# IAP 2018
Sensing for Resilience and Sustainability

This new IAP subject will teach how to design and build sensor systems for environmental measurement. A resilient community depends on knowledge of the environmental stressors it must cope with (e.g. storms, floods); that data is obtained from sensors. A sustainable community needs to measure the effectiveness of environmental mediation strategies, those measurements also come from sensors. Thus resilient and sustainable communities rely on
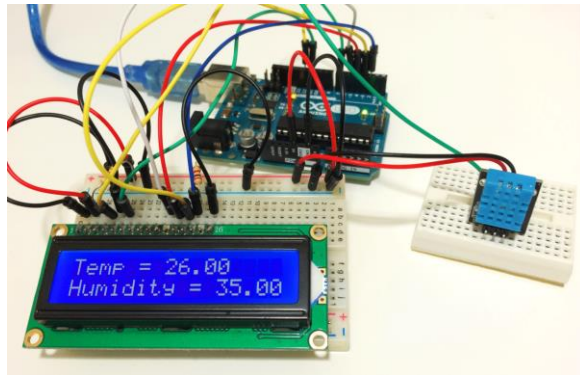
data from a variety of sensors embedded in or observing the environment. Whether you are analyzing data from existing sensors, building a sensor network from off the shelf parts, or designing a new sensor system, it is essential to have a good working knowledge of sensors and the electronics and software necessary to read, transmit and store sensor data. That is the focus of this subject. We will start with an electronics "boot camp" in which you will learn enough theory and practical knowledge to understand the electronics that underlie sensors and sensing systems. You will then learn about microcontrollers, how to interface sensors to them and how to use them as data loggers. Next the basic characteristics of all sensors, and the specific properties of the major types of sensors will be presented with plenty of hands-on demonstrations. You will then apply your knowledge to build and program a data logging sensor system from parts available in the lab and go measure something in the real world (outside) or within the built environment of MIT. Finally you will analyze your data and present it in a short written report. In this class you will learn:

1. Basic analog and digital electronics
2. How to use electronic test equipment and how to build and test simple circuits
3. Microcontroller (Arduino) architecture, programming and interfacing
4. Characteristics common to all sensors, how to read a sensor data sheet
5. Characteristics of specific sensor types (e.g. temperature, humidity, light)
6. Design of sensor data logging systems

This will be a one week intensive course that will meet for three hours in the morning and three hours in the afternoon for an entire week. There are no prerequisites and freshmen are encouraged to attend. Please bring a notebook to class. *Limit 16 students*

2.S975 Undergraduate Special Subject in Mechanical Engineering (New)

3 Units, P/D/F, Instructor: Dr. Thomas R. Consi (consi@mit.edu)

Monday Jan. 22, to Friday, Jan. 26 (5 days)   9am – 12pm, 1pm – 4pm (6 hours per day)

Location: MIT Sea Grant Teaching Laboratory, NW98-186, 12 Emily St., Cambridge

Photo Credit: http://www.circuitbasics.com/how-to-set-up-the-dht11-humidity-sensor-on-an-arduino/