AUTOMATIC WATER LEVEL CONTROLLER BY USING 555IC AND RELAY

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ABSTRACT
Water level indicator is widely used in many industries and houses. People generally worry about the wastage of water, when they switch ON the motor and forget to OFF. An Water Level Indicator may be defined as a system by which we can get the information of any water reservoir .Water level indicator system are quite useful to reduce the wastage of water from any reservoir, while filling such reservoir. But for domestic purpose we cannot go for the instruments which use radar or ultrasonic principle that costs high. Water tank overflow is a common problem which leads to the wastage of water. In this project, the transistor based water level indicator circuit is used to indicate the water levels in a tank. Whenever tank gets filled, it gives alerts on particular levels. The LEDs is generally used for indicate the water levels, and also it stops when it reaches to high level in the tank automatically.

INTRODUCTION
•   Here in this water level controller there are three level of sensors present in the tank i.e low, medium, high levels.
•   In this circuit, the motor is controlled automatically by using 555IC and relay.
•   Whenever the water in the tank is at low level the motor starts automatically and also it stops when it reaches to high level in the tank.
•   And also it indicates the levels of the water with the help of leds.

The project "automatic water level control with an automatic pump control system" is design to monitor the level of liquid in the tank.

The system has an automatic pumping system attached to it so as to refill the tank once the liquid gets to the lower threshold, while offing the pump once the liquid gets to the higher threshold. Sustainability of available water resource in many reason of the word is now a dominant issue. This problem is quietly related to poor water allocation, inefficient use, and lack of adequate and integrated water management. Water is commonly used for agriculture, industry, and domestic consumption. Therefore, efficient use and water monitoring are potential constraint for home or office water management system. Moreover, level in the overhead tank and ensures the continuous flow of water round the clock without the stress of going to switch the pump ON or OFF thereby saving control systems are widely used for monitoring of liquid levels in reservoirs. Proper monitoring is needed to ensure water sustainability is actually being reached with disbursement linked to sensing and automation, such based automated water level sensing and controlling by using 555 timer IC and relay.

a. Working Principle

⤴ Condition 1:

When the tank is empty (i.e. water is below the low level sensor) then the motor will start automatically, and tank fills gradually. Whenever the low level sensor is short circuit with the +ve supply through the water, then the red colour led is glow.

⤴ Condition 2:

When the water is at medium level, the medium level sensor is short circuit with the +ve supply through the water, then the blue colour sensor is glows.

⤴ Condition 3:

When the water is reached to the high level sensor (i.e. tank is going to full) then the motor will stop automatically, hence the high level sensor is short circuit with the+ve supply through the water, then the green colour led glows.
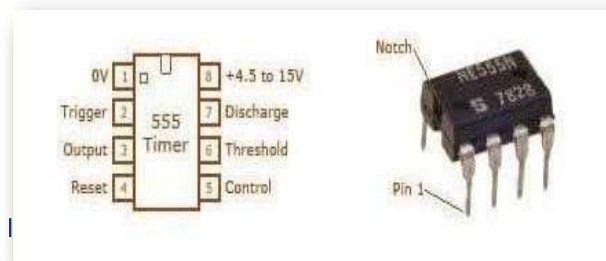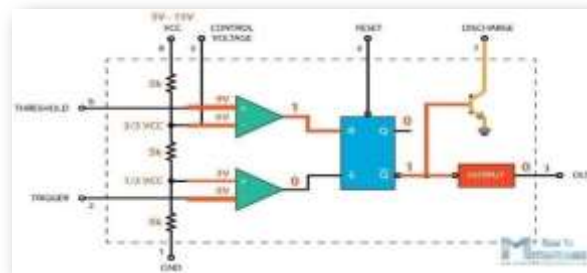
b. Circuit Diagram
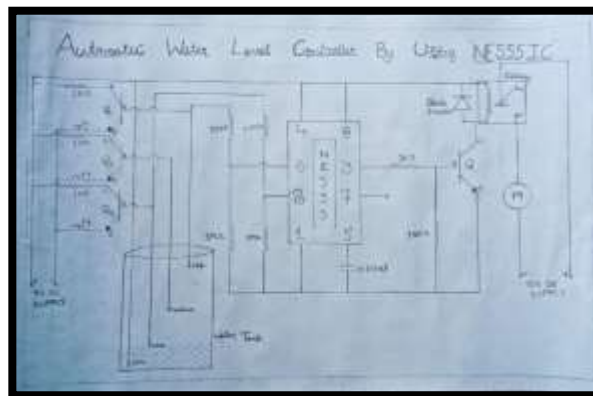
1. COMPONENTS

- **a)** NE555 IC
- **b)** Transistor BC547
- **c)** Relay 12V
- **d)** Resistors
- **e)** Capacitor
- **f)** Diode
- **g)** Leds
- **h)** Dc 12v supply (adopter)
- **i)** Battery 9v
- **j)** Motor

c. Working of Components

a) NE555 IC

➤ It is basically a monolithic timing circuit that produces accurate and highly stable time delays or oscillation.

> ➤ **Pin-1 Ground Terminal**
▪ All the voltages are measured with respect to the ground terminal.

> ➤ **PIN-2 Trigger**
▪ This is the inverting input terminal of a comparator 2, and is responsible for the transition of flipflop from Set to Reset.
▪ If we are apply less than 1/3vcc at pin 2, than the Set **(S)** pin of flipflop will get high signal than the output will be **HIGH.**

> ➤ **Pin-3 Output**
▪ The output of the timer is available at this pin. If the load is connected in between output pin**(3)** and ground pin**(1)** is called normally off load. And if the load is connected between output pin**(3)** and VCC supply pin**(1)** then it is called normally on load.

➤ **Pin-4 Reset**
▪ whenever the timer is to be reset or disabled, this pin is connected to the ground terminal, than the output is reset irrespective of the input condition. Thus is named as reset terminal.
▪ when this is not to be used for reset purpose, it should be connected to +VCC to avoid any possibility of false triggering.

➤ **Pin-5 Control Voltage**
▪ This pin is by default 2/3vcc we can supply any reference voltage to the inverting terminal**,**

➤ **Pin-6 Threshold**
▪ This is the non-inverting input terminal of comparator 1, which compares the voltage applied to the terminal with a reference voltage of 2/3vcc.
▪ At this pin if we are apply greater than the 2/3vcc, than the Reset **(R)** pin of flipflop will get high signal than the output will be **LOW**.

➤ **Pin-7 Discharge**
▪ This pin is connected internally to the collector of transistor and mostly a capacitor is connected between this terminal and ground. it is called discharge terminal.

➤ **Pin-8 Supply Terminal +VCC**
▪ A supply voltage of +5v to +18v is applied to this terminal with respect to ground terminal**(1).**
▪ Hence, this is the pin configuration of NE555 IC.

b) Transistor bc547
☐ A transistor is an electronic component that is used in this circuit to either amplify or switch electrical signals, allowing it to be used in a wide range of electronic devices.

c) Relay 12V
➤ A relay is an electromechanical device that can be used to make or break an electrical connection. it consists of a flexible moving mechanical part which can be controlled electronically through an electromagnet, basically, a relay is just like a mechanical switch but you can control it with an electronic signal instead of manually turning ON and OFF.

➢ By connecting the relay contacts to a contractor, the pump can be turned ON and OFF automatically.

d) Resistors

➢ A resistor is a passive two terminal electrical component that implements electrical resistance as a circuit element being equal, in a direct-current (DC) circuit, the current through a resistor is inversely proportional to its resistance and directly proportional to the voltage across it. This is the well-known Ohm's Law.

e) Capacitors

☐ A capacitor is a device that stores electrical energy in an electric field. it is a passive electronic component with two terminals.

f) Light Emitting Diode (LED)

A light-emitting diode (LED) is a two- lead semiconductor device that emits visible light when an electric current passes through it.

The light is not particularly bright, but in most LEDs it is monochromatic, occurring at a single wavelength. The output form an LED can range from red (at a wavelength of approximately 700 nano meters) to blue-violet (about 400 nano meters). Some LEDs emit infrared (IR) energy (830 nano meters or longer); such a device is known as an infrared emitting diode (IRED).

Features
i. Low power requirement
ii. High efficiency
iii. Long life

g) Diode IN4007

☐ A diode is a semiconductor device that essentially acts as a one-way switch for current. It allows current to flow easily in one direction, but severely restricts current from flowing in the opposite direction.

☐ According our circuit;
▪ A fly back diode or freewheeling diode is placed with reverse polarity from the power supply and in parallel to the relay's inductance coil. The use of a diode in a relay circuit prevents huge voltage spikes from arising when the power supply is disconnected.

h) 9v DC Supply battery

☐ It is used to provide the 9v supply to the indication circuit.

☐ A battery is an electro chemical cell (or enclosed and protected material) that can be charged electrically to provide a static potential for power or released electrical charge when needed. A battery generally consists of an anode, cathode and an electrolyte. Common types of commercial batteries and some of their characteristics and advantages are summarized in the following table. Battery types not shown include the zinc-air, flooded lead acid, and alkaline batteries.

i) Motor

➢ In this project, for our convenience we are using the small dc water pump. It is used to pump the water into the tank without any manual operation.
☐ Here we used motor is (9-12V).

Applications
☐ It is mostly used for all household purposes.
☐ It can be used in commercial centers and industries.
☐ It can be used in irrigation process.
☐ It can be used in all places where to control water level.
☐ Schools, colleges, factories etc………..

Need of water level controller
☐ Over flow problems.
☐ To prevent wastage of water.
☐ To prevent wastage of energy.

Advantages

➢ Low maintenance
➢ Easy to install
➢ Compact in size
➢ Avoid seepage of roofs and walls due to overflowing tanks.
➢ Fully automatic
➢ Saving of water and energy
➢ Increasing pump life

Disadvantages

☐ The components used in this circuit are sensitive.
☐ The cost of the wire is increased according to the height of the water tank.
☐ We need to insert the wire in accordance with the level of the water. OUTPUT

OUTPUT

Conclusion

➢ This project is the solution for saving water as well as energy by providing the automatic control system.
➢ And also it helps the user to know the different levels of the water in the tank.

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