DIGITAL SYSTEMS AND MICROCONTROLLERS - LAB REPORT 1

14/8/25

Yashaswi Priya

2025114007 GROUP-11 TABLE-7

Experiment 1

Objective:

Familiarization with Digital Test Kit and Binary Logic Levels.

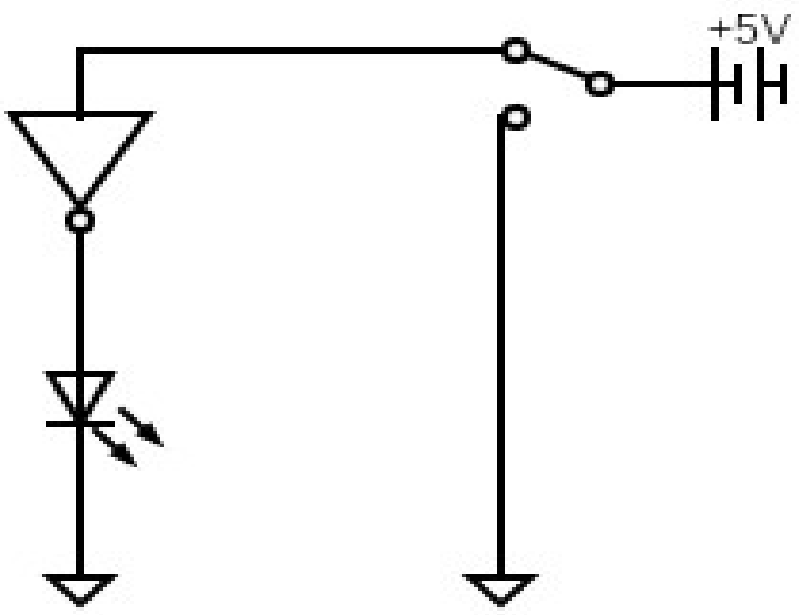
1. Getting conversant with the features of Digital Test Kit.
2. Understanding the implications of Binary Logic Levels using this Test Kit.

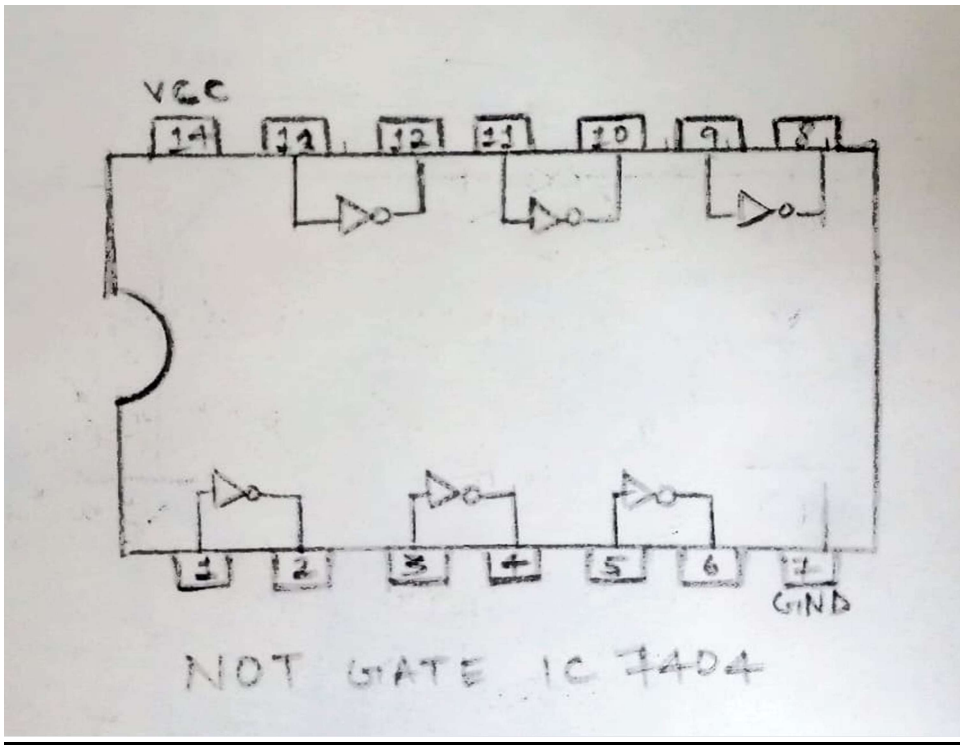
Electronic components used:

1. Breadboard
2. Battery
3. Switch
4. LED bulb
5. Resistor
6. Hex Inverter: 7404 IC (14 pin NOT gate assembly)
7. Connecting Wires

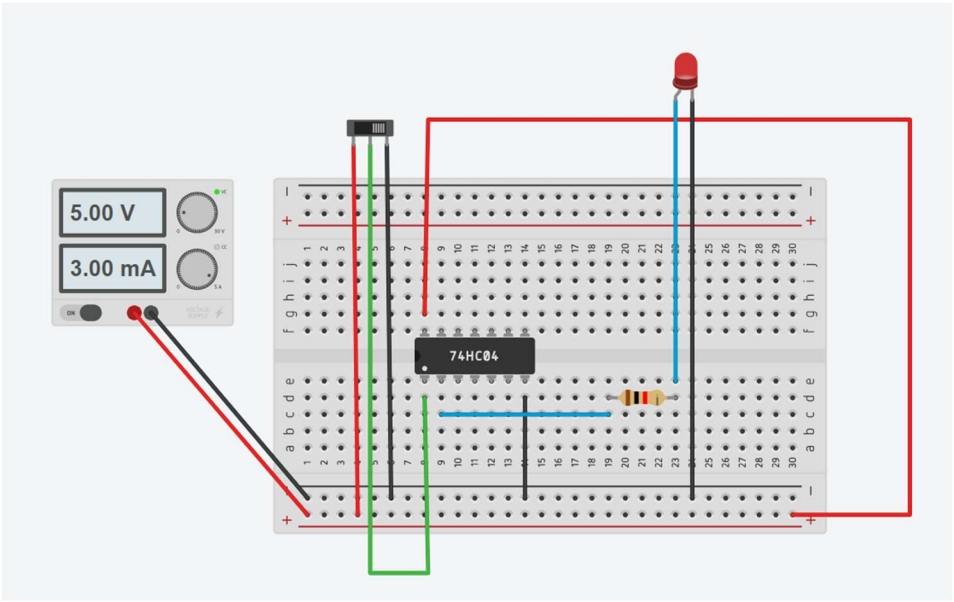
Components 1-5 are a part of the Digital Test Kit.

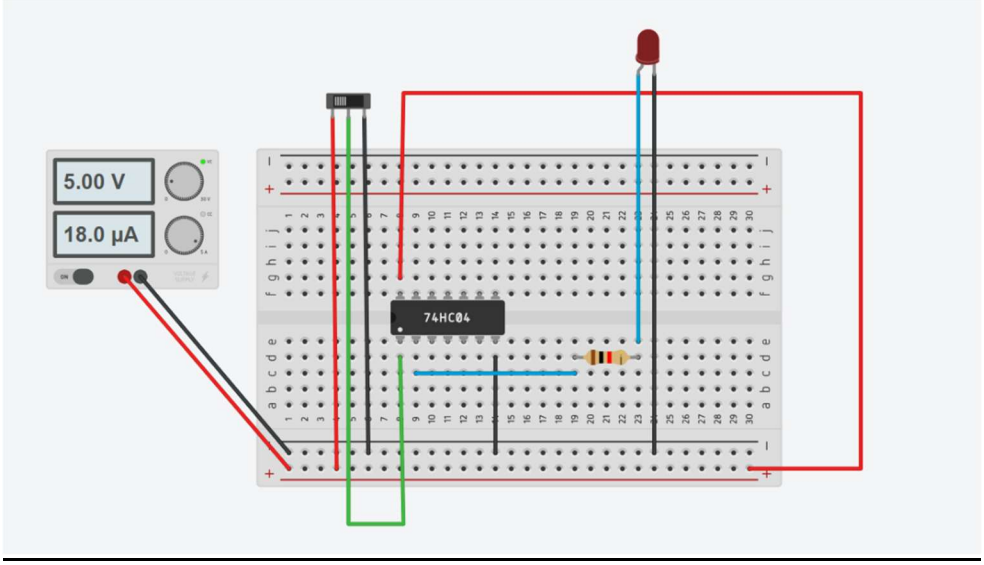
Reference circuit:





Tinkercad Reference circuit:



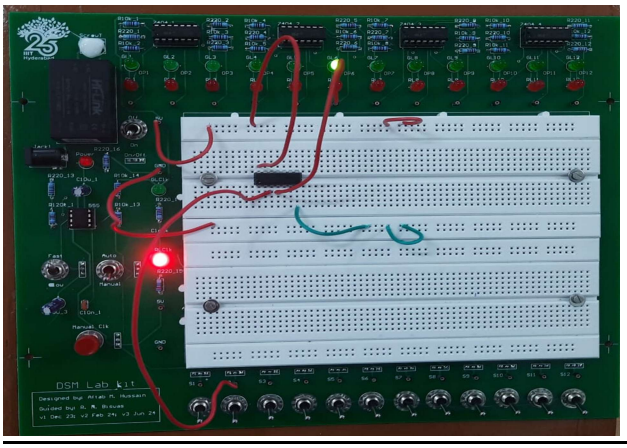


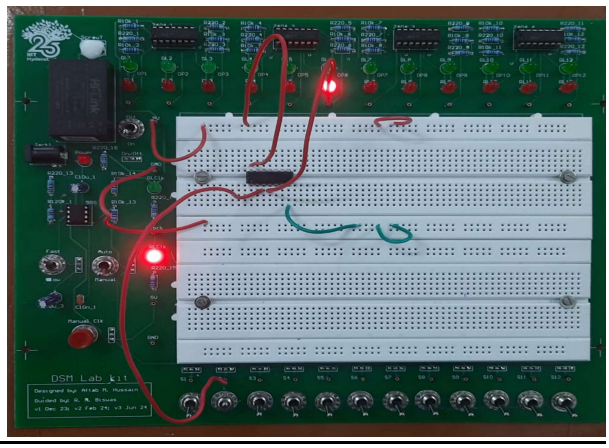
Procedure:

1. Put the clock switch in FAST position and switch on the VCC supply.
2. Check if all the input pins and LEDs are working properly: Red LED glows when switched on (1) and green LED when switched off (0).
3. Connect the VCC (14) and GND (7) pins of the IC to the VCC and GND lines of the Digital Test Kit respectively.
4. Connect the input pin of one of the NOT gates to the input switches; and the output pin to the LEDs.
5. Switch it ON and OFF and Note the observations.

Observation:

Now, the RED LED glows when we flick OFF the switch and the GREEN LED glows when we switch it ON.





Conclusion:

1. Flicking ON the switch now gives a HIGH output (RED LED).
2. Flicking OFF the switch now gives a LOW output (GREEN LED).
3. Hence, the IC has a NOT gate which flips the input HIGH->LOW and LOW->HIGH.
   Link to TinkerCAD simulation:
   https://www.tinkercad.com/things/4tdmy9mzrZy-lab1exp1?sharecode=undefined
   ****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

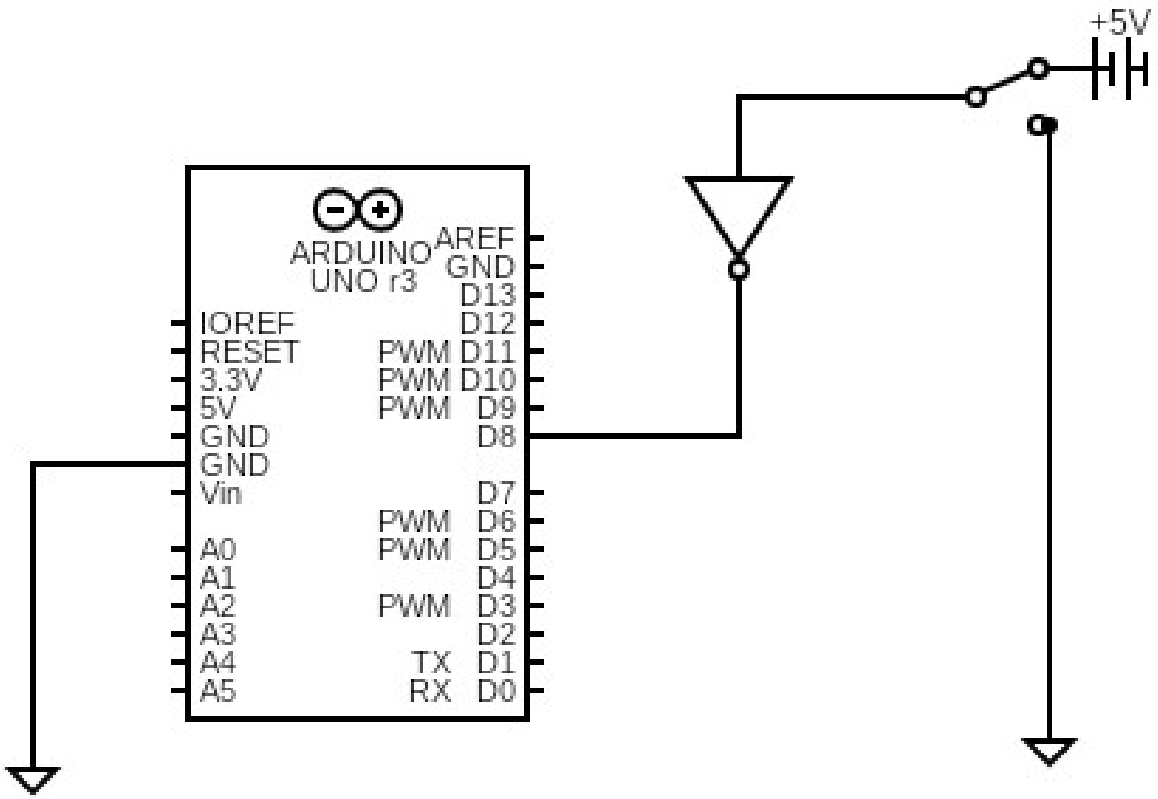
Objective:

To understand the working of Arduino ISP and compile C code for ATMega328P : A basic “Hello World” program using the NOT gate

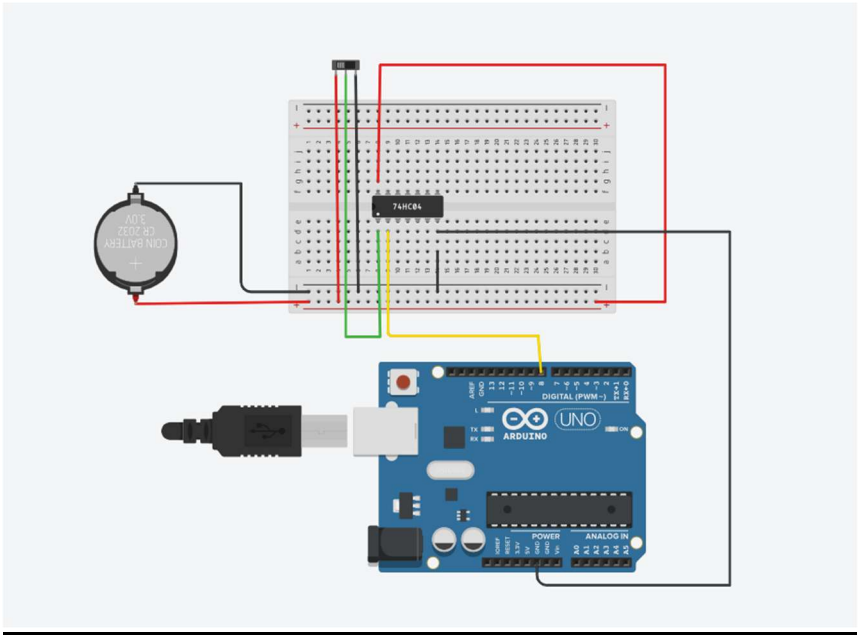
Electronic components used:

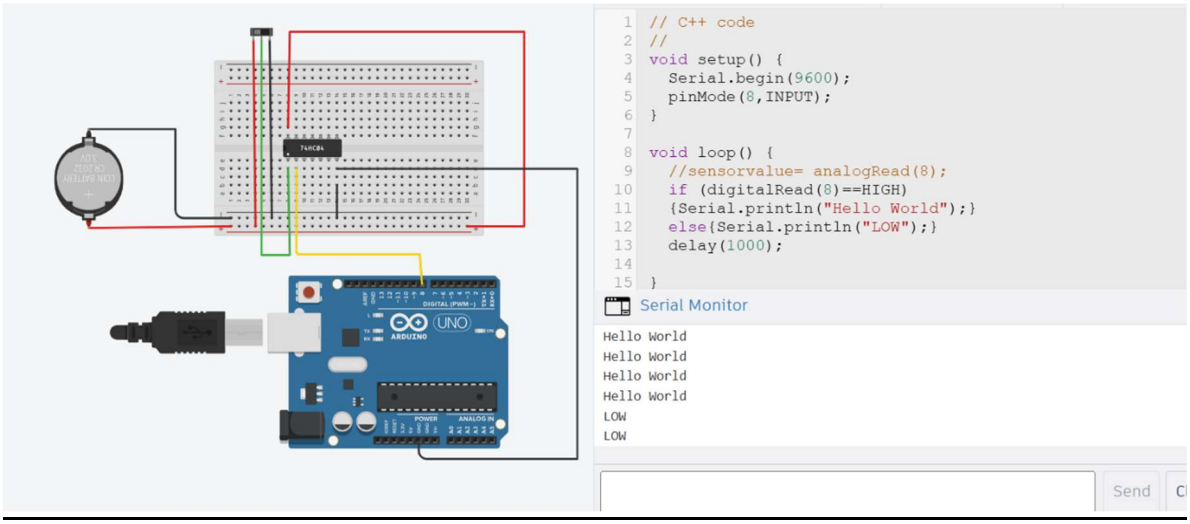
1. Arduino UNO
2. Battery
3. Switch
4. Digital Test Kit
5. Hex Inverter: 7404 IC (14 pin NOT gate assembly)
6. Connecting Wires

Reference circuit:



Tinkercad Reference circuit:





Procedure:

1. Connect the VCC (14) and GND (7) pins of the IC to the VCC and GND lines of the Digital Test Kit respectively.
2. Connect the 5V and GND of the Arduino to the power supply and GND of the Digital Test Kit.

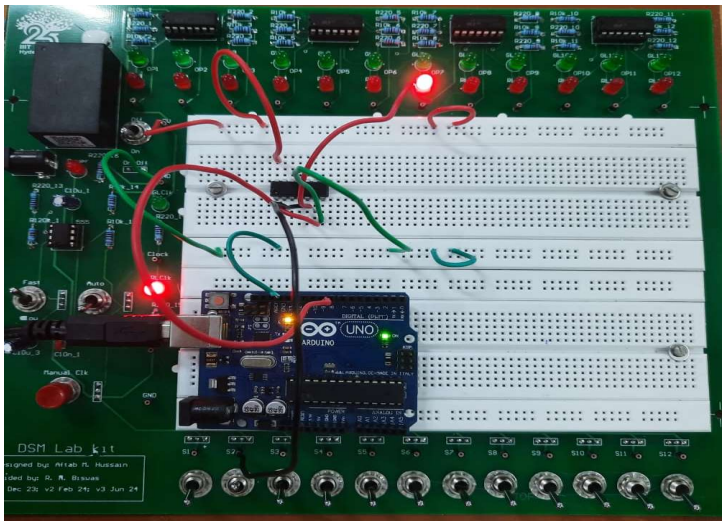
3. Connect the input and output terminals of the Digital Test Kit to the input and output terminals of a NOT gate in the IC respectively.
4. Connect the output of the NOT gate to the input of the Arduino (here, 8th terminal).
5. Connect the Arduino ISP to your device using a cable and write the following code in Arduino IDE:

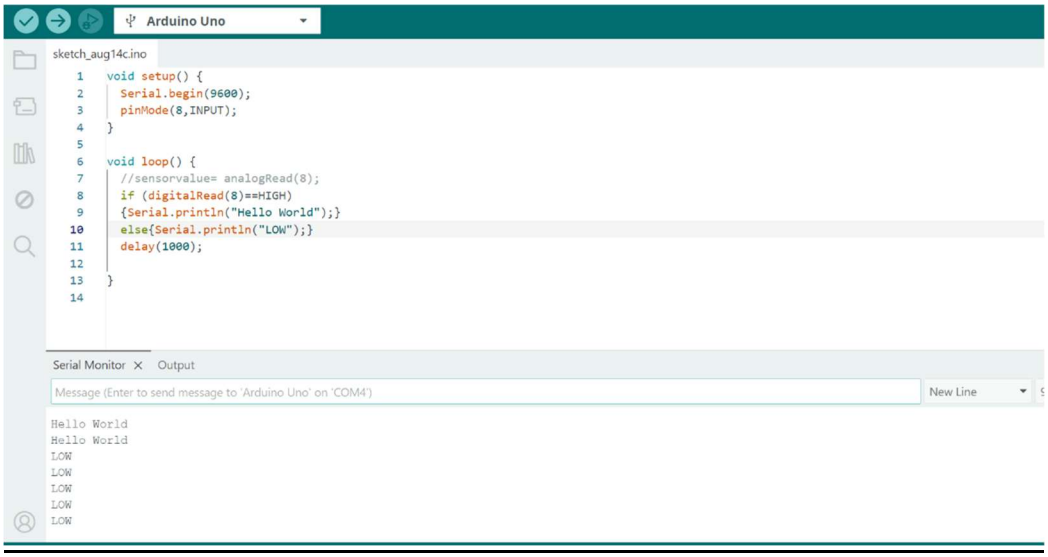
```
void setup() {
  Serial.begin(9600);
  pinMode(8,INPUT);
}

void loop() {
  //sensorvalue= analogRead(8);
  if (digitalRead(8)==HIGH)
  {Serial.println("Hello World");}
  else{Serial.println("LOW");}
  delay(1000);

```

6. Go to Tools -> Board -> Arduino UNO and then select the appropriate port.
7. Compile the code and upload it to the Arduino.
8. Flick the switch ON and OFF and Note the observations.

Observation:

1. When we input 0, it gets converted to 1 by the NOT gate and hence it prints “Hello World” on the Serial Monitor.
2. When we input 1, it gets converted to 0 by the NOT gate and hence it prints “LOW” on the Serial Monitor.





Conclusion:

By using the Arduino, we can understand the functioning of the IC in detail as well as form complicated circuits with complex codes in the future.

Link to TinkerCAD simulation:
https://www.tinkercad.com/things/5Ekh9x7GdWR-lab1exp2

**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.