Sarvajanik College of Engineering & Technology
Electrical Engineering Department

Report on Short term training program
On
GUJCOST- DST Sponsored One Week STTP on Application of Intelligent Techniques in Electrical Engineering
7 - 11th January, 2019

Title of STTP: Application of Intelligent Techniques in Electrical Engineering

Department: Electrical Engineering

Coordinators:

Dr. Chirag Naik, Assistant Professor, Electrical Engineering Department
Dr. Shabbir Bohra, Professor and HOD, Electrical Engineering Department
Prof. Chinmay Naik, Assistant Professor, Electrical Engineering Department

❖ No. of participants and their places: '22' participants from, SRCIT, Ankleshwar, CGPIT, Bardoli and SCET, Surat.

➢ **Details of Program:** This course was intended to offer a unique opportunity to learn about intelligent techniques and update the knowledge of the participants. The problem solving in modern electrical engineering requires to deal with complex, versatile, large amount of data for calculation, diagnosis and learning. The conventional methods are time consuming and less capable of handling these data. This necessitates the usage of intelligent techniques which are more efficient and fast During the above mentioned five days, intensive training was imparted to address basic knowledge representation, problem solving, and learning methods of artificial intelligence in;

o Power Quality Assessment
o Condition Monitoring
o Power System Optimization
o Smart Grid Applications
o Distributed Generation
o Renewable Energy Sources

➢ **Day wise report is as follows:**

Day 1: The course started with formal inauguration ceremony. The faculties from Computer engineering department and electrical engineering department delivered lectures on the following topics

❖ Title: Introduction to machine learning Algorithm

Expert Speaker: Dr.Nirali Nanavati
                Computer Engineering Department
                Sarvajanik College of engineering & Technology, Surat

The objective of this session was to give introduction about basic machine learning algorithm(MLA) and its application. Following topics were covered

- Fundamental Different learning methods including supervised and unsupervised learning were discussed
- Applications of MLA for CLasssification and /or regression problem solving
- Big data and small data problem

❖ Title: Genetic Algorithm & Power System Optimization

Expert Speaker: Prof. Chinmay Naik
                Electrical Engineering Department
                Sarvajanik College of engineering & Technology, Surat

The objective of the session was give introduction to Genetic Algorithm and its application to Power system. Following topics were discussed

- Different optimization techniques and genetic algorithm for optimization
- Basics of Genetic algorithm
- Power system optimization
- Optimal capacitor placement using genetic algorithm on radial transmission line
- Case study of IEEE33 and IEEE69 radial Bus system

Day 2: The faculties from SVNIT, Surat and Sigma Institute for Engineers delivered lectures on following topics

❖ Title: Condition Monitoring of Transformer

Expert Speaker: Dr. Prasanta Kundu
                S. V. National Institute of Technology, Surat.

The objective of this session was to summarize the application of Artificial Intelligent technique for one of most frequent the important maintenance activities carried out in the field of electrical supply system; i.e. condition monitoring of Transformer.

- Different maintenance techniques utilizing the artificial intelligence and early detection of different possible faults in the transformer by invasive and/or non-invasive methods.
- Partial Discharge Measurement
- Application of wavelet transform for transformer fault detection
- Electrostatic Voltmeter

- ❖ Title: Industrial Internet of things
  Expert Speaker: Mr. Mihir Rawal
  Sigma Institute for Engineers, Surat
  The objective of this session was to give introduction about internet of things and its application in industrial automation. Following points were discussed.
    - Industrial Automation
    - Internet of things
    - Industry 4.0
    - Communication between sensors, actuates and world wide web
- ❖ Lab session: hands on different optimization tools using Matlab. Genetic algorithm toolbox and its application to Electrical engineering

Day 3: The faculties from SVNIT, Surat and SCET surat delivered lectures on following topics

- ❖ Title: Darwinism Theory in AI techniques
- ❖ Expert Speaker: Dr. Vipul Kheraj
  Head, Physics Department, SVNIT,Surat

  The objective of this session was to get idea about AI application to Thin-Film Solar Photovoltaics. Following topics were discussed

    - technological evolution and comparison with human evolution using Darwin theory
    - optics and semiconductors
    - Genetic Algorithm(GA) method used for optimisation of number of layers and thickness of layers used in Laser diodes
    - Teaching Learning Based Optimization (TLBO) for Maximum Power Point Tracking(MPPT) for PV systems.

- ❖ Title: Role of Intelligent Techniques in Renewable Energy Sources
- ❖ Expert Speaker: Dr. Shabbir Bohra
  Professor & Head,
  Electrical Engineering Department, SCET, Surat

` The objective of this session was to give the glimpse of Application of AI techniques in field of renewable energy system.

- parameter identification of PV-Cell, sizing of PV- Panel, controlling of PV system- MPPT and inverter control, solar irradiance forecasting, output power forecasting and fault diagnosis of PV system.
- the suitability of particular method for given issue and its comparison with other conventional and artificial intelligent techniques
- The power forecasting procedure for PV systems using Wavelet(WT)-Neural Network (NN)
- TensorFlow- a tool developed by Google for AI and Deep Learning applications.
- ❖ Lab session was carried out for the hands-on experience on k - Neartest Neighbour (KNN) based Machine Learning Algorithm using Matlab environment and sample dataset.

Day 4: The faculties from SCET,Surat and Goldfinch Power & IT Solutions Pvt. Ltd. delivered lectures on following topics

❖ Title : Smart grid technologies & Artificial Intelligent
   Expert Speaker : Mr. Mrugesh Pawar
                        C.E.O, Goldfinch Power & IT Solutions Pvt. Ltd.

   The objective of this session was to give insight about smart grid technologies and its application. Following points were discussed
   - Recent development in smart grid technologies
   - Smart meters and distribution automation
   - Smart cities
   - Open access and power trading

❖ Title: Applications of intelligent Techniques for Power Quality Assessment

   Expert Speaker: Dr. Chirag A. Naik
                        Sarvajanik College of Engineering and Technology, Surat.

   The objective of this session is to introduce the applications of different intelligent techniques for Power Quality assessment problem. Following points were discussed.

   - Applications of different signal processing methods for PQ Classification, PQ indices, Responsibility estimation of PQ deterioration.
   - The applications of different intelligent classification techniques such as; K Nearest Neighbors, naïve Bayes classifier, neural networks for PQ classification.

❖ LAB session: Participants were introduced to Power logger and harmonic analyzer. Practical demonstration was done at the point of common coupling. Samples were taken and analyzed on software for various power quality studies.

Day 5: The Faculty from IIT Gandhinagar delivered lectures on following topic

❖ Title: Control of active power filter using instantaneous power theory

❖ Expert speaker: Dr Raghvan K
                        IIT Gandhinagar
   The objective of the session was to give the broader prospective about active power filter and neural networks. following topics were discussed

   - Fundamentals of instantaneous power theory
   - Harmonics measurement and filtration techniques
   - Active power filter
   - Neural network based controlling methodology

❖ The course formally ends with valedictory function and distribution of certificates. Participants gave their valuable feedbacks which includes the organizing of more STTP/workshops like this in future.

   Coordinators expressed their heartfelt gratitude to GUJCOST & DST for financial support. Coordinators also   were thank full to support extended by Principal Dr. Vaishali Mungurwadi, Dr. Chirag Paunwala, Associate dean R&D, Sarvajanik College of engineering & Technology, Surat

❖ Gallery:

Group Photo with the Participants

Dr. Vipul Kheraj (SVNIT, SURAT)

Dr. Shabbir Bohra (SCET, SURAT)

Dr. Chirag Naik (SCET, Surat)

Dr. Raghavan K. (IIT Gandhinagar)

Mr. Mrugesh Pawar
(Goldfinch Power & IT Solutions Pvt. Ltd.)

Dr. Nirali Nanavati(SCET, Surat)

Prof. Chinmay Naik(SCET, Surat)

Dr. Prasanta Kundu (SVNIT, Surat)

Mr. Mihir Rawal
(Sigma Inst. for Engineers, Surat)