COMP 790-136
Embedded Intelligent Systems

Bulletin Description

This course discusses the literature on smart and connects systems – which includes research papers on mobile and embedded systems, sensing, control and actuation systems, autonomous and intelligent systems and cyber-physical systems.

Permission of the instructor is required to enroll into the course. This course has variable content and may be taken multiple times for credit.

General Course Info

Term: Fall 2018
Department: COMP
Course Number: 790
Section Number: 136
Time: T, 1:30 PM – 4:00 PM
Location: FB 008
Website: https://eisys.web.unc.edu/

Instructor Info

Name: Prof. Shahriar Nirjon
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Email: nirjon@cs.unc.edu
Phone: 919-590-6039
Web: http://www.cs.unc.edu/~nirjon/
Office Hours: By appointments (typically before and after the class).

Teaching Assistants

TBD

Textbooks and Resources

There are no specific text books for this course. The course uses research papers from top-tier conferences and journals as well as online tutorials on technologies related to the course. Course materials will be made available to the students prior to the class via the course webpage and/or Sakai.

Each student must bring his/her own lab supplies. This includes mainly three types of things: (1) An Arduino kit, (2) a soldering kit, and (3) miscellaneous ICs and electronic supplies that will be announced in class. Additionally, students may require to send their circuit design to a fabrication factory which has a small cost of manufacturing the PCB. Overall, the cost of all these supplies should not be $50-$80.

Course Description

The goal of this course is to learn about the advances in intelligent embedded systems. The course content mainly includes research papers on mobile and embedded systems, sensing, control and actuation systems,

autonomous and intelligent systems and cyber-physical systems. Each offering of this course has a different flavor. In this semester, we will study battery-less computing platforms and machine learning for resource constrained systems. There are several activities in the course:

- Lectures/Presentations: The instructor will deliver some of the earlier lectures. Each student will present at least one research paper in the semester (the actual number depends on the number of enrolled students and availability of time slots).
- Lab Exercises: There will be some lab classes where each student will implement simple circuits and program microcontrollers to control them.
- Home Assignments: For each paper discussed in the class, there will be a 1-2 page written assignment (synopsis or Q/As).
- Midterm Exam: An open-book exam on the research papers covered in the class.
- Final Exam: An open-book exam on all the research papers covered in the class.

Target Audience

Computer science graduate students of all levels are the target audience of this course. The scope of this course is broader than most graduate level courses offered in the computer science department. Any MS or Ph.D. student should be able to relate some part of the course contents to his or her own research area and will be able to combine his expert knowledge with the rest of the course to show a broader impact of his research in solving real world problems.

Prerequisites

This course does not have any formal prerequisites. In general, required background knowledge to understand a topic will be covered in class. However, it is expected that students have a basic understanding of electronics and circuits and have experience in some programming language. Having prior experience of programming any microcontroller platform (e.g. an Arduino) is a plus.

Goals and Key Learning Objectives

Students will learn key technologies and concepts that are driving the ongoing revolution of smart and connected systems. Students will learn to design an end-to-end system and will be familiar with existing hardware and software tools to implement the system.

Course Requirements

In the lecture/presentation classes, students will participate in the discussion. Students are required to read the assigned papers for the class and submit the corresponding home assignments – before coming to the class. During lab exercises, students will build a basic electronic circuit and program a microcontroller to control it. The instructor will explain the circuit prior to the lab. Each student is responsible for bringing his/her own lab supplies.

Key Dates

- Home assignments are due prior to the beginning of each class.
- Presentation slides must be shared with the instructor at least 3 days before the class so that the instructor can provide his feedbacks.
- Midterm exam will be in late October.
- Final exam will be on the scheduled date by the university.

Grading Criteria

Item	Percentage
Class Participation	10
Labs	20
Home Assignments	20
Presentations	20
Mid-term Exam	15
Final Exam	15

Course Policies

- Attendance is mandatory.
- Late submissions of assignments and labs are not allowed unless an extension is given beforehand.
- Student presentations cannot be rescheduled.

Honor Code

Students are allowed to collaborate on labs, assignments and presentations to brainstorm together and challenge each other. Books and online resources are allowed for learning and for reference purposes. Any written material, software and hardware developed by a student must be their own contribution. A student must cite any work that is not their own but has been used in the project or assignments.

Course Schedule (always check course webpage for an up-to-date schedule)

Date	Class 1	Class 2
08/20	Lecture – Introduction	Lab – Introduction
08/27	Presentation 01	Lab 01 – Arduino Digital I/O
09/03	Presentation 02	Lab 02 – Arduino Analog I/O
09/10	Presentation 03	Lab 03 – Bread Boarding (LEDs)
09/17	Presentation 04	Lab 04 – Schematic (LEDs)
09/24	Presentation 05	Lab 05 – PCB (LEDs)
10/01	Presentation 06	Lab 06 – Bread Boarding (Project)
10/08	Presentation 07	Lab 07 – Schematic (Project)
10/15	Presentation 08	Lab 08 – PCB (Project)
10/22	Presentation 09	Lab 09 – Soldering Kit Practice
10/29	Presentation 10	Lab 10 – Project
11/05	Presentation 11	
11/12	**Mid-Semester Exam and PCB Ordering Deadline**	
11/19	Presentation 12	
11/26	Presentation 13	
12/03	Presentation 14	
TBD	**Final Exam**	

Disclaimer

The professor reserves to right to make changes to the syllabus and the schedule. These changes will be announced as early as possible.