

Mobile Robotics

Code EE-877	CreditHours 3-0
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CourseDescription

The applications of Autonomous system in service and field robotics are rapidly growing with the advancements in perception sensors and deep learning algorithms. These systems range from indoor wheeled mobile robots to unmanned aerial vehicles. Such systems interact with the environment through actuators and execute desires missions using sensors and interpretation/ understanding of environment. The course covers aspects of mobile robotics modeling, state estimation and control, thus enabling students to pursue research in essential domains relevant to the development of mobile robotics platforms.

TextBook:

1. Mobile Robotics: Mathematics Models and Methods, by Alonzo Kelly, Illustrated Edition 2011, Cambridge University Press ISBN 13: 9781107031159 -

ReferenceBook:

1. Introduction to Robotics by John. J. Craig, Pearson Publisher 3rd Edition 2004. ISBN. 0201543613

Prerequisites

Nil

ASSESSMENT SYSTEM FOR THEORY

Quizzes	15%
Assignments	10%
MidTerms	30%
ESE	45%

TeachingPlan

Week No	Topics	LearningOutcomes
1	Introduction	CourseOutline,objectives,teachingplan,assessment method, conceptsreview
2-6	Dynamic Model and Control of WMR	Mobile Robotics Introduction Frame descriptions, transformations and Vehicle Kinematics Longitudinal Dynamic Model and Control of WMR Lateral Dynamic Model of Control of WMR Linearization of WMR Models Probability and Random Processes
7-8	State Estimation	State Estimation Techniques Inertial and Positioning Sensors
9	MIDTERMEXAM	
10-12	Sensor Fusion	Global Positioning System Sensor Fusion using Kalman Filter and Extended Kalman Filter Trajectory Planning for Mobile Robots
13-17	Motion Planning	Global Motion Planning Algorithms Behavioral planner and Local Motion Planning Algorithms Introduction to Computer Vision and Machine Learning for Autonomous Vehicles
18	FINALEXAM	