



RCETECAC04 - Robotics and its Applications

Course outcomes:

- Explain the concepts of robots in terms of classification, specifications and coordinate systems, along with the need and application of robots.
- Examine different sensors and actuators used in Robotic Applications.
- Solve the kinematics and dynamics of motion for robots
- Explain navigation and path planning techniques along with the control architectures adopted for robot motion planning.
- Describe the recent research trends in the field of Robotics.

Syllabus:

UNIT I

Foundation for Beginners

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Introduction - brief history, definition, classification, specification and need based applications; Robot Components, Robot Anatomy, Robot Coordinates, Robot Specifications, Social and ethical issues, Applications.

UNIT II

Building Blocks of a Robot

Actuators-Types of electric motors -DC, Servo, Stepper motor, Sensors-classification of Sensors- Sensors for localization, navigation, obstacle avoidance and path planning in known and unknown environments.

UNIT III

Robot Kinematics and Dynamics

Robot kinematics - Homogeneous Transformation Matrices - Kinematics Equations –Denavit-Hartenberg Representation of Forward Kinematic Equations of Robot.



UNIT IV

Navigation ,Path Planning and Control Architecture

Mapping & Navigation –SLAM-Full SLAM and Online SLAM – SLAM Applications, Robot Control Architectures-Deliberative, Behaviour based control and Hybrid Control.

UNIT V

Research Trends in Robotics

Tele-robotics and Virtual Reality, Micro Robots, Nan robots, Cognitive robotics.

Reference Text Books:

1. Saeed. B. Niku, Introduction to Robotics, Analysis, system, Applications, Pearson educations, 2002
2. Craig, J. J., Introduction to Robotics: Mechanics and Control, 2nd Edition, Addison-Wesley, 1989.
3. K.S. Fu, R.C. Gonzalez and C.S.G. Lee, Robotics: Control, Sensing, Vision and Intelligence, McGraw-Hill, 1987.
4. Ronald C. Arkin, Behavior-based Robotics, MIT Press, 1998.