Project Name: WATER LEVEL CONTROLLER USING 555 TIMER IC

INTRODUCTION

The explained IC 555 based Automatic water level control circuit is a straightforward approach, project. It could automatically switch ON and OFF of the domestic water pump set based on the water level of the tank.

You are able to utilize this motor driver circuit at your home or college employing more affordable components.

Our project include two water level sensors, one particular attached at the top and the other towards the bottom. It consists of a 555 timer IC, a six volt relay to operate the pump or motors, wires which act as sensors, resistances, capacitor and a buzzer for notification and alarm purpose.

LITERATURE SURVEY

People generally worry about the wastage of water, when they switch ON the motor and forget to OFF them. Our idea may help them in saving water for future. Our project mainly consists of 555timer, a 6v relay, 230v ac motor and wires which acts as sensors. The wires are placed at the different levels of the tank. All these mentioned components take an active role in switching ON and OFF of the motor. The control stage of the circuit is an NE 555 IC; here we have manipulated the flip-flop within chip 555.

The rough cost of the project is pretty cheap only. There are plenty of existing solutions to our problem statement but maximum of them has a human involvement or are extremely expensive. Our circuit is cheaper. The principal good thing about this water level controller circuit is that it automatically controls the water pump with no involvement of the consumer.

THEORETICAL ANALYSIS
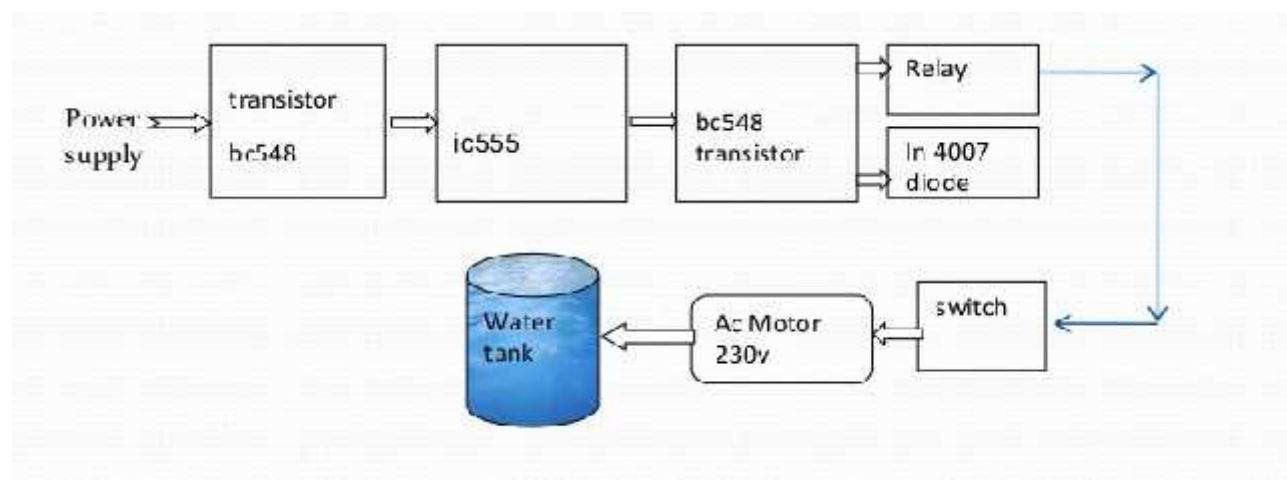
As shown in the above block diagram gives the information about the particular water level controller. It consist of NE555 IC timer, Relay, Motor and a Tank which can be used fill the water. We have also shown the use of a BC 548 Transistor and IN4007 Diode which will add more value to our project even though one can construct the circuit even without it. When the input 9v-12v is given from Battery/power supply to the circuit, the project starts working. The input is given from power supply then the transistor will active through the relay the power is supplied to the ic 555 timer. Without the transistor or relay we need to provide the direct applicable input voltage after stepping it down using smps or transformer to the integrated circuit for working. The output pin of the ic 555 timer is connected to the relay, diode and buzzer for alarm notification purpose. Then the relay is maintained at a required level and the motor will be start up by switching on. When the motor is on its ready to fill the tank by recognizing the sensors or water level in the tank. It is depend up on the level of water. When the water is full then automatically it gets switched off.

Hardware Requirements—

- Power Supply 6V.
- NE555 Timer IC.
- Resistors (100 x4)
- Relay 6V 30Amps.
- Capacitor
- 4 Connectors
- Buzzer
- Diode
- Transistor (Optional)
- Wires
- PCB

PIN DIAGRAM OF NE555 IC
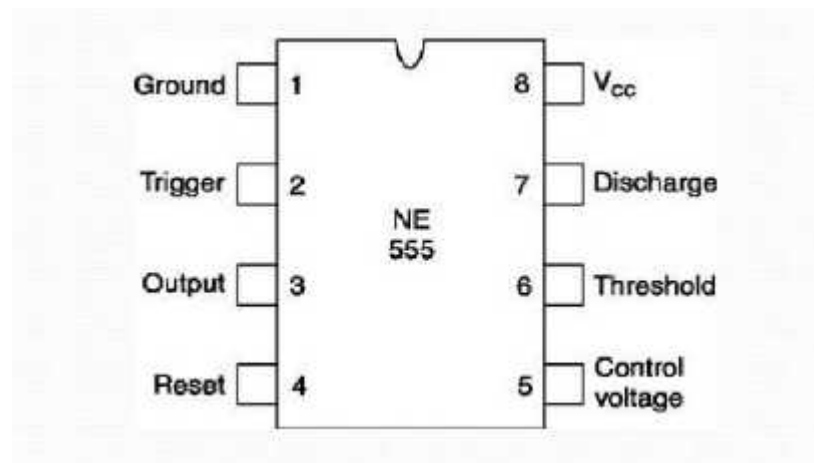
RELAY REQUIREMENT

The input section has a coil which generates magnetic field when a small voltage from an electronic circuit is applied to it. This voltage is called the operating voltage. Commonly used relays are available in different configuration of operating voltages like 6V, 9V, 12V, 24V etc. The output section consists of contactors which connect or disconnect mechanically. In a basic relay there are three contactors: normally open (NO), normally closed (NC) and common (COM). At no input state, the COM is connected to NC. When the operating voltage is applied the relay coil gets energized and the COM changes contact to NO. RELAY.

TRANSISTOR OPTIONAL

The transistor terminals require a fixed DC voltage to operate in the desired region of its characteristic curves. This is known as the biasing. For amplification applications, the transistor is biased such that it is partly on for all input conditions. The input signal at base is amplified and taken at the emitter. BC548 is used in common emitter configuration for amplifiers. The voltage divider is the commonly used biasing mode. For switching applications, transistor is biased so that it remains fully on if there is a signal at its base. In the absence of base signal, it gets completely off.

Software Requirements—

Kicad Software for PCB Designing.

EXPERIMENTAL INVESTIGATIONS

Test point 1 Base of Q1 is connected to up level of water through a resistor R1 (100).It will be at high voltage (VCC drop across R1). All other condition it will zero volts that is no connection.

FIRST READING

It is measured out across the positive end of CRO towards pin 2 of IC 555 and negative end at ground level. The output obtained is given below.

Tank is empty and below low level: 0v

Full: 3.2 v

Below up level: 6 v

SECOND READING

Reset input of 555 timer. It is connected to collector of Q1. It will be at high level when the water level is below up level. When the water level reaches the up level Q1 will conduct and T3 becomes low. It will reset the 555 Timer output and motor will set OFF. It is measured out across the positive end of CRO towards pin4 of IC 555 and negative end at ground level.

The output obtained is Tank is empty, below up level: 6 V and tank is full: 0v 6 v.

CIRCUIT DIAGRAM AND EXPLAINATION
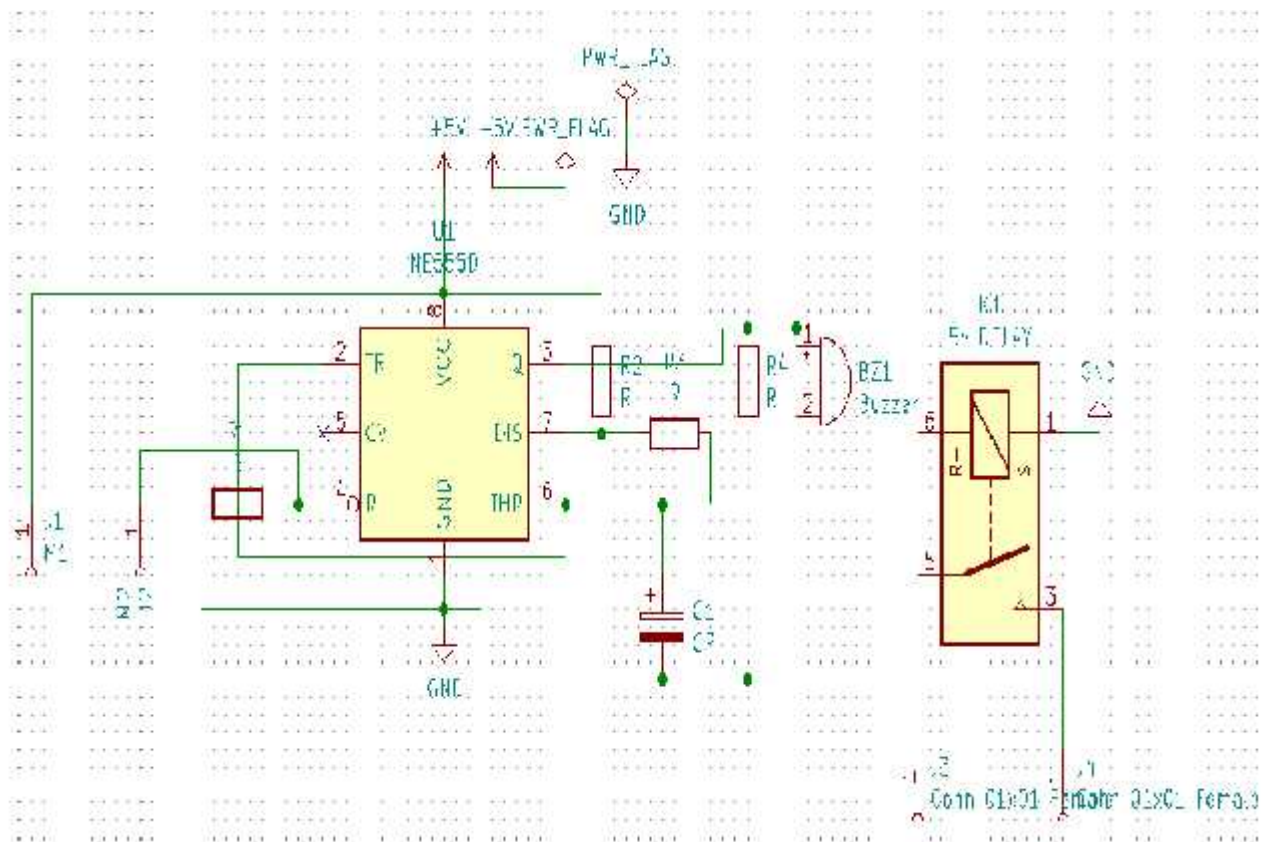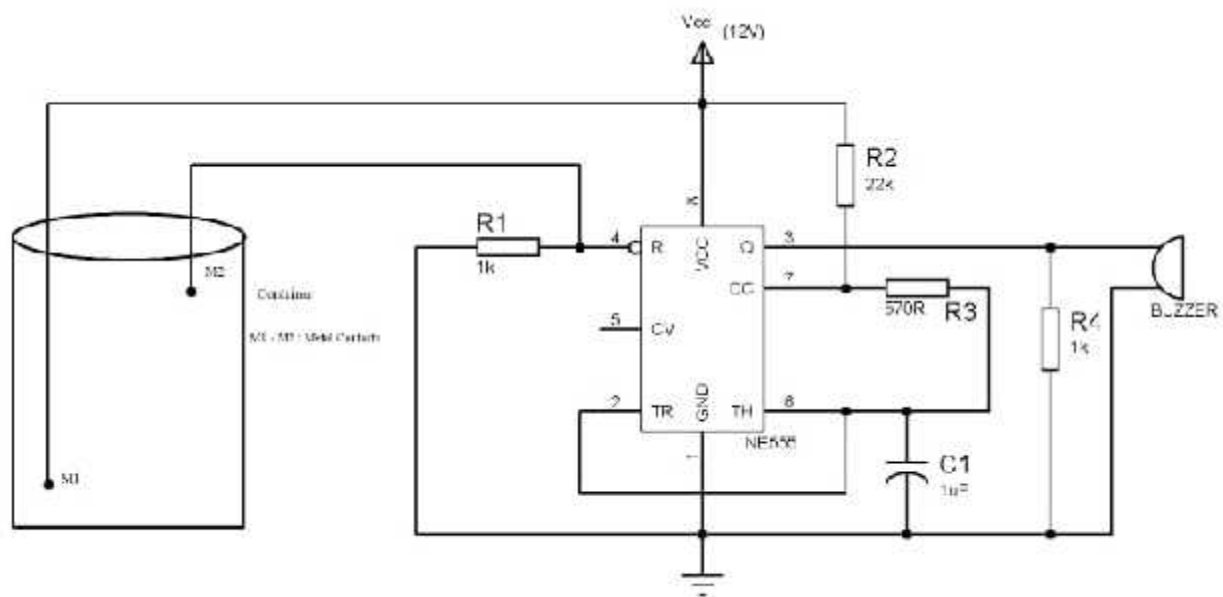
We know the property of 555 timer IC, that its output goes HIGH when voltage at the second pin (trigger pin) is less than 1/3 Vcc. Also we can reset back the IC by applying a LOW voltage at the 4th pin (Reset pin). In the above circuit3 wires are dipped in water tank. Let us define two water levels- Bottom (Low) level and Top (Up) level. One of the wire or probe is from. The probe from bottom level is connected to the trigger (2nd) pin of 555 IC. So the voltage at 2nd pin is Vcc when it is covered by water. When water level goes down, the 2nd pin gets disconnected (untouched) from water i.e. voltage at the trigger pin becomes less than Vcc.

Then the output of 555 becomes high while the water level rises, the top level probe is covered by water and the transistor becomes ON. Its collector voltage goes to Vce=0.2. The low voltage at the fourth pin resets the IC. So the output of 555 becomes 0 volt. Hence the motor will turn of automatically. For simple demonstration of this project we can use a DC motor directly at the output of 555 instead of relay.

For practical implementation we must use a relay. Rating of relay is chosen according to the load (motor). 32A relay is best suited for domestic applications.

RESULT
FIRST READING

It is measured out across the positive end of CRO towards pin 2 of IC 555 and negative end at ground level. The output obtained is given below.

Tank is empty and below low level: 0v

Full: 3.2 v

Below up level: 6 v

SECOND READING

Reset input of 555 timer. It is connected to collector of Q1. It will be at high level when the water level is below up level. When the water level reaches the up level Q1 will conduct and T3 becomes low. It will reset the 555 Timer output and motor will set OFF. It is measured out across the positive end of CRO towards pin4 of IC 555 and negative end at ground level.
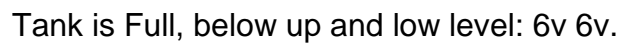
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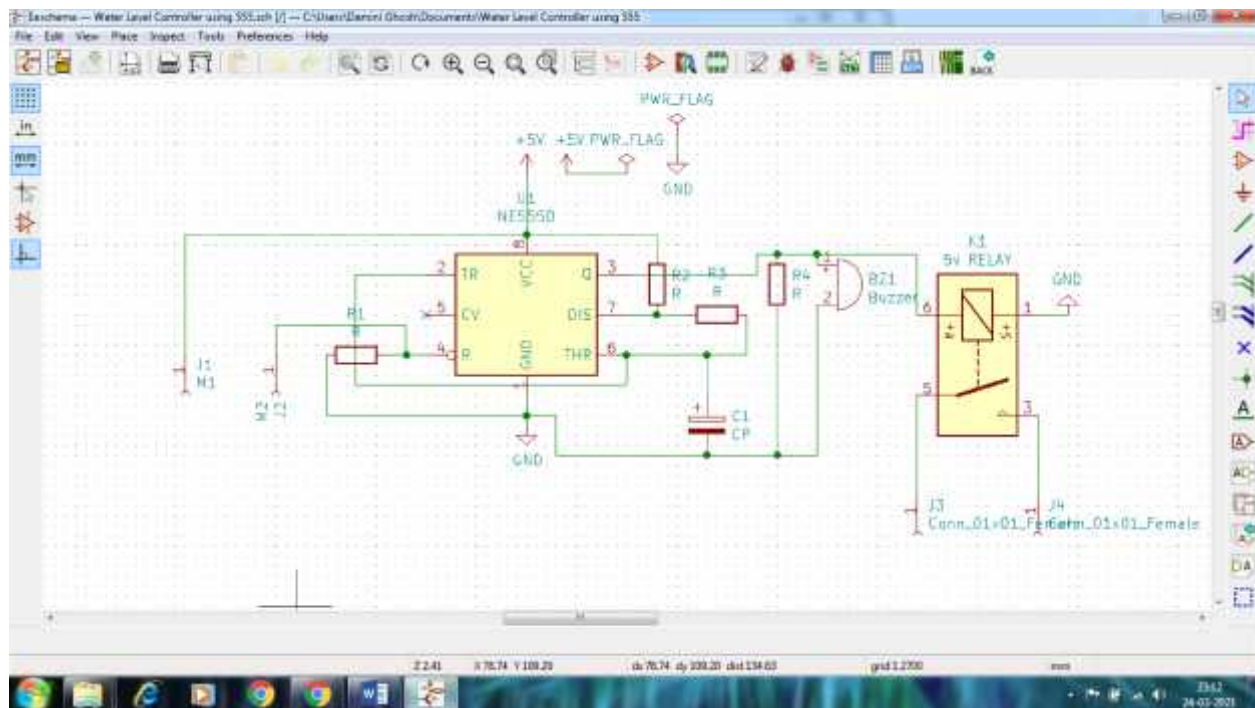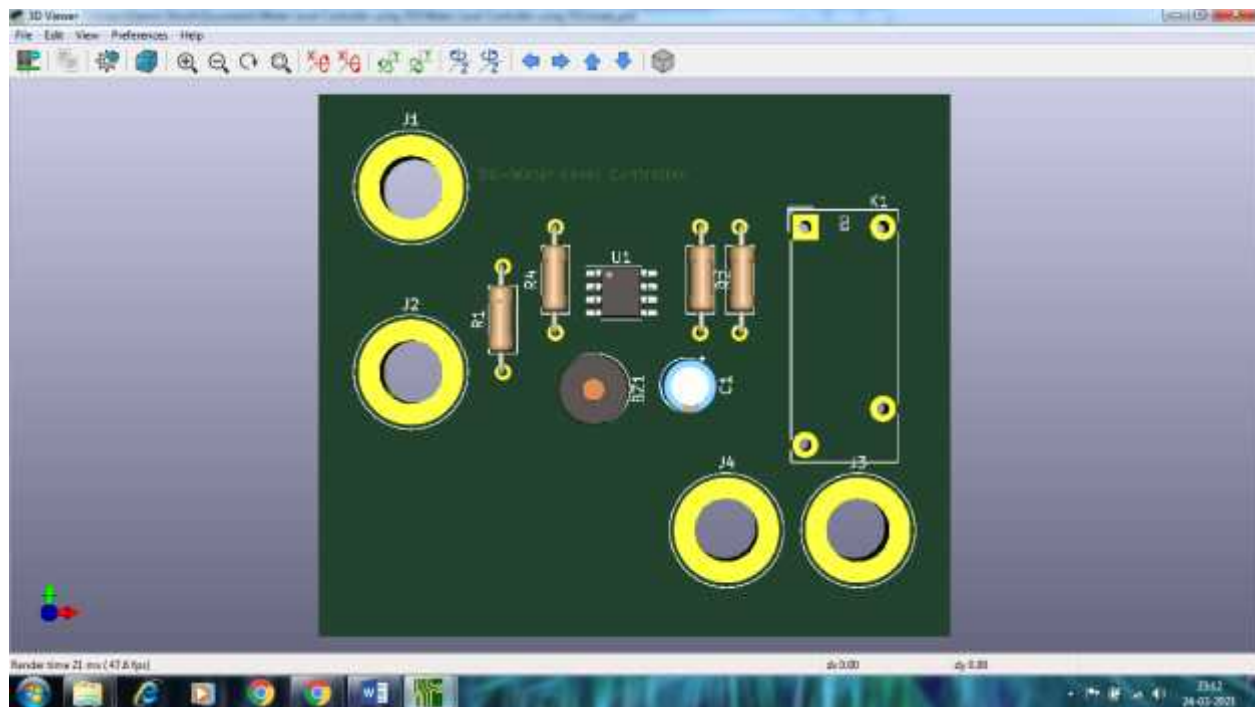
THIRD READING

Output of 555 Timer This signal will go high whenever water level goes below the low level and will get reset when water level goes above up level.

This time it is measured out across the positive end of CRO towards pin3 of IC 555 and negative end at ground level. The output obtained is given below.

Tank is below up level and full level is: 0V

Tank is empty, tank is below low level: 6V 6V.

FOURTH READING

Collector of Q2 is connected to VCC and relay. When water goes below the low level 555 Timer will set output and it will turn ON Q2 transistor. The point will become low. Otherwise, it will be high. It is measured out across the positive end of CRO towards collector of transistor Q2 and negative end at ground level. The output obtained is given below.

Tank is empty: 0v

Tank is Full, below up and low level: 6v 6v.

ADVANTAGES

1. Low maintenance.

2. Compact and good design.

3. Fully Automatic.

4. Save water, energy.

5. Increases Pump Life.

DISADVANTAGES
1. This project may not be able to handle high power.

2. The components used in this are sensitive and may damage easily.

3. We need to insert the wire in accordance with the level of water.

APPLICATIONS
1. It is used for all household purposes.

2. It can be used in commercial centers.

3. It will be very much useful to farmers to store large amount of water.

4. It can be used in all places to control water level.

CONCLUSION
By using our project, we can save power. I can be used in places where there is problem of Load Shedding. As it is automatically controlled, it limits the amount of electricity. As today energy conservation is the utmost need, using one of these devices is useful. The most utmost advantage of water level controller I that it can work on its own. It is because of relay and timer switches that there is no need to operate them manually. This means that a lot of human work is reduced. Additionally, water usage can be maximized with a water level controller.

Often, water pumps get more use during the middle of the day. A water level controller is helpful because it automatically provides more water during the middle of the day and less water at night. As a result, water remains at its appropriate level at all times. By using our project, we can save power. I can be used in places where there is problem of Load Shedding. As it is automatically controlled, it limits the amount of electricity. As today energy conservation is the utmost need, using one of these devices is useful.

This project has achieved the main objectives. Moreover, this project involved designing and development of automatic water level control system had exposed to the better way of software and hardware architecture that blends together for the interfacing purposes. The system employs the use of advance sensing technology to detect the water level.

• This system is very beneficial in rural as well as urban areas.

• It helps in the efficient utilization of available water sources.

• If used on a large scale, it can provide a major contribution in the conservation of water for us and the future generations.

FUTURE SCOPE
Automatic water level monitoring system has a good scope in future especially for agriculture sector. There are any areas where we need water level controller. It could be

agricultural fields, overhead tanks. We can make this project wireless by using NRF transmitter and receiver.

BIBLIOGRAPHY

Basically I have taken help of Wikipedia and watched plenty of Youtube videos to understand the working of the kicad software. I also read many journals on water level controller.