SIT111: Task 3.3P - Arduino LED Control via Button

Learning Objective

To build and understand a basic Arduino circuit that allows you to control an LED using a button. This is the first step to understanding how external inputs can control embedded devices.

Summary - TL; DR

1. Read through the materials on the unit site.
2. Build and test the Arduino circuit, run experiments.
3. Submit:
    - Summary and reflection
    - Outcome from activities:
        - Photos, codes, videos of the constructed circuit or experiments
        - Describe any additional insights or knowledge learned during the active learning activities

Your Task

Create a circuit with two LEDs and two buttons using an Arduino. Each button should control one LED. Write an Arduino sketch to read the button states and turn on the corresponding LED when its button is pressed, and off when released. Set up the circuit on a breadboard, and ensure the LEDs respond correctly to the button presses.

Materials Needed:

- Arduino Uno (or similar Arduino board)
- 2 LEDs (different colors recommended)
- 2 push buttons
- 4 resistors (220-ohm for LEDs and 10k-ohm for buttons)
- Breadboard
- Jumper wires
- USB cable to connect the Arduino to a computer
- Arduino IDE installed on the computer

Circuit Assembly:

- Connect each LED to a digital pin on the Arduino (e.g., pins 8 and 12) using a breadboard.
- Connect each button to another digital pin (e.g., pins 2 and 3).
- Insert a 220-ohm resistor in series with each LED.
- Use a 10k-ohm resistor for each button as a pull-down resistor to ensure a stable connection.

- Complete the connections with jumper wires, ensuring proper power and ground connections.

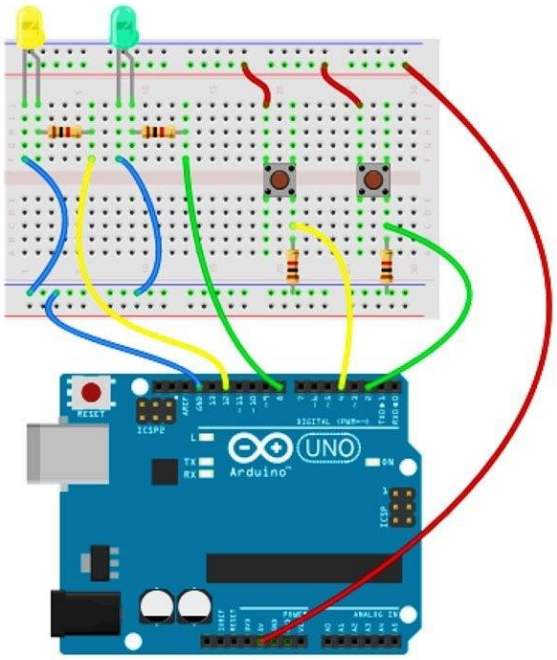

Figure 1: Sample Circuit

Programming:

Write an Arduino sketch where:

- Define the LED pins as outputs and button pins as inputs using pinMode().
- Use digitalRead() to check the button states in the loop() function.
- When a button is pressed (reads HIGH), turn on the corresponding LED using digitalWrite().
- When the button is released (reads LOW), turn off the LED.
- Ensure the program allows each button to control its respective LED independently.

```
// Define LED and Button pins int
led1 = 8; int led2 = 12; int button1 =
2; int button2 = 4;
void setup() {
  // Initialize LED pins as outputs
```

```
  // Initialize Button pins as inputs
  // Complete this section
}

void loop() {
  // Read the state of each button
  // Turn on the corresponding LED when a button is pressed
  // Turn off the LED when the button is released
  // Add the missing code here
}
```

Prepare Your Submission

Once you feel confident that you have achieved the learning goals, you can prepare a submission to demonstrate this. This will contain three sections: summary of what you learnt, reflection on your learning, and evidence of study and practice.

Section 1: Summary

Summarise what you have done and what you have learnt from the experiment. This should be a personal summary, written so that it will be useful to you should you need to quickly revise these concepts and tools in the future. Capture the most important aspects from the materials in the unit site and anything else you find related to this topic.

Section 2: Reflection

Reflect on your learning by responding to the following prompts:

- How do you know you have achieved the learning goals?
- What is the most important thing you learned from this and why?
- How does the content or skills learned here relate to things you already know?
- Where or when do you think it will be useful?

Note:: The content for the first two sections should not exceed 500 words or 1 printed page.

Section 3: Evidence of study and practice

This section will contain evidence of your outputs from the learning activities for this task:

- Screenshot of the Arduino IDE successsfully uploading the code
- Your code

- A short video of the working hardware (YouTube or Panopto)

Upload Your Submission

Once you have all the evidence in place, login to CICRA VLE and mark the task as **Ready for Feedback**. The submission process will ask you to upload evidence of completion of the task. For quizzes, please include a screenshot showing your quiz score. For Active Learning Session problems, you must submit evidence that you yourself had completed the activities. While working in groups/pairs is welcome, you must have evidence of your own contributions.

The system will also ask you to reflect on what unit learning outcomes have been achieved by this task.

Engage with Feedback

To get the task marked as **Complete**, you need to engage with the feedback you receive. Your tutor will review your submission and may ask you to clarify aspects of your learning, redo parts of the task, or include aspects you have missed. You may be asked to discuss the task in class or online. Use these discussions as an opportunity to help develop and validate your understanding.

If you are asked to resubmit, *make sure your subsequent submission includes a comment that describes how you have addressed the feedback you received*. This needs to demonstrate how you have addressed all the aspects indicated by your tutor in their feedback on your learning.