

MadMaker Challenge Course Overview

Week 0 - Teachers only

- Start here - Testing the various functions of edx (video, code snippets, uploading files)
 - Installing arduino and processing
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Week 1 - Challenge 1: Light it up

- **Sensors**
 - Survey
 - Arduino control flow, uploading
 - Integers and variables
 - **What can go wrong** - common errors & tips
 - **If Only**
 - If statements and conditionals
 - Button input from Esplora
 - If, Else if, Else
 - Speaker, making music
 - **Colours**
 - RGB LED & buttons
 - Primary colours
 - Number of colours possible with 3 bytes
 - Colour picker
 - Light spectrum
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Week 2 - Challenge 2: Processing

- **Processing**
 - Introduction to processing
 - Coordinates, Y-axis flipped in computer graphics
 - Shapes
 - Lines & midpoint equation
 - Fill and stroke
 - Colours - Grayscale, RGB, RGBA

- Colour mixer - *Esplora AND Processing*
 - Area of a circle
 - Turning equations into code
 - Circle radius - *Esplora AND Processing*
 - **Thresholds**
 - Thresholding, conditions
 - Microphone sensing and plotting
 - Detecting beats
 - Click fingers, click mouse (program the esplora mic to be a mouse)
 - Extension - tempo tapper
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Week 3 - Challenge 3: Sound in motion

- **Animate!**
 - Compound Operators
 - Logic - AND / OR
 - Bouncing ball - get ball to bounce in X
 - Bouncing ball - simplify using Logic
 - Bouncing ball - get ball to bounce in X & Y
 - Bouncing ball - change the colour mode
 - Making Animations
 - **Loop de loop**
 - Arrays and indexing
 - For loops
 - Looping - LED fade
 - Accessing arrays
 - Averaging an array
 - **Sound**
 - Adding the sound library
 - Frequency and Amplitude
 - Audio Visual Esplora - *Esplora AND Processing*
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Week 4 - Challenge 4: Lunar Lander

- **Rotate**
 - Acceleration into & Newtons 2nd Law, $F = ma$
 - Accelerometer coordinate system
 - Accelerometer printing values to serial

- Plotting acceleration - *Esplora AND Processing*
- Plotting acceleration activities - *Esplora AND Processing*
- Accelerometer challenge - RGB LED
- Accelerometer challenge - Screen Orientation - *Esplora AND Processing*
- **Lunar Lander**
 - Forces - gravity and thrust
 - Simulate ball bouncing
 - Rocket - adding gravity
 - Rocket - adding thrust - **trigonometry**
 - SPACEX rocket landing video inspiration
 - Make a controller - *Esplora AND Processing*