289C: Internet of Things: Introduction and Design
Spring 2019

Lectures room:	R 6:10pm-8:00pm Olson 217
	F 6:10pm-9:00pm Kemper 2161
CRN:	93057; 4 Units
Office Hours & Location:	TBD, Location TBD
Instructors (Co-teaching):	Aykutlu Dana & Saif Islam
E-mail address:	aykutlu@alumni.stanford.edu sislam@ucdavis.edu

Book(s):   "Internet of Things – From Research and Innovation to Market Deployment" Editors Ovidiu Vermesan, Peter Friess

"Designing for Internet of things", O'Reilly Publishing

"Internet of Things Principles and Paradigms", Editors Rajkumar Buyya, Amir Vahid Dastjerdi

Handouts (or class notes published on Web/Moodle), and a number of reference books for each topic.

Supplementary text: Gregory T. Kovacs, Micromachined Transducers Sourcebook

Grading:

Homeworks/Reading Assignments	20%
Midterms	30%
Laboratory	25%
Final exam – Project presentation	25%

Prerequisite / Co-requisite: Basic knowledge of C or Python programming languages,

Basic Electronics (analog and digital)

Course Description: This course introduces fundamental concepts in the Internet of Thing, a driving element in the ongoing digital transformation. The course will include introduction to Sensors, Embedded Systems, Networking Protocols for massively connected sensor/actuator networks. The course has a laboratory section with significant hands on work and a final project presentation based on the laboratory work.

Tentative Course Syllabus:

Week : 1
Course overview. Introductory concepts : IOT, Cloud Computing, Fog Computing, Networking, Security, Final Project Description

Week : 2
Sensors and Transducers. Applications of sensors: Scientific, Medical, Industrial and Consumer. Fundamental aspects of transduction: Noise, Detection limits, Dynamic range, Linearity.
Lab1: Analog Sensors

Week : 3
Microcontrollers for IoT Sensors: Embedded Systems, Resources and Processes, Power, Connectivity, Performance Interfacing Requirements,

Week : 4
Case Study: Arduino IDE and Sensor Interfacing
Lab2: Sensor and Actuator Interfacing

Week : 5 Networking and IoT: Layers, Protocols, IPV6, Connectivity (wired/wireless, Wi-Fi, cellular, ZigBee, LoRa, Bluetooth), Cloud and Fog computing, Security
Lab3: Bluetooth Connectivity of Sensor Interfaces

Week : 6
Programming tools, APIs, Python Programming, REST API

Week : 7
Case Study: Network Connected interfacing of Sensors

Week : 8
Application Domains and Scenarios
Lab4: Networked Sensing and interfacing

Week : 9
Final Project Presentations