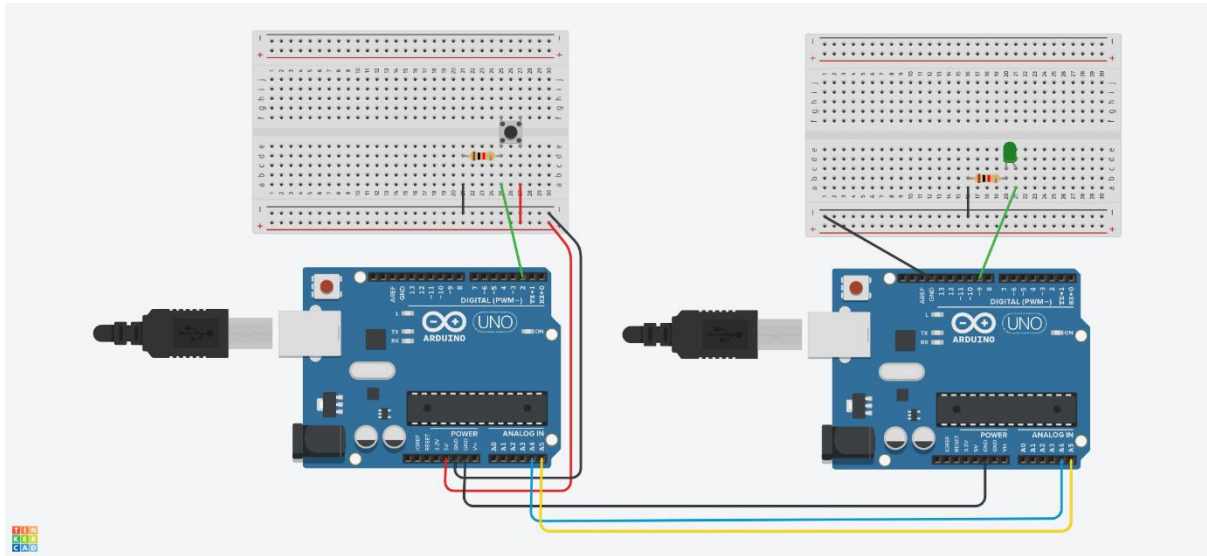# COMP6043 Physical Computing Lab 9

Note: if a task asks you to demonstrate your work to your lecturer, you must demonstrate and get your work signed off. Otherwise, no marks will be awarded for your work.

Once completed, upload your report to Canvas.

Task 1

Wire up the above circuit and enter the code below into the appropriate Arduinos.

Note: In Tinkercad, you enter the code for each Arduino separately. First click on the Arduino you want to enter code for and then click on the code button.

Master (On Left in above image)

```
#include <Wire.h>

int x = 0;
int slaveAddress = 9;
const int button = 2;
int buttonState = 0;

void setup() {

  pinMode(button, INPUT);
  Wire.begin();
  Serial.begin(9600);
}
```

```
void loop() {

 x = digitalRead(button);

 if(x == 1) {
  Wire.beginTransmission(slaveAddress);
  Wire.write(1);
  Wire.endTransmission();
 } else {
  Wire.beginTransmission(slaveAddress);
  Wire.write(0);
  Wire.endTransmission();
 }
 delay(10);

}
```

Slave (On Right in above image)

```
#include <Wire.h>

int LED = 9;
int x = 0;

void setup() {

 pinMode (LED, OUTPUT);
 Wire.begin(9);
 Wire.onReceive(receiveEvent);

 Serial.begin(9600);

}

void receiveEvent(int bytes) {

 x = Wire.read(); // read one character from the I2C
 Serial.println(x);

}

void loop() {

 if (x == 1) {
  digitalWrite(LED, HIGH);
  delay(300);
  digitalWrite(LED, LOW);
  delay(300);
 }

}
```

Verify that the LED connected to the Slave blinks when the button is pressed on the Master.

Task 2

The code for the Master Arduino in task 1 has repeating lines in the loop function. Specifically the following lines:

```
if(x == 1) {
  Wire.beginTransmission(slaveAddress);
  Wire.write(1);
  Wire.endTransmission();
} else {
  Wire.beginTransmission(slaveAddress);
  Wire.write(0);
  Wire.endTransmission();
}
```

Write a new function "sendData()" that's responsible for transmitting the data to the slave (and nothing more). What code would you need to move into this function? How could you use this function to reduce the number of lines and remove the repeating code seen in the "loop()" function?

Note: The "sendData()" function should only contain 3 lines.

Task 3

The Arduinos are talking to each other using 1s and 0s. In other words it's just HIGH and LOW values. We can use an Oscilloscope to observe the HIGH and LOW signals on the SDA and SCK lines.

The Oscilloscope can be found in tinkercad under "instruments" in the components menu. We'll connect two, one for the data line (left) and the other for the clock signal (right).
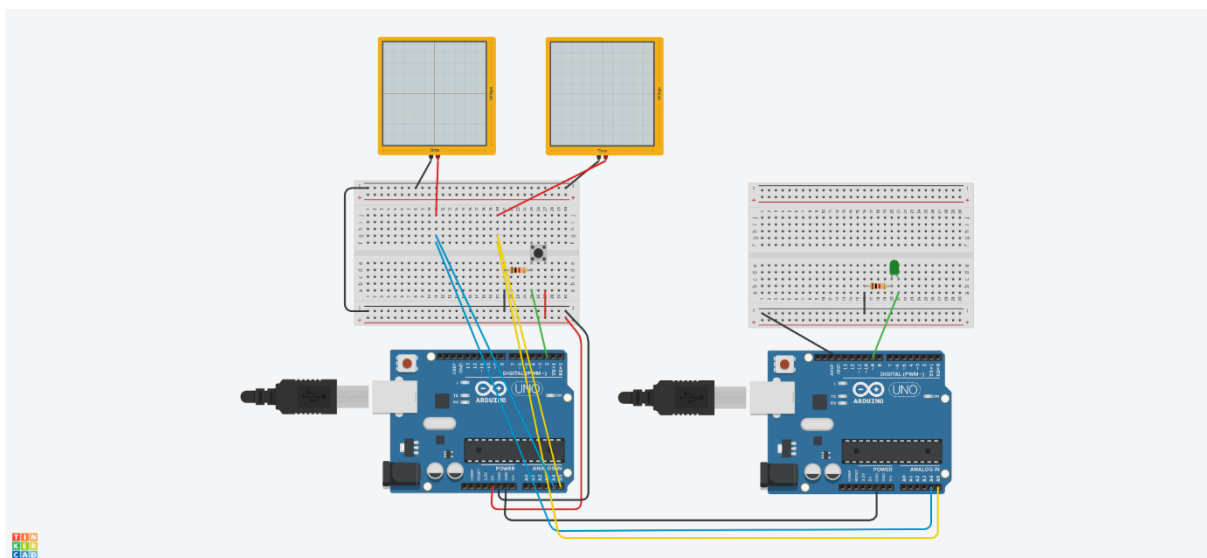
Click on each Oscilloscope and set the "Time Per Division" to 75µs.

When you run the simulation, what do you see on the Oscilloscopes?

Does the signal change in any way when you press the button?

If it does change, why do you think it changes in the way it does?

Task 4

Connect a sensor or input device of your own choosing to the master. Use this device to control an actuator of your own choosing on the slave.