



**INTERNATIONAL INSTITUTE OF
INFORMATION TECHNOLOGY**

H Y D E R A B A D

Lab Report-7

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Course: Digital Systems and Microcontrollers Lab

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1 Experiment 1

1.1 Objective

To Design a circuit for a decade counter and understand its usage
We have to make a sequential circuit that counts from 0 to 9 and then resets back to zero and so on

1.2 Equipment Required

1. Digital test Kit
2. 4 Bit-Ripple counter (IC 74HC93)
3. 7 Segment Display latch decoder (IC CD4511)
4. 7 Segment Display

1.3 Procedure

1.3.1 Setup

1. Connect the Clock to CP_0
2. Connect CP_1 to Q_0
3. Connect MR_1 to Q_3
4. Connect MR_2 to Q_1
5. Connect Q_i with Respective Alphabet on IC CD4511 IC
6. Connect a,b,c,d,e,f,g to corresponding positions on the 7-Segment Display
7. Connect the Cathode of the 7-Segment Display to the Ground

1.3.2 Testing

1. Turn on the Circuit
2. Put the clock on Automatic Slow Mode and Verify that all the numbers display correctly on the display with Correct order and it resets after 9

1.4 Schematic

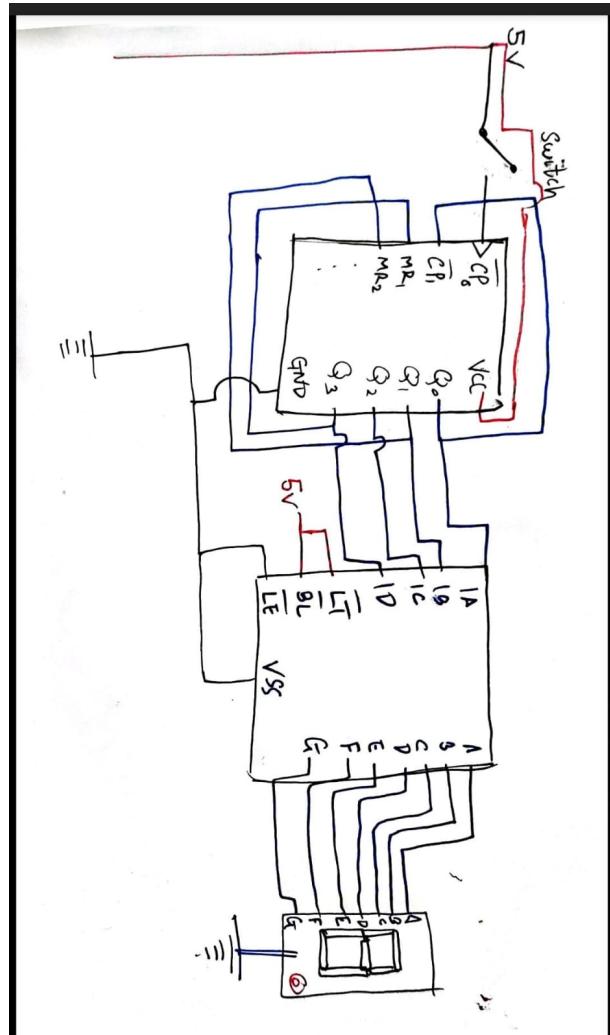


Figure 1: Schematic

1.5 Lab Photo

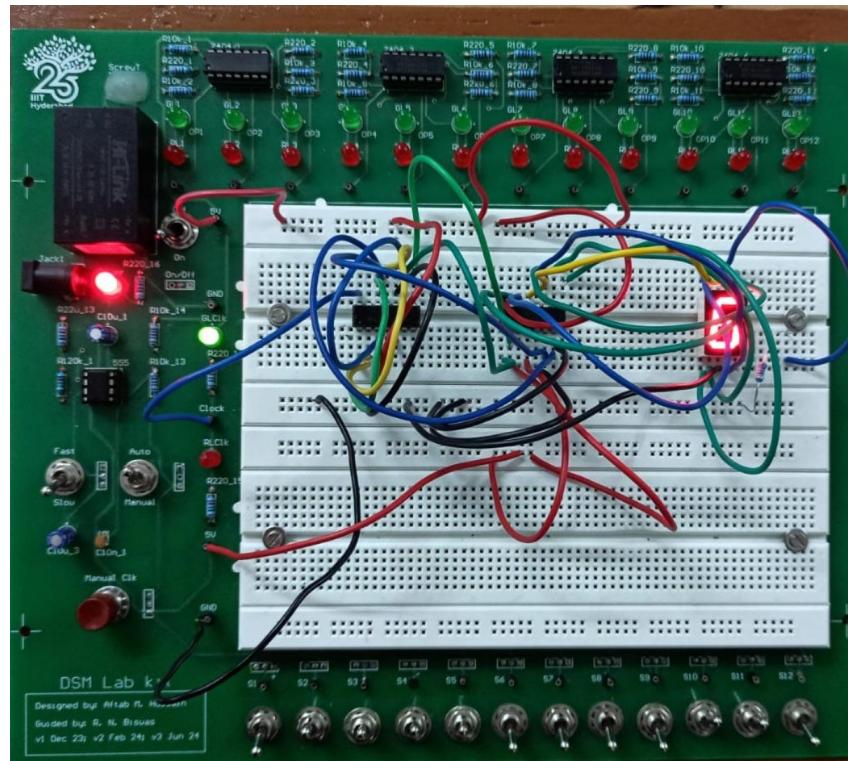


Figure 2: Lab Photo

1.6 TinkerCAD

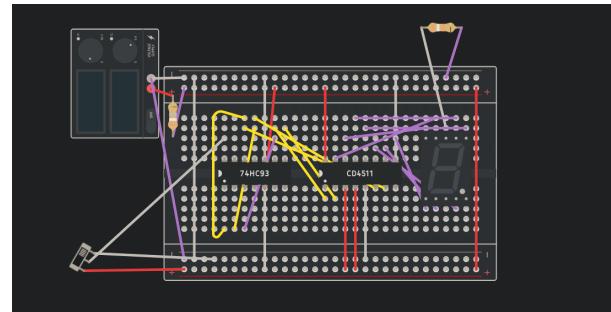


Figure 3: TinkerCAD

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1.7 Conclusion

We have designed and tested a Decade Counter.

2 Experiment 2a and 2b

2.1 Objective

To Design a 8-Bit Binary counter.

2.2 Equipment Required

1. Arduino UNO
2. Laptop with Arduino IDE
3. 74HC595(IC)

2.3 Procedure

2.3.1 Setup

1. Connect the Arduino UNO to your laptop and book up arduino IDE
2. Configure the board and the corresponding port with the IDE
3. Write the following Code for Experiment 2a

```

1 int ser = 8;
2 int rclk = 10;
3 int srclk = 9;
4
5 void setup() {
6     pinMode(ser, OUTPUT);
7     pinMode(rclk, OUTPUT);
8     pinMode(srclk, OUTPUT);
9 }
10
11 void loop() {
12     for (int i = 0; i < 256; i++) {
13         digitalWrite(rclk, LOW);
14         shiftOut(ser, srclk, MSBFIRST, i);
15         digitalWrite(rclk, HIGH);
16         delay(1200);
17     }
18 }
```

4. This is the code for Experiment 2b

```

1 const int ser    = 8;
2 const int rclk   = 10;
3 const int srclk = 9;
4
5 void setup() {
6     pinMode(ser, OUTPUT);
7     pinMode(rclk, OUTPUT);
8     pinMode(srclk, OUTPUT);
9     Serial.begin(9600);
10    Serial.println("Enter a number (0 7 ):");
11 }
```

```
12 void loop() {  
13     if (Serial.available() > 0) {  
14         int n = Serial.parseInt();  
15         if (n >= 0 && n <= 7) {  
16             byte data = (1 << n);  
17             digitalWrite(rclk, LOW);  
18             shiftOut(ser, srclk, MSBFIRST, data);  
19             digitalWrite(rclk, HIGH);  
20             Serial.print("LED ");  
21             Serial.print(n);  
22             Serial.println(" ON");  
23         } else {  
24             Serial.println("Enter a number between 0 and 7 only.");  
25         }  
26     }  
27 }  
28 }
```

2.3.2 Testing

1. The first experiment can be checked by just simply turning on the circuit and verifying the binary count
2. The Second experiment can be verified by turning on and entering a number between 0-7

2.4 Schematic

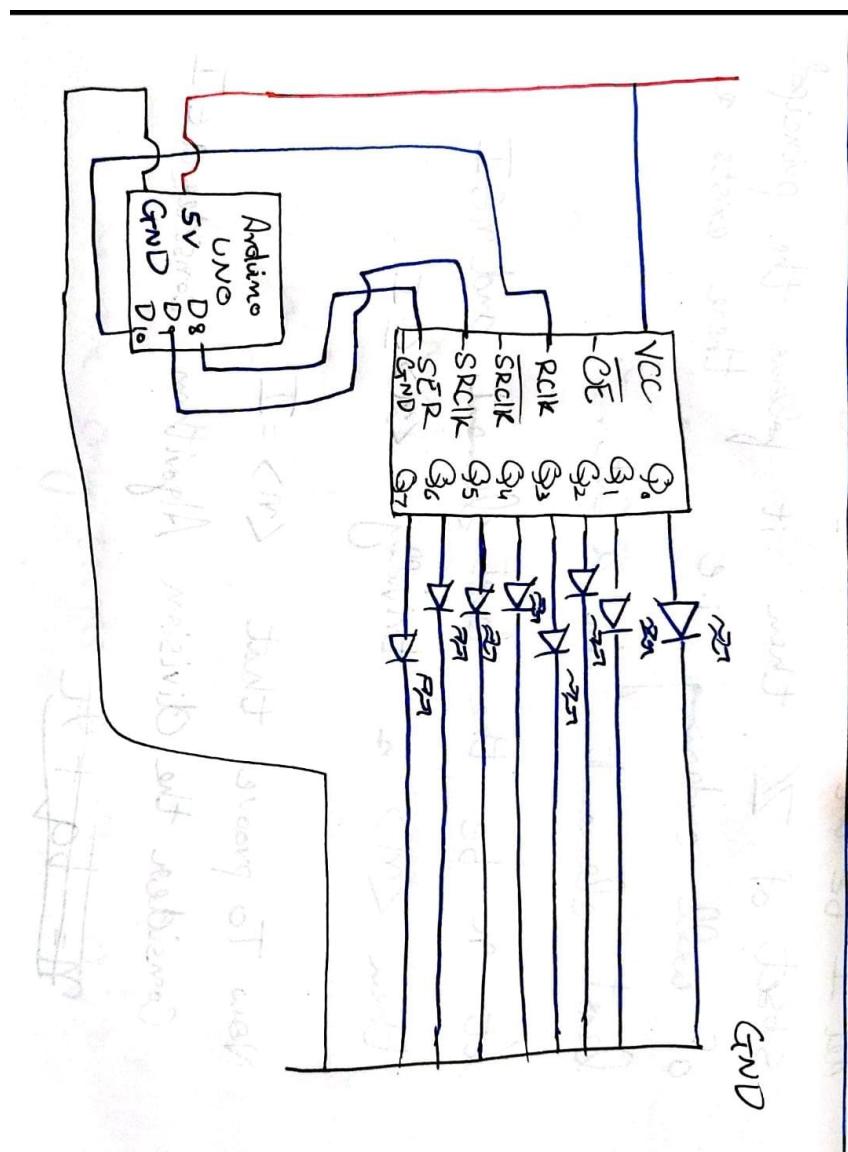


Figure 4: Schematic Diagram

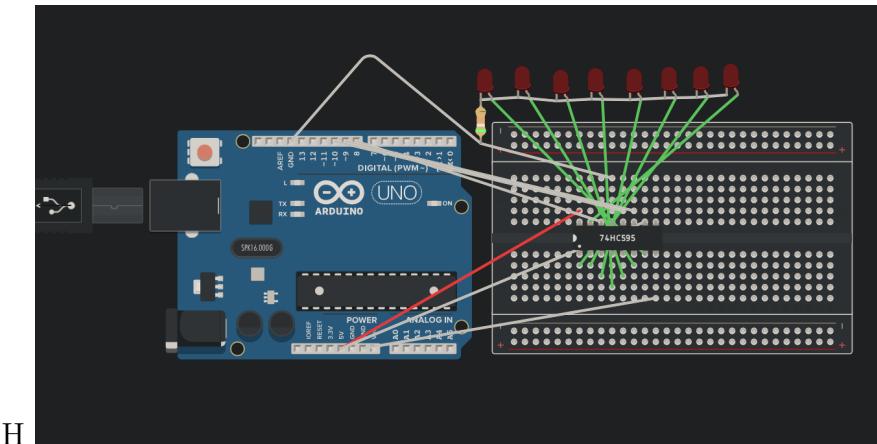


Figure 6: TinkerCAD

2.5 Lab Photo

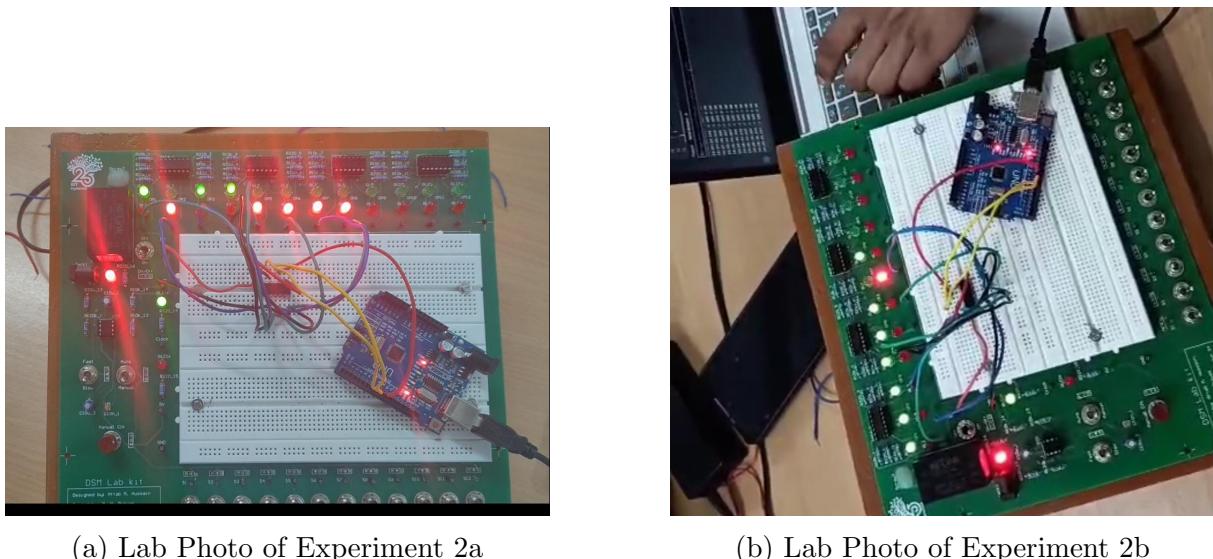


Figure 5: Lab photos of Experiments 2a and 2b

2.6 TinkerCAD

Experiment 1a
Experiment 2b

2.7 Conclusion

we have designed and verified an 8 bit counter using arduino.

3 Lab 3 experiment 4 TinkerCAD

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