INTRODUCTION TO ROBOTICS

MULTI-FACULTY

TYPE OF COURSE : New | Core | UG/PG
COURSE DURATION : 12 weeks (20 Jul' 20 - 9 Oct' 20)
EXAM DATE : 18 Oct 2020

INTENDED AUDIENCE : Undergraduate/graduate students interested in robotics

COURSE OUTLINE :

This course is a bridge-course for students from various disciplines to get the basic understanding of robotics. The mechanical, electrical, and computer science aspects of robotics is covered in this introductory course.

ABOUT INSTRUCTOR :

Prof Asokan T is a Professor in the department of Engineering Design and currently the Head of the Department. He has more than 25 years of professional experience in teaching and research. He has been teaching the course on Functional and Conceptual Design for the last 10 years for the undergraduate students. He is active in the design and development of products and has more than 18 patents filed/granted in India and abroad.

Prof Krishna Vasudevan is a professor in the department of electrical engineering at IIT Madras, with more than 25 years of professional experience. His area of specialization is drives and controls.

Prof. Ravindran is Mindtree Faculty Fellow and a professor at the Department of Computer Science and Engineering, and head the Robert Bosch Centre for Data Science and AI at IIT Madras. He has more than 15 years of teaching and research experience. His areas of expertise are reinforcement learning, machine learning and data science.

COURSE PLAN :

Week 1**:** Introduction to robotics- History, growth; Robot applications- Manufacturing industry, defense, rehabilitation, medical etc., Laws of Robotics

Week 2**:** Robot mechanisms; Kinematics- coordinate transformations, DH parameters

Week 3**:** Forward kinematics, Inverse Kinematics

Week 4**:** Jacobians, Statics, Trajectory Planning

Week 5**:** Actuators (electrical)- DC motors, BLDC servo motors

Week 6**:** Sensors , sensor integration

Week 7**:** Control ? PWM, joint motion control, feedback control

Week 8**:** Computed torque control

Week 9**:** Perception, Localisation and mapping

Week 10**:** Probabilistic robotics, Path planning, BFS; DFS; Dijkstra; A-star; D-star; Voronoi; Potential Field; Hybrid approaches

Week 11**:** Simultaneous Localization and Mapping

Week 12**:** Introduction to Reinforcement Learning