Arduous Arduinos

How can we make useful things?
Before we begin...

- Is there a need?
- How do we fill this need?
- Is technology appropriate for this need?
Example: Pulse Ox

- Is there a need?
- How do we fill this need?
- Is technology appropriate for this need?
The pulse oximeter: how does it work?

Courtesy of Google.com. Used with permission.
The pulse oximeter

how does it work?
The pulse oximeter
how does it work?
How does it work?

- Shines light through a finger
- Measures light intensity
- Converts intensity into blood oxygen level
So what do we need?

- We need to shine a light through a finger
- We need to measure light intensity
- We need to display and record the collected data
- We need to convert intensity into blood oxygen level
Display and record?

- The world is complicated
- We can break complicated systems down into easier problems
- We can use same data for multiple projects
The pulse Oximeter
how we did it
So what do we need?

- We need to shine a light through a finger
light through a finger
how we did it
burn Through a finger
how We screwed up
So what do we need?

- We need to shine a light through a finger
- We need to measure light intensity
Measuring the light
how we did it
Measuring the light
how we did it
Excerpts from TAOS Inc. product spec sheets removed due to copyright restrictions.
See Programmable Light-to-Frequency Converters spec sheets TSL230R-LF, TSL230AR-LF, and TSL230BR-LF.

Measuring the light

how we did it
Measuring the light

how we did it
Measuring the light
how we did it
Measuring the light
how we did it
So what do we need?

- We need to shine a light through a finger
- We need to measure light intensity
- We need to display and record the collected data
graphing and storing
how we did it
graphing and storing
how we did it
graphing and storing
how we did it
void serialEvent (Serial myPort) {
    // get the ASCII string:
    String inString = myPort.readStringUntil('
');

    if (inString != null) {
        // trim off any whitespace:
        inString = trim(inString);
        // convert to an int and map to the screen height:
        float inByte = float(inString);
        inByte = map(inByte, 0, 1323, 0, height);
        inByte = inByte/60;
        // draw the line:
        stroke(255,0,0);
        strokeWeight(4);
        strokeJoin(ROUND);
        strokeCap(ROUND);
        line(xPos, height - inByte, xPos, height - inByte);

        // at the edge of the screen, go back to the beginning:
        if (xPos >= width) {
            xPos = 0;
            background(150, 150, 150);
        } else {
            // increment the horizontal position:
            xPos++;
        }
    }
}
graphing and storing
how we did it
So what do we need?

- We need to shine a light through a finger
- We need to measure light intensity
- We need to display and record the collected data
- We need to convert intensity into blood oxygen level
How do we get the blood oxygen level?

- Process the data!
- Conditional statements (if)
- Control statements (while, for)
- Translating the abstract problem into a logical one
How can I learn about programming?

- Websites (Processing, Python, C)
- Books (O’Reilly collection is free!)
- Ask a friend
Main Ideas

- Understand the problem
- Break down the problem
- Design each block
- Experiment!
Questions?

I can’t have possibly explained everything in the right way to everyone
SURPRISE!

Now you have to build the system