Digicrafters

Lesson Plan - Blue Kit

Brief description

Students use Arduino to control an LED. The final LED project demonstrates simple input control with a Potentiometer.

- **Duration:** 2 x 20 min, 1 x 40 min activities
- **Key Stage:** 3
- **Year level:** Early Secondary
- **Topics:** Energy & Change, Electricity, Circuits, Input and Output, Light, Colour Mixing, Diffusion, Control, Automation
- **Preparation:** 10 minutes – Provide a Blue Kit, an egg and a straw for each small group, and set up a demo glowing egg
- **Extensions:** Adapt the code so the LED responds to conditions of a Data Feed
- **Art / Science / Technology:** Design, build and decorate a data visualizer created with Arduino

Activity 1 – FLASH!

Whole class Introduce Activity 1 (5 min):

Show the Arduino board, and the IDE. Upload the built in sketch to demonstrate a flashing LED. Explain the acronym LED and show the circuit. Direct students to the Digicrafters Project Page for Blue Kit Activity 1 – FLASH!

Small groups Activity 1 (5 - 10 min): Use the Arduino board and IDE to create a flashing LED. Change variables in the Arduino IDE to control the LED's flash.

Whole Class Discussion (5 min): Discuss the FLASH! activity.

Activity 2 – Glowing Gremlin Egg

Whole class Introduce Activity 2 (5 min):

Show the LED. Explain that PWM can gradually change the LED brightness, not just switched on or off (analogue/binary control). The more power the LED receives the brighter it is, the less power it receives the dimmer it is.

Direct students to the Digicrafters Project Page for Blue Kit Activity 2 – Glowing Gremlin Egg.

Small groups Activity 2 (10 min): Use the Arduino to control a PWM LED through a fading cycle. Blow an egg and use it to cover the LED and diffuse the light.

Whole Class Discussion (5 min): Discuss the Glowing Gremlin Egg activity.

Activity 3 – Rainbow Egg

Whole class Introduce Activity 3 (5 min):

Show the RGB PWM LED (4 pins). Explain the difference between the single colour LED's used in Activity 2 (which only emit monochromatic light). In this PWM LED, each colour channel can change in brightness. The power is provided to the three drivers (Red, Green, Blue). The more power each colour receives the brighter it is, the less power it receives the dimmer it is.

Direct students to the Digicrafters Project Page for Blue Kit Activity 3 – Rainbow Egg.

Small groups Activity 3 pt 1 (10-15 min): Use the Arduino to control an RGB PWM LED through a rainbow colour cycle. Diffuse the light using the egg from Activity 2.

Whole Class Discussion (5 min): Introduce the Potentiometer and explain it can be used to control the power provided to the three LED colours (Red, Green, Blue).

Direct students to the Digicrafters Project Page for Blue Kit Activity 4 – Control the Rainbow Egg.

Small groups Activity 3 pt 2 (10 min): Use the Potentiometer to control the LED through a rainbow colour cycle. Diffuse the light using the egg from Activity 2.

Whole Class Discussion (5 min): Discuss the Rainbow Egg activity.

Planning for safety

The low voltage Arduino board is powered over USB and is earthed. All materials in this lesson are safe to touch and cannot draw large currents or reach hazardous temperatures. The LED pins can be sharp edges and should be handled with care to avoid injury. The risks associated with this lesson are easily managed by implementing a few simple safety precautions and behaviour rules. You should always consider the individual circumstances of your classroom and discuss concerns with your health and safety representative or science coordinator.

Materials and equipment

- Blue Kit
- Digicrafters website
- Egg
- Straw
- Kitchen Roll