ECE 439-Control Systems Laboratory
Department of Electrical and Computer Engineering
New Jersey Institute of Technology
Newark, NJ

Instructor: Prof. Abdullah Hossain
Email: arh24@njit.edu
Office Hours: Email me to set up virtual meetings.
Credits: 2
Duration: 4 hours
Time and Location: FMH 204A Thursday 6 – 10 PM
Course Pre-requisite: ECE 431

Course Description

The objective of ECE 439 is for participants to develop competence with the techniques and hardware used in embedded microprocessor closed loop control. To achieve this objective, a number of projects have been designed around a 775 DC Motor 12V 12000RPM, driven by an H-bridge using an Arduino Mega 2560.

Announcements

Please ensure that you read the announcements on Canvas. Canvas automatically emails you the announcements to your school email as soon as they are posted. In case of technical difficulties, emergencies, or class cancellations, I will post an announcement to that effect. I suggest that you connect your school email to your phone.

Participation

Real-time class attendance is important for learning. You need to participate in class discussions and answer questions. Ask questions in class so that everyone can benefit. If you have any more clarifications needed, email me to inform me that you wish to meet with me.

Grading and Course Policy

The grades will be assigned depending on how well each project demonstration is executed. You may work in groups of threes and fours. Reports are not always required; projects that require write-ups will be indicated in advance. However, all codes, data, outputs, schematics, etc., should be saved in a digital portfolio for final submission. Submissions will be done via email. The lab manual will be posted on Canvas along with all other relevant documentation. Although all software is installed on the lab PCs, students should utilize their personal PCs to do most of the coding. This will allow them to work off site as well. All other circuitry and boards will be provided. Demonstration of working code and hardware is a must and all experiments are equally weighted.

Course Outcomes

1. Students will recognize functionality and structure of hardware components used in closed-loop control systems.
2. Students will be able to design, implement hardware, and test a closed-loop feedback control system.
3. Students will be able to program an embedded microprocessor for use in a real time feedback control system.
4. Students will be able to make a technical presentation on the design of control system experiments, acquired data, and their analysis.

Outcomes	Satisfies Criterion 3 item
1. Hardware familiarization	a,e,k
2. Control System implementation	a,b,e,k
3. Programming embedded microprocessor	a,b,e,k
4. Presentation	c,g,k

Tentative Topics

1. Familiarization with hardware to be used.
2. Introduction to programming of embedded computer (Arduino).
3. Testing operation of I/O, devices, and sensors.
4. Precise control and driving of motor.