An Introduction to Tangible Computing

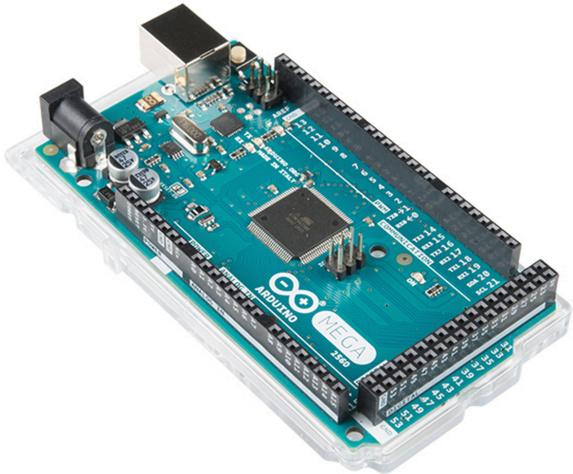
Lesson Plan

Level 7: Taught MSc in CS Masters

Tutor: Dr Timothy Neate

Context

- I am a post-doctoral researcher, interested in tangible computing
- Over the past 5-10 years simple, cheap micro controllers have become available to hobbyists
- I want to teach the basics of input (sensors) and output (actuators)
- I want to our students think critically about what computers can be (i.e., as more than just screens)
- This is loosely based on a class I gave (with others) last year to MSc students. This would be the first lecture of a module which extends this.



Lecture Overview

Duration: 3 hours

Number of students: 40-50

Lesson Aim: Students are expected to understand the core principles of tangible computing and develop simple hardware prototypes for input and output with a microcontroller.

Previous sessions: This is the introductory module. It is assumed that you have at least a small amount of programming experience.

Links to future sessions and assessment: Future sessions, and the assessment for this module, build off of the core concepts and skills learned in this session: tangible computing and microcontroller prototyping.

Resources: 10 Arduino starter kits (4/5 per group). Will be run in on the tables shown right.

Specific learning outcomes

1. **Recall** the general definition of a tangible computing system, **critique it** and contrast to current technology
2. **Demonstrate** the ability to choose the appropriate sensor or actuator for a given input/output modality
3. **Create** a tangible prototype which demonstrates how digital information affects physical output
4. **Create** a tangible prototype which demonstrates how physical action affects digital information
5. **Analyse** a current technology and ideate how it might benefit from tangible input or output

Approximate Time Plan

Time	Activity (Merged for brevity)
Before class	Students will read the "Radical Atoms" article to become familiar with tangible user interfaces. They will investigate tangible user interfaces further and create a post on Moodle briefly describing a tangible technology they have found.
0:00 - 0:20	In an open discussion, the students will discuss some of the technologies posted on Moodle.
0:20 - 0:50	The lecturer will give an overview of the different modes of input and output a tangible computing system might utilise. Students will provide input on examples of each.
00:50 : 01:00	Break
1:00 - 2:40	Over the next hour and a half (10 minute break in the middle with 'check-in'), the students will make two prototypes using Arduino, sensors and actuators. Lecturer and teaching assistant will circulate, help with specific issues and give feedback.
2:40 - 2:50	To conclude, will students discuss in their groups and reflect on "Perfect Red", from the paper they read before the session and think about how it could be made (theoretically) using the technology they have explored in the session.

Learning Theory Rationale

I aim to keep most of the theoretical learning of this lecture to pre-class activity and associated discussion to keep things as active as possible.

This can then be reiterated in the lecture-based part - to offer different learning styles.

In the practical aspects of the class, I aim to instil the things students have learned as they do the practical exercise through experimental learning.

In the reflective aspects of this class at the end and in the post-class exercise, I aim to get the students to reflect on the practical exercise they have just complete, in the broader more conceptual literature