



Summary:

Students will familiarize themselves with the MegaSat input/output architecture by identifying the usage of the Arduino Mega I/O pins.

Materials:

Each student should have the following materials, equipment, and supplies:

- Power supply capable of supplying 5 – 12 VDC
- Arduino Mega microcontroller
- Laptop with Arduino IDE installed w/ USB AB cable
- Breadboard
- Wires / Jumpers
- Wire Strippers
- 4x LEDs
- 4x 1 k Ω resistors
- 2x 10 k Ω resistors
- 1x pushbutton
- 1x toggle switch

Procedure:

Example 1 – Single LED

1. Assemble the circuit from the schematic in Figure 1 on a breadboard. Connect cathode (short lead) to ground. Connect a 1k resistors from the anode (long lead) of the LED to the Arduino digital pin 13.

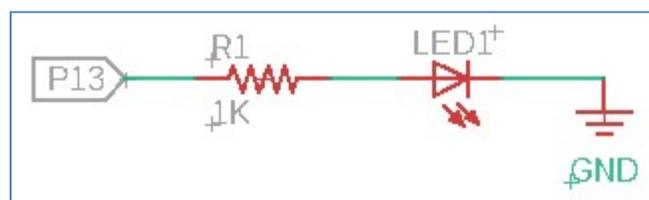


Figure 1: Schematic for a single LED

2. Write a simple loop that powers the LED on for 5 seconds and off for 5 seconds.
3. You should observe the LED blink off and on after you upload the code. Notice the on-board LED blinks in the same pattern. It is connected internally to pin 13 and will replicate react to the signals on that pin

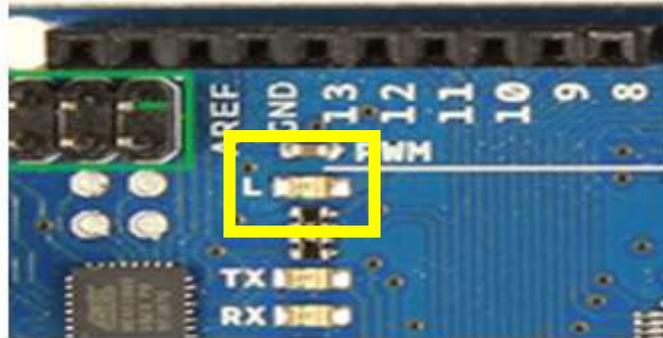


Figure 3: Diagram showing location of on-board LED

4. Turn off the power supply and disconnect the USB cable from the microcontroller. Leave the circuit connected.
5. Assemble the circuit in Figure 4. Using the breadboard, connect a 10k resistor to the 3.3V supply on the microcontroller to digital pin 7. Connect the toggle switch to the pin 7 and ground. When you press the switch, the voltage at pin 7 should go to ground.

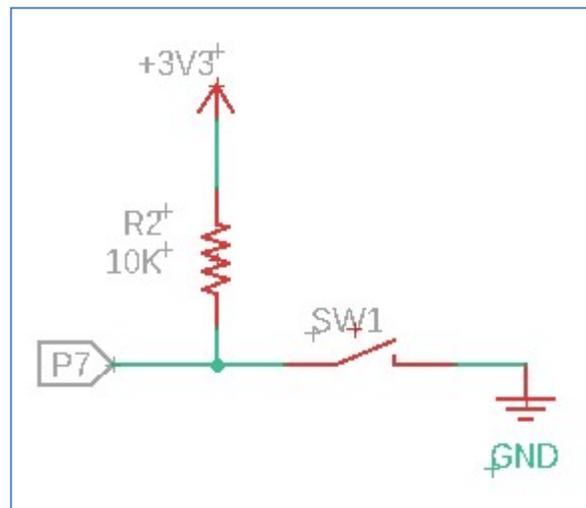


Figure 4: Schematic of toggle switch

6. Turn on the power supply. Write a simple code that will read the state of digital P7. It should report “HIGH” when the toggle switch is open and “LOW” when the toggle switch is closed.
7. Write a program that will turn the LED off and on by reading the state of a toggle switch. The LED should turn on when the switch is closed.
8. Next we will replace the switch with a pushbutton. Assemble the circuit in Figure 5 using a pushbutton.

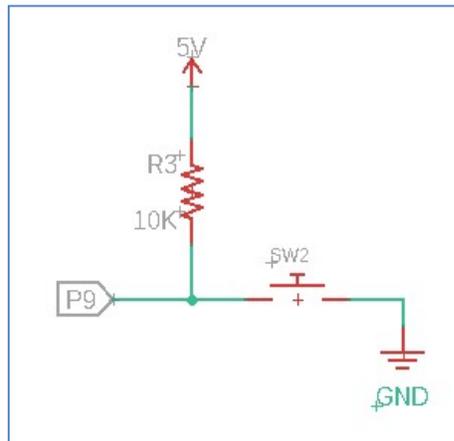


Figure 5: Schematic for the pushbutton

9. Write a program that will turn the LED on and off by reading the state of the pushbutton. It should turn on or off when the button is pressed.

Expected Outcomes:

Each team should complete the activity with the knowledge and skills to do simple digital output and input with the Arduino Mega microcontroller.