WM9RT-15 Autonomous Mobile Robots

27/28

Department
WMG
Level
Taught Postgraduate Level
Module leader
Paolo Villella
Credit value
15
Assessment
100% coursework
Study location
University of Warwick main campus, Coventry

Description

Introductory description

This module introduces the students to the technologies enabling mobile robots to navigate autonomously. It includes locomotion methods such as wheeled and legged, along with probabilistic algorithms used for path planning and decision-making in uncertain environments. Also the integration of sensors for navigation and mapping, and Simultaneous Localization and Mapping (SLAM).
When this module is delivered on any overseas programme, it is delivered in a 2-weeks block rather than over 4 weeks.

Module aims

This module aims to equip students with knowledge of locomotion, probabilistic robotics, sensor integration, sensor fusion, Simultaneous Localization and Mapping (SLAM), and autonomous decision-making in service robots. Enabling students to design and implement reliable autonomous robots capable of navigation in real-world environments beyond the factory.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be

covered. Actual sessions held may differ.

Locomotion of mobile robots
Probabilistic robotics
Sensor fusion
Simultaneous Localization And Mapping (SLAM)
Autonomous decision-making in service robots

Learning outcomes

By the end of the module, students should be able to:

- Critique locomotion techniques for autonomous robots for various environments .
- Apply conceptual probabilistic robotics, including path planning, uncertainty, and sensor fusion for autonomous navigation .
- Independently select and integrate sensors into autonomous systems to enable navigation, mapping, and environmental interaction .
- Implement Simultaneous Localisation And Mapping (SLAM) for real-time mapping and localisation in dynamic unpredictable environments.

Indicative reading list

Reading lists can be found in Talis

Specific reading list for the module

Subject specific skills

Analysis and design of mobile robot systems
Simulation of wheeled mobile robots

Transferable skills

Problem solving
Critical thinking
Team working

Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (50%)
Total	40 hours

Type	Required
Seminars	10 sessions of 1 hour (25%)
Online learning (independent)	10 sessions of 1 hour (25%)
Total	40 hours

Private study description

Literature review, recorded lectures, review

Costs

Category	Description	Funded by	Cost to student
IT and software		Department	£0.00

Assessment

You must pass all assessment components to pass the module.

Assessment group A

	Weighting	Study time	Eligible for self-certification
Assessment component			
Assessment 1: Individual portfolio	30%	18 hours	Yes (extension)
Implementation of real-time mapping for a robotic application.			
Reassessment component			
Assessment 1: Individual portfolio			No
Development of sensor fusion algorithm for autonomous navigation.			
Assessment component			
Assessment 2: Individual report	70%	42 hours	Yes (extension)
Discussion on different localisation and sensor technologies with references for a robotic application.			
Reassessment component			

	Weighting	Study time	Eligible for self-certification
Assessment 2: Individual report			No

Implementation of localisation and sensor techniques for a mobile robot.

Feedback on assessment

Individual written feedback

Availability

There is currently no information about the courses for which this module is core or optional.