

LAB REPORT: 6

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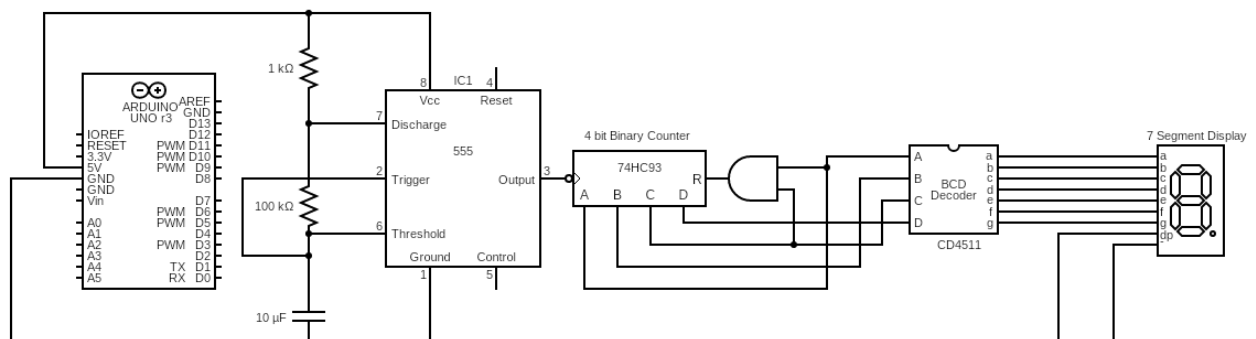
Group: 8

Part 1: Decade Counter

Aim/Objective of the experiment: To build a circuit for a decade counter

Electronic components used: 1 Arduino board, one 10 μ F capacitor, one 555 timer, three 1 kilo ohm resistors, one 100 kilo ohm resistor, one 4-bit binary counter(74HC93), one 7 segment decoder(CD4511), 1 cathode 7 segment display, 1 breadboard, wires

Reference Circuit:



Procedure:

1. Appropriate resistances are connected to the 555 timer, along with an appropriate capacitor to get pulse as output from the timer.
2. This output obtained is used as input for the 4-bit binary ripple counter.
3. By feeding bits 1 and 3 to the reset pins, the counter is made to count from 0 to 9.
4. The four output bits of the counter are inputted in the 7-segment decoder which gives 7 outputs A through G.
5. These are provided as input to the 7-segment display.

Conclusion:

We see that the 7-segment display shows from 0 to 9 and then resets to 0 and starts all over again, thus verifying our theoretical understanding.

TinderCAD simulation: <https://www.tinkercad.com/things/OJ1nZBE6i0o-arghya-lab-6-part-1-decade-counter/>

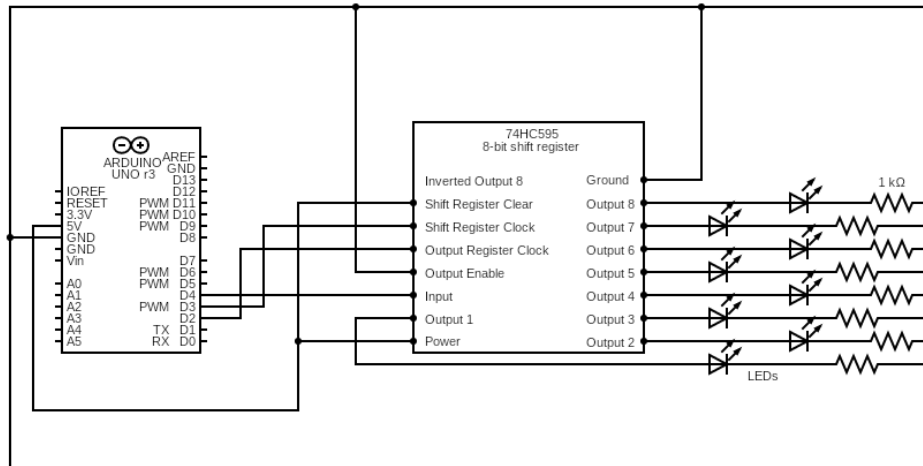
Part 2: Shift Registers

Part 2A

Aim/Objective of the experiment: To count from 0 to 255 and glow the 8 LEDs in order using code

Electronic components used: 1 Arduino board, eight 1 kilo ohm resistors, 8 LEDs, 2 breadboards, one 8-bit shift register(74HC595), wires

Reference Circuit:



Procedure:

1. The circuit is set up, as shown in the reference figure above, on the breadboards.
2. Three inputs are provided to the shift register from the Arduino.
3. The output pins of the IC are connected to the 8 LEDs.
4. An Arduino code is written to count from 0 to 255 and glow the 8 LEDs in order.

The code used:

```
int orc=2;
int src=3;
int inp=4;

void setup()
{
    pinMode(orc, OUTPUT);
    pinMode(src, OUTPUT);
```

```

    pinMode(inp, OUTPUT);
}

void loop()
{
    int i;
    for(i=0;i<256;i++)
    {
        digitalWrite(orc, LOW);
        int j;
        for(j=0;j<8;j++)
        {
            digitalWrite(inp,!!(i&(1<<(7-j))));
            digitalWrite(src,HIGH);
            digitalWrite(src,LOW);
        }
        digitalWrite(orc, HIGH);
        delay(500);
    }
}

```

Conclusion:

We see that the 8 LEDs display the bitwise binary representation from 0 to 255 and then resets to 0 and starts all over again, thus verifying our understanding of the usage of shift registers.

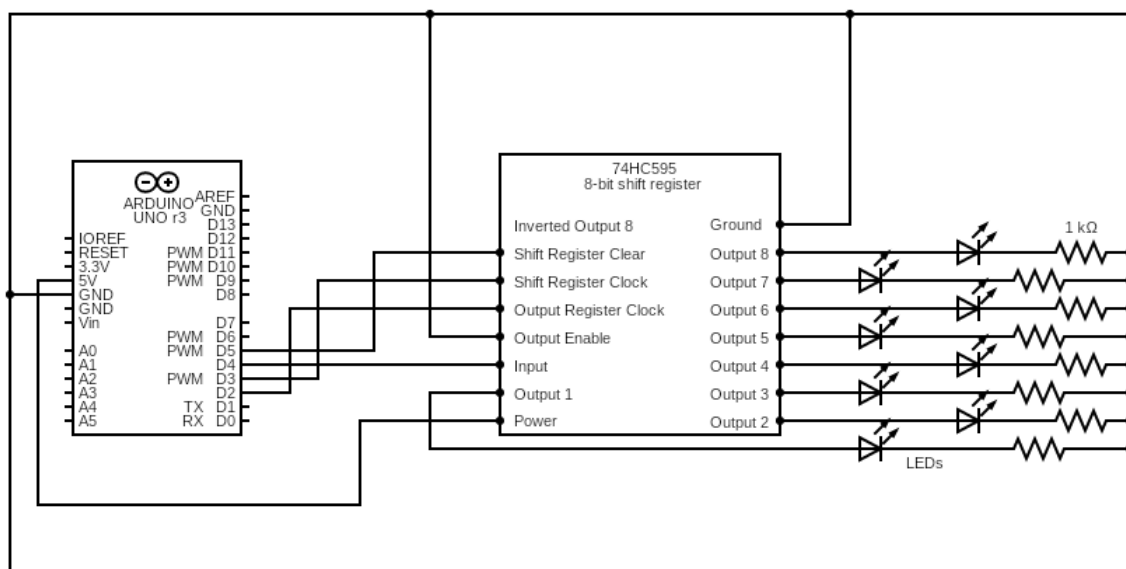
TinkerCAD Simulation: <https://www.tinkercad.com/things/9rJ6lHBJlHO-arghya-lab-6-part-2a-shift-register/>

Part 2B

Aim/Objective of the experiment: To take an input between 0 and 7 from the user and glow the corresponding LED using code and shift registers

Electronic components used: 1 Arduino board, eight 1 kilo ohm resistors, 8 LEDs, 2 breadboards, one 8-bit shift register(74HC595), wires

Reference Circuit:



Procedure:

1. The circuit is set up, as shown in the reference figure above, on the breadboards.
2. Four inputs are provided to the shift register from the Arduino.
3. The output pins of the IC are connected to the 8 LEDs.
4. An Arduino code is written to take an input between 0 and 7 from the user and glow the corresponding LED using code and shift registers

The code used:

```
int inp=2;//input pin
int orc=3;//output register clock
int src=4;//shift register clock
int clr=5;//shift register clear
```

```
int num;
```

```
void setup()
{
    pinMode(inp, OUTPUT);
    pinMode(orc, OUTPUT);
    pinMode(src, OUTPUT);
    Serial.begin(9600);
    digitalWrite(inp,HIGH);
    digitalWrite(clr,HIGH);
}
```

```
void loop()
{
    if(Serial.available(>0)
    {
        num=Serial.read();
        num=num-'0';

        int i;
        for(i=0;i<num+1;i++)
        {
            digitalWrite(src,HIGH);
            digitalWrite(src,LOW);
            if(i==0)
```

```
        digitalWrite(inp,0);  
    }  
  
    digitalWrite(orc,1);  
    digitalWrite(orc,0);  
  
    delay(500);  
}  
digitalWrite(clr,LOW);  
digitalWrite(inp,HIGH);  
digitalWrite(clr,HIGH);  
}
```

Conclusion:

We see that the LED corresponding to the user's input between 0 to 7 glows, thus verifying our understanding of the usage of shift registers.

TinkerCAD Simulation: <https://www.tinkercad.com/things/0tREgd8wbvT-arghya-lab-6-part-2b>
