UNITED INTERNATIONAL UNIVERSITY

Lab Report 3

Course Name: Microprocessors and Microcontrollers Laboratory

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Section: D

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Experiment no. 4

Push Button Controlled Fibonacci Number Generator via I2C Communication

Objective:

A push button is connected to the 1st Arduino (Master). Each time the push button is pressed, a number is sent to the 2nd Arduino (Slave) via I2C communication. The received numbers are then displayed on the Serial Monitor of the 2nd Arduino. The values sent from the transmitter Arduino follow the following pattern: 0, 1, 1, 2, 3, 5, 8, 13…… (Fibonacci sequence)

Verify this by checking the Serial Monitor of the receiver Arduino.

Equipment:

- Arduino Uno R3
- Arduino IDE (Compiler)
- Proteus (Simulator)

Introduction:

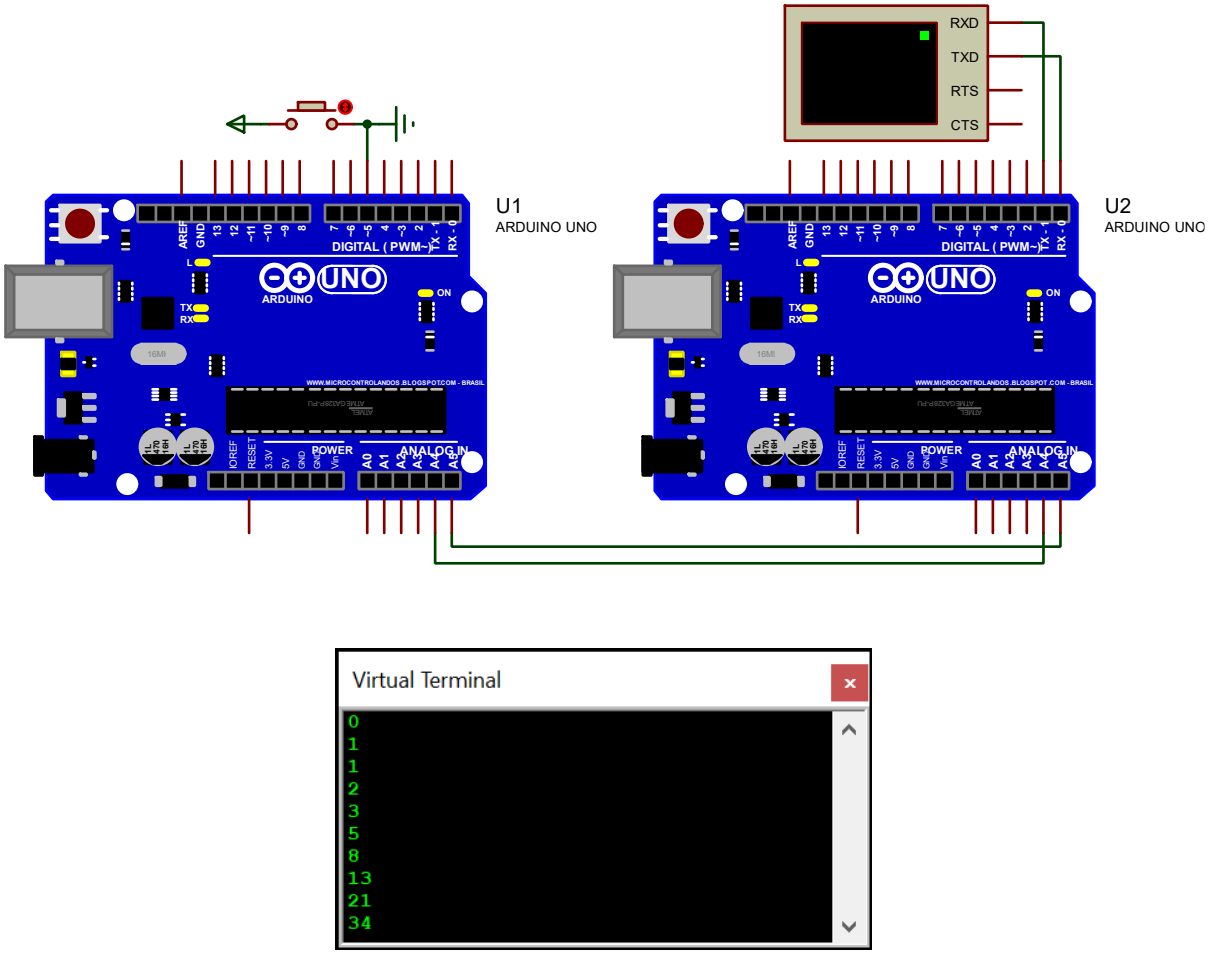
In this experiment, our objective is to establish a simple yet effective communication system between two Arduinos using I2C (Inter-Integrated Circuit) protocol. We will employ the concept of a master-slave relationship, where the first Arduino, acting as the master, will be equipped with a push button. Each time the push button is pressed, a unique number will be sent via I2C communication to the second Arduino, acting as the slave. The received numbers will then be displayed on the serial monitor of the slave Arduino. Interestingly, the transmitted numbers will follow a specific pattern - the Fibonacci sequence.

Components and its Functions:

1. **Arduino Uno (Master):** The Arduino Uno board serves as the master device in this experiment. It controls the overall operation and communicates with the slave Arduino. It is equipped with a push button, which acts as the trigger for transmitting numbers.
2. **Arduino Uno (Slave):** The Arduino Uno board functions as the slave device in this experiment. It receives the numbers transmitted by the master Arduino and displays them on the serial monitor.
3. **Push Button:** A push button acts as the user input for triggering the transmission of numbers. Each press of the button generates a new number in the Fibonacci sequence to be sent to the slave Arduino.

4. **I2C Protocol:** The I2C (Inter-Integrated Circuit) protocol is used for communication between the master and slave Arduinos. It allows for reliable and efficient data transfer over a short distance. The I2C protocol consists of two wires: SDA (Serial Data Line) and SCL (Serial Clock Line).
5. **Serial Monitor:** The serial monitor is a tool provided by the Arduino IDE that allows us to view the data received by the slave Arduino. It displays the Fibonacci numbers transmitted by the master Arduino in real-time.

Circuit Diagram:



Discussion:

In this experiment, we successfully implemented a communication system between two Arduino Uno boards using the I2C protocol. The master Arduino, equipped with a push button, generated a sequence of Fibonacci numbers with each press of the button. These numbers were then transmitted to the slave Arduino, which displayed them on the serial monitor.

Master Arduino Code:

```
#include <Wire.h>

int button = 0;
int lastButton = 0;
int firstFibonacci = 0;
int secondFibonacci = 1;

void setup() {
  pinMode(5, INPUT);
  Wire.begin();
}

void loop() {
  button = digitalRead(5);
  if (button != lastButton) {
    if (button == LOW) {
      Wire.beginTransmission(5);
      Wire.write(firstFibonacci);
      Wire.endTransmission();
      int temp = firstFibonacci;
      firstFibonacci = secondFibonacci;
      secondFibonacci += temp;
    }
    lastButton = button;
  }
}
```

Slave Arduino Code:

```
#include <Wire.h>

void setup() {
  Wire.begin(5);
  Wire.onReceive(receiveEvent);
  Serial.begin(9600);
}

void loop() {
}

void receiveEvent(int numBytes) {
  while (Wire.available()) {
    int receivedValue = Wire.read();
    Serial.println(receivedValue);
  }
}
```