Course Syllabus

CE 432 Robotics II (3-Credit)

Land Acknowledgement: *"We acknowledge the land that Fort Lewis College is situated upon is the ancestral land and territory of the Nuuchiu (Ute) people who were forcibly removed by the United States Government. We also acknowledge that this land is connected to the communal and ceremonial spaces of the Jicarilla Abache (Apache), Pueblos of New Mexico, Hopi Sinom (Hopi), and Diné (Navajo) Nations. It is important to acknowledge this setting because the narratives of the lands in this region have long been told from dominant perspectives, without full recognition of the original land stewards who continue to inhabit and connect with this land. Thank you for your attention and respect in acknowledging this important legacy."*

1. **Office Hours**: 8/28/2023 - 12/8/2023, Mon - Thu 2:20 - 3:20 pm in BH 601.

   Make an appointment if you need a face-to-face meeting outside office hours. (simply shoot me an email to check my availability).

   Lectures:

   Time: T and Th: 11:15 am – 12:40 pm (8/29/2023 – 12/7/2023)

   Location: BH570

2. **Course Overview**

This course focuses on the software/hardware for the development of robots. Students will work on multiple robot projects such as the ESP32-CAM robot, two-wheel balancing car, and real-time systems (FreeRTOS). Modern sensors and actuators will be introduced to students through lectures and labs. Tutorials and examples on joysticks, RFIDs, and strain gauges will be provided.

3. **Course Topics and Schedule. Please visit** www.yilectronics.com**, under the tag 'Teaching' to find the instructions, homework assignments, and other information.**

Week 1-4	ESP32-CAM Robot Programming/Design
Week 5	Sensors and Actuators
Week 6	3D Printing Workshop
Week 7-9	Joysticks and PCB Soldering of the ESP Robot Car
Week 10 - 12	A Two-Wheel Balancing Robot
Week 13	Fall Break

Week 14-15	Realtime System and FreeRTOS with ESP32
Week 16	Final Project Demonstration/Presentation

4. **Course Learning Outcomes (with associated ABET criteria):**

After completing CE432 students will be able to:

- Design power supply circuits for robots. (1, 2)
- Identify correct sensors and actuators for a robot. (1, 2)
- Design the software and the hardware of a robot arm or a robot car. (1, 2, 6)
- Design a feedback system using microcontrollers. (1, 2, 5, 6, 7)
- Perform product prototyping with PCBs. (1, 2)

5. **Engineering Program Student Learning Outcomes (ABET criteria)**
6. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
7. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural social, environmental, and economic factors.
8. an ability to communicate effectively with a range of audiences.
9. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
10. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
11. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.
12. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
13. **Prerequisite**

ENGR 431 or CE351 with a minimum grade C-.

7. **Textbook**

Rui Santos and Sara Santos, ESP32-CAM Projects. https://randomnerdtutorials.com/esp32-cam-projects-ebook/

Microchip, 8-bit AVR Microcontroller with 32K Bytes In-System Programmable Flash, 2015.

Other references:

http://yilectronics.com/Courses/CE432_RoboticsII/lectures.html

8. **Grading, Homework assignments, Quizzes, and Exams**

Homework assignments and quizzes 90%, project report/presentation 10%.

A: 93-100, A-: 90-92, B+: 87-89, B: 83-86, B-: 80-82, C+: 77-79, C: 73-76, C-: 70-72, D+: 67-69, D: 63-66, D-: 60-62, F: <60

Homework assignments are lab reports that you should upload to the website. (Instructions for how to do this will be available to you).

Quizzes will be done in class. I'll notify you 1 week prior to the day that has a quiz.

9. **Policies**

Regularly being tardy for lectures, leaving in the middle of lectures, or earlier from lectures is unacceptable without prior consent of the instructor.

Cheating or plagiarism will result in an automatic F grade in the course (so do your own homework and projects).

****"Fort Lewis College is committed to providing all students a liberal arts education through a personalized learning environment. If you think you have or you do have a documented disability which will need reasonable academic accommodations, and/or if you are a Veteran who may need services, please contact the Disability Services Office, 280 Noble Hall, 970-247-7383, disabilityservices@fortlewis.edu for an appointment as soon as possible."

Basic Needs Statement:

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their learning experiences is urged to contact Kate Suazo, *Professional Advocate and Case Manager*, for support (cmsuazo@fortlewis.edu; 970-822-8728).

FLC students may be eligible for SNAP benefits. Please contact Marissa Hunt, *Resource Center Manager* at Manna. 970-385-5095, ext. 3, or email: services@mannasoupkitchen.com.

In addition, the FLC Grub Hub is a student-led, food justice organization committed to serving students and their families by sharing free food for all. Please come visit the Grub Hub in their new location in the Student Union across from the post office to learn more.

Reach Out for Success Statement:

College students encounter setbacks from time to time. If you encounter difficulties and need assistance, it's important to reach out. Consider discussing the situation with an instructor, academic advisor, peer support office, or counselor. Learn about resources that assist with wellness and academic success at: https://www.fortlewis.edu/life-at-flc/student-services/student-affairs/student-affairs-home

If you or someone else is in immediate crisis, please call the local 24-hour crisis hotline (970) 247-5245, call the Colorado 24-hour crisis hotline (844) 493-8255, text "TALK" to 382555, or call the FLC Counseling Center during regular business hours (970) 247-7212.

Students as Parents Statement:

I am aware that it can be challenging to be a parent while enrolled in college courses and want to support parents to successfully pursue their education. If you are unable to attend class due to children's illnesses or unforeseen disruptions in childcare, please contact me.