Lab Worksheet 1

CSE360: Computer Interfacing

Classwork

Task 1

☐ **Experiment Title: Blinking a LED**

Objective: To learn how to blink a LED using an Arduino board.

Materials Needed:

- Arduino board (e.g., Arduino Uno)
- LED (Light Emitting Diode)
- Resistor (appropriate value for current limiting, typically around 220 ohms)
- Jumper wires
- Breadboard

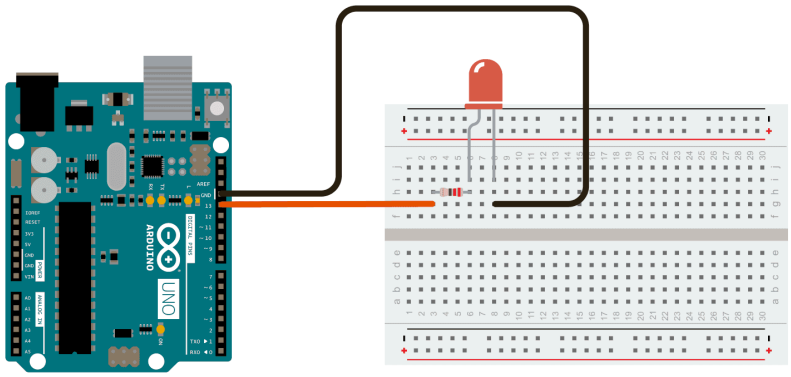
Procedure:

1. **Setup the Circuit:**

- Insert the LED into the breadboard. Make sure to note the longer leg (anode) and the shorter leg (cathode).
- Connect one end of the resistor to the anode (longer leg) of the LED.

- Connect the other end of the resistor to any digital pin (e.g., pin 3) on the Arduino board.
- Connect the cathode (shorter leg) of the LED to the Arduino's ground (GND) pin.

Pin diagram:



2. **Write the Arduino Code:**

- Open the Arduino IDE on your computer.
- Write a sketch to blink the LED on and off at a desired interval (e.g., 1 second).
- Use the digitalWrite() and delay() functions to control the LED.
- Test your code by uploading it to the Arduino board.

Code:

```
int led1 = 13;

void setup() {
  // put your setup code here, to run once:
  pinMode(led1, OUTPUT);
}

void loop() {
```

```
  // put your main code here, to run repeatedly:
digitalWrite(led1,1); // LED will blink
delay(100); // ms
digitalWrite(led1,0); // LED will not blink
delay(100); // ms
}
```

3. **Assemble the Experiment:**

- Connect the Arduino to your computer using a USB cable.
- Upload the code to the Arduino board.
- Power up the Arduino.

Analysis: Observe the LED as it blinks on and off also the interval at which the LED blinks.

Communication protocol used: None

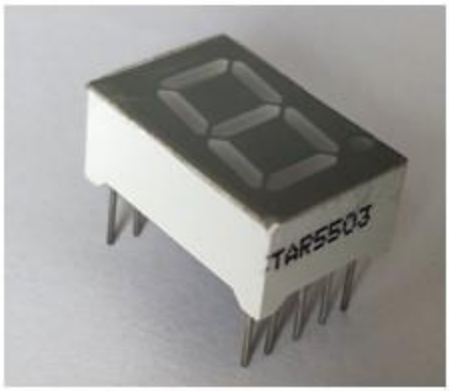
Task 2

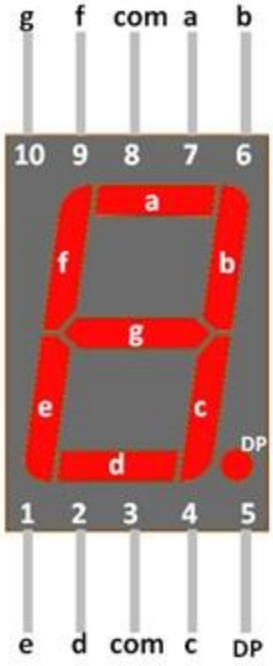
☐ **Experiment Title: Displaying Numbers 0-9 Using a 7-Segment Display and Arduino**

Objective: To learn how to interface a 7-segment display with an Arduino and display numbers from 0 to 9 sequentially.

Materials Needed:

- Arduino board (e.g., Arduino Uno)
- 7-segment display (common cathode or common anode)
- Resistors (appropriate values for current limiting, if necessary)
- Jumper wires
- Breadboard



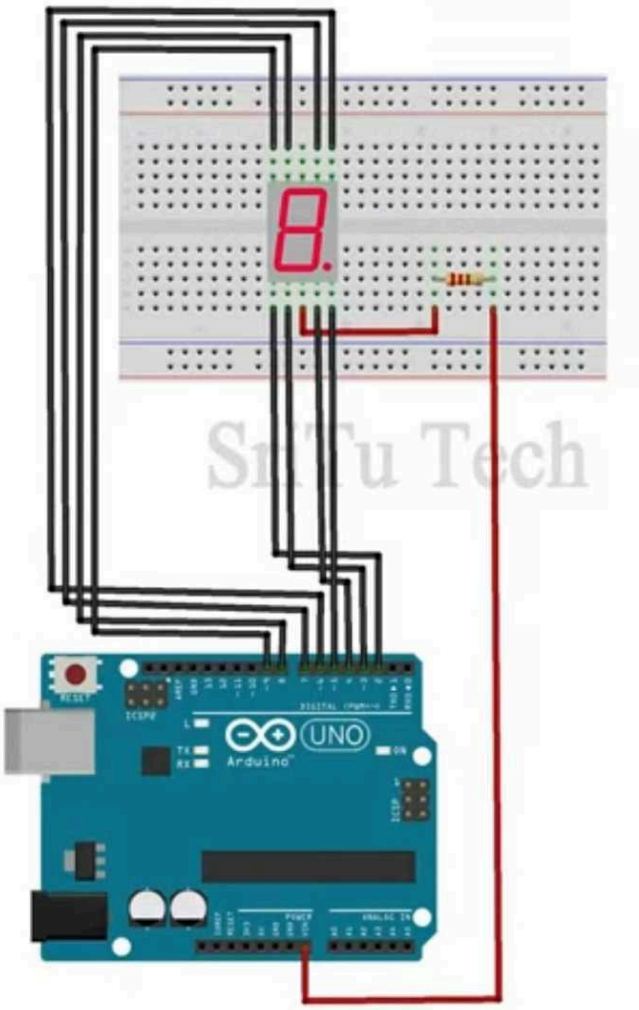


Procedure:

1.Setup the Circuit:

- Connect the 7-segment display to the Arduino board using jumper wires according to the pin diagram.
- Add current-limiting resistors in series with each segment of the display.

Pin diagram:



2. Write Code to operate the Arduino and 7 Segment:

- Open the Arduino IDE on your computer.
- Write a sketch to display numbers from 0 to 9 sequentially on the 7-segment display. You can use a function to display each digit.
- Ensure that you correctly map the Arduino pins to the segments of the 7-segment display.
- Test your code by uploading it to the Arduino board.

Code:

```
int x,y,z;
int digit[10][7] =

 {
   {0,0,0,0,0,0,1}, //0
```

```
    {1,0,0,1,1,1,1}, //1
    {0,0,1,0,0,1,0}, //2
    {0,0,0,0,1,1,0}, //3
    {1,0,0,1,1,0,0}, //4
    {0,1,0,0,1,0,0}, //5
    {0,1,0,0,0,0,0}, //6
    {0,0,0,1,1,0,1}, //7
    {0,0,0,0,0,0,0}, //8
    {0,0,0,0,1,0,0}  //9
};

void setup() {
  //Setting pin 0-6 as OUTPUT
  for(x=0;x<=6;x++){
    pinMode(x,OUTPUT);
  }
}

void loop() {
  // Loop y will continue for count 0 to 9
  for(y=0; y<=9; y++){
    // Loop z will continue for 7 segment display high or low
    for(z=0; z<=6; z++){
      digitalWrite(z,digit[y][z]);
    }
    delay(300);
  }
}
```

3. Putting the experiment together:

- Connect the Arduino to your computer using a power supplying USB cable.
- Upload the code to the Arduino board.
- Power up the Arduino.

Analysis: Observe the 7-segment display as the Arduino cycles through the numbers 0 to 9 and record any issues encountered during the experiment.

Communication protocol used: None

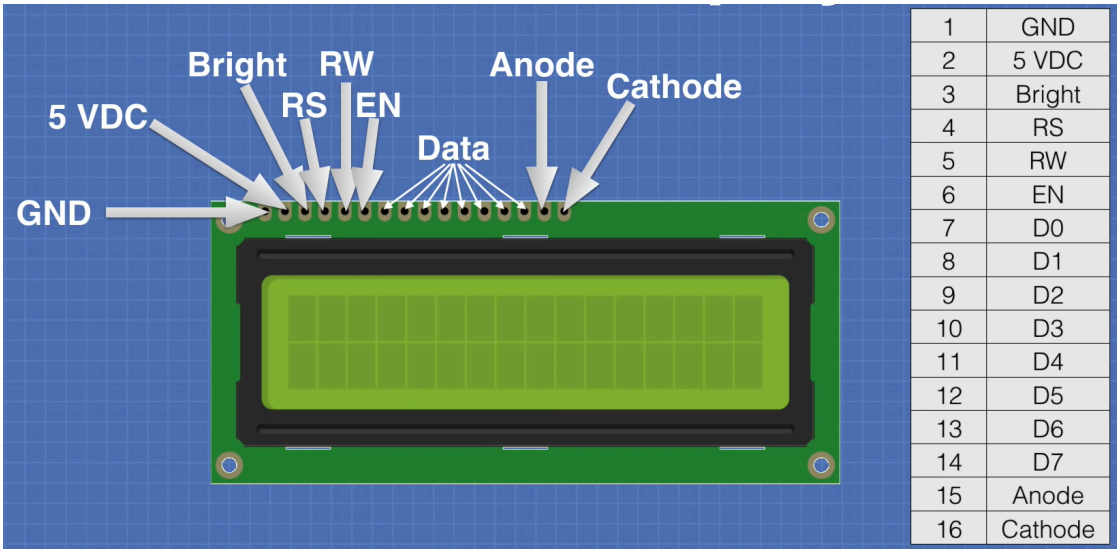
Task 3

☐ **Experiment Title: Write "Hello World" on a LCD display**

Objective: To learn how to interface an LCD display with an Arduino board and display texts/characters.

Materials Needed:

- Arduino board
- LCD display (16x2 or 20x4)
- Jumper wires
- Breadboard



1	GND
2	5 VDC
3	Bright
4	RS
5	RW
6	EN
7	D0
8	D1
9	D2
10	D3
11	D4
12	D5
13	D6
14	D7
15	Anode
16	Cathode

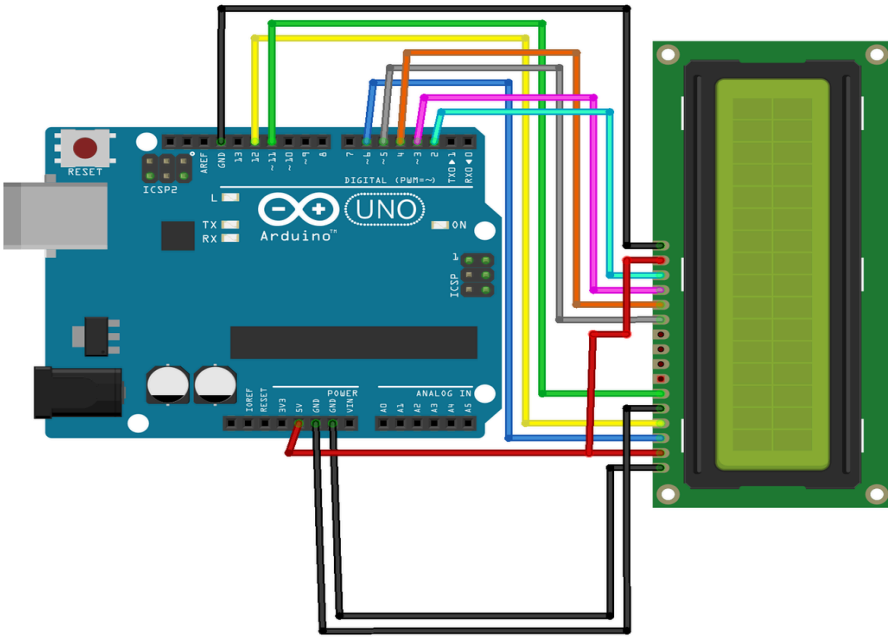
Procedure:

1. **Setup the Circuit:**

- Connect the Arduino to the breadboard.

- Connect the LCD display to the breadboard.
- Connect the pins of the LCD display to the Arduino according to the pin diagram.

Pin diagram:



VCC → 5V
GND → gnd
RS → 12
RW → gnd
E → 11
D4-D7 → 2,3,4,5

2. **Write Code to operate the Arduino and LCD Display:**

- Open the Arduino IDE on your computer.
- Write a sketch to initialize the LCD display and print the text "Hello World".
- Include the necessary library for controlling the LCD display (e.g., LiquidCrystal.h).
- Test your code by uploading it to the Arduino board.

Code:

```
#include <LiquidCrystal.h>

LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
```

```
void setup() {
  lcd.begin(16, 2);
  lcd.print("hello, world!");
}

void loop() {
}
```

3. **Putting the experiment together:**

- Connect the Arduino to your computer using a USB cable.
- Upload the code to the Arduino board.
- Power up the Arduino.

Analysis: Observe the LCD display for the text "Hello World" to appear.
Note any issues such as the text not displaying correctly or the display being blank.

Communication protocol used: Inter-Integrated Circuit (I2C)

Try it by yourself!

- ☐ **Experiment name: Display a 8 digit student ID of any 1 of your group members using 7 segment display**