NEW HORIZON COLLEGE

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"ELECTRIC WATER LEVEL CONTROL SYSTEM"

A MINI PROJECT

REPORT

Submitted by

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In partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION

ENGINERRING

NEW HORIZON COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

Certified that the mini project work entitled "**ELECTRIC WATER LEVEL CONTROL SYSTEM**" carried out **C.PREETHI KIRAN(1NH18EC027)** bonafide students of Electronics and Communication Department , New Horizon College of Engineering, Bangalore.

The mini project report has been approved as it satisfies the academic requirements in respect of mini project work prescribed for the said degree.

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ACKNOWLEDGEMENT

The satisfaction that accompany the successful completion of any task would be, but impossible without the mention of the people who made it possible, whose constant guidance and encouragement helped us succeed.

We thank **Dr. Mohan Manghnani**, Chairman of **New Horizon Educational Institution**, for providing necessary infrastructure and creating good environment.

We also record here the constant encouragement and facilities extended to us by **Dr.Manjunatha**, Principal, NHCE and **Dr. Sanjeev Sharma**, head of the department of Electronics and Communication Engineering. We extend sincere gratitude to them.

We sincerely acknowledge the encouragement, timely help and guidance to us by our beloved guide **DR. Sanjeev Sharma** to complete the project within stipulated time successfully.

Finally, a note of thanks to the teaching and non-teaching staff of electronics and communication department for their co-operation extended to us, who helped us directly or indirectly in this successful completion of mini project.

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ABSTRACT

The drinking water crisis in Asia is reaching alarming proportions. It might very soon attain the nature of global crisis. Hence, it is of utmost importance to preserve water for human beings. In many houses there is unnecessary wastage of water due to overflow in overhead tanks. Automatic Water Level Indicator and Controller can provide a solution to this problem. The operation of water level controller works upon the fact that water conducts electricity due to the presence of minerals within it. So water can be used to open or close a circuit. As the water level rises or falls, different circuits in the controller send different signals. These signals are used to switch ON or switch OFF the motor pump as per our requirements. The total amount of water available on Earth has been estimated at 1.4 billion cubic kilometers, enough to cover the planet with a layer of about 3 km. About 95% of the Earth's water is in the oceans, which is unfit for human consumption. 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 estimated that a person in India consumes on an average of 140 litres per day. This consumption would rise by 40% by the year 2025. This signifies the need to preserve our fresh water resources.

A water level indicator may be defined as a system by which we can get the information of water within the reservoir. Water level indicator systems are quite useful to reduce the wastage of water from any reservoir, while filling such reservoir. The wires with colors Blue, Red, Green & Yellow are adjusted to check Level 1, Level 2, Level 3 and Level 4 respectively. Each of these four wires are connected to the amplifier. In this project we have designed the sensor to measure water up to four levels. Four segments of insulated conducting wires are used and the naked ends within water are connected with carbon rods. The length of the wire segments are adjusted according to the water levels within the reservoir.

Keywords: Water Level Indicator, Controller, conducting wires.

Chapter-I
INTRODUCTION

A Water Level Indicator may be defined as a system by which we can get the information of any water reservoir. Water level indicator system is quite useful to reduce the wastage of water from any reservoir, while filling such reservoir.

Water is most essential thing on earth .Safe drinking water is essential to human and other life forms even though it provides no calories or organic nutrients.

The project we have done is water level indicator with alarm. This is an industrial defined project i.e. IDP. And the title is so given from the problem define "Level of the water in the tank". we got the above mentioned problem definition from our research and understanding.

The Basic components involved in the design of level indicator are following:

- Transistor(BC547)
- Resistor(220 ohm)
- LED
- Buzzer
- Connecting Wires
- Breadboard

SCOPE:

This circuit not only indicates the amount of water present in the overhead tank but also gives an alarm when the tank is full. This worthy device starts ringing as soon as the water tank becomes full. It helps to check overflow and wastage of water by warning the customer when the tank is about to brim. The system provides visual water level indication with audio alarms at desired levels. It also provides automatic control of pumps at a remote location.

Now no need to go on the room to look the water level.

- It shows the water level in your room like level 1 ,level 2 and level 3

- Alarm starts ringing as soon as tank becomes full.
- Suitable for every tank

Chapter-II

LITERATURE SURVEY

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CHAPTER III

PROPOSED METHODOLOGY

A simple water level indicator can be made using resistors, LEDs, etc. For this it may be designed a water sensor by using conducting wires. In this paper we have designed the sensor to measure water up to four levels. Take 4 segments of insulated conducting wires. Tore out the ends of these wires, approximately 1cm. Adjust the length of the wire segments ac-cording to the water levels. In the following diagram it has been displayed with 4 different colours. The wire with Black colour is connected to buzzer. The wires with colours Yellow, Red, &Green are adjusted to check Level1, Level2, Level3 and Level4 respectively.

Water level indicator works through the following circuit diagram. Here this circuit is connected to 9 volt dc voltage source. The positive end of the dc source is connected to the over-head water tank and the negative end of the dc source is connected the diode leds and the buzzer accordingly.

The other end of the leds are connected to the 220 ohm resis-tors and the resistor ends are connected to the separately to the over-head water tank. The buzzer's other end is connected to the over-head water tank here the resistor is not connected. One switch is connected between the positive voltage source of the circuit and the battery.

List of Components in the Design of Indicator:

Sl. No.	Name of Components	Range
1.	Bread Board	Small size
2.	3 Led Lights (Green, Yellow.Red)	1-2 volt
3.	Dc voltage source (BATTERY)	9 volt
4	Transistor	BC547
5	3 resistors	220 ohm
6	Wires	As required
7	One Buzzer	5 – 15 volt

Chapter-IV
PROJECT DESCRIPTION

Working Principle:

When the water stared filling to the over head water tank then the green led glows, next when the level reaches upto the mid level of the over head water tank then yellow led glows after that the red led glows that the tank is going to be full or full at last the buzzer sounds when tank is going to be over flow.

Schematic diagram of Water level Indicator:

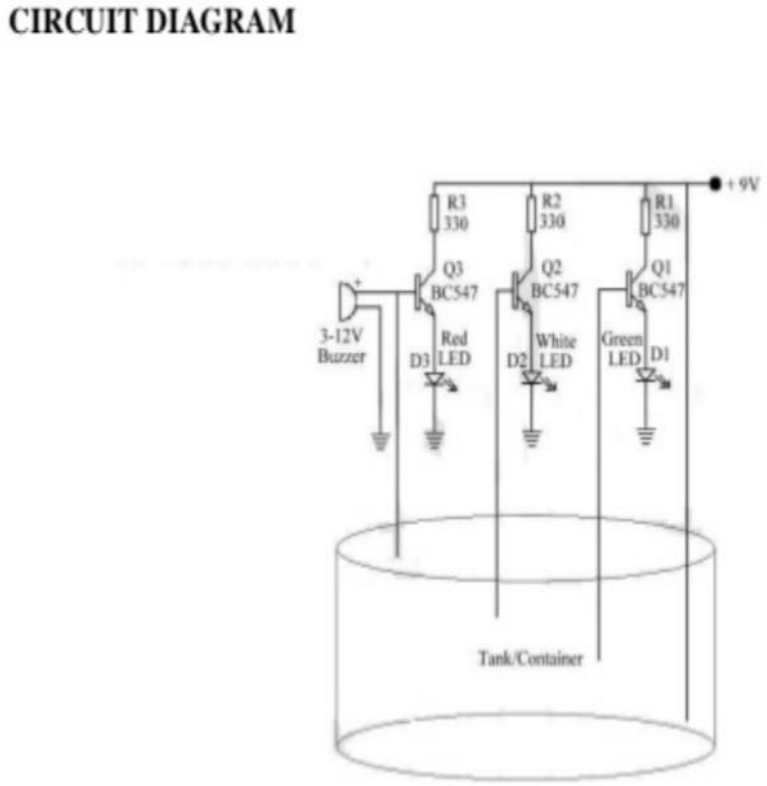


Fig1: Water level Indicator circuit diagram

The Basic components involved in the physical design of water level Indicator are:

Transistor

A **transistor** is a semiconductor device used to amplify and switch electronic signals and power. It is composed of a semiconductor material with at least three terminals for connection to an external circuit. A voltage or current applied to one pair of the transistor's terminals changes the current flowing through another pair of terminals. Because the controlled (output) power canbe much more than the controlling (input) power, a transistor can amplify a signal. Today, some transistors are packaged individually, but many more are found embedded in integrated circuits.

The transistor is the fundamental building block of modern electronic devices, and is ubiquitous in modern electronic systems. Following its release in the early 1950s the transistor revolutionized the field of electronics, and paved the way for smaller and cheaper radios, calculators, and computers, among other things.

The essential usefulness of a transistor comes from its ability to use a small signal applied between one pair of its terminals to control a much larger signal at another pair of terminals. This property is called gain. A transistor can control its output in proportion to the input signal; that is, it can act as an amplifier. Alternatively, the transistor can be used to turn current on or off in a circuit as an electrically controlled switch, where the amount of current is determined by other circuit elements.

There are two types of transistors, which have slight differences in how they are used in a circuit. A bipolar transistor has terminals labeled base, collector, and emitter. A small current at the base terminal (that is, flowing from the base to the emitter) can control or switch a much larger current between the collector and emitter terminals. For a field-effect transistor, the terminals are labeled gate, source, and drain, and a voltage at the gate can control a current between source and drain. The image to the right represents a typical bipolar transistor in a circuit. Charge will flow between emitter and collector terminals depending on the current in the base. Since internally the base and emitter connections behave like a semiconductor diode, a voltage drop develops between base and emitter while the base current exists. The amount of this voltage depends on

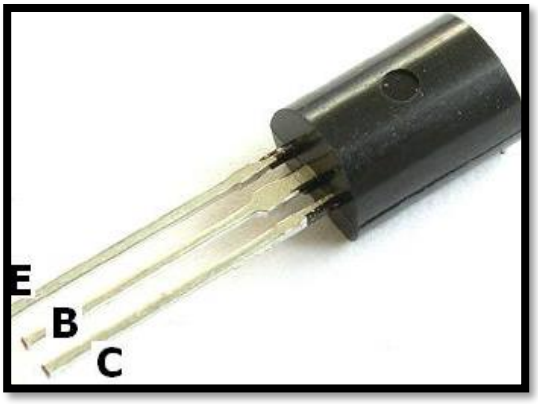


Fig2: Transistor

the material the transistor is made from, and is referred to as V_{BE}.

FIG(2) Schematic of Transistor

BC547 Transistor Features

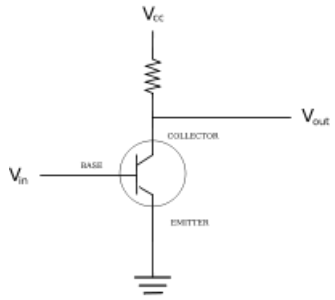
- Bi-Polar NPN Transistor
- DC Current Gain (h_{FE}) is 800 maximum
- Continuous Collector current (I_C) is 100mA
- Emitter Base Voltage (V_{BE}) is 6V
- Base Current(I_B) is 5mA maximum
- Available in To-92 Package

Brief Description on BC547

BC547 is a NPN transistor hence 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. BC547 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 100mA, hence we cannot connect loads that consume more than 100mA using this transistor. To bias a transistor we have to supply current to base pin, this current (I_B) should be limited to 5mA.

When this transistor is fully biased then it can allow a maximum of 100mA 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.



FEATURES **FIG3:**Transistor

- Low current (max. 100 mA)
- Low voltage (max. 65 V).

APPLICATIONS

- General purpose switching and amplification.

Resistor(220ohm)

A **linear resistor** is a linear, passive two-terminal electrical component that implements electrical resistance as a circuit element. The current through a resistor is in direct proportion to the voltage across the resistor's terminals. Thus, the ratio of the voltage applied across a resistor's terminals to the intensity of current through the circuit is called resistance. This relation is represented by Ohm's law:

Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in most electronic equipment. Practical resistors can be made of various compounds and films, as well as resistance wire (wire made of a high-resistivity alloy, such as nickel-chrome). Resistors are also implemented within integrated circuits, particularly analog devices, and can also be integrated into hybrid and printed circuits.

The electrical functionality of a resistor is specified by its resistance: common commercial resistors are manufactured over a range of more than nine orders of magnitude.

When specifying that resistance in an electronic design, the required precision of the resistance may require attention to the manufacturing tolerance of the chosen resistor, according to its specific application. The temperature coefficient of the resistance may also be of concern in some precision applications. Practical resistors are also specified as having a maximum power rating which must exceed the anticipated power dissipation of that resistor in a particular circuit: this is mainly of concern in power electronics applications. Resistors with higher power ratings are physically larger and may require heat sinks. In a high-voltage circuit, attention must sometimes be paid to the rated maximum working voltage of the resistor.

Practical resistors have a series inductance and a small parallel capacitance; these specifications can be important in high-frequency applications. In a low-noise amplifier or pre-amp, the noise characteristics of a resistor may be an issue. The unwanted inductance, excess noise, and temperature coefficient are mainly dependent on the technology used in manufacturing the resistor. They are not normally specified individually for a particular family of resistors manufactured using a particular technology. A family of discrete resistors is also characterized according to its form factor, that is, the size of the device and the position of its leads (or terminals) which is relevant in the practical manufacturing of circuits using them.

FIG-4 Resistors

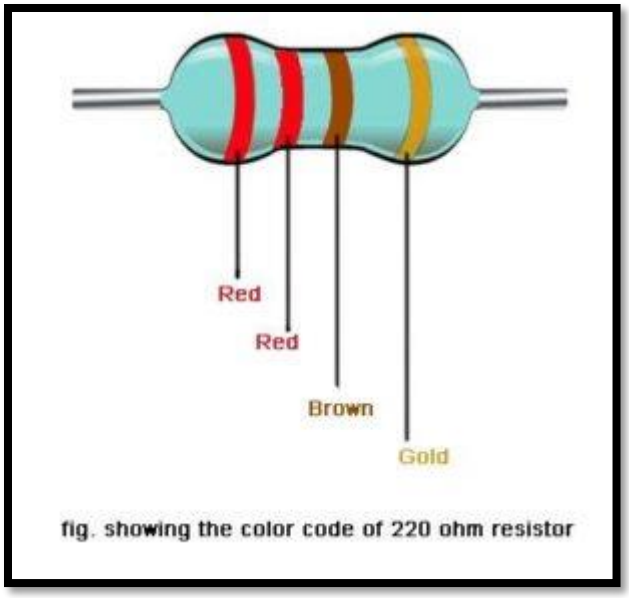


FIG_5 Resistor colour code

Types of resistors:

The most commonly used resistors all look the same. They look like a small worm with coloured stripes on the side. There are many types of resistors available. The most common one ceramic rod wound by copper wires on the inside. The number of copper turns and the thickness of the copper determine the resistance of the component.The more the turns and lesser the thickness, the more the resistance. There are also resistors with spiral patterns of carbon, instead of the copper winding. Such resistors are used for making smaller value resistors. Let us take a closer look at all the resistors.

1. Wire-wound Resistors

The resistors with a ceramic rod wound up with copper wires are called wire-wound resistors. Such resistors have the effect of inductance as they have copper windings. Even though the wires are wound in sections with alternate reversed condition an inductance is produced. Thus, different types of windings are used. One type of winding is called the flat thin former method which helps in reducing the cross-sectional area of the coil to a great extent. There are also other types of windings called Ayrton-Perry winding and bifilar winding. Some wire-wound resistors have an aluminium case so that they can be connected to heat sinks which dissipate heat.

2. Carbon Composition Resistors

They are usual resistors with a resistive element in the shape of a cylinder. The resistive element is a mixture of carbon powder and ceramic. This mixture is held together with the help of a resin. This mixture is embedded with wire leads. This is then attached to wires made of lead. The value of the resistor can be found out by a method called colour coding, which is painted onto the outer body of the resistor.

If the concentration of carbon increases, the resistance of the component decreases. This type of resistor is not used so commonly now. Though this resistor was highly reliable, their overheating and overvoltage characteristics are not so reliable.

3. Carbon film

This type of resistor is applicable for circuits working under a range of temperatures. The resistor is made by depositing a carbon film onto an insulating substrate. They can operate at a range from -55 °C to 155 °C. The voltage range varies from 100 Volts to 650 Volts with a resistance from 1Ω to 10 MΩ.

4. Thin and Thick Film Resistors

This type of resistor was the backbone of the popular surface mount device resistors used now. The names differentiate in the manner in which the film is applied onto the cylinder. The

For a thin film resistor, vacuum deposition method is used to include the resistive material onto the insulating substrate. This type of resistor is commonly used for making printed circuit boards. This type of resistor produces accurate resistance as the whole process of its making can be controlled.

Thick films are also produced in the same manner as a thin film. But they also have some additional compounds like glass and also a screen printing liquid.

Both of them vary in their temperature ranges as well as prices. Thin films are more expensive than thick films.

5. Metal Film Resistors

This type of resistor is made by coating with nickel chromium [NiCr]. The process of making this resistor is similar to that of thin film resistors. The difference will be in the compounds used.

6. Ammeter Shunt Resistor

This is the most unique type of resistor which is used for current sensing. It has four terminals and is used in the milliohms and microohms range. Though they are used for measuring small currents, if the current is allowed to pass through a shunt mechanism, they can be used for measuring high currents as well. Through this mechanism the current is measured with accordance to the voltage drop across it.

The shunt mechanism consists of two brass blocks. Inbetween them are strips of low temperature co-efficient of resistance alloys. Large bolts threaded into the blocks make the current connections.

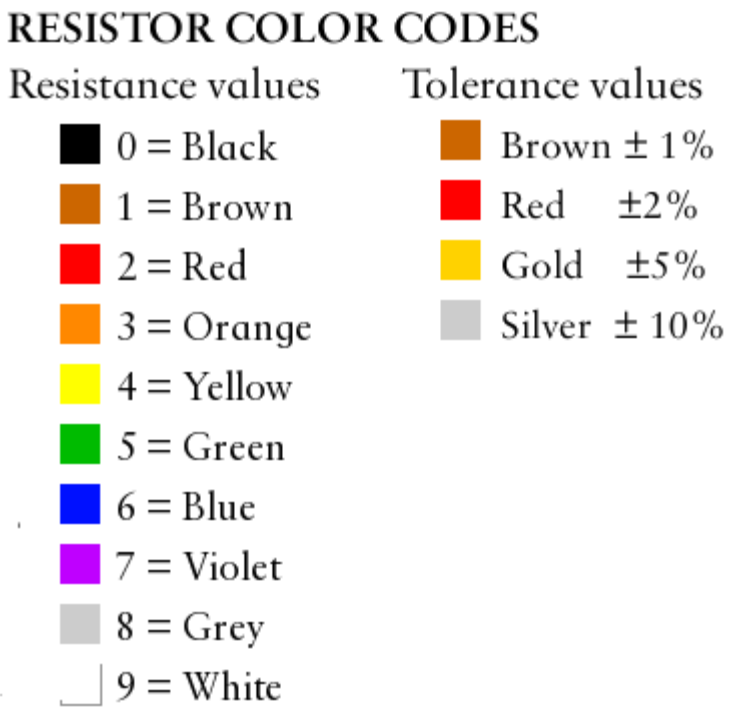
Colour Coding

The value of the resistance is found out by colour coding. The resistors have a band of colours shown in their outer covering. Here are the steps to determine the value of the resistor.

- All resistors have three bands of colours, followed by a space and then a fourth band of colour. The fourth band of colour will be brown, red, gold or silver.
- To read the colours turn it to the position such as the three consecutive colours come on the left and then the space and the rest of the colours.
- The first two colours from the left indicate the first two digits of the value. The third colour represents the digital multiplier. That is, it indicates how much you have to multiply the first two numbers with. Thus if you have a resistance with the first three colours being brown, black and red, the value of resistance is 10*100 = 1000 ohms or 1K.
- The last band, after the space indicates the tolerance of the resistor. This indicates the range of accuracy of the resistor. Thus, along with the three colours above, if the fourth colour is gold, it means you have a tolerance between +/-5%. Thus the actual value of the resistance can be between 950 Ohms and 1K.

- There can also be resistors with five colours. If so, the first three represents the digits, the fourth will be the multiplier and the fifth will be the percentage of tolerance. This indicates that a more precise value of the resistor used can be obtained from a 5-colour resistor.

Take a look at the colours and their associated numbers given below.



Colour coding of resistors

Uses of Resistors

Though resistors can cause wastage of electricity, it has a lot of advantages and applications in our daily life.

- Resistance is one of the main ingredient in the working of a light bulb. When electricity passes through the filament of the bulb, it burns bright as it turns extremely hot due to its smaller size. Though this mechanism wastes a lot of electricity, we are forced to use it to obtain light. The light used nowadays are highy efficient than the older incandascent lamps.

- The similar filament working is the main ingredient in the working of some of our usual household stuffs like electric kettles, electric radiators, electric showers, coffee makers, toasters, and so on.
- The application of variable resistance is also helpful to us. Our TV's, radios, loud speakers and so on work on this principle.

4.4 Breadboard

A breadboard is a solder less device for temporary prototype with electronics and test circuit designs. 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 breadboard has strips of metal underneath the board and connects the holes on the top of the board. The metal strips are laid out as shown below. Note that the top and bottom rows of holes are connected horizontally and split in the middle while the remaining holes are connected vertically.

Note how all holes in the selected row are connected together, so the holes in the selected column. The set of connected holes can be called a node

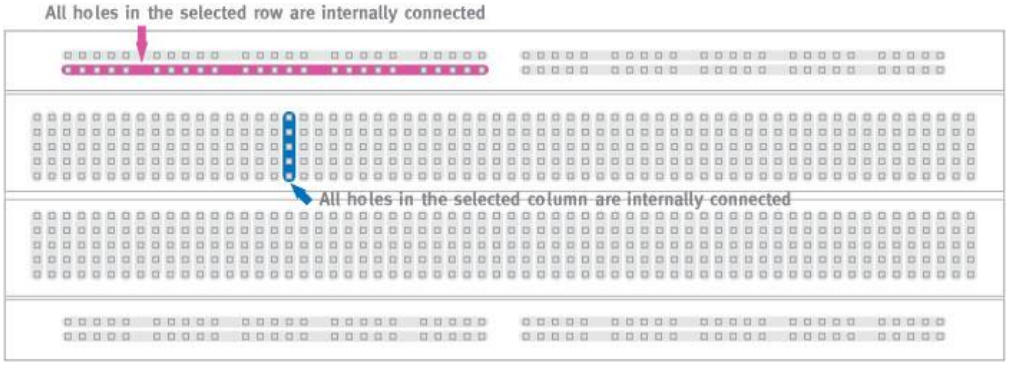


FIG6. Breadboard

4.5 LED

A **light-emitting diode** (**LED**) is a semiconductor light source. LEDs are used as indicator lamps in many devices and are increasingly used for other lighting. Introduced as a practical electronic component in 1962, early LEDs emitted low-intensity red light, but modern

versions are available across the visible, ultraviolet, and infrared wavelengths, with very high brightness.

When a light-emitting diode is forward-biased (switched on), electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence and the color of the light (corresponding to the energy of the photon) is determined by the energy gap of the semiconductor. LEDs are often small in area (less than 1 mm^2), and integrated optical components may be used to shape its radiation pattern. LEDs present many advantages over incandescent light sources including lower energy consumption, longer lifetime, improved robustness, smaller size, and faster switching. LEDs powerful enough for room lighting are relatively expensive and require more precise current and heat management than compact fluorescent lamp sources of comparable output.

Light-emitting diodes are used in applications as diverse as replacements for aviation lighting, automotive lighting (in particular brake lamps, turn signals, and indicators) as well as in traffic signals. LEDs have allowed new text, video displays, and sensors to be developed, while their high switching rates are also useful in advanced communications technology. Infrared LEDs are also used in the remote control units of many commercial products including televisions, DVD players, and other domestic appliances.

4.6.1 Practical use

The first commercial LEDs were commonly used as replacements for incandescent and neon indicator lamps, and in seven-segment displays, first in expensive equipment such as laboratory and electronics test equipment, then later in such appliances as TVs, radios, telephones, calculators, and even watches (see list of signal uses).

These red LEDs were bright enough only for use as indicators, as the light output was not enough to illuminate an area. Readouts in calculators were so small that plastic lenses were built over each digit to make them legible. Later, other colors grew widely available and also appeared in appliances and equipment.

As LED materials technology grew more advanced, light output rose, while maintaining efficiency and reliability at acceptable levels. The invention and development of the high-power white-light LED to use for illumination, which is fast replacing incandescent and fluorescent lighting. (See list of illumination applications).

Most LEDs were made in the very common 5 mm T1¾ and 3 mm T1 packages, but with rising power output, it has grown increasingly necessary to shed excess heat to maintain reliability, so more complex packages have been adapted for efficient heat dissipation. Packages for state-of-the-art high-power LEDs bear little resemblance to early LEDs.

Fig(7) LED

4.6 Buzzer Principle

An audio signal source such as a microphone or recording produces an electrical "image" of the sound. That is, it produces an electrical signal that has the same frequency and harmonic content, and a size that reflects the relative intensity of the sound as it changes.

The job of the amplifier is to take that electrical image and make it larger -- large enough in power to drive the coils of a loudspeaker. Having a "high fidelity" amplifier means that you make it larger without changing any of its properties.

Any changes would be perceived as distortions of the sound since the humer ear is amazingly sensitive to such changes. Once the amplifier has made the electrical image large enough, it applies it to the voice coils of the loudspeaker, making them vibrate with a pattern that follows the variations of the original signal.

The voice coil is attached to and drives the cone of the loudspeaker, which in turn drives the air. This action on the air produces sound that more-or-less reproduces the sound ressure variations of the original signal.

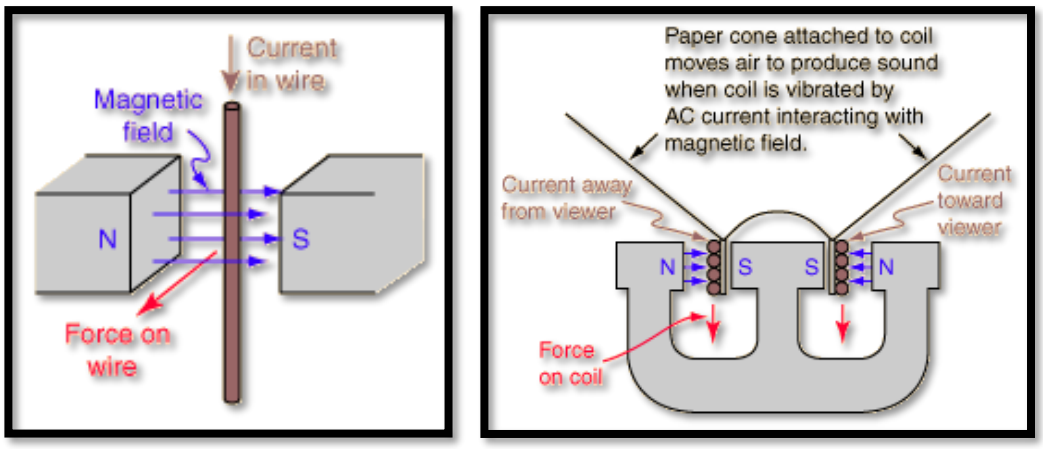


FIG-8 Buzzer

Chapter-V

ADVANTAGES AND LIMITATIONS

Applications:

Water level Indicator can be used in Hotels, Factories, Homes, Apartments, Commercial complexes, Drainage, etc. It can be fixed for single phase motor, three phase motors, fuel level indicator in vehicles. liquid level indicator in the huge contain-er companies on the tank walls.

Advantages:

- Reduce the wastage of water
- No possibility to overflow of water tank
- Cost of circuit is low
- It is easy to fabricate the circuit
- Power requirement is low

Limitations:

- Circuit is bulky.
- This project is used in only in water tank.

Chapter-VI

CONCLUSIONS AND FUTURE SCOPE

Conclusions:

The water level Indicator employs a simple mechanism to detect and indicate the water level in an over-head tank or any other water container. The sensing is done by using a set of four probes which are placed at four different levels.

We can conclude that 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.

In these days, when the Earth's reserve of consumable water is decreasing every moment, every drop has its value.

Water level controller is a simple yet effective way to prevent wastage of water. Its simplicity in design and low cost components make it an ideal piece of technology for the common man.

Future Work:

In future, we want upgrade this circuit with some sensor which can automatically stop the power supply of the driving pump or motor. As a result the future circuit is not very cheaper the the present one, but we try our best to

- Make it simple,
- Easy to use,
- Easy to install,
- To make Available for all,
- Try to smaller than the present one.

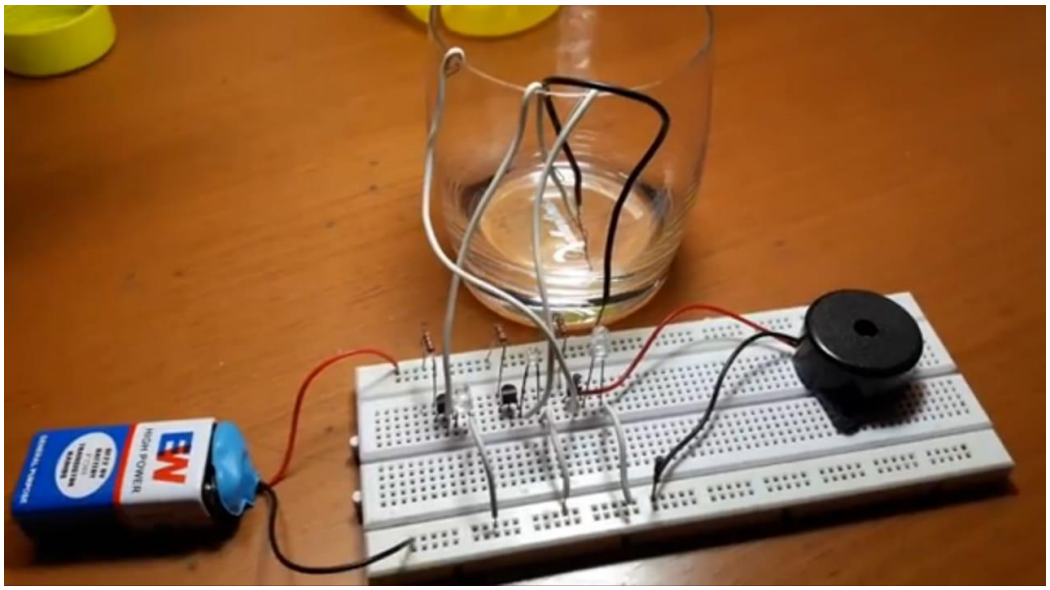


FIG 9.WATER LEVEL CONTROL SYSTEM