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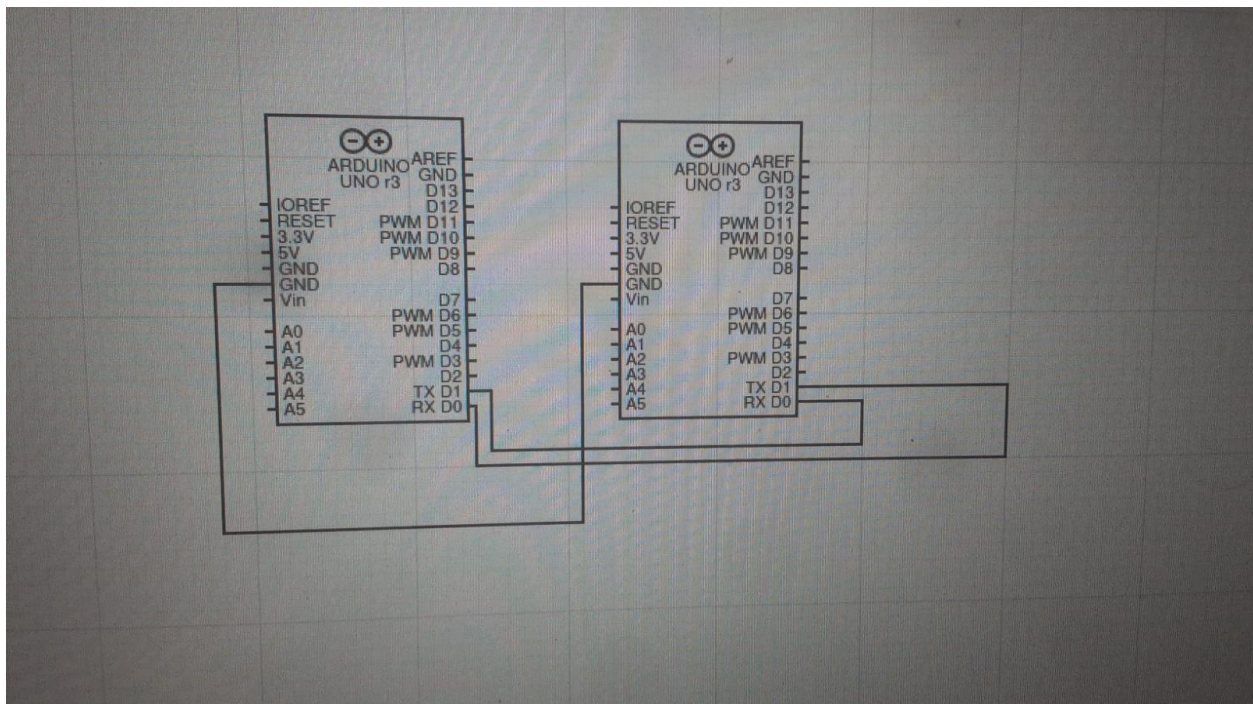
LAB 9
DIGITAL SYSTEMS AND MICROCONTROLLERS

AIM :

- To establish a bi-directional serial communication between two microcontrollers (Arduino). To send and receive data (both string and numbers) between two microcontrollers.

ELECTRONIC COMPONENTS :

- Two Arduino's (microcontrollers)

REFERENCE CIRCUIT :

PROCEDURE:

- All Arduino boards have at least one serial port (also known as a UART or USART), and some have several.
- Serial communication on pins TX/RX uses TTL logic levels (5V or 3.3V depending on the board).
- Don't connect these pins directly to an RS232 serial port; they operate at +/- 12V and can damage your Arduino board.

- To use these extra serial ports to communicate with your personal computer, you will need an additional USB-to-serial adaptor, as they are not connected to the arduino USB-to-serial adaptor.
- To use them to communicate with an external TTL serial device, connect the TX pin to your device's RX pin, the RX to your device's TX pin, and the ground of your arduino to your device's ground .
- Code for transfer numbers to other arduino :
  Arduino 1 :

```
void setup()
{
  Serial.begin(9600);//sets the data rate to 9600bps
  //this is the baud rate
}

void loop()
{
  for(int i=1;i<=10;i++)
  {
        Serial.println(i);
        delay(500);
  }
  if(Serial.available())
  {
        int x ;
        x = Serial.parseInt();
        Serial.println(x);
  }
}
```

Arduino 2:

```
void setup()
{
  Serial.begin(9600);
}

void loop()
{
  if(Serial.available())
  {
        int x = Serial.parseInt();
        Serial.print("Recieved:");
        Serial.println(x);
```

```
  }
  delay(500);
  Serial.println(15);
  delay(500);

}
```

- **Code for transfer of strings to other arduino :**
  Arduino 1:

```
void setup()
{
  Serial.begin(9600);//sets the data rate to 9600bps
  //this is the baud rate
}

void loop()
{
  char name[100] = "Malla Sailesh";
  Serial.write(name,13);
  delay(5000);
  if(Serial.available())
  {
        char x[100];
        Serial.readBytes(x,15);
        Serial.print("Recieved: ");
        Serial.println(x);
        delay(5000);
  }

}
```
  Arduino 2:

```
void setup()
{
  Serial.begin(9600);
}

void loop()
{
  if(Serial.available())
  {
        char x[100];
```

```
            Serial.readBytes(x,13);
            Serial.print("Recieved:");
            Serial.println(x);
    }
    delay(5000);
    char name[100] = "Malla Sailesh 2";
    Serial.write(name,15);
    delay(5000);
 }
```

OBSERVATION:

- The transfer of data (both string and number) between two Arduino is shown in bi-directional mode . I mean if we print a number/string then the data is transferred to the receiver (pin 0) of arduino 2 .
- **For Circuit 1**

  Arduino 1: The observed output -

  1
  2
  3
  4
  5
  6
  7
  8
  9
  10
  15
  1
  2
  3
  So on

  Arduino 2: The observed output -

  15
  Received 1
  15
  Received 2
  15
  Received 3
  15
  Received 4
  15
  Received 5
  15
  So on

- **For Circuit 2**

Arduino 1 : **The observed output - (i did not print new line character . so they are printed in the same line)**

Malla SaileshMalla SaileshRecieved: Malla Sailesh 2 so on

Arduino 2 : **The observed output -**

Malla Sailesh 2Recieved:Malla Sailesh

Malla Sailesh 2 so on

LINK TO THE TINKERCAD SIMULATION :

1)
https://www.tinkercad.com/things/hr1rToqtXds-lab-9-circuit-1/editel?sharecode=b1Z0YwHiwQXd6Hb3cMpQzMTPVlsbh92HOiaCLcXcZf0

2)
https://www.tinkercad.com/things/8FVUPrAliFh-lab-9-circuit-2/editel?sharecode=nLRUNnm9QSCf16TtMUqoT9d-g7tX4HFoAEGHONJUXlQ