditions and resolution requirements. The minimum outcome of the workshop will be:

- Learn how to determine whether GPR will be suitable for a particular project objective
- Learn how to design GPR survey to get maximum information
- Learn how to choose various parameters during data acquisition
- Learn how to carry out simple in-field processing of data
- Learn how to carry out advanced processing to minimise noise and extract maximum information from GPR data
- Learn use and theoretical aspects of various filters, migration, corrections etc.
- Learn how to carry out 3D processing of data
- Learn to conduct QC checks on GPR data and results obtained through GPR contractors
- Application specific training on:
  - Utility detection and mapping
  - Concrete inspection (voids, delamination, rebar etc.)
  - Pavement inspection (thickness of various layers etc.)
  - Void detection
  - Archaeology
- Any other topic/ application of interest of participants.
- Numerous practical tips for effective GPR utilization based on 3 decades of experience.
Key Elements:

- Introduction to Geophysics
- Introduction to geology, soil properties, stratigraphic processes.
- Introduction to Ground Penetrating Radar Method
  - Brief History
  - Basic Principle
  - EM Waves Propagation
  - Velocity of EM Waves
  - Wavelength/attenuation/dispersion
  - Electrical Properties of Rocks, Soils, Fluids
  - Magnetic Properties of Rocks, Soils, Fluids
  - Environmental influences of temperature, pressure, chemistry and time
  - Geological Heterogeneity, Anisotropy and scale
  - Radar Equation
  - Scattering, reflection, refraction, diffraction
  - Antenna Polarization, Fresnel Coefficient, Snell’s law
  - Near Field, Far Field, Multi-pathing, interferences,
- Field Procedure and Approaches for GPR Surveys
- Antenna selection, frequency vs depth
- Various Antenna Configurations in various applications
- Data acquisition, data handling
- Data Processing
  - High pass, low pass filters
  - Ormsybandpass filtering
  - Notch Filters
  - AGC, Move Out Correction, Terrain Correction
  - Migration, energy envelopes
  - Time-depth conversion
- 3D Processing of GPR Data
- Data interpretation
- Field Demonstration of GPR Surveys
- Specific case studies & methodology for:
  - Utility Detection
  - Concrete inspection
  - Archaeology
  - Pavement inspection
  - Ground water & geology
  - Cavity Detection
- Presentation by Trainees
- Interactive session with trainees

Facilitator:
The workshop will be conducted by expert with 29 years of experience of working with most of the available GPR models like GSSI, Mala, Sensor & Software, Pipe Hawk, Cobra, and Zond. His geographic GPR experience includes India, Canada, Singapore, Afghanistan, Saudi Arabia, Oman, Kuwait, Qatar, UAE and Bahrain. Till date he has conducted more than 500 GPR projects for various applications. He has used Ground Penetrating Radar for a wide range of applications including utility mapping, archaeology, cavity detection, concrete scanning, pavement analysis, vadose zone study, water resources, landmine detection, contaminant study etc.

Fee Structure:
BD 400 per participant, inclusive of training notes, morning & evening tea & Lunch. A discount of 10% for students and 5% discount on group booking of 03 or more participants from a single organization is applicable.

Registration Process:
Prior registration is must by sending email to pragya@afacademy.info. Fee to be paid through Banker’s Draft payable to Bahrain Society of Engineers-Training Centre or deposited in account ‘Bank BIC: NBOBBHBM / IBAN: BH18 NBOB 0000 0099 0989 11, National Bank of Bahrain-Manama Main Branch
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