EASE

EuropeAn network of steam Educators

LESSON PLAN

TITLE: LED Sequential Control- Beginner Project

GRADE LEVEL: 9th-12th

STEAM AREAS:

Science, Technology, Engineering

Materials Needed:

- Arduino Uno or similar Arduino board
- Breadboard
- Jumper wires
- 3 LEDs of different colors
- 3 220 ohm resistors
- USB cable for the Arduino

Objectives:

- Students will be able to identify the different components of an Arduino circuit.
- Students will be able to assemble an Arduino circuit to control three LEDs.
- Students will be able to write code to control the three LEDs in a sequential pattern.

Procedure

1. Set up the hardware. The first step is to establish a common ground. To do this, use a jumper wire to connect the ground pin on the Arduino to the negative rail on the breadboard. This allows all the LEDs to use the ground pin on the Arduino.
2. Insert the resistors. Insert the resistors into the breadboard. Space the resistors out with one leg connected to the negative rail.
3. Insert the LEDs. Before inserting the LEDs, make sure that you have the correct orientation. The longer leg of the LED is the positive leg. Insert the LEDs into the breadboard with the positive legs connected to the positive rail.
4. Connect the LEDs to the Arduino. Use jumper wires to connect the positive pins of the LEDs to the digital pins on the Arduino. The digital pins are labeled 0-13. The color of the LED corresponds to the digital pin that it should be connected to. For example, the red LED should be connected to digital pin 5.
5. Write the code. The code for this project is very simple. It will simply turn the LEDs on and off in a sequential pattern. **You can find the code below**.
6. Upload the code to the Arduino. Once you have written the code, you can upload it to the Arduino using the Arduino IDE.
7. Test the circuit. Once the code has been uploaded, you can test the circuit by turning on the Arduino. The LEDs should turn on and off in a sequential pattern.
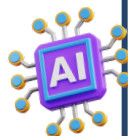
PROCEDURE

```cpp
// Import the Arduino library
#include <Arduino.h>

// Define the pins that the LEDs are connected to
const int redPin = 5;
const int greenPin = 6;
const int bluePin = 7;

// The setup function runs once when the Arduino is turned on
void setup() {
  // Initialize the digital pins as outputs
  pinMode(redPin, OUTPUT);
  pinMode(greenPin, OUTPUT);
  pinMode(bluePin, OUTPUT);
}

// The loop function runs repeatedly
void loop() {
  // Turn on the red LED
  digitalWrite(redPin, HIGH);
  // Wait for 1 second
  delay(1000);
  // Turn off the red LED
  digitalWrite(redPin, LOW);
  // Turn on the green LED
  digitalWrite(greenPin, HIGH);
  // Wait for 1 second
  delay(1000);
  // Turn off the green LED
  digitalWrite(greenPin, LOW);
  // Turn on the blue LED
  digitalWrite(bluePin, HIGH);
  // Wait for 1 second
  delay(1000);
  // Turn off the blue LED
  digitalWrite(bluePin, LOW);
}
```

In this lesson, we learned how to control three LEDs in a sequential pattern using an Arduino. We used the Arduino IDE to write code that turned the LEDs on and off in a specific order. We also learned how to set up the hardware and test the circuit.

Assessment: Students will be given a quiz on the material covered in the lesson.
Quiz Questions:
- What is the difference between voltage and current?
- How do voltage and current affect the brightness of an LED?
- What is the Arduino?
- How do you use the Arduino to control an LED?
- How do you write code to create a sequence of different colors?

ASSESSMENT

- Students will be assessed on their ability to assemble the circuit, write the code, and test the circuit.
- Students will be given a quiz on the material covered in the lesson.

REFERENCES

- https://www.youtube.com/watch?v=e1FVSpkw6q4
- https://www.instructables.com/LED-Sequential-Control/
- https://store.arduino.cc/products/arduino-starter-kit-multi-language

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