DIGITAL SYSTEMS AND MICROCONTROLLERS - LAB REPORT 7

30/10/25

Yashaswi Priya

2025114007 GROUP-11 TABLE-7

Experiment 1

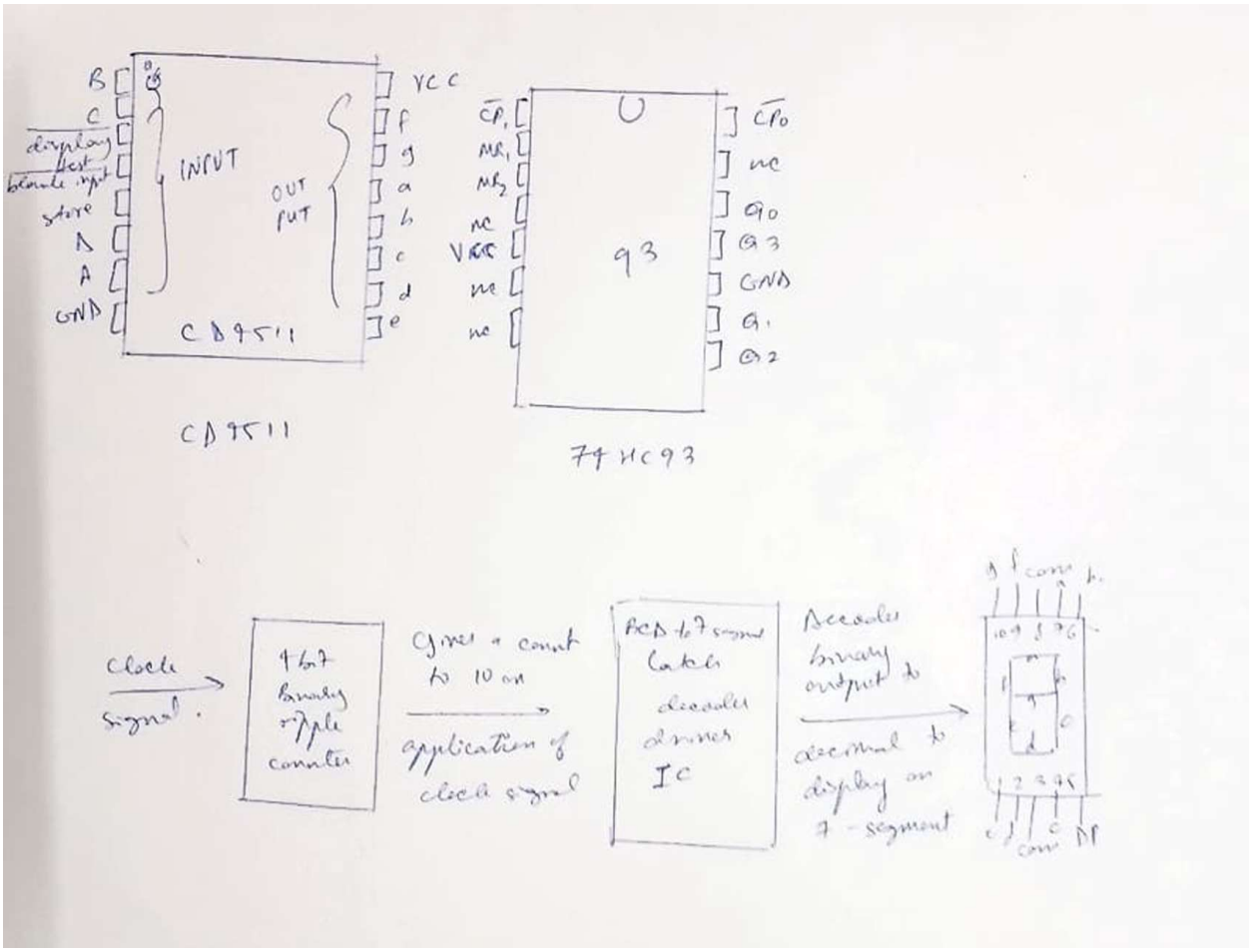
Objective:

To build a decade counter

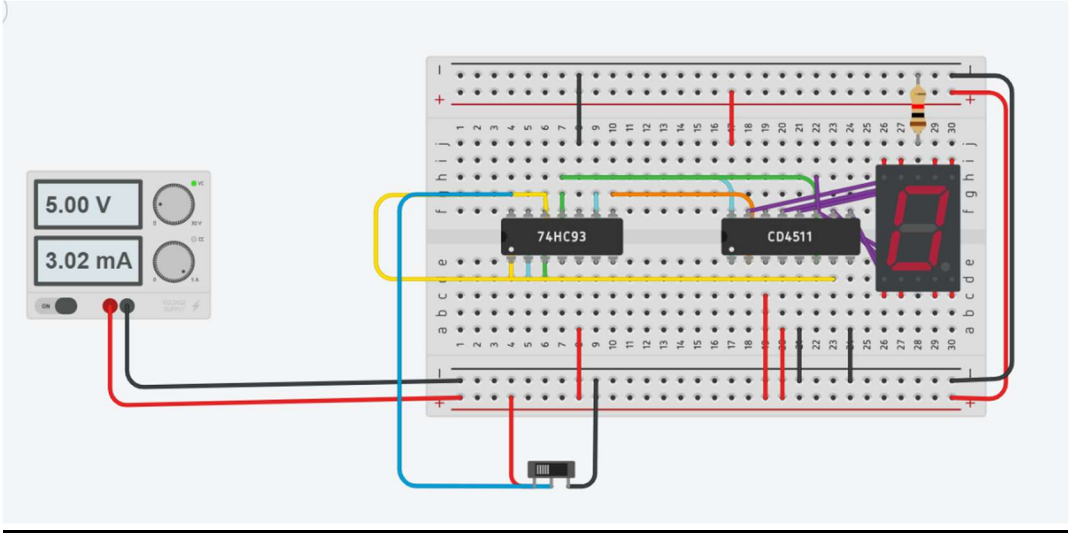
Electronic components used:

1. Digital Test Kit
2. Connecting Wires
3. ICs: 74HC93, CD4511
4. 7-segment display

Reference circuit:



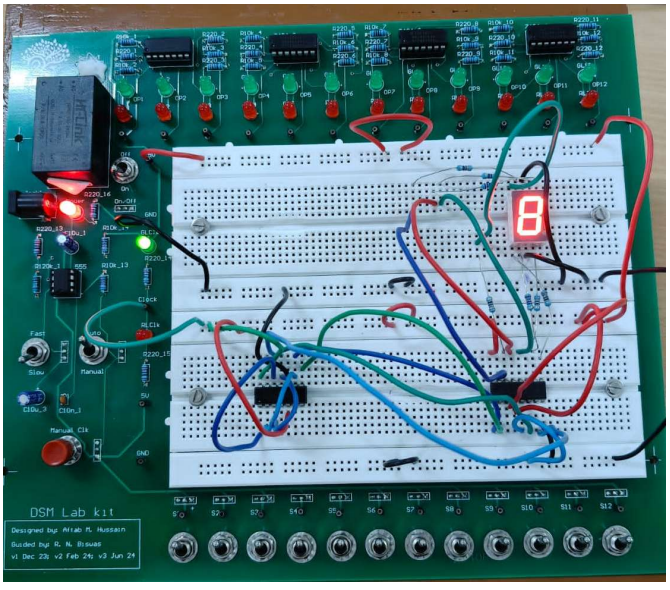
Tinkercad Reference circuit:



Procedure:

1. Connect the VCC (14) and GND (7) pins of the ICs to the VCC and GND lines of the Digital Test Kit respectively.
2. Connect the common cathode of the display to GND
3. Connect CPO' to clock, Q0 to CP1', MR1 to Q1, MR2 to Q3, and then to CD4511 and to the display as shown below.

Observation:



Conclusion:

CLOCK	DISPLAY
T1	0
T2	1
T3	2
T4	3
T5	4
T6	5
T7	6
T8	7
T9	8
T10	9
T11	0

Hence, it acts as a decade counter.
Link to TinkerCAD simulation:
https://www.tinkercad.com/things/lva9y2rGUed-lab7exp1?sharecode=6PWKsKREmsj-7CGPLrf8J6Zj1YD7GMJQ8aOJQVbPN0

****The TinkerCAD link does not work properly sometimes. If there's an issue with the same, please tell me and I can send you the login details of my Tinkercad Account.

Experiment 2-A

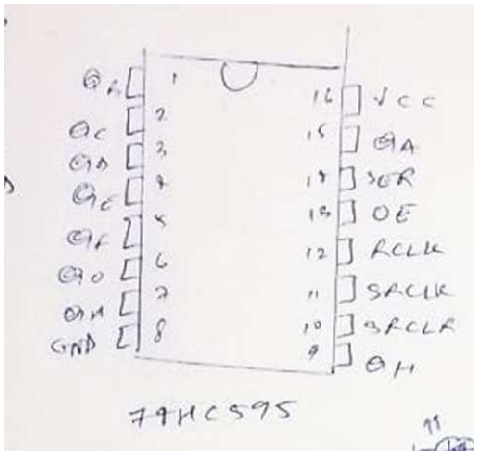
Objective:

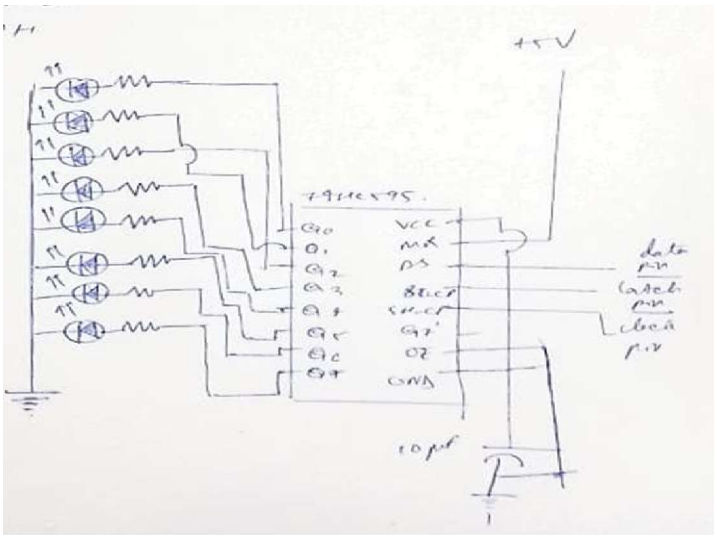
To use a shift register to count from 0 to 255 using an Arduino

Electronic components used:

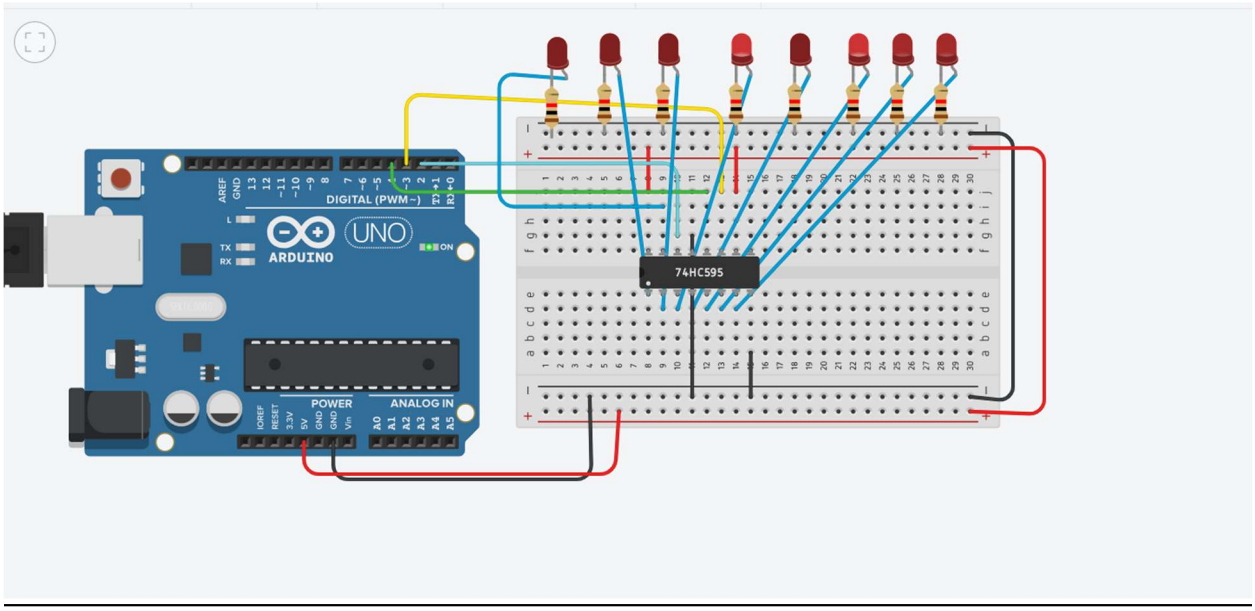
1. Digital Test Kit
2. Connecting Wires
3. ICs: 74HC595
4. Arduino Uno board

Reference circuit:





Tinkercad Reference circuit:



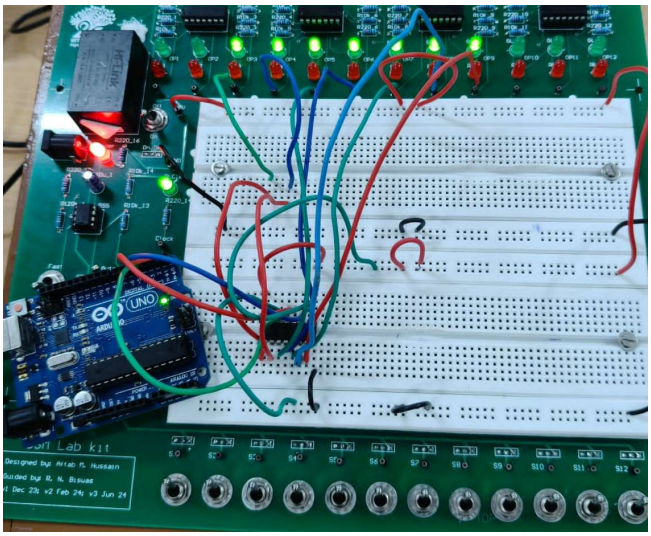

```
const int ser=2;
const int srclock=3;
const int clock=4;
void setup() {
  pinMode(ser,OUTPUT);
  pinMode(srclock,OUTPUT);
  pinMode(clock,OUTPUT);


}

void loop() {
  for(int i=0;i<256;i++)
  {
    digitalWrite(clock,LOW);
    shiftOut(ser,srclock,LSBFIRST,i);
    digitalWrite(clock,HIGH);
    delay(500);

  }

}
```

Procedure:

1. Connect the VCC (14) and GND (7) pins of the ICs to the VCC and GND lines of the Digital Test Kit respectively.
2. Make the connections as shown in the reference circuit.
3. Write the code shown below:

```
const int ser=2;
const int srclock=3;
const int clock=4;
void setup() {
  pinMode(ser,OUTPUT);
  pinMode(srclock,OUTPUT);
  pinMode(clock,OUTPUT);

}

void loop() {
  for(int i=0;i<256;i++)
  {
    digitalWrite(clock,LOW);
    shiftOut(ser,srclock,LSBFIRST,i);
    digitalWrite(clock,HIGH);
    delay(500);

  }

}
```

Observation:



Conclusion:

Hence, a 0-255 counter has been made successfully.

Link to TinkerCAD simulation:
https://www.tinkercad.com/things/e1MO87I9qlf-lab7exp2?sharecode=UT2KN9mLNZtHWk4FilOB0CCsdMkHC9cr3SmDH0VX878

**Site used to make circuit reference diagrams: https://www.circuit-diagram.org/editor/
****The TinkerCAD link does not work properly sometimes. If there's an issue with the same, please tell me and I can send you the login details of my Tinkercad Account.

Experiment 2-B

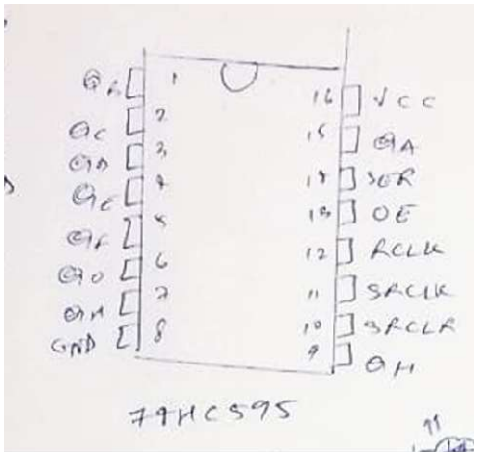
Objective:

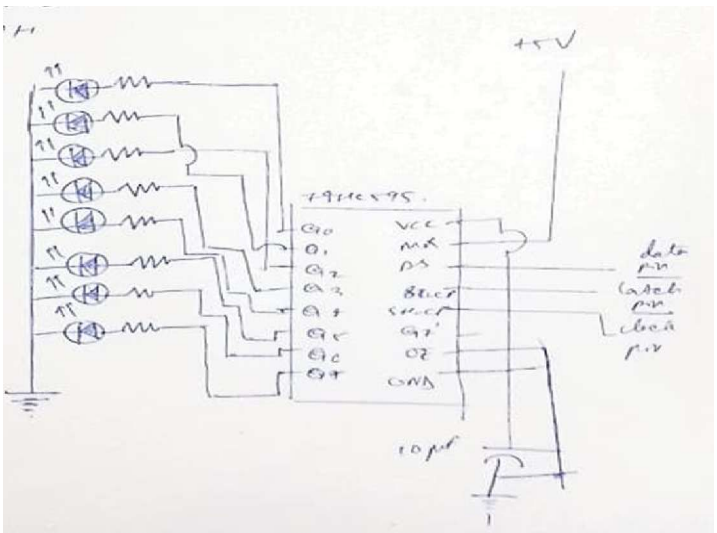
To build a circuit that inputs 0-7 from user and then lights the corresponding LED/

Electronic components used:

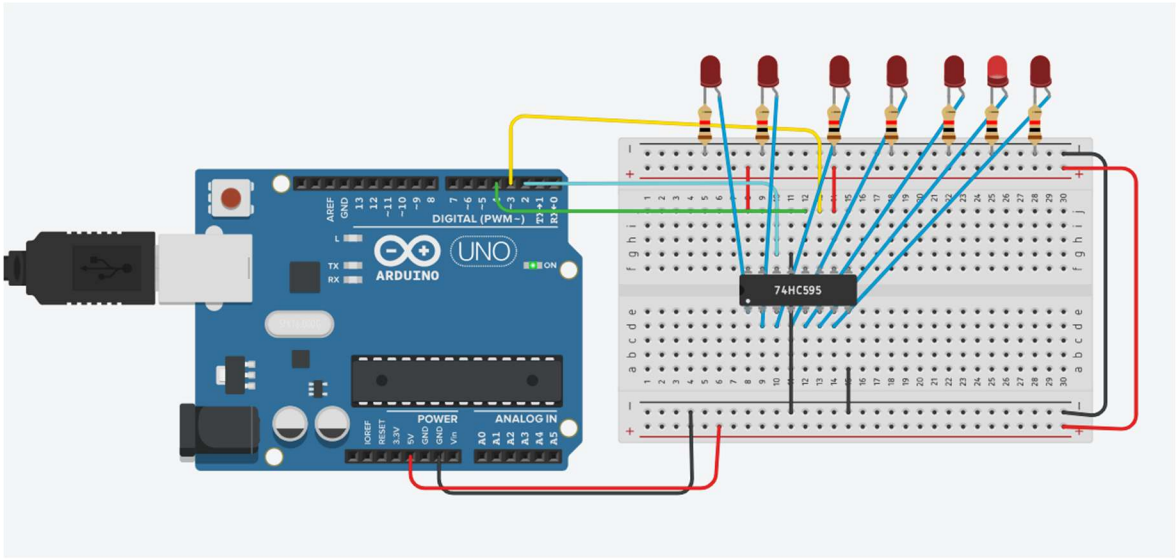
1. Digital Test Kit
2. Connecting Wires
3. ICs: 74HC595
4. Arduino Uno board

Reference circuit:





Tinkercad Reference circuit:



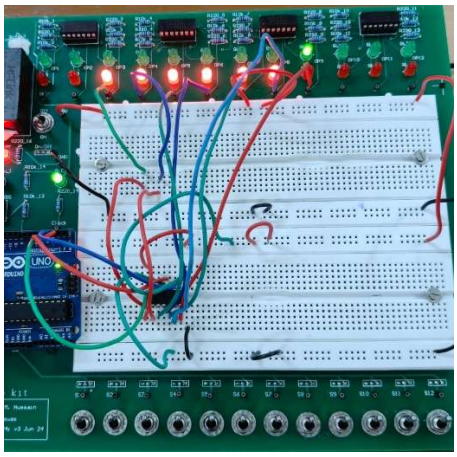

```
const int ser=2;
const int srclock=3;
const int clock=4;
void setup() {
  pinMode(ser,OUTPUT);
  pinMode(srclock,OUTPUT);
  pinMode(clock,OUTPUT);
  Serial.begin(9600);


}

void loop() {
  if (Serial.available()>0)

  {
    int input = Serial.parseInt();
    digitalWrite(clock,LOW);
    shiftOut(ser,srclock,MSBFIRST,(1<<input));
    digitalWrite(clock,HIGH);
    delay(1000);

  }
```

Procedure:

1. Connect the VCC (14) and GND (7) pins of the ICs to the VCC and GND lines of the Digital Test Kit respectively.
2. Write the following code:

```
const int ser=2;
const int srclock=3;
const int clock=4;
void setup() {
  pinMode(ser,OUTPUT);
  pinMode(srclock,OUTPUT);
  pinMode(clock,OUTPUT);
  Serial.begin(9600);

}

void loop() {
  if (Serial.available()>0)

  {
    int input = Serial.parseInt();
    digitalWrite(clock,LOW);
    shiftOut(ser,srclock,MSBFIRST,(1<<input));
    digitalWrite(clock,HIGH);
    delay(1000);

  }

}
```

Observation:



Conclusion:

Hence, the LED lights up corresponding to the users input.

Link to TinkerCAD simulation:
https://www.tinkercad.com/things/gFEQN2tjtsF-lab7exp3?sharecode=MQcPYPSrOhfg3I-Ap-lSZ0f4rW5K2s7BHnESWzQlTPo

****The TinkerCAD link does not work properly sometimes. If there's an issue with the same, please tell me and I can send you the login details of my Tinkercad Account.