LAB REPORT-8

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PART-A

Tri State Buffer

AIM/OBJECTIVES OF THE EXPERIEMEMT:

To get familiar with the working of a tri state buffer and verify the obtained truth table

ELECTRONIC COMPONENTS USED:

1) Ardunio

2)Breadboard

3)NMOS

4)PMOS

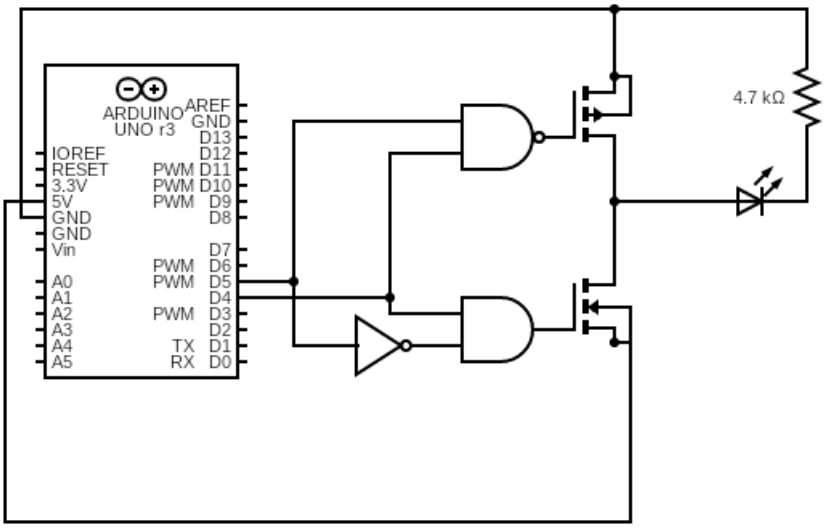
5)LED

6)Resistor

7)Connecting Wires

8)Quad NAND gate(74HC00 IC)

REFERENCE CIRCUIT:



PROCEDURE:

1) Take a breadboard and ardunio. Give Vcc and GND connection to the breadboard through the Arudino.

2) Take a IC, CMos, NMos and place it on breadboard and give respective connections to it as shown in the reference circuit.

3) Connect one led at the output pin of both CMOS and NMOS and connect resistor to it.

4) Now connect enable pin and input pn to the ardunio.

5) Now write the code in code section (give inputs).

6) ***CODE:-***

```
int input = 4;
int enable = 3;
void setup()
{
  pinMode(input, OUTPUT);
  pinMode(enable, OUTPUT);
  Serial.begin(9600);
}
void loop()
{
  if(Serial.available()>1)
  {
    int a = Serial.read() - '0';
```

```
    int b = Serial.read() - '0';
        digitalWrite(enable, a);
        digitalWrite(input, b);
        Serial.print("Enter Enable and input : ");
        Serial.print(a);
        Serial.println(b);
  }
  delay(100);
}
```

7) Now make a truth table from the observations.

CONCLUSION:

1) From this experiment we observe that the how tri state buffer works.

2) Below outputs is observed for the ouur inputs as follows.

ENABLE	INPUT	OUTPUT
0	**0**	**Z**
0	**1**	**Z**
1	**0**	**0**
1	**1**	**1**

These are the outpus observed during simulation

LINK FOR THE TINKERCAD SIMULATION:

https://www.tinkercad.com/things/hSXvYc6IfhN-lab-8-part-a/editel?sharecode=-bfx7XM6klSYccBG_-I5gozwE1sgEpPh9OKpBuvM3Bk

PART-B

Data flow using Tri state Buffers

Aim\objective of the experiement:

To understand data flow control using a tristate buffer

Electronic components used:

1) Ardunio

2)Breadboards

3)4-Tri state buffers

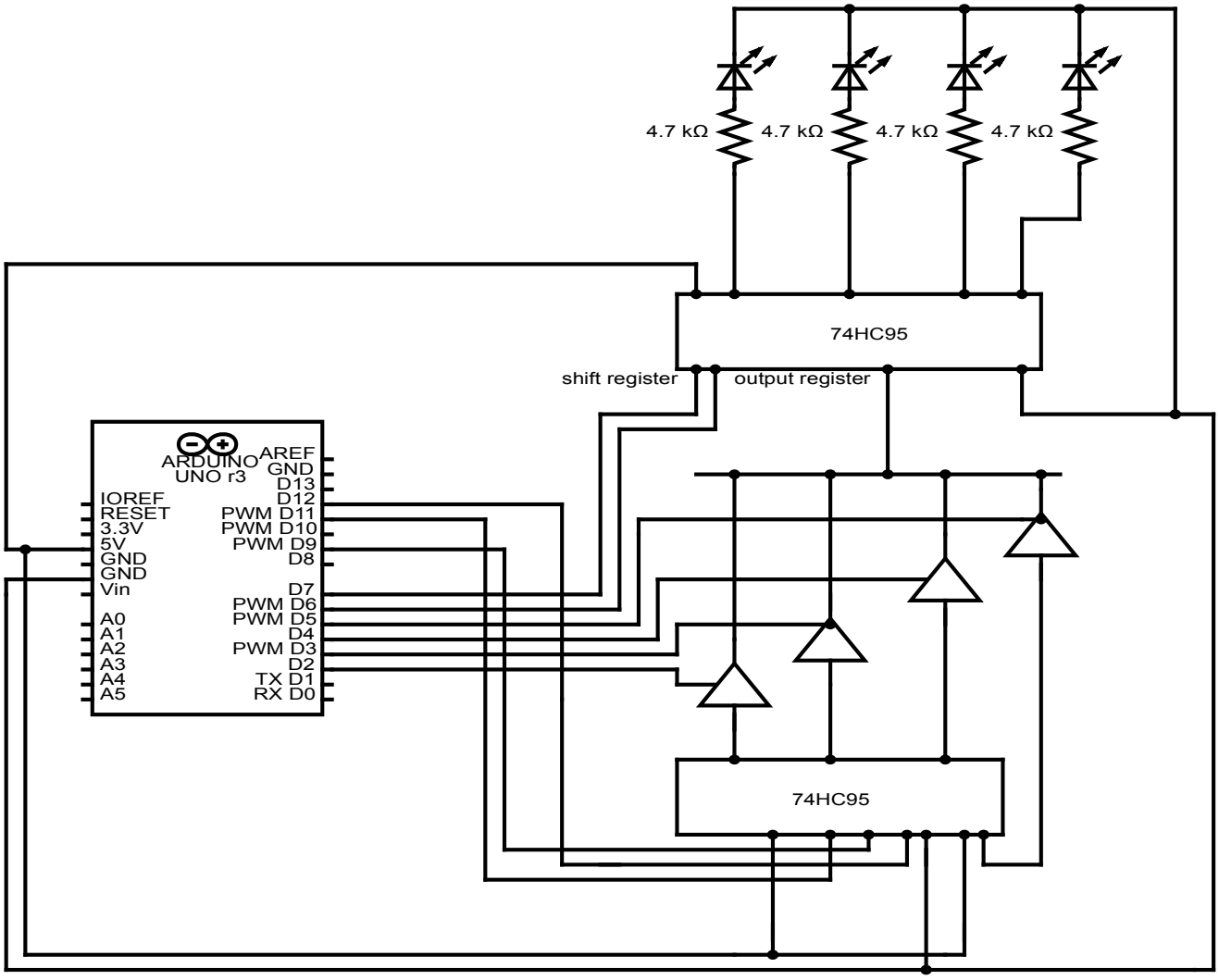
4)2-8 bit registers

5)LED s

6)Resistors

7)Connecting Wires

REFERENCE CIRCUIT:



Procedure:

1) Take the mini breaboard and place a 8-bit register on it and give respectives connections to the register and breadboard from ardunio [Input pin, Enable pin].

2) Now give the 8-bit register output to the 4-leds and connect it to the resistors.

3) Now connect the outputs of 4 leds to the input of 4 tri state buffers.

4) Now take another breadboard and place an 8-bit register on it and give respective connections from ardunio and inputs for this 8-bit register is the output of 4 tri state buffers.

5) Now connect the outputs of 8-bit register to 4 leds and give resistor (2^{nd} breadboard).

6) Now give the VCC and GND connections to all breadboards make a circuit as shown in the reference circuit diagram.

7) Now write the code in code section and start simulation and give inputs and then check it works properly or not.

8)***CODE****:*

```
const int latchPin = 11;
const int clockPin = 12;
const int dataPin = 9;
int x=0;
int y=0;
void setup ()
{
  pinMode(latchPin, OUTPUT);
  pinMode(clockPin, OUTPUT);
  pinMode(dataPin, OUTPUT);
  pinMode(2, OUTPUT);
  pinMode(3, OUTPUT);
  pinMode(4, OUTPUT);
```

```
  pinMode(5, OUTPUT);
  pinMode(6, OUTPUT);
  pinMode(7, OUTPUT);

  Serial.begin(9600);
   Serial.println("ENTER A NUMBER BETWEEN 01-15 \n");
}
void loop()
{
   if(Serial.available()==2){
    x=Serial.read();
    x=x-'0';
    y=Serial.read();
    y=y-'0';
    Serial.println("INPUT: \n");
    Serial.print(10*x+y);
    Serial.println("\n");

    digitalWrite(latchPin, LOW);

    shiftOut(dataPin, clockPin, MSBFIRST, 10*x+y);

    digitalWrite(latchPin, HIGH);
    digitalWrite(6, LOW);
    digitalWrite(2, LOW);
    digitalWrite(3, LOW);
    digitalWrite(4, LOW);
    digitalWrite(5, HIGH);
    digitalWrite(6, HIGH);
    delay(0.5);
    digitalWrite(6,LOW);
    delay(0.5);
```

```
digitalWrite(7, HIGH);
delay(1);

digitalWrite(7, LOW);
digitalWrite(2, LOW);
digitalWrite(3, LOW);
digitalWrite(4, HIGH);
digitalWrite(5, LOW);
digitalWrite(6, HIGH);
delay(0.5);
digitalWrite(6,LOW);
delay(0.5);
digitalWrite(7, HIGH);
delay(1);

digitalWrite(7, LOW);
digitalWrite(2, LOW);
digitalWrite(3, HIGH);
digitalWrite(4, LOW);
digitalWrite(5, LOW);
digitalWrite(6, HIGH);
delay(0.5);
digitalWrite(6, LOW);
delay(0.5);
digitalWrite(7, HIGH);
delay(1);

digitalWrite(7, LOW);
digitalWrite(2, HIGH);
digitalWrite(3, LOW);
digitalWrite(4, LOW);
digitalWrite(5, LOW);
```

```
    digitalWrite(6, HIGH);
    delay(0.5);
    digitalWrite(6,LOW);
    delay(0.5);
    digitalWrite(7, HIGH);
    delay(1);


    Serial.print("OUTPUT :\n");
    Serial.print(10*x+y);
    Serial.print("\n");
  }
}
```

CONCLUSION:

1)From this Experiement we understood the passage of data(output) of one register to the another register as input to the another registher through bus.

2)we unerstood that how data flow control using tristate buffer.

3)From the serial monitor we gave inputs to the circuit and observe the outputs form 01 to 15, for each number we observe that leds glow as like binary number of our correspnding input.

4)We observed the below outputs for given inputs.

OUTPUTS for our respective INPUTS	
INPUT(Enable,Input)	**OUTPUT**
00	0000
01	0001
02	0010
03	0011
04	0100
05	0101
06	0110
07	0111
08	1000
09	1001

10	1010
11	1011
12	1100
13	1101
14	1110
15	1111

LINK FOR THE TINKERCAD SIMULATION:

https://www.tinkercad.com/things/h7vmavBWlxp-lab-8-part-b/editel?sharecode=ZFC-G6_xhK_g-Xn9pPAyiLd3iEOnkCz5vyqVzVjY9lc