TCN2720 - Introduction to IoT

Three Credits, Four and a half hours, Engineering Topic.

Instructor: Dr. Yu Du.


Specific Course Information:
This is an undergraduate-level course that introduces the fundamental concepts of the Internet of Things (IoT) and motivates the study of IoT. The course touches on every aspect of IoT including devices, data collection, networking, cloud computing, risks, and opportunities in the IoT context. It also considers the motivation for investing in IoT by providing various domains (e.g., energy, medical, transportation, manufacture, etc.) where IoT devices are heavily used. Topics covered include the fundamental components of IoT systems; sample application domains for IoT; data collection through sensors, actuators, and embedded devices; networking for IoT; cloud computing and storage for IoT; programming IoT devices; data analytics; risks, privacy and security issues; and benefit and opportunities.

This course will consist of 8 modules and 4 projects. Module availability is open. Projects will be completed in individually and in groups and will be due approximately every 1-4 weeks depending on the project. Projects will be evaluated within 3 weeks of submission. Communication will take place primarily via the official email and professor announcements. At the end of the course, students would have learned the key concepts in IoT and the driving power behind the fast IoT adaptation. Students would have experienced some hands-on activities as well.

Specific Goals for the Course

a. Specific outcomes of instruction
Upon successful completion of this course, the student will:
1. review the getting started page located in the course modules.
2. introduce yourself to the class during the first week by posting a self-introduction in the appropriate discussion forum.
3. take the practice quiz to ensure that your computer is compatible with the learning management system, Canvas.
4. interact online with instructor and peers.
5. review and follow the course calendar.
6. log into the course at least 3 times per week.
7. respond to discussion boards, blogs, and journal postings within 3 days.
8. respond to emails within 2 days.
9. submit assignments by the corresponding deadline

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.
In this course the student will have to show
(a) an ability to apply knowledge of mathematics, science, and engineering (N/A)
(b) an ability to design and conduct experiments (simulations), as well as to analyze, interpret data (N/A)
(c) an ability to design a system, component, or process to meet desired needs (N/A)
(d) an ability to function in multi-disciplinary teams (N/A)
(e) an ability to identify, formulate, and solve engineering problems (homework) (N/A)
(f) an understanding of professional and ethical responsibility (N/A)
(g) an ability to communicate effectively (through project reports) (N/A)
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context (N/A)
(i) a recognition of the need, and an ability to engage in life-long learning (N/A)
(j) a knowledge of contemporary issues (N/A)
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (N/A)
(l) a knowledge of probability and statistics (N/A)

**Brief list of the topics to be covered**

1. Introduction to IoT
2. IoT Network Architecture and Design
3. The "Things" in IoT
4. Connecting Smart Objects
5. Programming the IoT Devices/ Programming the IoT Devices
6. Securing IoT
7. Data and Analytics for IoT
8. IoT applications in the real world: Manufacturing/ IoT applications in the real world: Utilities/ IoT applications in the real world: Smart and Connected Cities/ IoT applications in the real world: Transportation/ IoT applications in the real world: Public Safety

**GRADING:**

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<th>Course Requirements</th>
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<td>Assignments</td>
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<td>Discussion/Participation</td>
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<td>Quizzes</td>
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<td>Projects</td>
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<td>Exams</td>
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**Conversion of Numerical Grade to Letter Grad**

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