ECE 5553 (Approved): Autonomy in Vehicles

Course Description

Autonomy in the context of modern vehicles; cruise control, anti-lock brake systems (ABS), steering control/lane keeping; introduction to automated highway systems (AHS).

Prior Course Number: 753.02
Transcript Abbreviation: Autonomy in Vehcls
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Undergrad, Graduate
Student Ranks: Junior, Senior, Masters, Doctoral
Course Offerings: Spring
Flex Scheduled Course: Never
Course Frequency: Even Years
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 3.0 hr Lec
Expected out-of-class hours per week: 6.0
Graded Component: Lecture
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prereq: 3551, 5551, or 551, or Grad standing in Engineering.
Exclusions: Not open to students with credit for 753.02.
Cross-Listings:

Course Rationale: Existing course.

The course is required for this unit's degrees, majors, and/or minors: No
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001
Subsidy Level: Doctoral Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

General Information

Autonomy in the context of modern vehicles; cruise control, anti-lock brake systems (ABS), steering control/lane keeping; introduction to automated highway systems (AHS). Both technologies and algorithmic aspects are covered. The course will also review recent national
and international challenges and showcases including the DARPA Grand Challenges and the DARPA Urban Challenge.

Course Goals

Understanding and appreciating self-driving vehicles both on and off the road. Appreciating the effects of technological advancements and market forces
Using hybrid system control techniques for designing an autonomous system
Understanding the complexities of system integration, with multiple sensors and mobile entitities in structured and unstructured environments

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Understanding autonomy	2.0							
Review of the role of control in autonomy (Speed control, suspension control, integrated vehicle dynamics)	5.0							
Sensors and actuators	3.0							
Fusion of data from multiple sensors	3.0							
Data communication within the car	4.0							
Hybrid System Control	4.0							
Modeling driver intent	1.0							
Examples of autonomy, cruise control and A	3.0							
Autonomy related issues: lane departure warning, stability, GPS	3.0							
AHS and related coordination and control	3.0							
The DARPA Challenges	5.0							
Recent advances and project reviews	3.0							

Grades

Aspect	Percent
Homework	30%
Midterm	20%
Term project	20%
Final exam	30%

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
**	a	An ability to apply knowledge of mathematics, science, and engineering.
*	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
*	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.
**	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
	g	An ability to communicate effectively.
**	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
**	j	A knowledge of contemporary issues.

Course Contribution		College Outcome
**	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Notes or Comments

changed course abbreviation, prereqs, goals and topics to match university format.

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