***Title:*** The Internet of Things - Create your Internet Enabled Large Format Drawing Machine

***Dates of course:*** Either week is fine, first week is prefered.

***Instructors:*** Petra Bonfert-Taylor, Rich Crowley, Mark Franklin (coordinating instructor), Jane Reynolds, Dan Safford, Ben Servoz

***Intended audience:*** Open to anyone in the Dartmouth community, priority given to art students or students with a drawing project in mind. The idea is to create a meeting point between Art and Engineering.

***Prerequisites****:* No engineering or programming experience needed, willingness to learn electronics and the Python programming language.

***Narrative description of idea and what students will learn:***

It has become commonplace for devices to be connected to the Internet; the possibilities for novel Internet-connected devices are endless. Perhaps a US Mail mailbox that texts its owner when mail is delivered and sends a picture of its contents? Or maybe an activity monitor that allows TV viewing only after the viewer has gotten enough exercise? With possible applications ranging from practical to fun to whimsical, it is clear that this will be an area of intense innovation for some time.

This mini-course will guide students through building an internet-connected Drawing Machine they can keep for their own art projects. They will:

- discover Raspberry Pi
- learn the basics of Linux and command line
- learn the basics of the Python programming language
- wire circuits on a breadboard
- introduce the technologies that make these devices work with the Internet (HTML, HTTP, web browsers).
- provide hardware & software building blocks and guidance on putting them together

We will deliver most “lecture” type material via interactive slides (LCS) on the Raspberry Pis themselves.

We will measure Students’:

- Progress and understanding via the questions they ask and feedback they provide to questions we pose with Live Class Survey
- Success implementing the hands-on steps
- Feedback on the course via surveys during and after the course

***Rough outline of daily schedule:***

**Day 1:**

Wire simple circuit
Control from Linux
Learn Python basics
Control from Python
Stepper motor

**Day 2:**

Another stepper motor
Build drawing machine
Math & programming of movement through coordinate system

**Day 3:**

Wiring and programming servo motor for Pen up and down
Drawing with GCode & Turtle graphics
Tools & ideas for generating drawings

**Day 4:**

Drawing, practice & adjustments

***Resources required:***

All the items we would purchase are readily available, so we can postpone getting them until we know the number of students.

- Raspberry Pi and related equipment: estimate $100 per students (this equipment is given to the students)
- Various computer equipment (monitors, keyboards) were acquired from previous offerings
- Various Instrument Room-supplied existing equipment (loans) and inexpensive materials

***Facilities needed:*** M132 (ideal) or other lab or classroom for the week. Projects reside in the room for the week, so we lock the room after hours.

***Maximum class size:*** 12 to 15 students, we usually overbook a bit to account for some attrition before the class begins and after the first day.