

ME 133 Winter 2023
Lab 1: *Of Buttons and LEDs*
January 19, 2023
Due: 1/25/2023

Submit a zip file named `yourFirstName-Lab1.zip` on Canvas with your code, a lab report (following the format in syllabus), and a short video proving the working hardware-software integration.

Exercise 1

Check that you received all of the necessary materials. Here is a list of every component that was supposed to be shipped to you. Double check that everything is there. If there is something that you do not know how it should look like, do not worry: we will go over all of them during our first lab.

- 1 x Arduino Uno
- 1 x Power and data cable
- 1 x Breadboard
- 1 x Step Motor (28BYJ-48)
- 1 x Step Motor controller board
- 1 x DC Motor with power wires
- 10 x 330 Ohm Resistors
- 5 x 2 K Ohm Resistors
- 5 x 10 K Ohm Resistors
- 4 x 0.1 uF Capacitors
- 3 x Diodes 1N4001
- 3 x Transistor PN2222
- 1 x Photoresistor
- 2 x Potentiometer
- 6 x Buttons
- 6 x LEDs
- 1 x Piezobuzzer SFM-27
- Assorted jumpers (at least 6 male/female)

Is there something missing? Let the TA know as soon as possible.

Exercise 2

Material required

- Arduino
- 2 x 330 Ohm to 1 K Ohm Resistor
- 2 x LED

Coding together

In class, we will look at the code (and wiring) to have a LED blink. You can find the code also from the Arduino IDE by opening the example in `File > Examples > 01.Basic > Blink`.

Functions we will learn about

- `void setup()`: The `setup()` function is called when a sketch starts. Use it to initialize variables, pin modes, start using libraries, etc. The setup function will only run once, after each powerup or reset of the Arduino board.
- `void loop()`: After creating a `setup()` function, which initializes and sets the initial values, the `loop()` function does precisely what its name suggests, and loops consecutively, allowing your program to change and respond. Use it to actively control the Arduino board.
- `digitalWrite(pin, value)`: Write a HIGH or a LOW value to a digital pin.
- `pinMode(pin, mode)` Configures the specified pin to behave either as an input or an output. See the description of digital pins for details on the functionality of the pins.

- `delay(ms)`: Pauses the program for the amount of time (in milliseconds) specified as parameter. (There are 1000 milliseconds in a second.)

Assignment

With what we learned, program the Arduino to make an LED blink with the Morse Code of your name. Source: https://en.wikipedia.org/wiki/Morse_code.

Hint

Create a `dot()` and a `line()` function. Then create a function for every letter that you need (e.g., `letterA()` will first call `dot()` and then `line()`). Do not forget to include a short wait after each letter and a longer one after each word!

Exercise 3

Material required

- Arduino
- 2 x 330 Ohm to 1 K Ohm Resistor
- 2 x 10 K Ohm Resistor
- 2 x LED
- 2 x Buttons

Coding together

We will learn how to read when a button is pressed. The code is available also at `File > Examples > 02.Digital > Button`.

Functions we will learn about

- `digitalRead(pin)`: Reads the value from a specified digital pin, either HIGH or LOW.

Assignment

Have two LEDs and two buttons. At the setup, LED1 is ON, LED2 is OFF. When the user presses BUTTON1 then LED1 turns off. When the user presses BUTTON2 then LED2 turns ON. When both buttons are pressed, then both LEDs are on.