

SERB Karyashala High end Workshop **on** **Artificial Intelligence for Modeling** **and Control of Robotic Systems**

13 –19 July, 2024



sponsored by SERB, DST, Govt. of India

Coordinator:

Dr. Shihabudheen K V

Dr. Sudheer A P

Organized by



Department of Electrical Engineering &
Department of Mechanical Engineering
National Institute of Technology Calicut
NIT Campus P.O.,
Kozhikode ,Kerala– 673601

About Karyashala

Science and Engineering Research Board (SERB) a statutory body under the Department of Science and Technology, Government of India has inaugurated an Inter-Ministerial Initiative 'Accelerate Vigyan (AV) Scheme' to provide a big push to high-end scientific research and prepare scientific manpower which can venture into research careers and knowledge-based economy. AV aims to expand the research base in the country, with three broad goal consolidation/aggregation of all scientific training programs, initiating high-end Orientation Workshops, and creating opportunities for Research Internships. Under AV scheme, is an attempt to boost Research & Development in the country by enabling and grooming potential PG and Ph.D. level students by developing dedicated research skills in selected areas/ disciplines/fields through High-End orientation workshops 'KARYASHALA'. This will be especially important for those researchers who have limited opportunities to access such learning capacities/facilities/infrastructure.

About the Department

Electrical Engineering Department of NIT Calicut was established in 1961. The Department offers an undergraduate program in Electrical and Electronics Engg., post graduate programmes in Instrumentation & Control Systems, Industrial Power and Automation, High Voltage Engineering, Power System and Power Electronics as well as research programmes leading to Ph.D. Degree

About NIT Calicut

National Institute of Technology Calicut was founded as Regional Engineering College, Calicut in 1961. Set in a

picturesque at the foothills of the Western Ghats, it is located about 22 kilometers north-east of Calicut city. It is prestigious institute with a reputation for excellence at both undergraduate, postgraduate and research levels, fostering the spirit of national integration among the students and a close interaction with industry. Members of the faculty have active collaborations with universities and elite institutions within and outside India for research and have active consultancy for industries. For details, see the website: www.nitc.ac.in

About Calicut

God's own country Kerala, has plenty of places that are of historical and tourist interest. Kozhikode also known as Calicut, is a city in the state of Kerala in southern Indian on the Malabar Coast. This region is a major knowledge hub of Kerala and it proudly hosts many institutions of national eminence such as NITC, IIMK, NIELIT, CWRDM, Kerala School of Mathematics, IISR etc. Calicut is well connected by rail/road/air to major cities in India. Apart from the serene beaches on the west and the high ranges of the Western Ghats on the east, there are many landmark places that attract attention of the tourists. NITC is 22 km off the city limits towards east and is located at Chathamangalam.

Course Objective

The primary objective of the workshop is to enhance participants' understanding of the applications of artificial intelligence (AI) in robotic systems. It aims to provide in-depth knowledge about various AI techniques and their practical implementation in the field of robotics.

In the present era, robotics its use much beyond manufacturing and extends to area like e- commerce, logistics, retail, healthcare, disaster management, smart homes and assistive technology among others.

Intelligent modeling and control techniques enable robots to achieve higher levels of precision, accuracy, and efficiency in their tasks. By incorporating advanced algorithms and AI-based approaches, robots can adapt to dynamic environments, optimize their movements, and make informed decisions, leading to improved performance and productivity. With the ability to perceive and analyze sensory data, robots can dynamically adjust their control strategies, ensuring optimal responses to changing scenarios. This flexibility enables robots to operate in diverse environments and perform a wide range of tasks efficiently. By leveraging AI algorithms, robots can perceive, interpret, and understand their surroundings, enabling them to make real-time decisions based on the available data. This autonomy is particularly valuable in complex and dynamic environments where robots need to navigate, plan, and execute tasks independently.

Realizing the need of the time, the present workshop is aimed to give lectures and training on machine learning, deep learning techniques for efficient modeling and control of robotics systems such as drones, wheeled mobile robots and flexible links. The participants will be exposed to the basics and fundamentals behind the robotic theory with intelligent algorithms.

Topics covered:

This course is designed to provide detail overview of fundamentals of robotic modeling and control including kinematics and dynamics, control and motion planning and its industrial applications using artificial intelligent techniques.

- Fundamental mathematics for robotics and AI
- Introduction to Dynamics and Intelligent modeling
- Software based modeling (CAD)
- Overview of AI and its applications in robotics
- Deep learning and neural networks for robotics

- Computer vision techniques for robotic perception
- Sensor fusion for integrating data from multiple sensors
- Object recognition and tracking in robotics
- Path planning and obstacle avoidance
- Internet of Robotic Things (IoRT)
- Python/Matlab/Robotic Operating System (ROS) Programming Language during Lab Session
- Hands-on Training & Lab visit
- Industrial visit

Course Outcomes

On completion of this course, participants are expected to be capable of understanding the basics of artificial intelligence how they can be used, analyse in robotic modeling and control. Participants will get exposure to the development of robotic systems and control with its software.

Resource persons

All the sessions will be handled by faculty experts from IIT/IIIT/IIST/NITs and experts from leading Academic /R&D/Industry.

Who should attend?

The program is meant to support motivated PG and Ph.D. level students, who are having a strong willingness to get excellence in their scientific and engineering research pursuits.

The applicants should produce a declaration form along with “No Objection Certificate (NOC)” from the

institute for allowing their student to undergo training in the workshop, if selected.

How to apply

Declaration form along with NOC in the prescribed format duly filled up in all respects, should reach the coordinator through google form <https://forms.gle/B4uomJNRzdKq9mLm6> before the last date.

Important dates:

Last date (Application)	26.06.2024
Selection List by E- mail	27.06.2024

Note:

- No participant fees will be collected. Participants are limited to 25
- TA will be provided as per GOI rules
- Accommodation will be provided in hostel guest rooms subjected to availability.
- 100% attendance is compulsory.

For query contact:

Mr. Jyothish Sebastian, Research Scholar, EED.

Email: roboticcoursenitc@gmail.com

Mob: 8301852448