REPORT

on

Faculty Development Program on

"AI applications in Electric Power Systems and Locomotives"

20th – 24th January 2020, BNMIT, Bangalore

Department of Electrical and Electronics Engineering

Vidyaya Amrutham Ashnuthe

B.N.M. Institute of Technology

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A Report on Faculty Development Program on

"AI applications in Electric Power Systems and Locomotives"

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Abstract:

Artificial Intelligence (AI) is playing a major role in the fourth industrial revolution. During the last 15 years, pattern recognition, expert systems, artificial neural networks, fuzzy systems, evolutionary programming, and other artificial intelligence methods have been proposed in an impressive number of publications in the power system community. The Faculty Development Program (FDP) organized by the department of electrical and electronics engineering was primarily focused on the hands-on approach towards AI applications on the power system and electric vehicle. The sessions were dealt with experts covering the basics, research gaps, key focus areas and hands-on training.

Day 1: 20th January 2020

Forenoon Session: 9: 30 am to 12:45 pm

The FDP Program was conducted from 20th January 2020 to 24th January 2020. The program was inaugurated by Dr. Gurunath Gurrula,. Asst.Prof, Department of Electrical Engineering, IISc, Bangalore with th Key Note Address.

Dr. Gurunath Gurrula started the session by stressing the necessity of curiosity amongst the researches. His session covered the preliminary steps that should be taken by the young researchers, the present research trends and gaps available. Professor was also given a brief about the various machine learning techniques available and the application of the same in power engineering problems.

Inauguration of FDP

Dr. Gurunath Gurrula, Asst. Prof., IISc

Day 1: 20th January 2020

Afternoon Session: 1: 45 pm to 04:45 pm

The session handled by Dr. Pramod Kumar Naik, Senior Manager, Agimus Technology, Bangalore, was completely hands-on. The tool used by him was Matlab. Dr. Pramod discussed the importance of data points and the different machine learning toolboxes available in Matlab package. The examples used by him covered the application of SVM techniques and Data point visualization. He also highlighted the latest toolboxes and apps available in the Matlab packages.

Dr. Pramod Naik, Senior Manager, Agimus Technology

Day 2: 21st January 2020

Forenoon Session: 9: 30 am to 12:45 pm

During the first half of the session, Dr. Indiramma, Professor, BMSCE, Bangalore, gave a brief talk about the Industry 4.0, cyber-physical systems, digital twin & augmented reality, cloud computing and its applications in various industries. In the second half of her session, Professor trained the audience with the Jupyter Notebook toolbox for the K-Means algorithm and the K-Nearest Neighbour algorithm.


Dr. Indiramma M, Professor, BMSCE, Bangalore

Day 2: 21ˢᵗ January 2020

Afternoon Session: 1: 45 pm to 04:45 pm

The forenoon session was conducted by Dr Sanjeev Naik, Specialist, Automotive Division, L&T Technology Services, Bangalore. After outlining the various batteries available, their needs and it's specific usage in terms of electrical locomotives, Dr. Sanjeev Naik had enlightened the audience with the need of the Battery Management System (BMS). The concept of State of Charging (SoC) was introduced, followed by the hands on Simulink session on BMS fundamental design using Matlab. Dr. Naik concluded the session by highlighting the different progression happened in locomotives over the past century at the Indian and the global level.
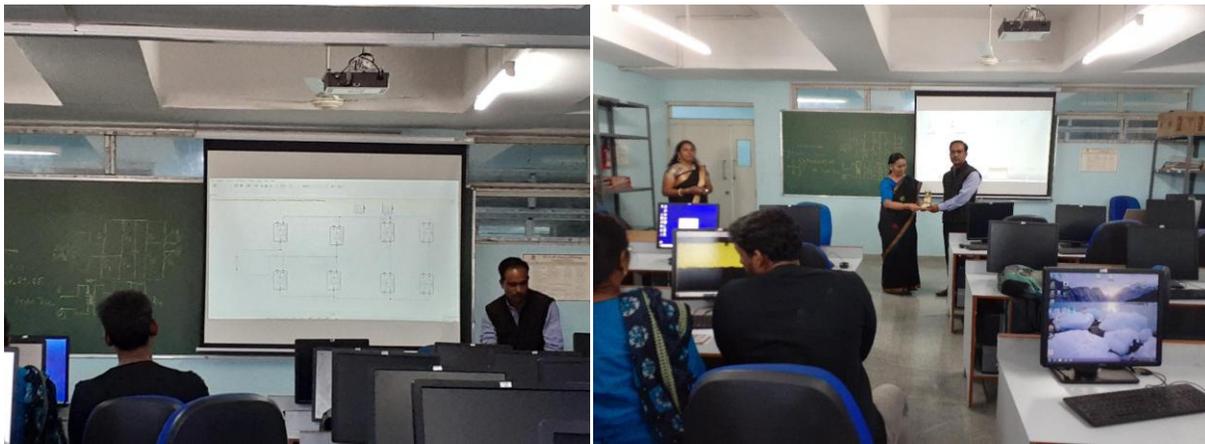

Dr SanjeevNaik, Specialist, L&T Technology Services, Bangalore

Day 3: 22ⁿᵈ January 2020

Forenoon Session: 9: 30 am to 12:45 pm

Dr. S Sudalai Shunmugam started the session explaining the pollution flashover phenomenon and the block out reported in the Indian power system. Further, he explained the measures taken by Central Electrical Authority (CEA), the pollution mapping carried out throughout India by Central Power Research Institute (CPRI) and Power Grid Corporation of India Ltd (PGCIL). He also showcased the high voltage insulators, the parameters of the insulator which play an influential role in pollution flashover and the difficulty in achieving the data.

Mr. Shankar, CARES India, Bangalore introduced the R-Studio toolbox to the audience, the basic functionalities, the fundamentals of regression equation and correlation. The audience was trained for generating the regression equation and analyzing the statistical errors in prediction. The session got concluded by explaining the physical significance of the results and the learning gained by the analysis.
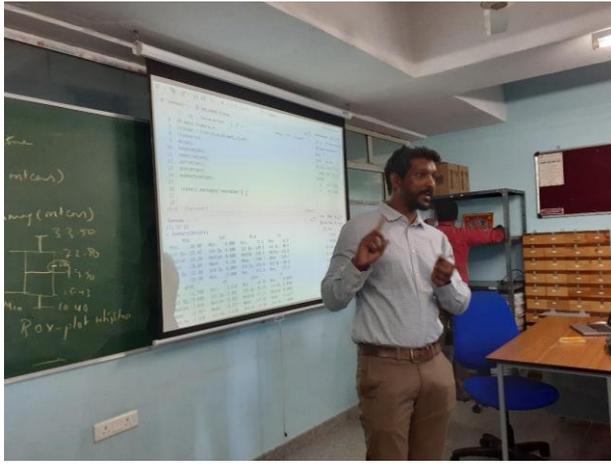
Mr. Shankar, CARES India, Bangalore

Day 3: 22nd January 2020

Afternoon Session: 1: 45 pm to 04:45 pm

Dr. Jyothi S Naik, Associate Professor, BMSCE, Bangalore, explained in brief about the simple and multiple regression analysis. The audience was trained on Jupyter Notebook. Detailed discussions were made on the importance of error analysis to be performed on the estimated output.


Dr. Jyothi S Naik, Associate Professor, BMSCE, Bangalore

Day 4: 23rd January 2020

Forenoon Session: 9: 30 am to 4:45 pm

Mr. Shashi Kumar, Senior Application Engineer (Forenoon Session) and Mr. Rakshith B S, Senior Application Engineer (Afternoon Session), CoreEL Technologies, Bangalore, trained the participants with the Matlab deep learning toolbox. The need for alexa.net and similar package files were discussed in brief. The hands-on training in image processing, pattern recognition and decision tree algorithm were provided. The session ended by discussing the importance of the confusion matrix.
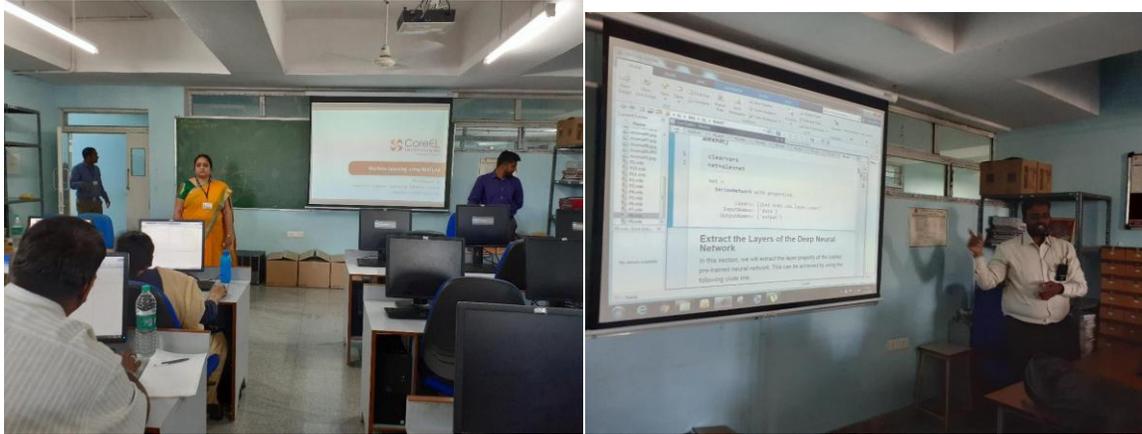
Mr. Shashi Kumar (R) and Mr. Rakshith B S (L) , CoreEL Technologies, Bangalore

Day 5: 24th January 2020

Forenoon Session: 9: 30 am to 12:45 pm

Dr. Chandrasekhar, Technical Lead, Automotive Business Division, TCS, Bangalore, started the session by explaining the different types of electric locomotives, the similarities and the differences. He also elaborated on the significance and work function of the Cell Monitor Board (CMB) and Advanced Device Assistance System (ADAS). He ended the session by explaining the threats caused by cyber-attacks on smart vehicles. He also highlighted the research key focus areas on the electric vehicle sector.

Dr. Chandrasekhar, Technical Lead, TCS, Bangalore

Day 3: 24ᵗʰ January 2020

Afternoon Session: 1: 45 pm to 04:45 pm

The industrial visit to '**Dubas Engineering Pvt. Ltd.',** Electronic City, Bangalore. provided first-hand exposure to the audience about the industrial UPS systems design and development, static frequency converters, grid-interactive systems, railway power systems and defense power systems. The audience gained knowledge about in-house testing, testing agencies in India and the standard to be maintained for the export of electrical products. The visit concluded after having an interactive session with Mr. Durga Prasad and Mr. Abbas, the founders of Dubas Engineering Pvt. Ltd.

FDP Participants at '**Dubas Engineering Pvt. Ltd.',** Electronic City, Bangalore

Faculty Development Program on "Applications in Electric Power Systems and Locomotives", held between 20ᵗʰ to 24ᵗʰ January, 2020 at BNMIT, Bengaluru.

We extend our heartfelt acknowledgements to the Management of BNMIT for providing an opportunity for the successful conduction of FDP and knowledge enhancement of young researchers.