Design and Implementation of Water level indicator

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Abstract─The drinking water crisis in Bangladesh is reaching alarming proportions. It might very soon attain the nature of global crisis. Hence, it is of extreme importance to preserve water. In home based water tank, the one problem is very common to us that the control of water level of overhead tank, as a result the wastage of water is increasing day by day. But we all know water is very precious to us. This problem can be controlled by a simple electronic circuit consists with some cheap electronic components ,that circuit is called 'Water Level Indicator'. The operation of water level controller works upon the fact that water conducts electricity. 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. Water Level Indicator is a simple low cost circuit. First we introduced this circuit from the web. There the circuit is made with various components like IC , arduino ,Timer , Resistors, Leds and etc. After we discussed that how to make the circuit without IC ,Timer arduino and after we calculate that we got the result, beside we got help from our teacher about this circuit. At last we got a simple circuit without transistor and it shows result. We removed the IC ,Timer arduino to make the circuit cheap and easy installation to all .The other liquid control circuits, which we have seen those are very critical than this circuit

Keywords─**Transistor, Buzzer, LED, Base, Emitter, Collector**

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 nutriants. 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 an average of 135 litres per day. This consumption would rise by 40% by the year 2025. This signifies the need to preserve our fresh water resources .

However, some observers have estimated that by 2025 more than half of the world population will be faced water based vulnearbility. The presence of water level indicator in reservoir can help control wastage and water indeaquacy in such reservoir. Water level indicator is used to show level of water in an over head tank, this keeps the user informed about the water level at all time avoids the situation of water running out when it is most needed. Indicators circuits have also alarm features. It not indicate amount of water present in overhead tank but also gives an alarm when tank is full. Advantages of the proposed water level controller are, very less maintenance, very low cost, very simple construction and the circuit involved is also relatively simpler. It can be easily made at home . After assembling the system, what remains is to observe its operation and efficiency. This can be done by breaking down the activity of the controller from the detection of water to the working of the pump. We go over the responses obtained when water reaches the sensors and the logic employed behind it. We also try to justify how a system as simple as ours can compete with those available commercially.

II.   Methodology:

A.   Implementation Setup:

In this project, we have used transistor , LED (Light Emitting Diode),buzzer, a 9V battery and a curtain.

Step1: Connect the cathode of each led to collector terminal of BC547 transistor power rail(blue rail) on breadboard which would be the ground supply. Connect the anode of LED to supply 9 volt power source.

Step2 : Connect each 100 ohms resistor in series with base terminal of each five (Q2,Q3,Q4,Q5,Q6)BC547.Another terminal of each resistor is connected to water tank.

Step 3: Connections each emitter terminal of BC 547 transistor to the negative terminal of source 9V battery . Positive terminal of 9V battery is connected to water tank.

Step4: Buzzer is connected to collector terminal of BC547 and another teminal is connected to source voltage .[1]

The connection diagram is as shown in figure 1. So, at a glance the required circuit parts:
1.   Transistor

2. DC power source
3. Breadboard
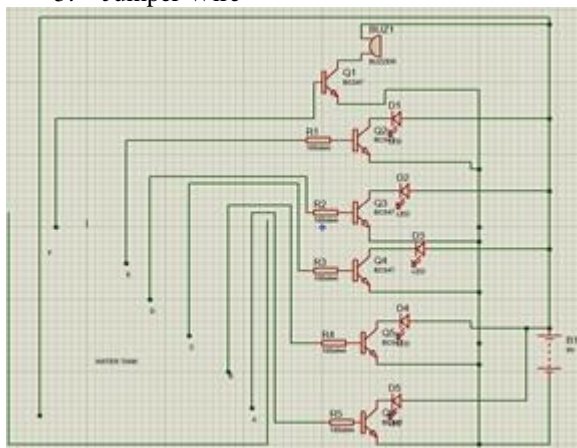4. Mechanical setup
5. Jumper Wire

Figure 1: Circuit Diagram

B. *Working Principle:*

Here we are using transistor (of NPN type) as a Switch. Initially there is no voltage applied to the base of the Transistor Q6 and the transistor is in OFF state No current is flowing through collector and emitter and LED is OFF. When the water level reaches to Point A in the tank, the positive side of the battery gets connected to the base of the Transistor Q6 through the water. So when a positive voltage has been applied to the base of the Transistor Q6, it gets into ON state and current starts flowing from collector to emitter. And RED LED glows. You can see resistors at the base of each transistor, which is used to limit the maximum Base current.Generally a transistor gets its ON state fully when a voltage of 0.7 V is applied to the base. There are also resistors with each of the LEDs, to drop the voltage across LEDs, otherwise LED may blow up. Same phenomenon happens when water level reaches to Point B. As soon as water level reaches to Point B, a positive voltage gets applied to the Transistor Q5, it gets ON and current started flowing through YELLOW LED, and LED glows. With same principle, others LED glow when water level reaches to Point C,D,E respectively .And finally Buzzer beeps when water level reaches to F.[2]

C Result and Applications

The water level indicator automates this system. As soon as the water reach the respective point and the led glow and when the water tank fill up , the buzzer alarm 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 veichles. liquid level indicator in the huge container companies on the tank walls.

III.   Drawbacks

While doing this project we have experienced some difficulties. The main difficulty is that we were not able to test to real water tank which situated upon the roof ... Being unable to make a mechanical setup for our water tank was another major difficulty. Our circuit connections were being loosen several times. It would have been great for us if we could have been able to solder the wires.

IV.   Cost Analysis

Here below we have listed all the items that were needed to make this project successful.

Serial	Component	No. of component	Per unit cost (Tk)	Total Cost(TK)
1	Resistor	5	10	50
2	Led	5	11	55
3	Buzzer	1	15	15
4	Transistor	6	10	60
5	Water jar	1	60	60
6	Jumper wire	10	12	120
7	Bread board	1	90	90
8	DCpower source	1	50	50

Table 1: Details of Purchased Instruments

Total cost = 500 Tk

V.   Future Plan

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

As a result it can available

VI.   Acknowledgement

It is a pleasant task to express our gratitude to all those who have accompanied and helped us in this work. First and foremost, we take this opportunity to express deep sense of gratitude to our Guide (late) Assistant Prof .Minmoy Dey, Department of Electrical Engineering, Chittagong University of Engineering and Technology for his invaluable suggestions and encouragement throughout the project which helped us a lot to improve this project work. Our sincere thanks to all our family members for their moral support and encouragement, without which, the work would not have been possible. Last but not least, we extend our thanks and appreciation to our friends, colleagues, batch-mates and everyone who have helped us directly or indirectly to get this work done.

VII.   Conclusion

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.

VIII.   References

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