



AICTE-ISTE sponsored one-week Online Orientation/Refresher Programme

(PHASE – III)

On

DEVELOPMENTS IN AI & ROBOTICS

Date of Orientation/ Reresher programe :19-05-2021- 26-05-2021

Collaborative Institutions : All India Council for technical Education& Indian Society for technical Education ICTE & ISTE

Session 1: Inauguration Ceremony

Dr. Nimisha Singh welcomed the Chief Guest Prof. Shyam Sundar Pattnaik, Director, NITTTR Chandigarh, Guest of Honor Prof. Vijay D. Vaidya, Executive Secretary, ISTE and Col. B. Venket, Director, Faculty Development Cell, AICTE, New Delhi. She then asked Faculty Development Program Coordinator Dr. Tejinderpal Singh Sarao, Head of Department, MechanicalEngineering to provide details about the program. Later, she asked Prof. Jyoti Bansal, Principal BFCET to extend a vote of thanks to the respected dignitaries.



Brochure of FDP on Recent Development in AI & Robotics

Prof. Shyam Sundar Pattnaik, Chief guest of the day inaugurated the event and shared about various ongoing NASA missions namely Mission Shakti, Apollo Program, Drake Equation, etc. In addition to these projects, he also mentioned designing of 6 feet tall robot by NASA for space exploration. He mainly guided the audience not to restrict the research work for limited laboratory facilities but to look upon computational facilities available to the academicians. Prof. Vijay D. Vaidya firstly congratulated BFCET team for their selection in organizing FDP after tough competition between institutions and then illustrated the role of faculty for execution of National Education Policy. He described a Trained Training Program specifically organized for faculty members in the research area of Machine Learning, Artificial Intelligence and Internet of Things (IoT). It would be a free online rigorous training for members shortlisted after the screening test. Col. B. Venket expressed his gratitude to all the organizing committee of BFCET. He was quite enthusiastic about the online program that allows hundreds of participants to join on a common platform.

Day 2: Thursday, May 20th, 2021

Resource Person-

1. **Dr. BS Pabla [NITTR, Chandigarh]**



2. Dr. Ashish Singla [TIET, Patiala]

3. Dr. Prashant Kumar [CSIR-CSIO, Chandigarh]

In first session Prof. (Dr) BS Pabla, Professor Mechanical Engineering department from NITTTR, Chandigarh was the expert. Prof. Pabla enlightened the audience by sharing the vision of NEP 2020 policy. He discussed about the major problems currently faced by the higher education system in our country. Expert shared that higher education commission of India (HECI) will ensure best practices in the educational sector. He discussed that HECI had four verticals National higher education regulatory council (NHERC), National Accreditation Council (NAC), Higher Education Grants Council (HEGC) and General Education Council (GEC). Expert discussed the functions of all four verticals in detail. He said that by year 2040, all higher education institutions (HEIs) shall aim to become multidisciplinary institutions, each of which will aim to have 3,000 or more students and a holistic and multidisciplinary education would aim to develop all capacities of human beings in an integrated manner. He explained that regulatory system of higher education will ensure the distinct functions of regulation, accreditation, funding, and academic standards. Then he answered the queries of participants and concluded the talk. In next Session Dr. Ashish Singla, delivered a talk on recent developments in AI and Robotics. He started his session with his ongoing collaborations for many projects with SUNY USA, UGAV Sweden, DRDO, IIT Ropar, CSIO and IIT Delhi. He explained the mathematical modelling with schematic diagram of cart pendulum system and discussed about the mobile robotics that is his ongoing project in collaboration with IIT Delhi. Third Session was taken by Dr. Prashant Kumar, Senior Scientist CSIR, Chandigarh. the topic for the third session was ethical issues in conduct of research and development. He started the session with what are ethics and the ethics are the moral principles to distinguish between right or wrong. Then he discussed about the classification of ethics that are fundamental ethics, personal ethics, societal ethics, regulatory ethics etc. Then he discussed about the top institutional causes for plagiarism in India that plagiarism in academics is a direct consequence of schooling, pressure to publish etc.



Day 3: Friday, May 21st, 2021 Resource Person –

- 1. Prof. Ashish Singla, TIET, Patiala**
- 2. Rishemjit Kaur, Senior Scientist, CSIR Chandigarh.**
- 3. Dr. Parvinder Singh, CUP, Bathinda**

The topic for the first session was Robotics in Healthcare delivered by Prof. Ashish Singla.. He started the talk by explaining two devices of Healthcare: Surgical Device and Assistive Device. He added his ongoing collaborations with CSIR CSIO Chandigarh for surgical device and University of Gavic, Sweden and DEBEL, Bangalore. Dr Singla discussed about the manipulators used for medical applications by showing basic mechanical structure of MMA modeled in inventor environment along with its prototype developed at CSIR-CSIO, Chandigarh. And also discussed about the exo-skeleton which means providing external support to the body parts of the elderly people so that they can have the better mobility. In last, he answered the queries of participants. The topic for the second session was ‘Can we teach morality to machines? Ethics of AI and Robotics delivered by Dr Rishemjit Kaur. First, she discussed about advanced technologies and their concerns. After that she talked about notion of artificial intelligence (AI) Dr. kaur also discussed the history of AI and Asimov’s law of robotics. As the session proceeded, she explained the privacy, surveillance in this digital world and privacy preserving techniques. The topic for the third session was “A journey from classical computing to quantum computing: Application in Robotics delivered by Dr. Parvinder Singh. Expert talked about how quantum mechanics (QM) was originated. After that he explained the concept of QM. Quantum algorithms have been discussed by Dr. Singh that run on a quantum computer and achieve a speed-up, or other efficiency improvements over any possible classical algorithm. the end of the session, Dr. Singh discussed about the Quantum machine learning: training the machine to learn from the algorithms implemented to handle data.

Day 4: Monday, May 24th, 2021

Resource Person-

- 1. Prof. Amandeep Kaur [CUP, Bathinda]**
- 2. Prof. Suril Shah [Professor, IIT Jodhpur]**
- 3. Dr. Gaurav Kumar [Director, MRCS]**



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Prof. Amandeep Kaur, delivered her session on 'AI & Robotics in industry'. She explained that AI is the combination of several technologies, which allow software and machines to sense, understand, act and learn on their own. She further explained that industrial production can achieve higher efficiency compared to human labour. Prof. Amandeep also discussed that AI can enable robots to perform tasks that a person would not do. She discussed about the direct benefits of machine learning and AI for manufacturing and the direct benefits were cost reduction, predicting remaining useful life, improved supply chain management. The topic for the second session was 'Robot motion planning' taken by Dr. Suril Shah. He started with the definition of Motion planning that it also known as path planning and it is a computational problem to find a sequence of valid configurations that moves the object from the source to destination. He explained that in robot motion planning two planning were there the first one was the path planning and the other was the trajectory planning. In last ten minutes, he cleared doubts of participants. The topic for the third session was open-source platforms and use cases for real time intelligent applications delivered by Dr. Gaurav Kumar. He started his session with the various open source platforms for real time intelligent applications that were GAZEBO, NODE-RED. Expert taken two sessions on this topic.

Day 5: Tuesday, May 25th, 2021

Resource Person:

1. **Dr. Gaurav Kumar, Director MRCS**
2. **Dr. Mala Kalra, NITTTR Chandigarh**
3. **Dr. Ritesh Kumar, Senior Scientist, CSIR Chandigarh**

Dr. Gaurav Kumar, Director MRCS addressed the audience on the topic "Open Source Platforms and Use Cases for Real Time Intelligent Applications-Part 2". It was a complete hands-on session. He demonstrated the procedure step by step to access openweathermap.org/api by searching in browser and subscribing to the respective API. Next, he discussed about Message Queuing Telemetry Transport (MQTT) which is a dynamic control and communication protocol. It is used to connect low power devices. He then described Cooja Simulator which is a free open source tool. It is test bed for connecting real sensors. He also briefed about Near Field Communication (NFC) and other protocols like AMQP, COAP, CAP, etc. Dr. Mala Kalra, NITTTR Chandigarh addressed the audience on the topic "Data Analytics using Python". She discussed about Data Science Life Cycle which includes Data Collection, Data Wrangling, Exploratory Data Analysis, Data Modeling and Optimization. She then explained the libraries of Python namely NumPy and Pandas. The expert



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then went for hands on session in Python programming language. She used Anaconda Navigator and Jupyter Notebook as Integrated Development Environment (IDE). She taught how to import the libraries of Python, read an input file and play with the array inputs. She trained the audience to make dynamic arrays using certain functions like arrange and random. At the end of the session, she clarified the doubts of participants in an effective manner. Next Dr. Ritesh Kumar, Senior Scientist at CSIR Chandigarh addressed the audience on the topic “Principle Component Analysis: Applications in Machine Learning”. Session 3 provided clear insight about applications of Principle Components Analysis (PCA) in machine learning field which are Data Visualization, Data Compression, Noise Reduction, Data Classification, Trend Analysis and FactorAnalysis.

Day 6: Wednesday, May 26th, 2021

Resource Person –

1: - Er Abhishek Gupta, R&D Head, Tevatron Technologies Pvt Ltd

2:- Mr. Amitesh Marwah, State Youth Coordinator, Art of living, Punjab

Er Abhishek Gupta delivered the expert talk on the topic “Challenges and opportunities for AI and Robotics start-ups”. He discussed about the artificial intelligence (AI), Machine learning (ML), deep learning (DL) and then about the challenges for deploying AI such as requirement of huge data set, product deployment. He said that different skill set in people (mathematics, robotics, computer science, physics, machine learning algorithm and physics) are required for start-ups of AI and Robotics. As the session proceeded, he described the need of cloud computing. At the end of the session, he discussed about the opportunities of AI & Robotics in various fields such as in military, agriculture. Mr. Amitesh Marwah, delivered his talk on session ‘Healing from Breath through the art of living’. He initiated the talk by describing about Body, Breathe, Mind, Intellectual, Memory and happiness. He also added it is the only mind which oscillates between our past and future. Meanwhile, Mr. Amitesh Marwah invited Dr. Vikas Gautam. He told us the importance of Yoga and breathe and what is the science behind them. After that, he invited every participant to do breathing in-out yoga for 35-45 minutes so that it will shifts our energy level high. It was experienced that while doing meditation, we are completely in harmony with our emotions and moreover become aware our emotions. In the last session of the program, quiz took place from 2:00 p.m. to 3:00 p.m. At last, Dr. Tejinder Pal Singh Sarao, FDP coordinator thanked all members of organizing team, participants, resource persons, and management of BFGI for success of programme.