Department of Electrical & Computer Engineering
AIR UNIVERSITY

PROJECT REPORT

Analog Electronics

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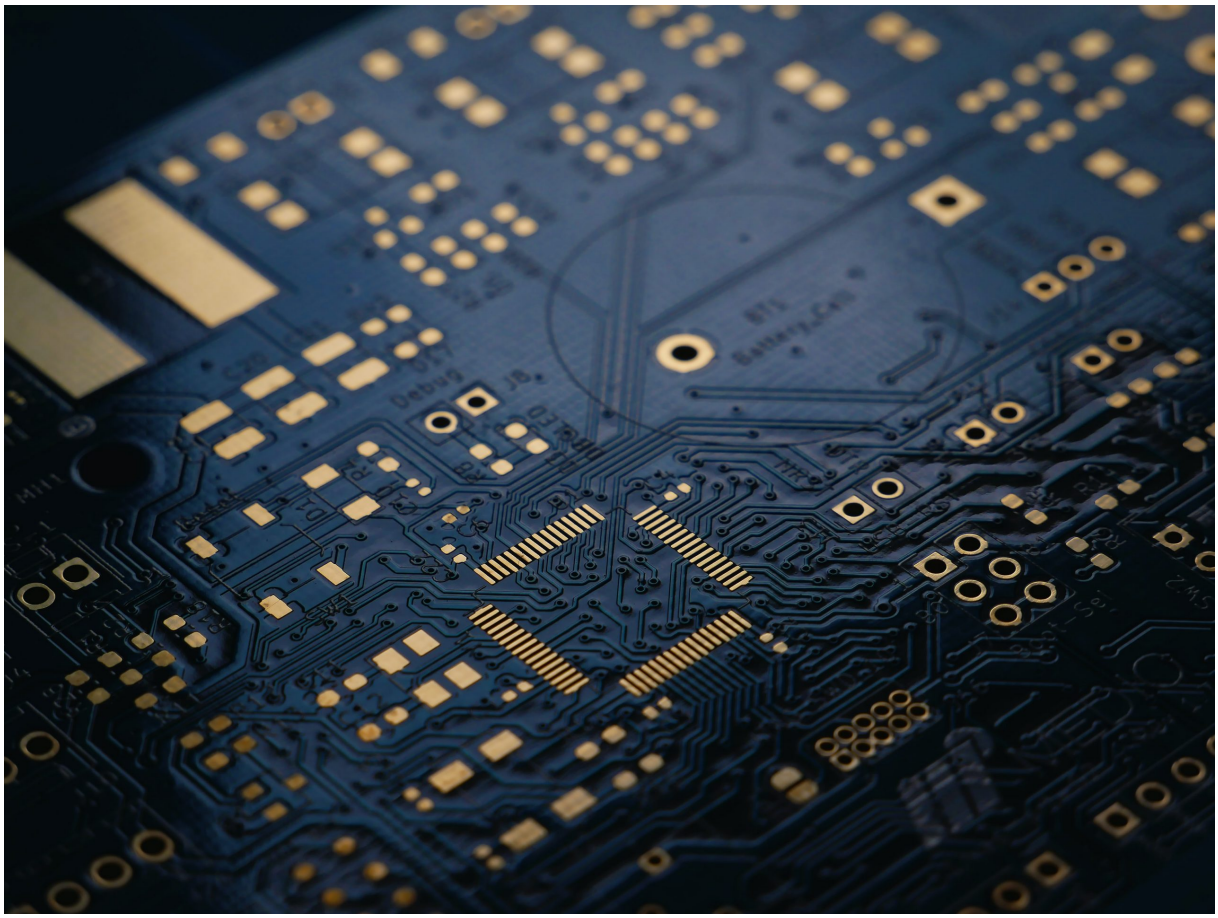
Complex Engineering Assignment



Water Level Indicator

ABSTRACT

Design a water level indicator that can show the level of water in a container or tank. When the water level reaches a critical level, the system should be able to send out alarms. Water tank overflow is a typical problem that results in water waste. Though there are various options that automatically shut off the water flow when the tank is full. This document will show an efficient method of how to build a circuit that will detect the water level and sound an alert when the tank is full or reaches a predetermined level. The circuit comprises of a transistor element and a buzzer that detects overflow or excess water in the container. When the water reaches the maximum limit, the LED flashes with a buzzer sound to indicate that it is time to cease pouring or filling the water.

Contents

1 OBJECTIVES

- To learn the working of a water indicator.
- Hands-on experience in designing.
- Understand the workings of such circuits.
- Indicate empty/low, half and full.

2 Equipment

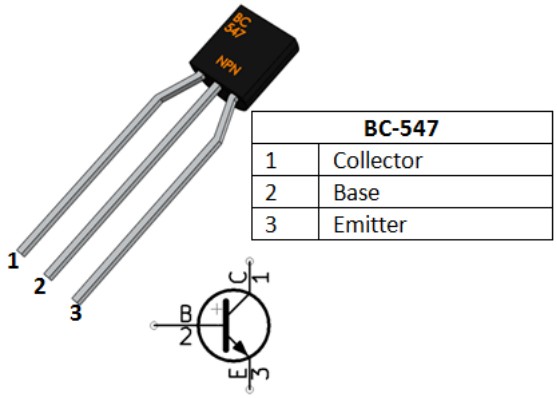
- Resistor (220 ohm resistor)
- Jumper wires
- Buzzer
- LED (RED, YELLOW, GREEN)
- Water tank
- NPN Transistor (BC-547)
- Breadboard
- DC Source/9V Battery

3 INTRODUCTION

A water-level marker is an electronic circuit device that transfers data back to the control board to show whether a waterway has a high or low water level. Some water level markers utilize a mix of test sensors or changes to detect water levels. The reason for a water level pointer is to measure and oversee water levels in a water tank. The control board can likewise be customized to consequently turn on the water once levels get excessively low and the top of the water back to the sufficient level.

3.1 Transistor (BC-547)

The BC547 transistor is an NPN transistor. A transistor is nothing but the transfer of resistance which is used for amplifying the current. A small current of the base terminal of this transistor will control the large current of emitter and base terminals. The main function of this transistor is to amplify as well as switching purposes. The maximum gain current of this transistor is 800A.



BC-547	
1	Collector
2	Base
3	Emitter

3.2 Applications

- In swimming pools, water level indicators can be used to keep the water level at a consistent height, ensuring that the pool is safe for use.
- Used to control the water level in fountains, ensuring that the fountain operates properly and doesn't overflow.
- Used in various industrial chemical processing plants.

3.3 Advantages

- Power Saver
- Money Saver
- Water Maximization
- Reliable Electronic Design
- Automatic

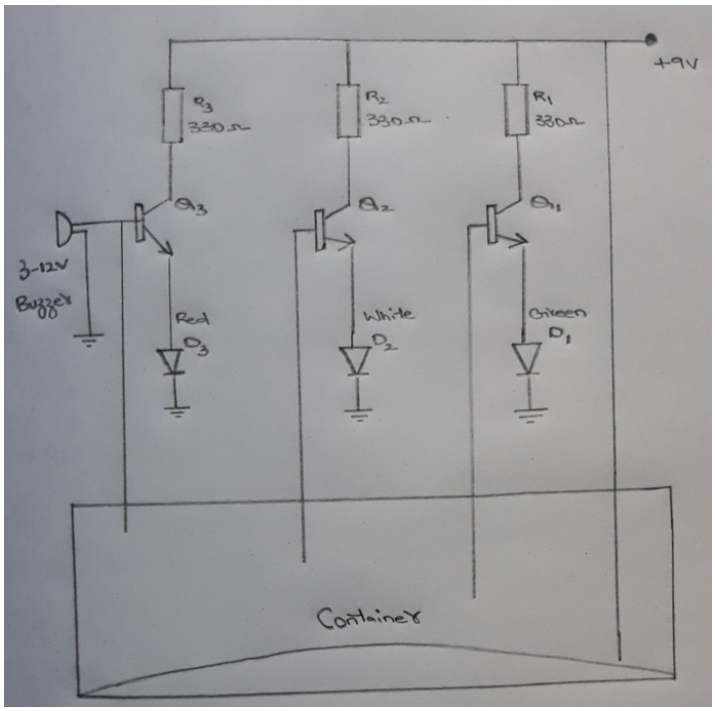
4 Procedure

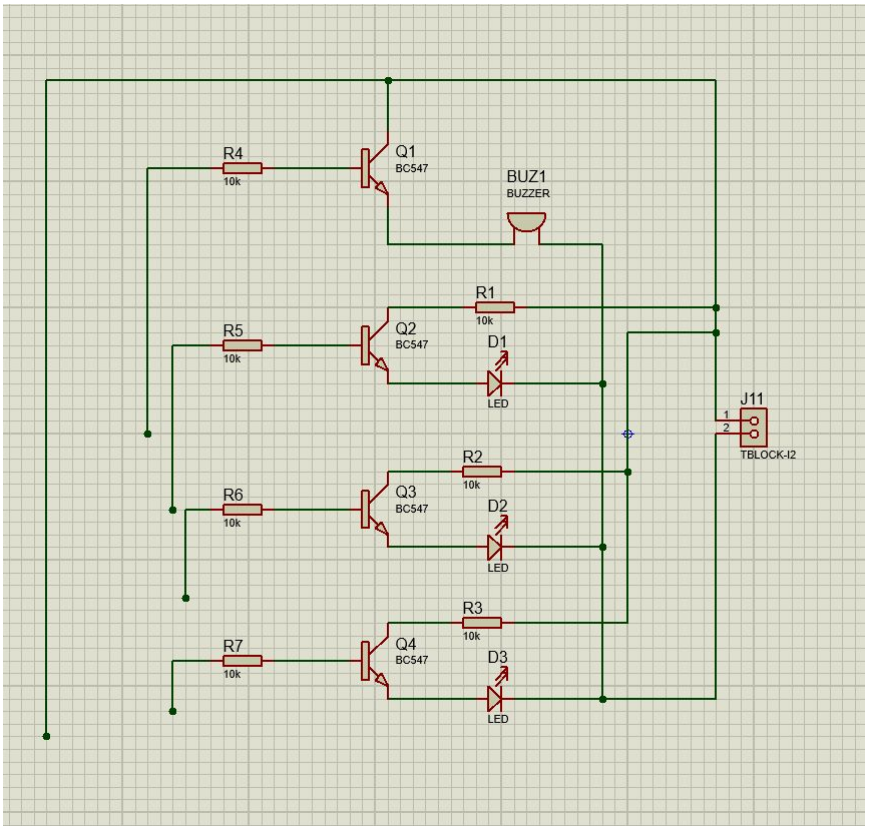
- Launch Proteus software
- Design the schematic using resistors, LEDs etc.
- Obtain PCB layout in pdf format.
- Obtain its Print on Butter Paper.
- Use an iron to get the impression on the PCB board from butter paper.
- Use $FeCl_3$ Solution for permanent impression on the Board.
- Use a small drilling bit to create holes.
- Once done, Insert BC547 transistor on the breadboard. The left one is the collector, the middle one is the base and the last one is the emitter.
- Insert the other two transistors as well on the board as well.
- Connect 330 ohms resistors to all the collector terminals of the transistor of the breadboard.
- Now insert the green Led with its anode to the emitter of the first transistor and cathode to the negative rail of the board and do the same for white and red LEDs.
- Now connect the buzzer on the board. Connect the negative wire of the buzzer to the negative rail of the board and the positive wire to the emitter of the third transistor.
- Connect one wire each to the base of the transistors. Dip the other end of the wire in the container with water, it is important to dip the wires in the water level-wise and not keep the bare ends of the wire on the same level.
- Connect the power to the circuit and start adding water to the bowl and see the LEDs light up sequentially and the buzzer buzzing at the end.

5 Working Principle

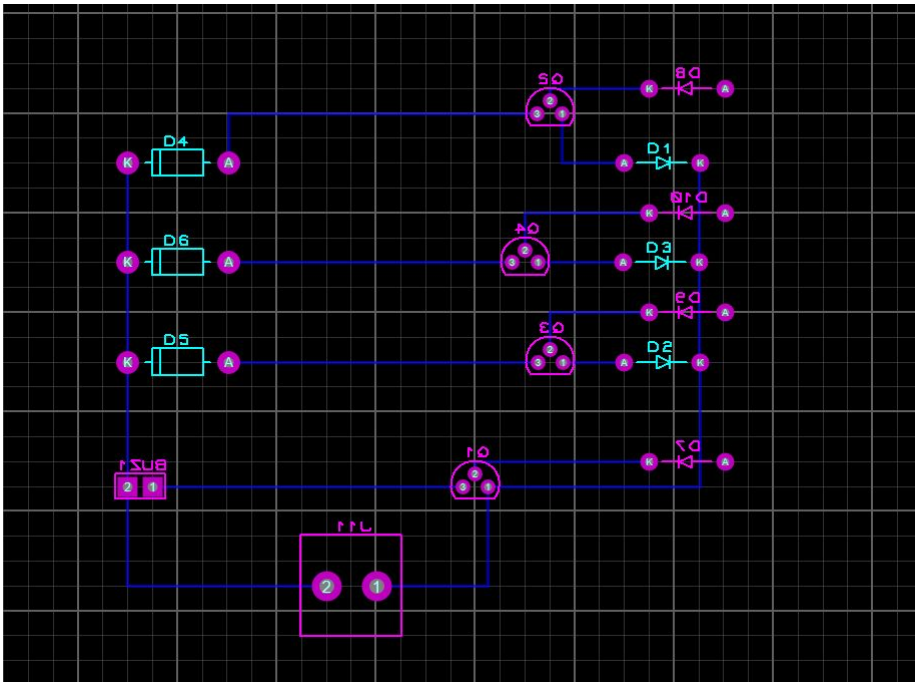
The circuit is set up to show three levels of water in the tank: low but not empty, half and full but not overflowing. All of the LEDs turn off when there is no water in the tank, indicating that the tank is fully empty. When the water level rises and comes into contact with the sensor, the first LED illuminates, showing that there is water in the tank. The Second LED will light up when the water level rises and reaches half the tank. When the tank is High and full of water third LED indicator is ON. Lastly when the water level in the tank becomes full and overflows, the buzzer sounds an alert to indicate that the tank is full.

6 Circuit Diagram



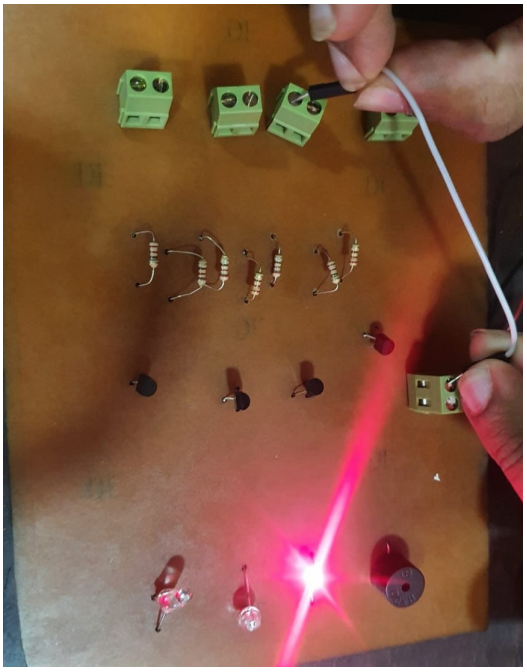


7 PCB Layout



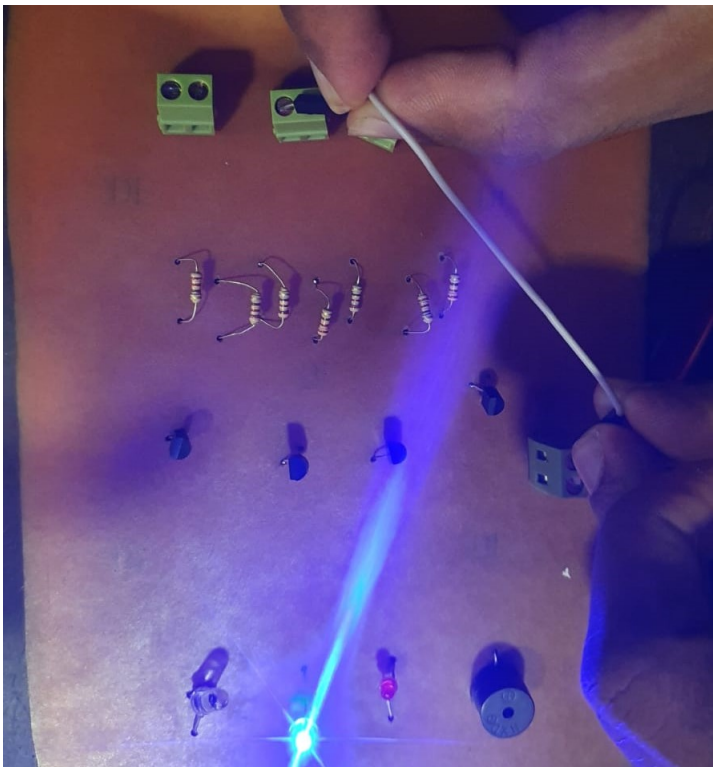
8 Test Cases

Case 1
When the tank has no water there is no signal in the indicator. After starting the flow waster first LED indicates the level of water.



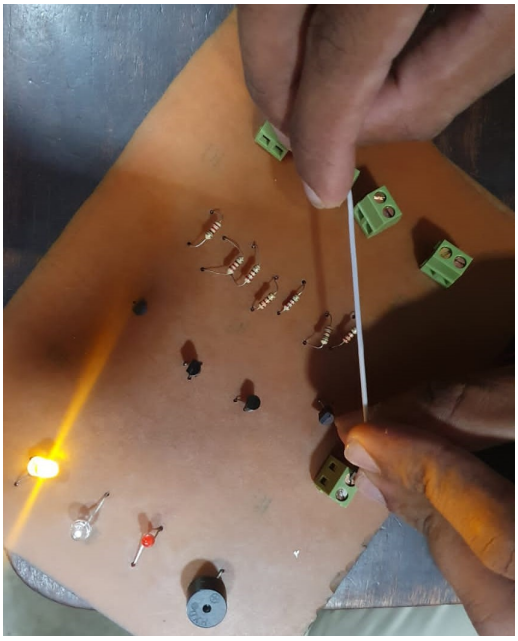
Case 2

When tank is medium-full of water, then the 2nd LED indicator is ON.



Case 3

When the tank is High and full of water third LED indicator is ON.



Final Case

After overflowing the tank Buzzer is starting the sound.

9 Conclusion

This Project of water level indicator is a practical and useful application of analog electronics. It may be used to monitor water levels and avoid overflow or shortages in a number of contexts, including homes, workplaces, and factories. Students will be able to study and apply essential ideas of electronics and sensor technologies while developing a device that will have a substantial influence on water management and conservation. The project may be developed further by adding features such as automatic water flow control and remote monitoring capabilities. Overall, the water level indicator project is a fantastic learning opportunity that gives practical skills while also contributing to the sustainable use of a critical resource.