# iBot Club Workshop Phase

*Task Set 1.0: Getting Started with Arduino*

Coordinator Team

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**PREREQUISITE**

**YOU MUST COMPLETE TASK SET 0 (CIRCUIT FUNDAMENTALS) BEFORE STARTING THIS SET.**
Do not attempt to power the Arduino until you have demonstrated safe breadboarding practices in Task 0.

**REQUIREMENT NOTICE**

**LAPTOP WITH ARDUINO IDE IS REQUIRED.**

## 1 Overview

In this phase, we move from physical circuit logic to programmable logic. You will use the Arduino Uno R3 to control outputs and read inputs. **Note:** Unlike Task 0, you will NOT use the AA batteries. The Arduino will be powered via the USB cable connected to your laptop.

## 2 Task 1.0.1: Hello World (Internal Blink)

### Objective

Verify your software setup and communication with the board by blinking the on-board LED.

### Hardware Required

- 1x Arduino Uno R3 (Middle Drawer)
- 1x USB Cable (Middle Drawer)

### Instructions

1. Connect the Arduino to your laptop.
2. Select the correct Board (Arduino Uno) and Port in the Arduino IDE.
3. Write a program to blink the **Built-in LED** (Pin 13 or `LED_BUILTIN`).
4. **Check:** The small orange LED marked 'L' on the board should blink at your set interval.

## 3 Task 1.0.2: The Breathing LED (Analog Output)

### Objective

Learn Pulse Width Modulation (PWM) to simulate analog output. Instead of blinking On/Off, the LED should fade in and out smoothly.

### Hardware Required

- Arduino Uno + Cable
- 1x Breadboard
- 1x LED (Any color)
- 1x 330Ω Resistor
- Jumper Wires (Open Shelf)

### Instructions

1. Connect the LED and Resistor on the breadboard.
2. Connect the positive leg of the LED to a **PWM-enabled pin** on the Arduino (pins marked with a tilde ∼, e.g., 3, 5, 6, 9, 10, 11).
3. Write a code loop that gradually increases brightness from 0 to 255, and then decreases from 255 to 0.
4. **Hint:** Use `analogWrite()`.
5. **Check:** The LED should "breathe" smoothly, not blink.

## 4 Task 1.0.3: The Toggle Switch (Digital Input)

### Objective

Implement a "Soft Latch" or Toggle Logic. The button should act like a light switch, not a horn.

### Logic Requirement

- **Initial State:** LED is OFF.
- **Action 1:** Push and Release Button → LED turns ON (and stays ON).
- **Action 2:** Push and Release Button again → LED turns OFF.

### Hardware Required

- Same setup as 1.0.2
- 1x Push Button (Middle Drawer)
- Extra Jumper Wires

### Instructions

1. Add the push button to your circuit.
2. Connect one side of the button to a Digital Pin (e.g., Pin 2) and the other to Ground (if using `INPUT_PULLUP`) or 5V (if using a pulldown resistor).
3. **Check:** Clicking the button once toggles the LED. Holding the button down should not cause the LED to flash rapidly.

## 5 Submission Guidelines

Submit the following via the Google Form:

- **GitHub Link:** A repository containing three separate folders/files for the three tasks (e.g., `Task_1.0.1.ino`, etc.).
- **Drive Link:** A video showing the **Breathing LED** and the **Button Toggle** in action.

## 6 Cleanup Checklist

1. Unplug the Arduino from your laptop.
2. Remove all wires and components from the breadboard.
3. Return Arduino, Cable, Components, and Breadboard to the **Middle Drawer**.
4. Return Jumper Wires to the **Open Shelf**.