Lab Report 6

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Experiment 6 (Part A) - Decade Counter

Objective:

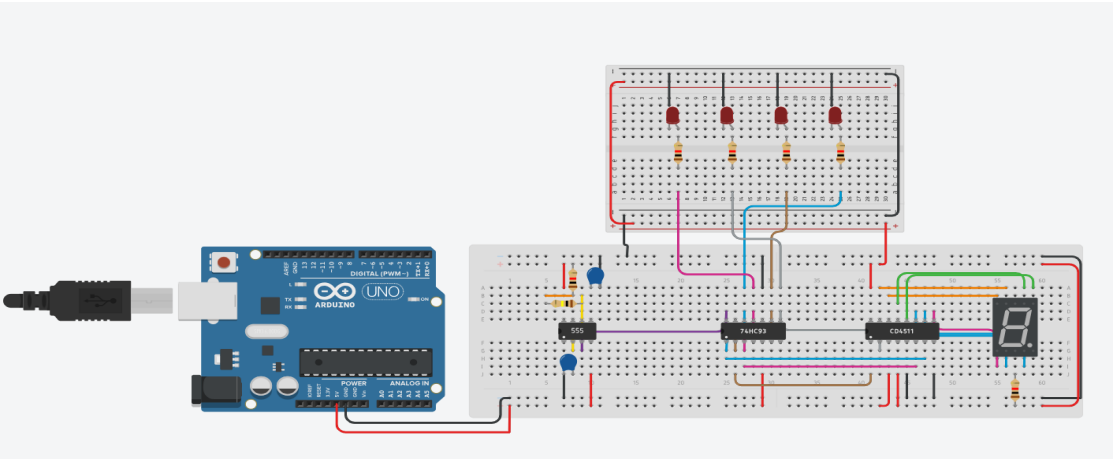
To design, assemble and test a Decade Counter.

Electronic Components Required:

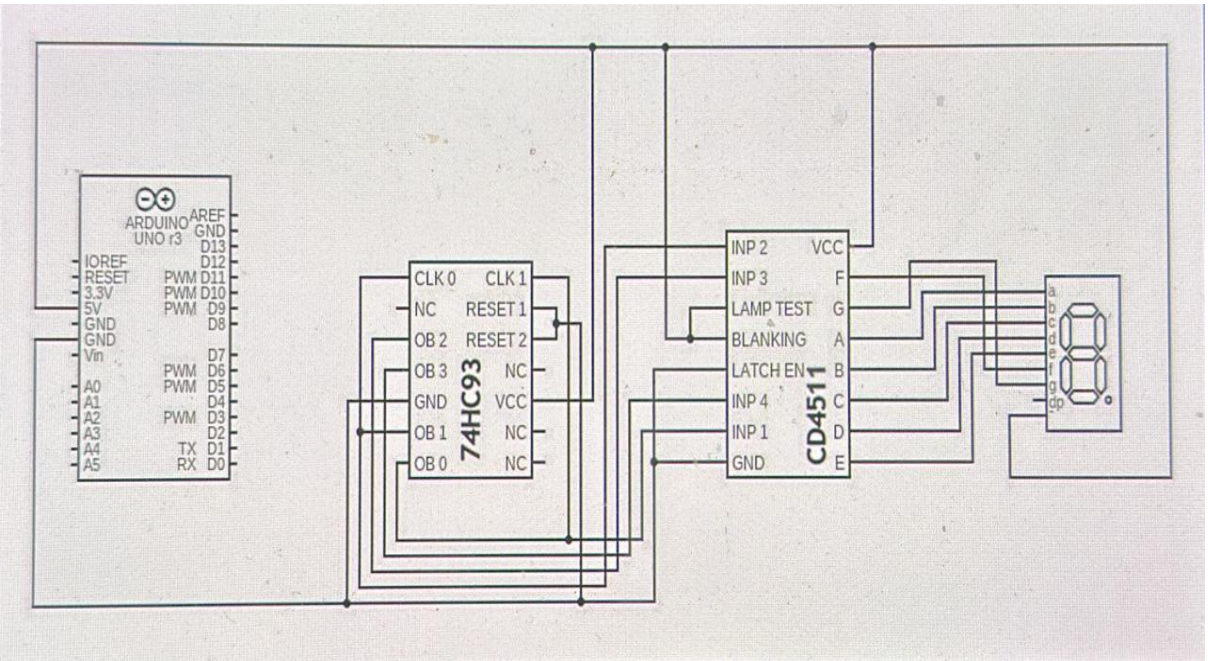
1. Digital Test Kit
2. CD4511 IC 7 Segment Decoder
3. 74HC93 IC 4-Bit Ripple Counter
4. Resistor
5. 7 Segment Display
6. Voltage Supply
7. Normal Wires

Reference Circuit:

1. Tinkercad Screenshot



2. Circuit Diagram

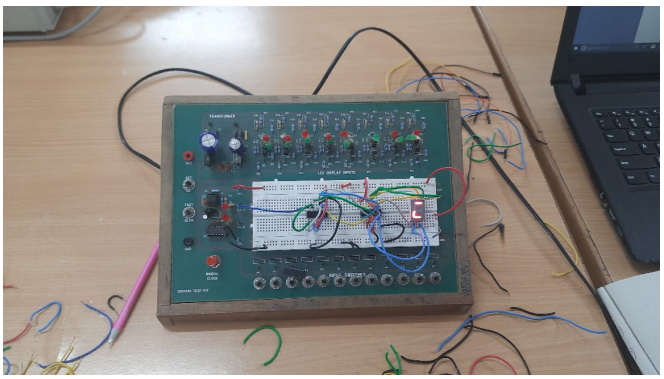


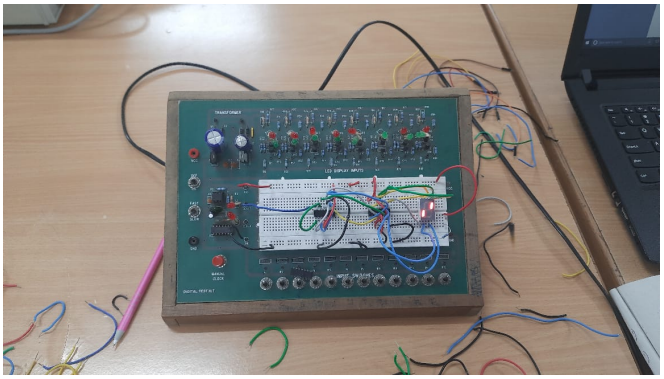
Procedure:

1. Connect the ICs to the breadboard.
2. Connect the VCC and GND pins to the breadboard and ICs.
3. Connect the CLK-R/CLK-M of the breadboard to the appropriate pin in the counter, make other necessary connections and observe the counter output.
4. Once the counter output is verified, connect it to the 7-Segment Decoder.
5. Connect the 7 outputs of the decoder to the respective pins in the 7-Segment Display.
6. Observe the output of the 7-segment Display.

Observations:

We see that the counter counts to 9 then resets to 0 and begins to count again.





Conclusions:

We have created a decade counter with a 7-segment display and verified its working

Link for Tinkercad Simulation:

https://www.tinkercad.com/things/k50C4oxCVWJ-6a-decade-counter/editel?sharecode=ufLuMc46WChnx9Urggq7YKhBemeqkv5owstUJvVohIw

Experiment 6 (Part B) - 8 Bit Counter

Objective:

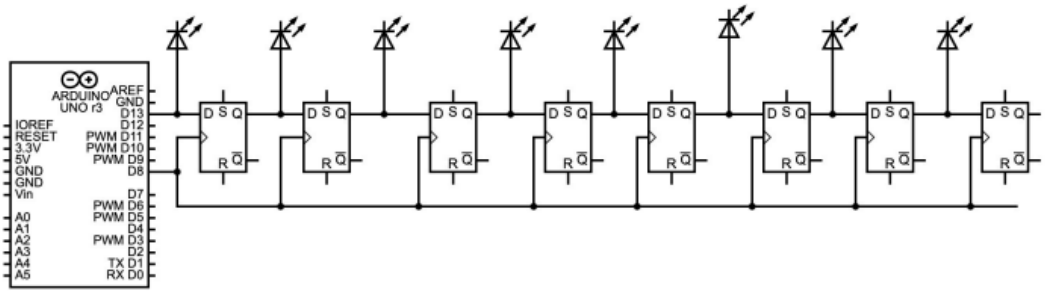
To build a circuit using a shift register to count from 0 to 255 and glow the 8 LEDs in order.

Electronic Components Required:

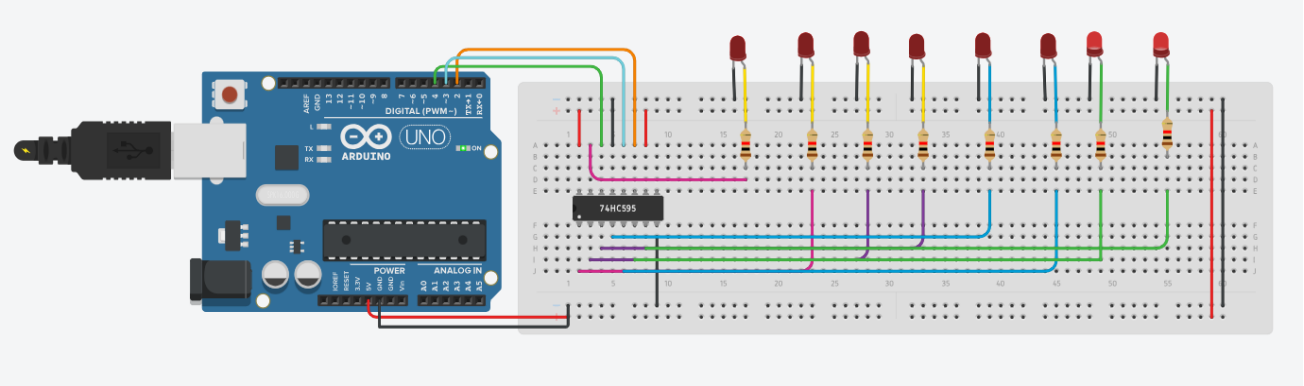
1. 74HC95 IC Shift Register
2. Arduino
3. Normal Wires
4. Digital Test Kit
5. Voltage Supply

Reference Circuit:

1. Circuit Diagram



2. Tinkercad Screenshot

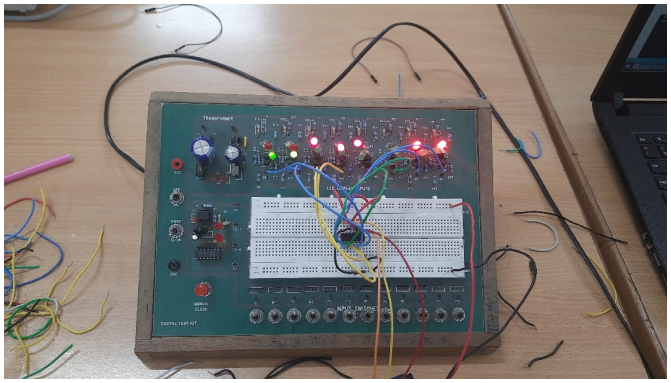


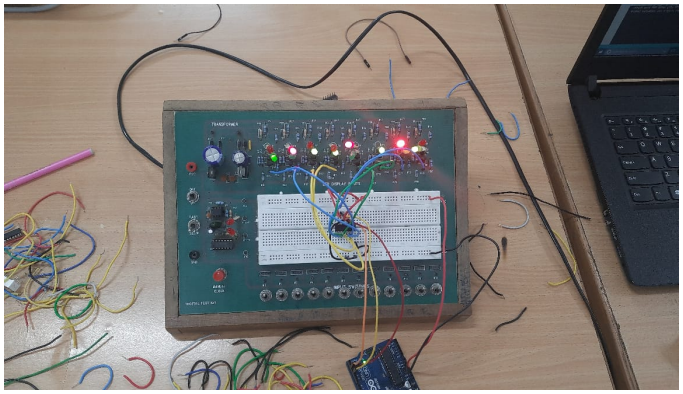
Procedure:

1. Take a Breadboard, Arduino, and connect the Ground and 5V Terminals on them.
2. Connect the Output n terminals of IC with a numbered LED.
3. Connect Power and Ground of IC, Ground the OUTPUT Enable, and VCC the Shift Register Clear.
4. Connect Input, OUTPUT Register Clock, SHIFT Register Clock with the Arduino pins. (here, 12, 10, 11 respectively)
5. Type the following code given in the Code section.

Observations:

The corresponding bulbs glow and count till 255 (11111111).





Code:

```
int clockpin =2, latch =3,datapin=4;
void setup()
{
  pinMode(clockpin, OUTPUT);
  pinMode(latch, OUTPUT);
  pinMode(datapin, OUTPUT);
}

void loop()
{
  for(int i=0;i<256;i++)
  {
    digitalWrite(latch, LOW);
    shiftOut(datapin, clockpin, LSBFIRST, i);
    digitalWrite(latch, HIGH);
    delay(1000);
  }

}
```

Conclusions:

Via this practical experiment, we learned & implemented the working of 8-bit shift register and learned more about coding up for shift Registers. We successfully made an 8-bit simple Binary Counter using Shift Register implementation and checked it's working successfully.

Link for Tinkercad Simulation:

https://www.tinkercad.com/things/imlr2pJ48eH/editel?returnTo=%2Fclassrooms%2FiOqwse40oHf%2Factivities%2FbX6pAEsr3wp%3Ftype%3Dcircuits&sharecode=_6IrQpxjdRl8sEEfTaaispRBE8U5KE-qZgPc0iftiZA

Experiment 6 (Part C) - 0 to 7 Counter

Objective:

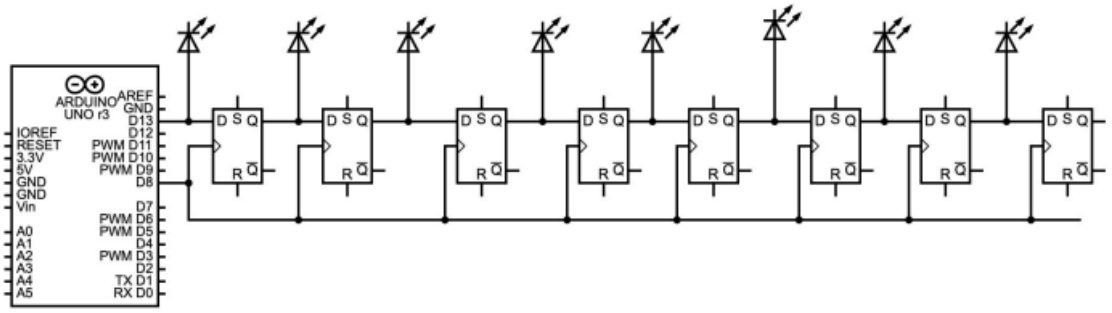
To build a circuit using a shift register to take input from the user (range 0-7) and glow the corresponding LED.

Electronic Components Required:

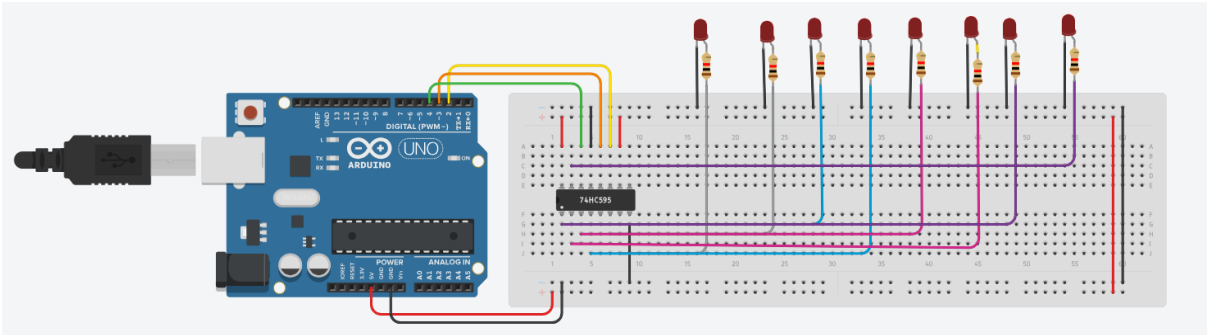
1. Arduino UNO
2. Digital Test Kit
3. 74HC95 IC Shift Register
4. Normal Wires
5. Voltage Supply

Reference Circuit:

1. Circuit Diagram



2. Tinkercad Screenshot

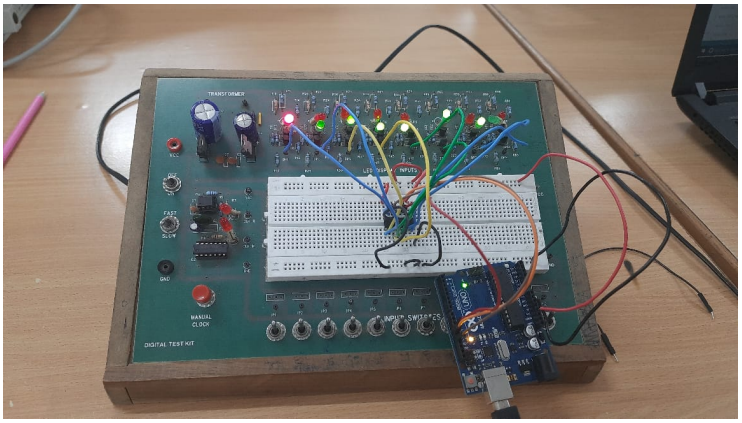


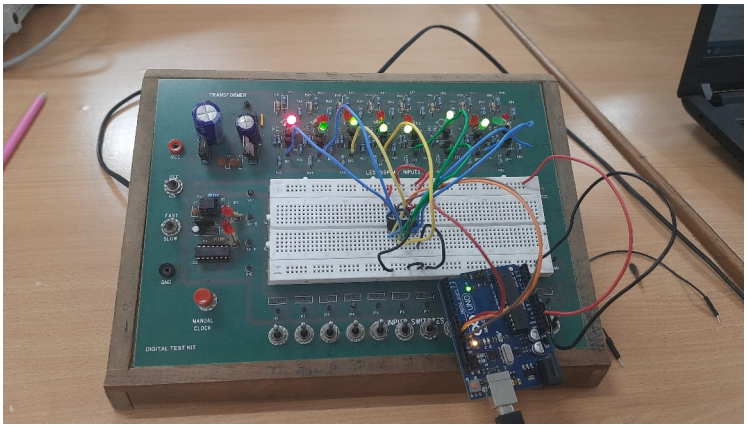
Procedure:

1. Take a Breadboard, Arduino, and connect the Ground and 5V Terminals on them.
2. Connect the Output n terminals of IC with numbered LED.
3. Connect Power and Ground of IC, Ground the OUTPUT Enable, and VCC the Shift Register Clear.
4. Connect Input, OUTPUT Register Clock, SHIFT Register Clock with the Arduino pins. (here, 12, 10, 11 respectively).
5. Type the following code given in the Code section.

Observation:

Depending on user input in the Arduino terminal, the corresponding bulb lights up on the breadboard.





Code:

```
int clockpin =2, latch =3,datapin=4,A;
void setup()
{
pinMode(clockpin, OUTPUT);
pinMode(latch, OUTPUT);
pinMode(datapin, OUTPUT);
Serial.begin(9600);
}
void loop()
{
  while (Serial.available()==0){}
  if(Serial.available() > 0)
    A = Serial.parseInt();
  digitalWrite(latch, LOW);
  shiftOut(datapin, clockpin, MSBFIRST, (1<<A));
  digitalWrite(latch,HIGH);
}
```

Conclusions:

Via this practical experiment, we learnt & implemented the working of 8-bit shift register and learnt more about coding up for shift Registers. We successfully glowed the LEDs according to the user input via Serial Monitor.

Link for Tinkercad Simulation:

https://www.tinkercad.com/things/9qk8L4ntIUb-6c-shift-register-0-to-7-counter/editel?sharecode=qD2eJrfr0OqZVBwIhLtIKUMozSVsDbC53dHAoERFedM