Guia docent
205241 - AVP - Programació de Vehicles Autònoms

Última modificació: 19/04/2023

Unitat responsable: Escola Superior d'Enginyeries Industrial, Aeroespacial i Audiovisual de Terrassa
Unitat que imparteix: 707 - ESAII - Departament d'Enginyeria de Sistemes, Automàtica i Informàtica Industrial.

Titulació:
GRAU EN ENGINYERIA DE SISTEMES AUDIOVISUALS (Pla 2009). (Assignatura optativa).
GRAU EN ENGINYERIA DE TECNOLOGIA I DISSENY TÈXTIL (Pla 2009). (Assignatura optativa).
GRAU EN ENGINYERIA ELÈCTRICA (Pla 2009). (Assignatura optativa).
GRAU EN ENGINYERIA ELECTRÒNICA INDUSTRIAL I AUTOMÀTICA (Pla 2009). (Assignatura optativa).
GRAU EN ENGINYERIA MECÀNICA (Pla 2009). (Assignatura optativa).
GRAU EN ENGINYERIA QUÍMICA (Pla 2009). (Assignatura optativa).
GRAU EN ENGINYERIA DE DISSENY INDUSTRIAL I DESENVOLUPAMENT DEL PRODUCTE (Pla 2010). (Assignatura optativa).
GRAU EN ENGINYERIA EN TECNOLOGIES AEROESPACIALS (Pla 2010). (Assignatura optativa).
GRAU EN ENGINYERIA EN TECNOLOGIES INDUSTRIALS (Pla 2010). (Assignatura optativa).
GRAU EN ENGINYERIA EN VEHICLES AEROESPACIALS (Pla 2010). (Assignatura optativa).

Curs: 2023 **Crèdits ECTS:** 3.0 **Idiomes:** Anglès

PROFESSORAT

Professorat responsable: Morcego Seix, Bernardo

Altres:

METODOLOGIES DOCENTS

The theoretical part of the course is developed through lectures including theoretical sessions imparted with the aid of presentations. The applied part is developed with a project-based approach but adapted to the specific traits of the course.

OBJECTIUS D'APRENENTATGE DE L'ASSIGNATURA

The main objective of the course is to acquire a hands-on, panoramic view of the problems and (programmed) solutions in the control system of an autonomous vehicle.
Some aspects of this overview are treated in depth. Consequently, there are sub-objectives derived from the main one, which are: to create a functional ROS module in a complex software project, to distinguish and classify the problems in autonomous vehicle guidance and to deal with an introductory problem from other knowledge areas, such as computer vision, artificial intelligence or computer control.

HORES TOTALS DE DEDICACIÓ DE L'ESTUDIANTAT

Tipus	Hores	Percentatge
Hores grup gran	30,0	40.00
Hores aprenentatge autònom	45,0	60.00

Dedicació total: 75 h

CONTINGUTS

Module 1: Introduction to AV

Descripció:
1.Autonomous vehicles (definition, autonomy levels, examples, controversies)
2. General description of the AV Control Architecture
3. Sensors and actuators

Activitats vinculades:
1

Dedicació: 2h
Grup gran/Teoria: 2h

Module 2: Programming environment

Descripció:
4.Linux OS
5. ROS

Activitats vinculades:
2

Dedicació: 16h
Grup gran/Teoria: 1h
Aprenentatge autònom: 15h

Module 3: AV Problems and solution

Descripció:
6. Guidance problems
7. Navigation problems
8. Control problems

Activitats vinculades:
1,2,3

Dedicació: 57h
Grup gran/Teoria: 27h
Aprenentatge autònom: 30h

ACTIVITATS

1. Theory lectures

Descripció:
Exposition of the subject theory contents.

Objectius específics:
Knowledge transfer, creation of a conceptual reference frame, solving questions and generating interest about the subject.

Material:
Slide compilations and handouts at Atenea
General bibliography of the subject

Lliurament:
This activity is evaluated together with activity 2 and 3.

Dedicació: 6h
Grup gran/Teoria: 6h

2. Lab project

Descripció:
Students, in groups, follow the instructions to program one of the blocks that make up the control system of an autonomous vehicle. These sessions take place at the lab. A complete, functional program architecture of the autonomous vehicle is given and the objective is to add a new module to this architecture each group.

Objectius específics:
Proper application and programming of problem identification and solving.

Material:
Project instructions at Atenea
Simulation software (ROS)
Lab experimental platforms
Course handouts and notes

Lliurament:
Programs, working simulations and working experiments.

Dedicació: 55h
Grup gran/Teoria: 20h
Aprenentatge autònom: 35h

3. Final demonstration

Descripció:
Each group explains its project and carries out an experimental demonstration of the behavior of its programmed block.

Objectius específics:
Assess the knowledge acquisition of activities 1, 2.
Refine student assessment within group from the evaluation in activity 2.

Material:
Lab experimental platforms
Presentation assets

Lliurament:
Proper working of the programmed block.
Answers to the questions posed during the presentation.

Dedicació: 14h
Grup gran/Teoria: 4h
Aprenentatge autònom: 10h

SISTEMA DE QUALIFICACIÓ

Project assessment – planning: 25%
Project assessment – code development: 25%
Project assessment – presentation: 25%
Project assessment – demo: 25%

BIBLIOGRAFIA

Bàsica:
- Yurtsever, Ekim [et al.]. "A survey of autonomous driving: common practices and emerging technologies". IEEE Access [en línia]. 2020, vol. 8, p. 58443-58469 [Consulta: 02/11/2022]. Disponible a: https://ieeexplore-ieee-org.recursos.biblioteca.upc.edu/document/9046805.- Badue, Claudine [et al.]. "Self-driving cars: a survey". Expert Systems with Applications [en línia]. 2021, vol. 165, p. 113816 [Consulta: 02/11/2022]. Disponible a: https://www-sciencedirect-com.recursos.biblioteca.upc.edu/science/article/pii/S095741742030628X#bib1.