Dte microproject-converted

Computer engineering (Government Polytechnic Mumbai)

GOVERNMENT POLYTECHNIC, JINTUR

MICRO PROJECT REPORT

Academic year: 2021-22

TITLE OF PROJECT

Build a Light detector using IC 7400 [NAND GATE]

DEPARTMENT : Computer Engineering (III semester)

SUBJECT : Digital Techniques.

CODE : 22320

SUBMITTED BY :

1. **WADHAV NILESH MANOHAR (CO213)**
2. **KOUNDINYE JITEN DHANANJAY (CO214)**
3. **JADHAV ABHAY PANDURANG (CO215)**

SUBMITTED TO:

Government polytechnic jintur,
for academic year 2021-2022

UNDER THE GUIDANCE OF:

Shree Ranganath Girhe,
(Lecturer in Digital Techniques)

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION

Certificate

This is to certify that Mr. /Ms. **WADHAV NILESH MANOHAR (CO213)**
KOUNDINYE JITEN DHANANJAY(CO214)
JADHAV ABHAY PANDURANG (CO215)

of THIRD Semester of Diploma in **COMPUTER ENGINEERING of** Institute, **Govt. Polytechnic Jintur (9419)** has completed the **Micro Project** satisfactorily in Subject –**DIGITAL TECHNIQUES** for the academic year 2021-22 as prescribed in the curriculum.

Subject Teacher **Head of the Department** **Principal**

Seal of Institution

INDEX

PROJECT ABSTRACT

In this project, we will build a light detector circuit using a NAND gate chip. A light detector circuit is a circuit that can detect light. When a bright light shines on the circuit, such as from a flashlight we will make it so that a LED tumis on.

CONTENT

❖ INTRODUCTION:-

Logic gates are the electronic circuits that explain the logical relationship between input and outputs. Now the question arises what are the logic operations. We know that all types of digital equipment such as mobiles, computers, etc., understand the data in terms of binary bits i.e., either in terms of 0's or 1's, and also all types of digital equipment store the data in terms 0's and 1's. The mathematical operations with 0's and 1's are commonly known as logic operations.

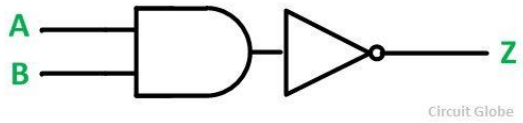
There are three basic gates according to logic operations, we have OR gate for addition, AND gate for multiplication, and NOT gate for inversion. The OR, AND, NOT are known as the basic gates. By making combinations of these basic gates we have two universal gates NAND and NOR. Here, we are focusing on understanding a NAND gate.

❖ THEORY:-

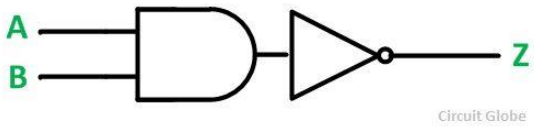
The NAND gate is a combination of an AND gate and NOT gate. They are connected in cascade form. It is also called **Negated And gate**. The NAND gate provides the false or low output only when their outputs is high or true. The NAND gate is essential because different types of a boolean function are implemented by using it.

The NAND gate has the property of functional completeness. The function completeness means any types of gates can be implemented by using the NAND gate. It performs the function of OR, NOR and AND gate.

The logic symbol for the gate is shown below:



The logic circuit of the NAND gate is shown below:



From the logic circuit, the output can be expressed as:

$$Z = \overline{A.B}$$

The equation is read as "Z equals NOT A AND B". Since the logic circuit involves an AND gate followed by an inverter. The output can only be low when both the inputs are high.

A	B	$Z = \overline{A.B}$
0	**0**	**1**
0	**1**	**1**
1	**0**	**1**
1	**1**	**0**

From the truth table of the gate, it is clear that all the inputs must be high to get a low output and if any of the input is low, the output obtained will be high. If any one of the input is also high the output will be high that is 1.

❖ COMPONANTS

1. **power supply:-** A power supply is an electrical device that supplies electric power to an electrical load. The primary function of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load.

2. **wires:-** A wire is a single usually cylindrical, flexible strand or rod of metal. Wires are used to bear mechanical loads or electricity and telecommunications signals.

3. **NANDGate7400IC:-**The IC 7400 is a 14-pin chip and it includes four 2-input NAND gates. Every gate utilizes 2-input pins & 1-output pin, by the remaining 2-pins being power & ground. This chip was made with different packages like surface mount and through-hole which includes ceramic (or) plastic dual-in-line and flat pack.

4. **330ΩResistor:-**The resister is 1/4 Watt, +/- 5% tolerance PTH resistors. Commonly used in breadboards and perf boards, these 330Ohm resistors make excellent LED current limiters and are great for general use.

5. **6.8kΩResistor:-**This resistor is 6.8K Ohm 0.25W High Quality Carbon Film Resistor (CFR) with ±5% Tolerance and Tin Plated Copper Leads. 6.8K Ohm Resistor Color Code: Blue, Gray, Red, Golden. Resistance: 6.8K Ohm, Power Rating: 0.25 Watt, Approximate Maximum Current: 6.06mA .

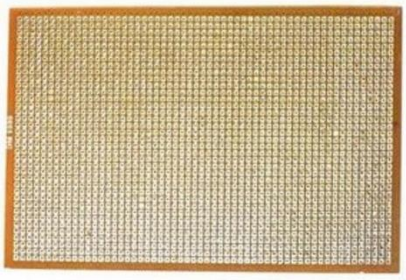
6. **LED (Light-emitting diode):-**A light-emitting diode (LED) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine. with electron holes, releasing energy in the form of photon. When a bright light shines on the circult, such we will make it so that a LED turns on.

7. LDR (Light Dependent Resistor):-

An LDR is a component that has a (variable) resistance that changes with the light intensity that falls upon it. This allows them to be usatt in light sensing circuits. A typical LDR. LDR Circuit Symbol

8. 0 PCB board :-

Zero PCB is basically a general-purpose printed circuit board (PCB), also known as perfboard or DOT PCB. It is a thin rigid copper sheet with holes pre-drilled at standard intervals across a grid with 2.54mm (0.1-inch) spacing between holes.



❖ **PROCEDURE :-**

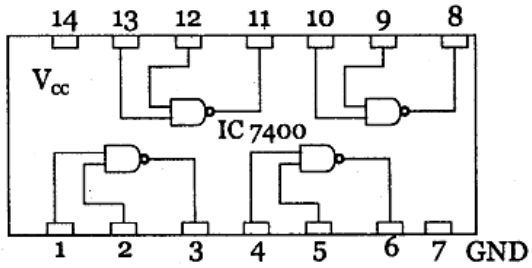
1) Place a wire into the voltage terminal and ground terminal.
2) Connect the power supply with the digital multimeter to set the power supply to 9 volts.
3) Connect the breadboard with ground and the 9 volts.
4) Place the 7400 IC onto the breadboard.
5) Connect pin 14 to the voltage and pin 7 to the ground of the 7400 IC.
6) The cathode part of the LDR is connect with pin 1 of the 7400 IC and the anode part is connect to the ground.
7) The 6.8k resistor it connected to the voltage source and with pin 2 of the 7400 IC.
8) The 330 resistor is connected with pin 3 and the anode pin of the LED.
9) The cathode pin of the LED is connected to the ground

❖ **Total cost of project**

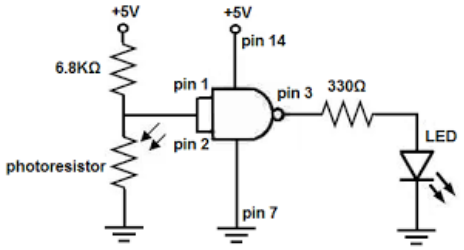
- **NAND gate IC = 50 /- RS. (1)**
- **LDR=50/-RS (1)**
- **RESISTOR 330 ohm = 5/- RS. (1)**
- **RESISTER 6.8kohm=5/-RS (1)**
- **LED = 10/- RS. (1)**
- **Battery 9v = 20/-RS.**
- **0PCB=10/-RS**

Total = 150/- RS.

❖ BLOCK DIAGRAM :-



❖ CIRCUIT DIAGRAM:-



❖ ADVANTAGES AND DISADVANTAGES OF NAND GATE.

Cost: NAND is cost-effective per byte and has a high storage capacity for its physical size.

Endurance: NAND cells eventually wear out as their transistors degrade. A NAND chip lasts until it reaches its write-cycle limit, after which it will no longer be able to store new data. A NAND chip can withstand anywhere from 1,000 to 100,000 erasures, depending on the brand, model, and design. NAND chips are physically sturdy and more durable than magnetic forms of storage.

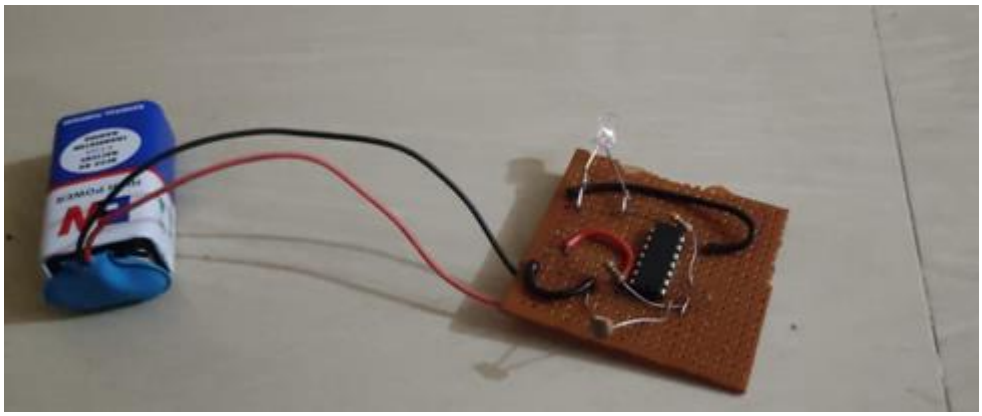
Replaceability: When NAND flash memory wears out, you can replace the chip with a compatible component.

NAND shortage: A combination of high demand and a trend toward manufacturing denser 3D NAND technology (also known as vertical NAND) resulted in a NAND shortage that began in 2016. Two-dimensional, or planar, NAND is still the more cost-effective type as of 2018.

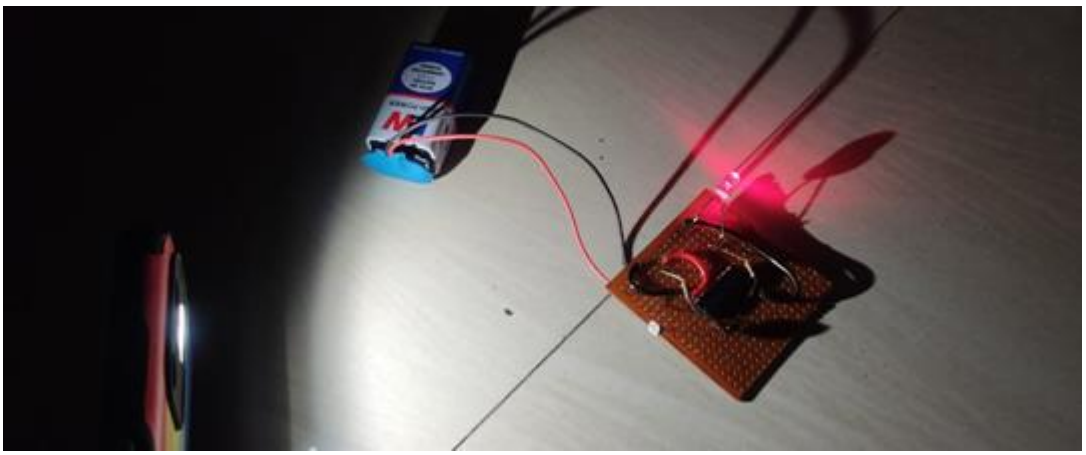
NAND memory is especially useful in devices that need to be able to store and frequently erase and replace large files, such as tablets, USB drives, and digital cameras.

❖ FINAL LOOK OF PROJECT:-

- **When <u>light off</u> the out put is**



- **When <u>light on</u> the output is**



CONCLUSION

Light Detectors are used to simply detect light. Within this circuit, whenever you turn the room light off and apply light onto the circuit, the LDR will detect light which will allow the LED to become lite.

REFERENCES AND SOURCES USED

1. Book of digital technique.
2. Google.