CS 390N: Internet of Things

College of Information and Computer Sciences, UMass Amherst

Winter 2017

Instructor:

Sunghoon Ivan Lee (email: silee at cs)

Class:

TBD

Office hours:

TBD

Course Description:

We are living in a world where everyday objects, such as smartphones, cars, TVs, and even refrigerators, are becoming smarter and constantly connected to each other to build, operate, and manage the physical world. This emerging paradigm, namely the Internet of Things (IoT), has great potential to impact how individuals live and work by providing a source of innovative decision making.

The design of the IoT, which is defined as "an internetwork of physical items – each embedded with sensors – that are connected to the Internet", requires the understanding of embedded electronics, software, sensors, network, and data analytics. To prepare our students as forerunners of this future, this course will introduce a wide range of topics in the broad areas of IoT, and provide hands-on experiences via a series of exciting projects.

Credit:

3 credits

Course Objectives:

- To understand how sensors and embedded systems work
- To understand how to program on embedded and mobile platforms including ESP8266 and Android
- To understand how to communicate with other mobile devices using various communication platforms such as Bluetooth and Wi-Fi.
- To understand how to make sensor data available on the Internet.
- To understand how to analyze and visualize sensor data
- To understand how to work as a team and create end-to-end IoT applications.

Course Contents:

- Fundamentals of electronics
- Analog/digital sensors

- Input & outputs in embedded systems
- Memory management in embedded systems
- Embedded software design
- Networking in IoT
- Human in the loop -- wearable technologies
- Cloud computing & data visualization

Course Components:

1. Lectures
   o A lecture will be provided once every week.
   o Instructional materials will be presented.
2. Labs
   o A lab class will be provided once every week.
   o A total of six labs with increasing levels of difficulty will be provided throughout the semester.
   o Students will work in a group of two throughout the entire semester.
   o Each lab group needs to demonstrate the completion of the lab work by the designated deadlines.
3. Midterm Exam
   o The midterm exam will be based on the lecture/lab materials covered up to that point.
4. Final Project
   o Students will be working on the final project for approximately 4 weeks.
   o Students must submit a proposal for their final project and receive approval from the instructor.
   o Students will demonstrate their final project at the showcase scheduled at the end of the class.
   o Students must create a 3-minute video clip describing the objectives, methods, and results of their projects.
   o Outstanding projects will be awarded for the Best Demo, Best Project, and Best Presentation Awards.

Course Grading:

The final grade for this course will be based on the following assessment components. Note that percentages may change according to number and type of assignment.

Component	Percentage
Attendance	10%
Labs	40%
Midterm Exam	20%
Final Project	30%

Attendance:

Student participation in lab sessions is vital to the success of this course. Participation accounts for 10% of the overall course grade. Students are expected to attend all lab sessions (lectures are not mandatory).

If you miss one lab, you will receive 5% for the participation grade, i.e. deduction of 5% for the entire grade. If you miss more than one lab, you will receive 0% for the participation. Excused absences will be permitted, if the student can provide satisfactory evidence to the instructor to substantiate the reason for absence (e.g., injury, illness, etc.).

Groups

Each lab group should be made up of two students, and all the lab work need to be completed as a group. Lab performance will be evaluated as a group. Students must describe the contribution of each person for each lab work, which may be reflected on the lab evaluation.

Lateness Policy:

Full credit will be given for assignments turned in on the due date, 80% credit for one day late, and 50% credit for two days late. NO credit will be given after two days late.

Accommodation Statement:

The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning disability on file with Disability Services (DS), you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify me within the first two weeks of the semester so that we may make appropriate arrangements.

Academic Honesty Statement:

Since the integrity of the academic enterprise of any institution of higher education requires honesty in scholarship and research, academic honesty is required of all students at the University of Massachusetts Amherst. Academic dishonesty is prohibited in all programs of the University. Academic dishonesty includes but is not limited to: cheating, fabrication, plagiarism, and facilitating dishonesty. Appropriate sanctions may be imposed on any student who has committed an act of academic dishonesty. Instructors should take reasonable steps to address academic misconduct. Any person who has reason to believe that a student has committed academic dishonesty should bring such information to the attention of the appropriate course instructor as soon as possible. Instances of academic dishonesty not related to a specific course should be brought to the attention of the appropriate department Head or Chair. Since students are expected to be familiar with this policy and the commonly accepted standards of academic integrity, ignorance of such standards is not normally sufficient evidence of lack of intent (http://www.umass.edu/dean_students/codeofconduct/acadhonesty/).