LAB REPORT-6

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PART A

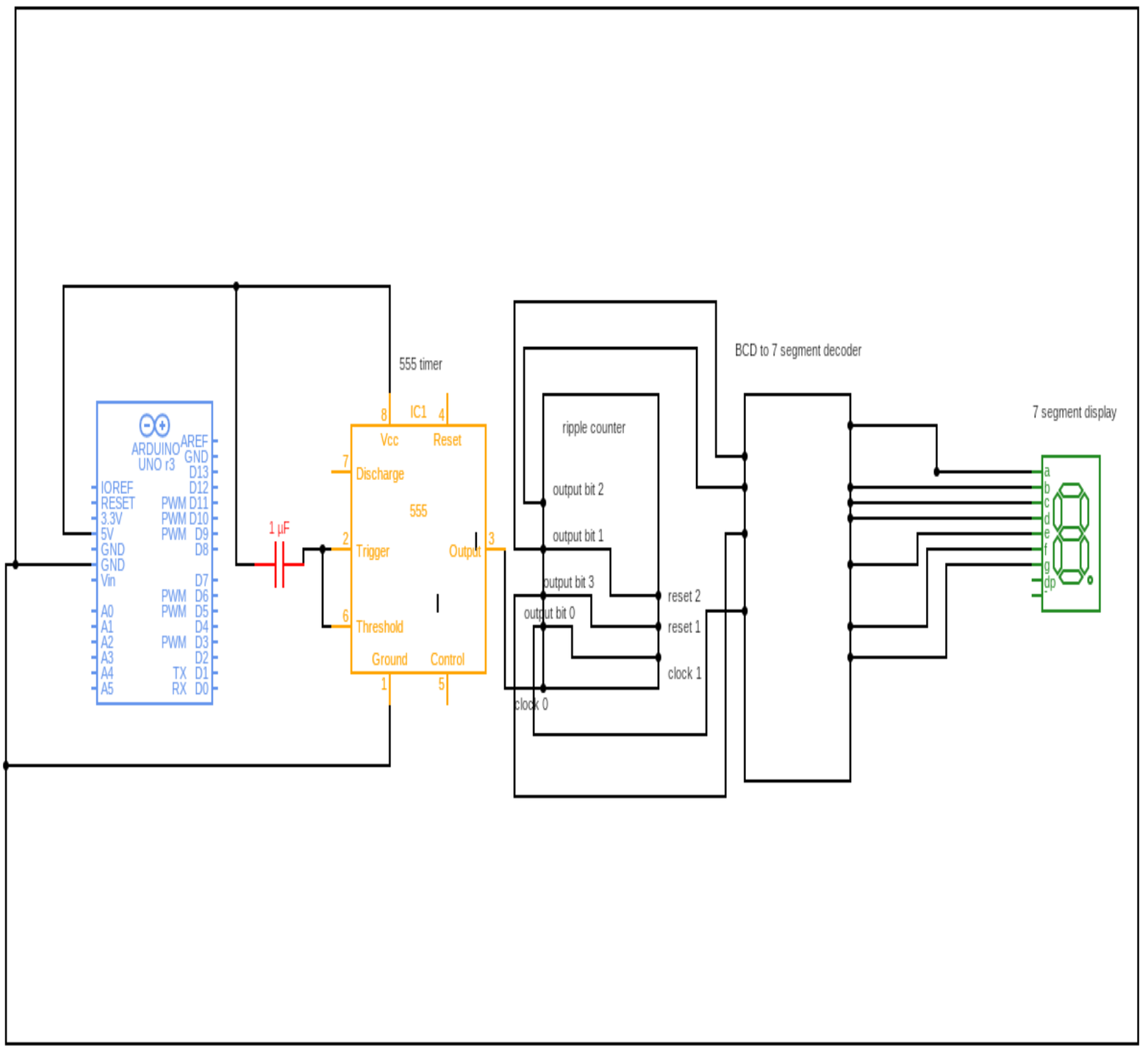
Aim of the experiment:

To make a sequential circuit that counts from 0 to 9 and then resets back to 0 and so on.

Electronic Components used:

1. Connecting Wires
2. 74HC93 IC
3. Arduino UNO
4. Resistors (5)
5. 555 Timer
6. 7 Segment display (Common cathode)
7. Capacitor
8. LED

Reference Circuit:



Procedure:

1. Drag all the electronic components mentioned above to the Tinkercad working area.
2. Attach the 555 Timer, ripple counter IC and BCD IC as shown.
3. Connect the 555 Timer output to clock 0 of the ripple counter, clock 1 of ripple counter to output bit 0, reset 1 to output bit 3 and reset 2 to output bit 1.
4. Connect the output bits of ripple counter to respective inputs of BCD to 7 – segment decoder.
5. Right appropriate code and start simulation.

Observation:

On starting simulation, we can see the numbers from 0 to 9 are displayed on the 7 – segment display. The blinking of LED denotes that the 555 timer IC works correctly.

Link for Tinkercad simulation circuit part A

PART B

Aim of the experiment:

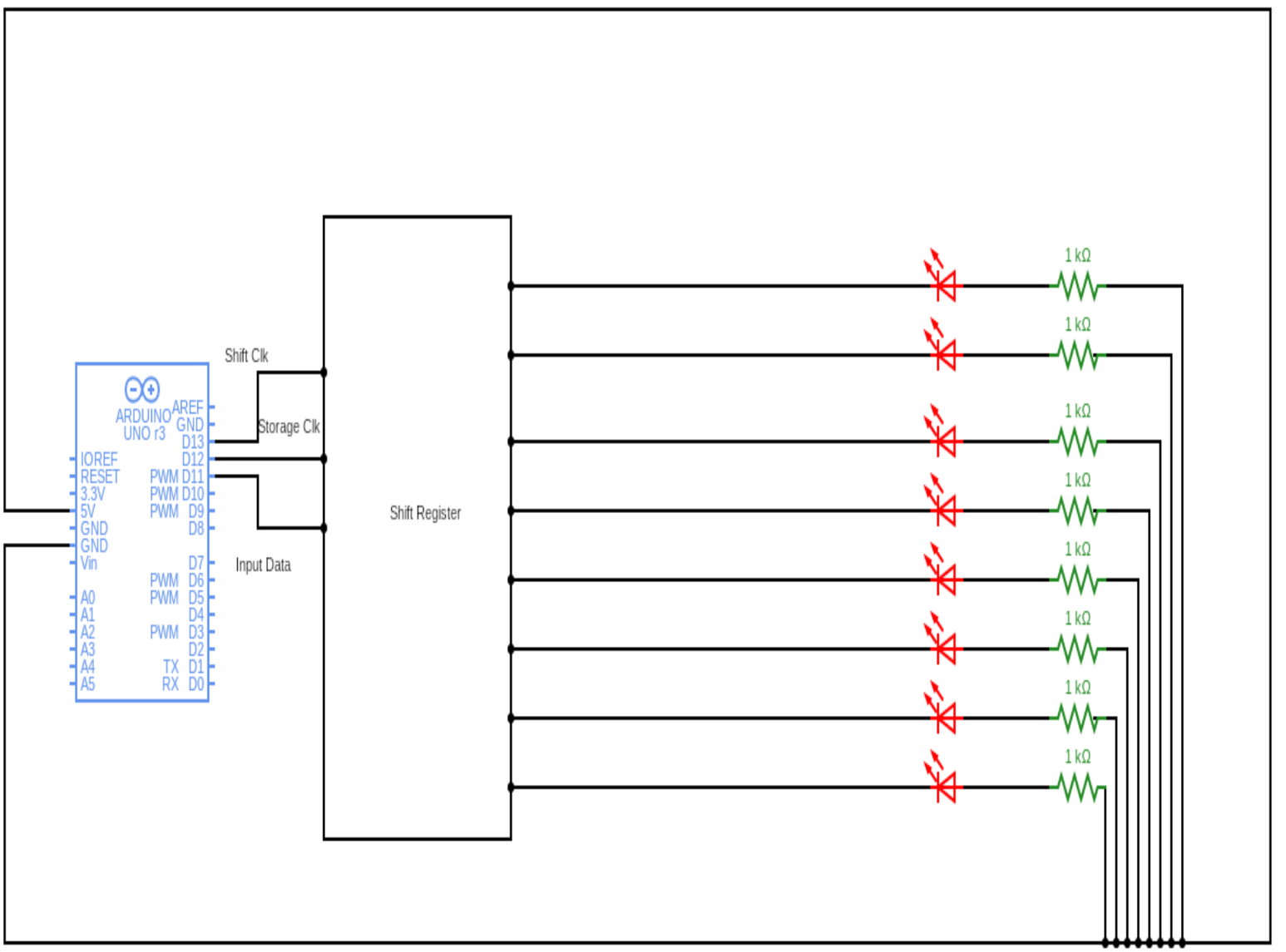
(I)To build a circuit for shift register and write the code to count from 0 to 255.

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

Electronic Components used:

1. 74HC595 IC (Shift Register)
2. Connecting Wires
3. LEDs (8)
4. Resistors (8)
5. Arduino UNO
6. Small Breadboard

Reference Circuit:



Procedure:

1. Drag all the components to Tinkercad working area and set up the circuit as shown.

Code (I):

```
int input = 11;                    //pin 11 assigned to input data
Int latch = 12;                    //pin 12 assigned to data that will be latched
int clock = 13;                    //pin 13 assigned to clock
 void setup()
{
  pinMode(input, OUTPUT);
  pinMode(latch, OUTPUT);
  pinMode(clock, OUTPUT);
}
void loop()
{
  int i;
  for(i=0; i <256; i++)
  {
    digitalWrite(latch, LOW);
    shiftOut(input, clock, MSBFIRST,i);
    digitalWrite(latch, HIGH);
    delay(500);                              //keeps LED on for 500 milliseconds
  }
  }
```

Code (II):

```
int input = 11;              //pin 11 assigned to input data
int latch = 12;             //pin 12 assigned to data that will be latched
int clock = 13;              //pin 13 assigned to clock
int num;


void setup()
{
  pinMode(input, OUTPUT);
  pinMode(latch, OUTPUT);
  pinMode(clock, OUTPUT);
  Serial.begin(9600);

Serial.print("Enter a number between 0 and 7 to glow corresponding LED");
}
void loop()
{
  if(Serial.available() > 0)
  {
    num = Serial.read();
    num = num - '0';
```

```
  Serial.println(num);


  int x = 1;                          //shift register output cursor
  int i;
  for(i=0; i <=num; i++)
  {
   if(i==0)
    x = 1;                            //starts from least significant bit (or output 1 of shift register)
   else
    x = x * 2;                        //moves to next higher bit (next output)
   if(i==num)
   {
    digitalWrite(latch, LOW);
    shiftOut(input, clock, MSBFIRST,x);
    digitalWrite(latch,HIGH);
    delay(500);
   }
  }
 }
}
```

Observation (I):

On starting simulation we can see numbers from 0 to 255 in binary format are displayed on the LEDs, with the rightmost LED representing the least significant bit and leftmost LED representing the most significant bit. We can also conclude that using 8 bits, the maximum value that can be obtained is 2^8 – 1 i.e., 255.

Observation (II):

It can be seen that the LED corresponding to the given input number from 0-7 glows.

Link for Tinkercad simulation circuit part B(i)

Link for Tinkercad simulation circuit part B(ii)