

NIRMA UNIVERSITY

Institute:	Institute of Technology, School of Technology
Name of Programme:	Minor in Industrial Automation (Inter-disciplinary) Offered by BTech in Electronics and Instrumentation Engineering.
Semester:	VII
Course Code:	4EI301IE25
Course Title:	Robotic in Automation (Except Mech)
Course Type:	Elective Course -II under Minor (Interdisciplinary)
Year of Introduction:	2024-25

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Course Learning Outcomes (CLOs):

At the end of the course, the students will be able to –

1. determine the basic components of autonomous robot (BL2)
2. describe properties of robotic hardware useful in robot automation (BL2)
3. interpret programming methods for robot in automation (BL3)
4. analyze robot control for decision making in automation. (BL4)

Unit	Contents	Teaching hours (Total 45)
Unit-I	Introduction Fundamental of robots, components of a complete robot, Fundamental concept of robotic strategies in automation.	03
Unit-II	Robot peripherals Overview of sensor classification, classification and operation of tactile and other various sensors, interfacing with electrical actuators, vision sensors in robotics, sensing devices for automated inspections, various motion control peripherals, implementations of encoders in various industrial automation.	10
Unit-III	Robot programming in automation Methods of programming, robot program as a path in space, motion interpolation, capabilities of robot programming techniques, robot language structure, computation and operation for program control, programming commands, LISP programming in the factory.	08
Unit-IV	Robot control in automation sequence and programmable controller for automation, simulation of robot control system, working of automated guided vehicle in automation industries, automated storage system, introduction to RPA (robotic process automation) technology, case study of robotic application in various automated processes.	08

Unit-V	Intelligent automated systems	08
	Introduction to artificial intelligence in robot-based automation, reasoning about robot motion control, path planning implementation, case study for unmanned autonomous mobile robot system, multi-agent based robotic control system and its applications in industrial warehouses, automated system for all robots in practice.	
Unit-VI	Robot in industries	08
	Robot machining, material handling and palletizing, robotic inspection system, robot manufacturing cell, use of robots in automotive industries, welding and spray-painting applications, robot for industry assembly line, case study of robots in various processing industries.	

Self Study:

The self -study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Tutorial:

Tutorial work will be based on above syllabus with minimum 10 tutorials to be incorporated.

Suggested Readings/ References:

1. Mikell Groover, *Industrial Robotics*, McGraw hill education.
2. Alok Mani Tripathi, *Learning robotic process automation*, Packt Publishing.
3. R.K Rajput, *Robotics and industrial automation*, S. Chand Publishing.
4. A. K Gupta, *Industrial automation and robotics*, Mercury Learning and Information

Suggested List of Tutorials:

Sr. No	Title
1.	To analyze motor sequence using motor controller
2.	To exemplifying the working of encoder sensor and its relevant numerical
3.	To classify and compare various sensor types used in robotics
4.	To study robotic programming for applications
5.	To analyze the implementation of vision sensors in robotics as a case study
6.	To understand a simple automated guided vehicle (AGV) based control system
7.	To determine path planning for mobile robots
8.	To analyze motion interpolation techniques in robot programming
9.	To study the role of robots in modern automotive assembly lines
10.	To make flow chart for intelligent robot system in industry