



**NEW HORIZON
COLLEGE OF ENGINEERING**

Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
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Water control_system

Mini Project

Report

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In practical fulfillment of the degree of

Bachelor of Engineering

IN

ELCTRICAL AND ELCTRONICS ENGINEERING

Contents

SI NO.	CONTENT	PG NO.
1.	Abstract	5
2.	Introduction	6
3.	Working procedure	7-8
4.	Circuit description	8
5.	Relay	9-10
	Transistor	11
	Diode	12
	LED	13
	Resistor	14
	battery	14-15
	Centrifugal pump	16
	buzzer	16-18
	Breadboard	18
6.	Working model	19-20
7.	Result	21
8.	application	21
9.	future scope	22
10.	Conclusion	23-24



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BONAFIDE_CERTIFICATE

This is to certify that **B. Sai Bharath Reddy, D. Siva Prasad, S.v. Pavan Kumar**, bearing University number **1NH18EE705, 1NH18EE714, 1NH18EE744 respectively** have submitted the Mini project title. **“WATER CONTROL SYSTEM”** in partial fulfillment for the course of **EEE** Department. The report has been prepared as per the given format and is approved for submission and presentation.

Signature of the guide.

(Ms. Guna Priya).

Signature of the HOD

(Dr. Ram Kumar S)

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Date: -30/10/2019.

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BE(EEE) 3rd Semester

1. Abstract-

We all use water daily for various purposes but not many of us really care for the unnecessary wastage of water. There is water crisis in Asia, especially for drinking water, which is scaling to considerable peaks. This might very soon attain the nature of global crisis. Therefore, it is of utmost importance to preserve water. Today, in many houses, commercial properties, etc. there is needless wastage of water because of overflow in overhead tanks. 'Automatic Water Level Indicator and Controller' may be an answer to that. The operation of water level controller works upon the very fact that water conducts electricity because of the presence of minerals with in it. Thus, water within the tank may be wont to shut a circuit. As the water level rises, different circuits in the controller send different signals. These signals are used to automatically switch OFF the motor pump to avoid the unnecessary wastage of water. It can be said that, about 95% of the Earth's water is in the oceans which is unfit for human consumption. So, out of the remaining 5%, about 4% is locked in the polar ice caps and the rest 1% constitutes all fresh water found in rivers, streams and lakes which is suitable for our consumption. A study calculable that an individual in Asian nation consumes on a median of one hundred forty liters per day which might rise by four-hundredth by the year 2025. This signifies that there is a need to preserve the freshwater resources available in nature.

Index Terms- Automatic controller, diode 1N4007, SPDT Relay, transistorsBC548, water wastage.

2. INTRODUCTION-

A water level indicator could also be outlined as a system by that we will get the knowledge of water level at intervals the reservoir. Each and each time it'd not be attainable for the operator to stay a watch on the water filling method within the reservoir and like a shot switch the motor OFF manually once the reservoir is completely filled. It may happen few times that the operator might be busy with some work and unknowingly forgets about switching the motor OFF manually and due to this kind of negligence, there might be unnecessary wastage of water. Keeping this in mind we have designed a system which can avoid these issues by completing the task automatically. The automatic water level indicator and controller systems area unit quite helpful to scale back the wastage of water from any reservoir, while filling water in such reservoir without worrying about switching the motor OFF once the reservoir is filled to avoid wastage of water. In this project we have used four probes namely A, B, C, D which are adjusted at four different levels in such a way that the three of them namely B, C, D area unit wont to sense the 3 levels one,2 and 3 respectively of water in the tank. The fourth probe particularly A is employed as common and reference level to the 3 probes. In this project we've got conjointly used 3 junction rectifier indicators particularly Red (Level1), Yellow (Level2) and Green (Level3) which are connected to the three transistors. The four segments of insulated conducting probes (namely A, B, C, D) are immersed within the water tank by placing their naked ends at various above-mentioned levels with the help of a rod. The length of the wire segments is adjusted according to the different water levels within the tank to indicate the required three water levels. This is simply envisioned by observant the 3 junction rectifier indicators. Once the Level 3 is sensed by probe-D in the water tank, the Green LED blinks indicating the tank is filled which in turn automatically switches the motor OFF by the relay switching mechanism so as to avoid wastage of water.

3. WORKING PROCEDURE

The operating procedure of this project is: the circuit consists of 4 sensing probes particularly A, B, C, D that are swayback in water at varied levels to sense the level of water in the tank. The probe A is connected as common too the three, which should be at the bottom most part of the water tank, also it acts as a reference level. The probes B, C, and D are set as Minimum/Slightly filled (Level 1), Half filled (Level 2) and Fully filled (Level3) respectively. The circuit is assembled on a general zero PCB. On the PCB, three LED indicators – Red, Green, Yellow are connected to the three BC548 transistors T1, T2 and T3. Both the LEDs and the transistors have related to the resistors of required values. Short length single stranded wires are use dispensing probes A, B, C and D. A Single Pole Double Throw (SPDT) relay switch is connected to the transistor T3. A 1N4007 diode is connected to the relay switch. A motor is connected to the ordinarily closed terminal of the relay switch permitting it to figure until the common pole is shifted to ordinarily open terminal. A power supply of 5V is supplied to the circuit and that of 12V is supplied to the relay switch. When the power is supplied, as soon as the water in the tank touches the probe A and B both, a small current flow from A to B through water and to the bottom of electronic transistor T1 via a 220Ω resistance. As a result, the transistor conducts causing the Red LED to glow indicating that the water is filled to a minimum required level. Similarly, when water touches sensing probe C, a small current flow from A to C through water and to the base of transistor T2 via a 220Ω resistor. As a result, the transistor T2 conducts causing Yellow LED to glow and indicates that the tank is half-filled and still the pump works, and it gives the information about the level of water in the tank. Finally, when the water in the tank touches sensing probe D, a small I current flows from A to D through water and to the base of transistor T3 via a 220Ω resistor. As a result, the transistor T3 conducts causing the Green LED to glow and indicates the tank is filled and immediately the pole of the relay switch shifts from normally closed to ordinarily open that disconnects

the motor from the circuit and stops functioning. This prevents the unnecessary wastage of water once the tank is filled.

4. CIRCUIT DESCRIPTION

The circuit for this project may be referred from the Fig. 1 which gives an overview of how the connections of the necessary components are made to achieve the automated system to indicate and control water level & avoid its wastage.

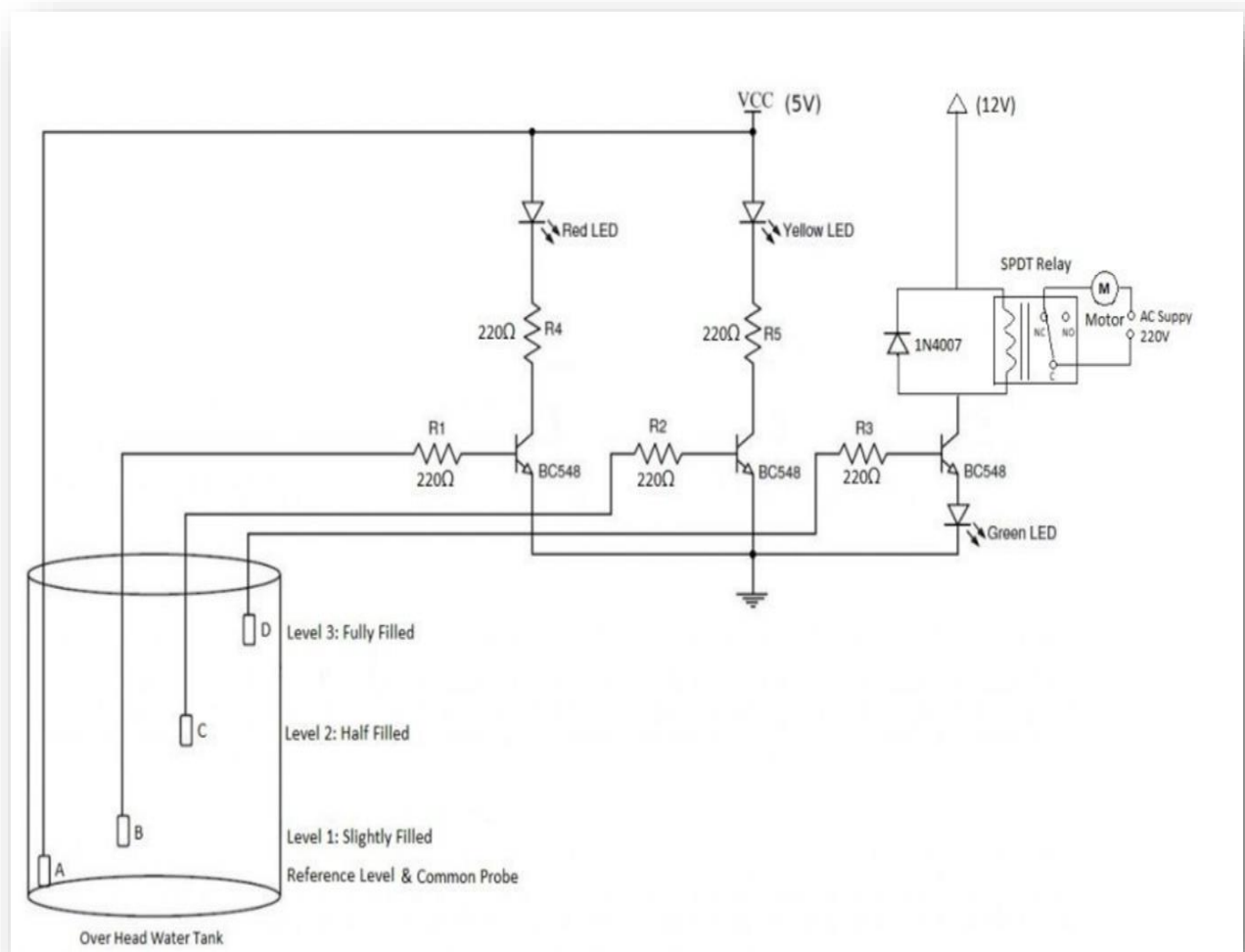
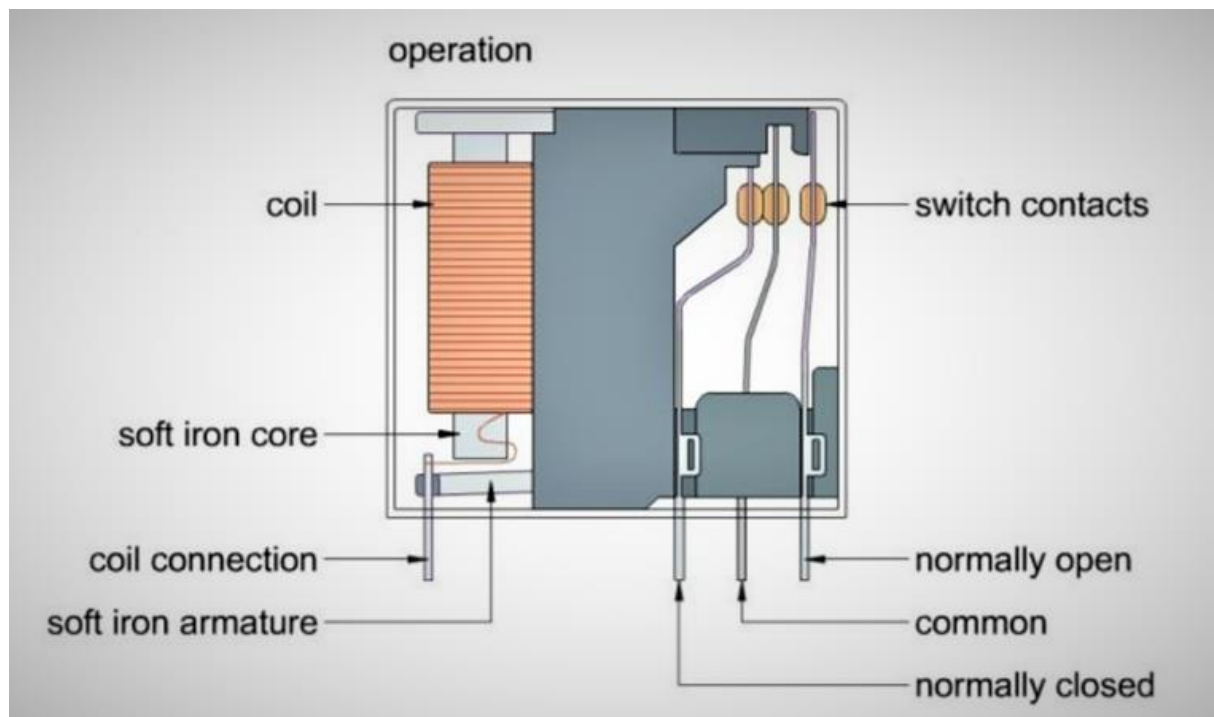


Fig. 1 – Circuit Diagram

5. System Description

A. Relay Switch:



Relays square measure outlined as remote-controlled electrical switches that square measure controlled by another switch e.g. - a horn switch. Relays permit a tiny low current flow in an exceedingly circuit to manage the next current circuit. The relay used here may be a Single Pole Double Throw (SPDT) relay whose magnetizing coil terminals operate 6V DC offer. It has the following terminals:

COIL- This is one end of the coil.

COIL- this can be the opposite finish of the coil. These square measures the terminals wherever we tend to apply voltage to so as to convey power to the coils (which then can shut the switch). The polarity does not matter. One aspect gets positive voltage and also the alternative aspect gets negative voltage.

NO- This is Normally Open switch. This is the terminal wherever the device is connected that we wish the relay to activate once the relay is battery powered. The device connected

to NO terminal are going to be deactivated once the relay has no power and can activate once the relay receives power. We will use this terminal for powering the pump.

NC- This is the Normally Closed Switch. This is the terminal wherever we tend to connect the device that we wish battery-powered once the relay receives no power. The device connected to North Carolina are going to be active once the relay has no power and can deactivate once the relay receives power.

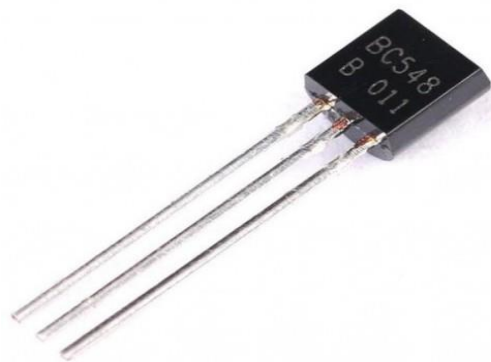
COM- this can be the common terminal of the relay. When the relay is powered and the switch is closed, COM and NO will be shorted. If the relay isn't powered and the switch is open, COM and NC get shorted.

The SPDT Relay (10A) [JQC-3FC (T73) DC5V] is a high-quality Single Pole Double Throw Relay (SPDT). The Relay consists of a coil, 1 common terminal, 1 normally closed terminal, and one normally open terminal. When the coil of the relay is at rest (not energized), the common terminal and the normally closed terminal have continuity. When the coil is energized, the common terminal and also the unremarkably open terminal have continuity. This relay's coil is rated up to 5V and also the contact is rated up to 10A. In this project we have connected the motor to the normally closed terminal due to which it can keep on working until the tank gets filled and common terminal shifts to the unremarkably open terminal that successively disconnects the motor from the circuit.

B. BC548 Transistors:

BC548 is an NPN transistor so the collector and emitter will be left open (Reverse biased) when the base pin is held at ground and will be closed (Forward biased) when a signal is provided to base pin. BC548 has a gain value of 110 to 800, this value determines the amplification capacity of the transistor. The maximum amount of current that could flow through the Collector pin is 500mA, hence we cannot connect loads that consume more than 500mA using this transistor. To bias a transistor, we must supply current to base pin, this current (I_B) should be limited to 5mA.

When this transistor is fully biased, it can allow a maximum of 500mA to flow across the collector and emitter. This stage is called Saturation Region and the typical voltage allowed across the Collector-Emitter (V_{CE}) or Base-Emitter (V_{BE}) could be 200 and 900 mV respectively. When base current is removed the transistor becomes fully off, this stage is called as the Cut-off Region and the Base Emitter voltage could



be around 660 mV.

BC548 is general purpose semiconductor, NPN, bipolar electronic transistor. It is used for amplification and switching purposes. The current gain could vary between one hundred ten and 800. In this project these transistors are acting as switches. It will act as closed switch once voltage at base terminal is bigger than or capable zero.7V, else it will act as open switch. It will show the common electrode configuration and is created from semiconductor.

C. 1N4007 Diode:

A diode is a device which allows current flow through only one direction. That is the current should always flow from the Anode to cathode. The cathode terminal can be identified by using a grey bar as shown in the picture above.

For 1N4007 Diode, the maximum current carrying capacity is 1A it withstands peaks up to 30A. Hence, we can use this in circuits that are designed for less than 1A. The reverse current is 5uA which is negligible. The power dissipation of this diode is 3W.



A diode permits electrical current to flow in one direction, from the anode to the cathode. Therefore, the voltage at the anode should be above at the cathode for a diode to conduct electrical current. In theory, when the voltage at the cathode is greater than the anode voltage, the diode will not conduct electrical current. Here, once the circuit is ON once power provide is provided, it will initially act as a reverse bias & once the power supply is OFF, it will act as forward bias and facilitate in dissipation of evoked electromotive force within the coil of relay.

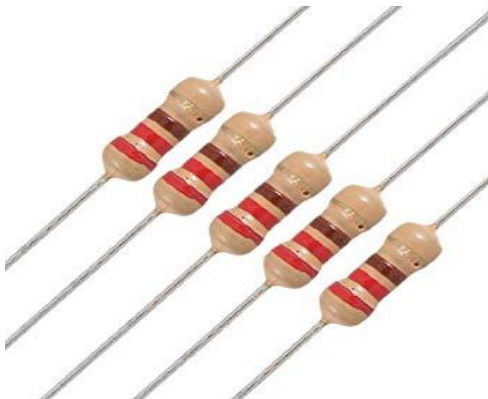
Although within the world, diodes cannot achieve zero or infinite resistance. Instead, a diode will have negligible resistance in one direction (to allow current flow), and a very high resistance in the reverse direction (to prevent current flow). A diode is effectively sort of a valve for associate degree circuit.

D. Light Emitting Diodes (LED):



LEDs are a specific kind of diode that converts electricity into light. The positive side of the LED is called the Anode and is marked by having a longer Lead or Leg. The other, negative side of the LED is called the Cathode. Current flows from the anode to the cathode and never the other direction. We have used 3 LEDs that indicate the 3 levels of water within the tank. Once the tank is filled the final Green LED blinks and the relay switches the motor OFF automatically.

E. Resistors:



Resistors act to scale back current flow, and, at a similar time, act to lower voltage levels at intervals circuits. In electronic circuits, resistors are used to limit current flow, to adjust signal levels, bias active elements, and terminate transmission lines among other uses. We have used 220Ω resistors at base of transistors and at the anode of the LED's for the required functions referring the data sheets.

F. Power Supply:



The nine-volt battery, or 9-volt battery, may be a common size of battery that was introduced for the first electronic transistor radios. It has an oblong prism form with rounded edges and a polarized snap connector at the highest. This type is often employed in walkie-talkies, clocks and smoke detectors.

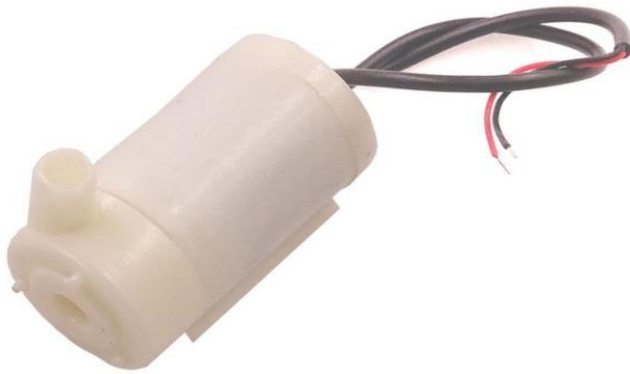
The nine-volt battery format is usually accessible in primary carbon-zinc and alkaline chemistry, in primary lithium iron disulfide, and in rechargeable form in nickel-cadmium, nickel-metal hydride and lithium-ion. Mercury-oxide batteries of this format, once common, haven't been factory-made in a few years because of their mercury content. Designations for this format embrace NEDA sixteen 04 and IEC 6F22 (for zinc-carbon) or MN1604 6LR61 (for alkaline). The size, no matter chemistry, is commonly designated PP3—a designation originally reserved solely for carbon-zinc, or in some countries, E or E-block.

Most nine-volt base-forming batteries are created of six individual one.5 V LR61 cells enclosed in a wrapper.

These cells are slightly smaller than LR8D425 AAAA cells and might be employed in their place for a few devices, even though they are 3.5 mm shorter. Carbon-zinc varieties are created with six flat cells during a stack, enclosed in a moisture-resistant wrapper to prevent drying. Primary atomic number 3 varieties are created with 3 cells serial.

A dual power supply of 4V & 9V is designed as needed. The 4V supply is given to the left part of the circuit in which transistors, LED (YELLOW and RED) indicators and the resistors are connected as per the necessary requirements. A 9V supply is given to the right side of the circuit in which SPDT relay is used and a transistor with the GREEN LED indicator.

G. Centrifugal Submersible Pump



The pump is often found within a submersible fountain pump and a few air-con units. As the blade within it turns, water is drawn in one aspect of the pump. It is then expelled out the other end. The power and size of the blade decide the quantity of water flow. More water can be pumped if we have a larger impeller. As the impeller rotates, it moves water from the inlet (which is located near the center of rotation of the impeller) along the surfaces of the impeller to the outer parts of the volute by suggests that of force (thus, its name centrifugal pump). As this water collects in the outer regions of the volute, it is directed to the outlet. The water going the outlet causes the water pressure to drop at the water. To match the speed with that water is going the outlet, the pump sucks in new water at the inlet. These pumps should be set before beginning, that during this case is already done as a result of its underwater application.

H. Piezo Buzzer:

Piezo buzzers use the inverse electricity principle to form movement of a ceramic disc to supply sound waves. The buzzer includes a built-in

oscillating circuit. Piezo buzzers operate over a good temperature vary and make noises starting from soft and delicate to loud and aggressive.

When electricity materials are harassed, the pressure causes changes on the surface of the fabric, these pressure variations lead to compression on one surface and strain on the opposite one. As a result, the positive charges collect on one aspect of the fabric, and the negative charges collect on the other aspect. This generator effect converts mechanical energy into electricity. In the reverse piezo effect, utilized in buzzers, applying associate degree electrical field causes the length of the surface to alter and converts power into energy that makes sound waves the human ear can detect.

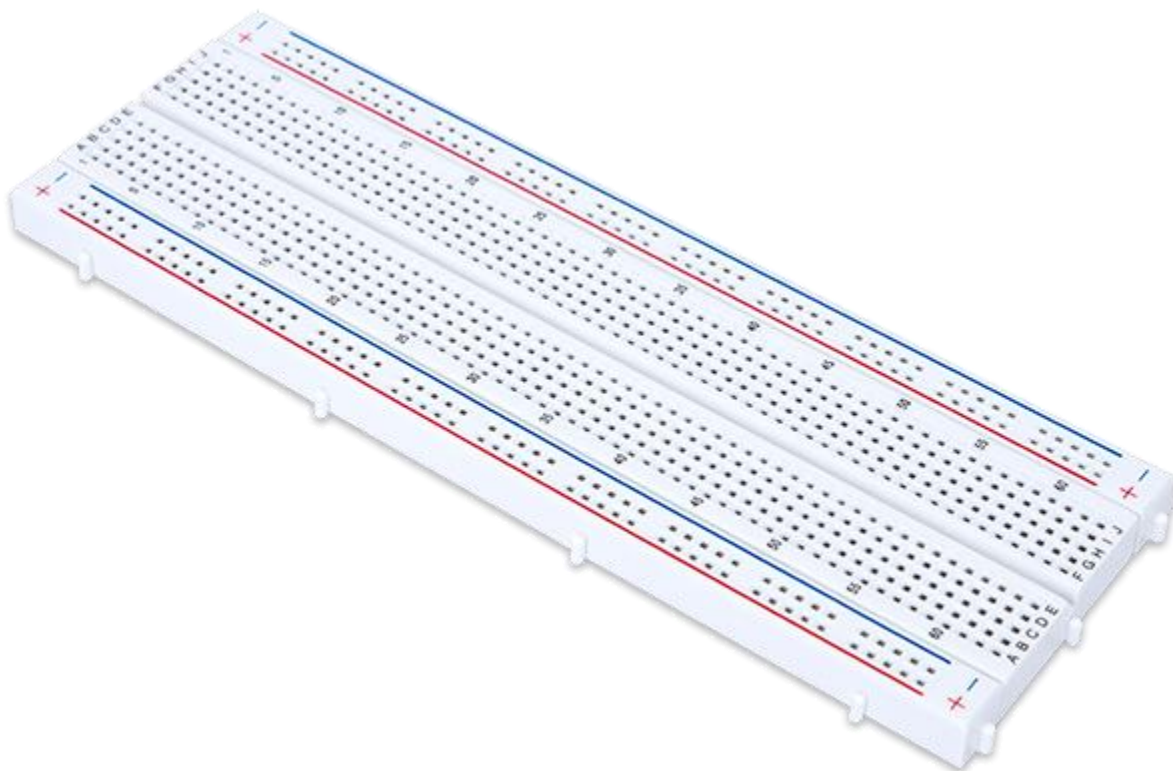


A buzzer or electronic device is associate audio device, which can be mechanical, mechanical device, or electricity (piezo for short). Typical uses of buzzers and beepers embrace alarm devices, timers, and confirmation of user input like a depression or keystroke.

Electromechanical:

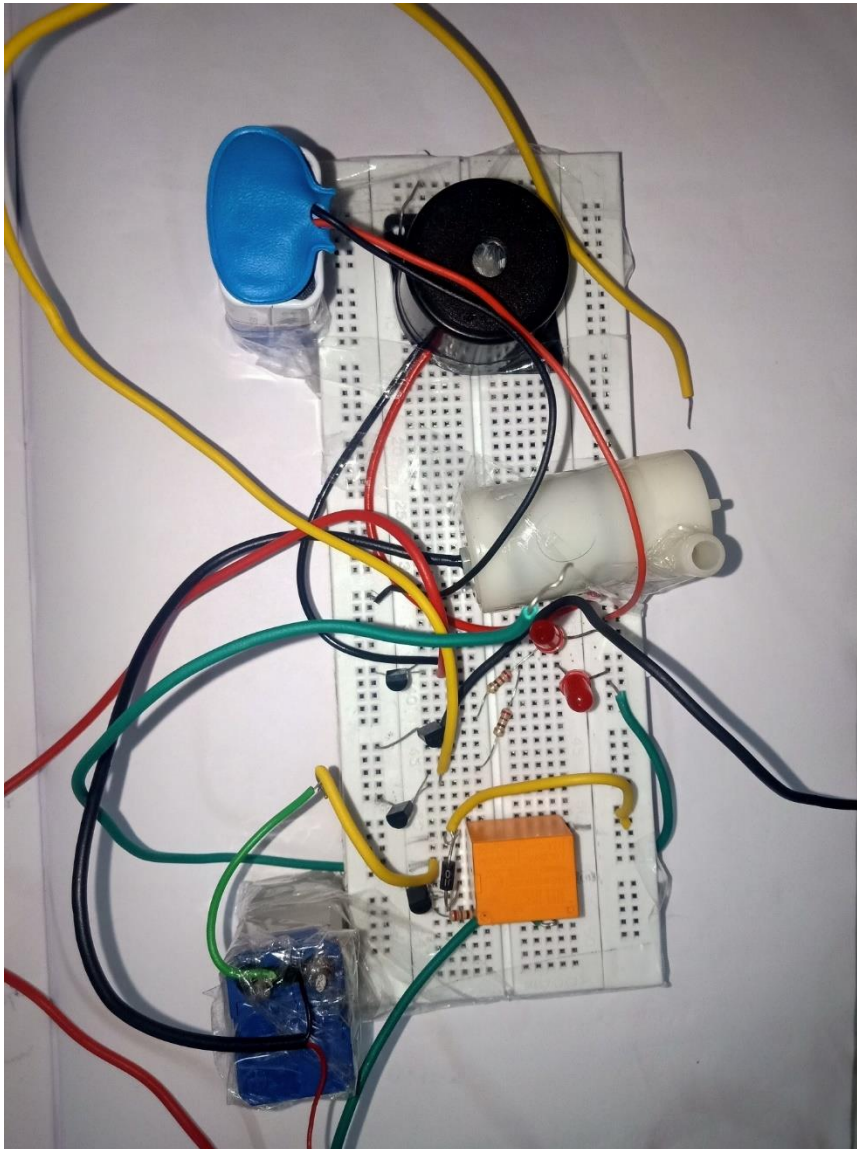
Early devices were supported Associate in Nursing mechanical device system the image of an electrical bell while not the metal gong. Similarly, a relay may even be connected to interrupt its own activating current, inflicting the contacts to buzz. Often these units were anchored to a wall or ceiling to use it as a sounding board. The word "buzzer" comes from the rasping noise that machine buzzers created.

I. Breadboard:



A bread board could be a solderless device for temporary example with natural philosophy and check circuit styles. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate. The bread board has strips of metal beneath the board and connect the holes on the highest of the board. The metal strips are laid out as shown below. Note that the highest and bottom rows of holes area unit connected horizontally and split within the middle whereas the remaining holes area unit connected vertically.

6. Working model:



Operation:

The operation of this project is incredibly easy and may be understood simply. In our project "water level indicator" there are 3 main conditions:

1. there's no water accessible within the supply tank.
2. Intermediate level i.e. either of 3rd to 7th level.
3. there's ample quantity of water accessible within the supply tank.

CONDITION 1:

Water not accessible once the tank is empty there's no conductive path between any of the eight indicating probes and also the common probe (which is connected to 5v+ supply) so the electronic transistor base electrode region won't have spare biasing voltage thus it remains in cutoff region and also the output across its collector are Green Mountain State some four.2v. As during this case the microcontroller is employed within the active low region (which suggests that it considers 0-2 volts for prime and 3-5 volts for LOW) currently the output of semiconductor device that is 4.2v approximately will be considered as LOW by the microcontroller and hence the default value given by microcontroller to the seven-segment display is 1 which indicates as the tank is empty.

CONDITION 2:

Intermediate levels currently because the water starts filling within the tank a conductive path is established between the sensing probes and also the common probe and also the corresponding transistors get enough biasing at their base, they start conducting and now the outputs will be V_{ce} (i.e. 1.2v-1.8v) approximately which is given to microcontroller. Here the microcontroller is programmed as a priority encoder that detects the simplest priority input and shows corresponding water level at intervals the seven-segment show. In this project whereas the water level reaches the seventh level i.e. last however one level together with show in seven phase a discontinuous buzzer is activated that warns user that tank goes to be full shortly.

CONDITION 3:

Water full once the tank becomes full, the highest level probe gets the conductive path through water and also the corresponding electronic transistor gets into conductivity whose output given to microcontroller with this input microcontroller not

solely shows the amount in seven phase display however additionally activates the continual buzzer by that user will perceive that tank is full and may switch off the motor and save water.

7. RESULTS

We can see the results of 3 LEDs indicating the 3 Levels one, 2 and 3 achieved by water in the tank, displayed by Red, Yellow and Green LEDs respectively. The result shown, indicates that the tank is filled by achieving the Level 3 in water tank which in turn switches the motor OFF immediately due to the relay mechanism.

8. APPLICATIONS

There are various applications of this project. Automatic Water Level Indicator & Controller may be employed in completely different sectors like Hotels, Factories, Homes flats, Commercial Complexes, Industries, Agricultural Purposes etc. It may be wont to indicate fuel or oil levels in tanks or vehicles.

Automatic Water level Controller may be employed in Hotels, Factories, Homes Apartments, Commercial Complexes,

Drainage, etc., It can be fixed for single phase motor, Single Phase Submersibles, Three Phase motors. (For 3Æ and Single-Phase Submersible Starter is necessary) and open well, Bore well and Sump. We can management 2 motor and 2 sumps and 2 overhead tanks by single unit. Fuel level indicator in vehicles.

Liquid level indicator within the Brobdingnagian containers within the corporations.

9. FUTURESCOPE

The basic need of human being is water and it is one of the most important necessary for all living beings. But sadly, a huge amount of water is being wasted by uncontrolled use and due to our negligence. Some other machine-controlled water level observance system is additionally offered to this point however most of the strategy has some shortness in follow. We tried to beat these issues associate degree enforced an economical machine-controlled water level observance and dominant system. Main intension of this research work is to establish a flexible, economical and easy configurable system which can solve water losing problems. In the close to future as home automation web-based water level observance and control-ling system will be designed, through which the system can be controlled from any place via internet through mobile phone. This could have a considerable have the benefit of this analysis work for economical management of water.

Main intension of this project is to establish a flexible, economical and easy configurable system which can solve water losing problems. Soon as home automation web-based water level monitoring and controlling system can be designed, through which the system can be controlled from any place via internet through mobile phone. A GSM module can be integrated to receive the current status via SMS in registered cellphones. It can be modified and put to great use like taking preventive steps when some natural calamities like floods, drainage overflows etc. are detected and for avoiding extremely in-toxic liquid overflows in chemical plants etc. This could save precious lives of number of living beings. Also, the assets purchased from hard earned money could be refrained from getting damaged with the prior information from such automated indicator sand controllers.

10. CONCLUSION

This system terribly is extremely is incredibly efficacious to beat the water crisis within the world and it's very effective and sound then tradition methodology which incorporates mechanical floating probe strategies. This system is all rely upon digital signals and switch ON/OFF the pump in keeping with the water levels. It shows wonderful performance with its reliable digital technology and it's cheaper and sturdy. It ought to be enforced at each space whether; it came in rural or urban sector. Need of water is very cardinal to every living organism so, it's our duty to develop new ways to save it from wastage and preserve it for are next generations.

This paper was meant to style an easy and affordable automatic water level indicator and controller. This is not just for cistern however can also be used for varied liquids & oil level in industries and chemical labs too. To design this technique, we used transistor as a platform connected to relay along with local materials for low cost.

We tried to design a system in such a way that its components will be available easily and when connected, will be able to prevent the wastage of water. The whole system operates automatically. So, it doesn't would like any professional person to control it. It is not at all very expensive. This style has way more scope for future analysis and development. Though it's a project, we hope some modification in this project will lead to a reasonable diversity of usage.

Water Level Indicator Project Features:

- Easy installation.
- Low maintenance.
- Compact elegant design.
- the automated water level controller ensures no overflows or dry running of pump there by saves electricity and water.
- Avoid ooze of roofs and walls thanks to overflowing tanks.

- Fully automatic, saves manpower.
- Consume little or no energy, ideal for continuous operation.
- Automatic water level controller provides you the flexibleness to make a decision for yourself the water levels for operations of pump set.
- Shows clear indication of water levels within the overhead tank.

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