An Efficient System for Water Level Indication System for Agricultural Purposes

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Abstract: Water crisis is something which is being faced by everyone in this world. The water is being wasted by humans in alarming rate even though, they know the resource is scares and one such example among numerous example is wastage of water by overfilling of overhead tank, which is a small mistake, but the impact that create is huge. So it is utmost important to preserve water for the upcoming generation to come. Automatic water level indicator can provide solution for this problem, but rural people can't effort such expensive system for their agricultural purposes related work So, in this paper, we have introduced a system which is cost efficient and dynamically measures the level of water inside the tank and gives the indication to farmer about the level of water in the reservoir and if the level is less or more than certain level, gives the user indication.

I. INTRODUCTION

In this present world, scarcity of water became a major issue around the globe. Many countries are facing this problem. It is being predicted that by 2030, there will be an increase of 40% more consumption of water and the available fresh water in this world is less than 1 percent of the total amount of water present. Water is being wasted in numerous ways by the people and one such way of water wastage is by overhead tank, even though the tank is full, the pump continues to run and results in major loss of water, people may think what wrong in wasting some few litres of water in such way. The truth is, consider we are wasting about 10-20 litres of water in this way, note that we are not the only person present in this world, if this happen to 20 lakh people across INDIA, about 2 crore litre of water is been wasted through this one carelessness. So, in this paper we proposed a system which can be used to detect the level of water in the tank and gives indication if it is full or empty. In Urban area, people can afford full automatic water level indicator which can turn ON/OFF whenever the water is low or high respectively. But, in case of farmers they can't afford to buy such expensive company made product for this purpose of indicating water. So, for helping them to solve their problem. We are proposing a model in this paper, an efficient system for water level indication for agricultural purposes, because water is widely/ largely used for agricultural purposes and they can't afford to lose even one litre of water. So, our proposed system which can be placed on their reservoir, comes at very low price, which can be afforded by them, that can be used to reduce the level of wastage of water

II. LITERATURE REVIEW

In this paper, they have created a cost efficient technique for indicating water by using transistor which acts as a switch. A base wire which is being connected to the positives terminal of the battery is placed at the bottom of the experimental setup and 3 wires are placed at different levels of the experimental system, the principle of the procedure is that, when the water level increases, the bottom wire and the different wires placed at different level gets internally connected by flows ions. Thus creating a flow of current through transistor and it acts as switch by turning ON corresponding light indicating the level of water. This system was indeed a cost efficient and easy to make [1].

In this paper, they have introduced fully automatic system for water level indications by using Arduino and ultrasonic sensor. The principle of the project was, they used ultrasonic sensor for measuring the distance of water in the tank (vertical distance). If the distance is less than a certain threshold then it gives away a signal to the Arduino, indicating the Arduino to turn ON the motor, the ultrasonic sensor continues to measure the distance. If it reaches a certain threshold (vertical distance) the sensor indicates the Arduino to turn OFF the motor. Thus, this system was able to give a fully automatic system, which requires no human interference [2].

In this paper, it used PIC controller and transistor, for making the system fully automatic. This system can even be used for detecting oil. This used the principle of transistor which acts as a switch, which makes the led to glow at different stages, as the level of water increases. This signal is sent to PIC controller and make the pump to turn ON/OFF according to the signal given [3].

III.   COMPONENTS USED

A.   Transistor BC547

It is a semi-conductor device which can be used to amplify or switch the given electronic signals. It consists of 3 terminals; emitter, base and collector. Transistors are commonly used as a switch in electronic related circuits. The working principle of Transistor, in this paper, act as a switch, a small input current is passed to the base of the transistor, resulting to big current flow between the emitter to the collector. This makes the transistor to act as switch in certain electronic circuits.
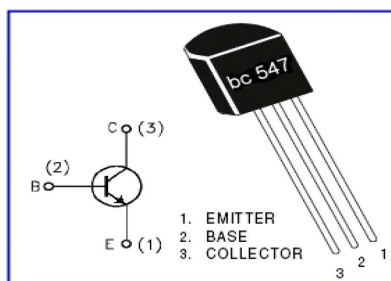

Fig 1 : BC547 Transistor

B.   LED

Light emitting diode which consists of two wires, one is called as cathode and other is called as anode. Which is used to emit visible light when the current passes through them. One of the important features of LED is that, it is cost efficient, has long life and high efficiency.
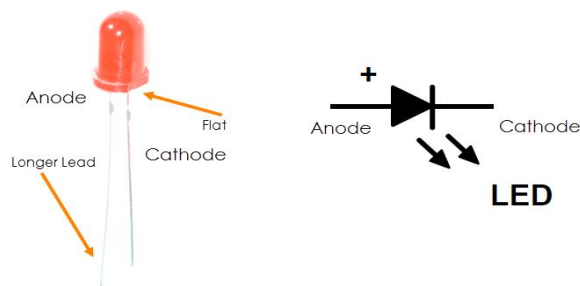

Fig 2 : LED (Light Emitting Diode)

C.   Buzzer

A buzzer is a device which is used to give audio related signals that can be widely used in alarm devices, timer etc.

Fig 3: Buzzer

D.   Leveller-Ball

This is component which is used to increase the accuracy of the reading, When the water level rises, the ball will also rise to reach horizontal axis from a slanting position, angled about 60^0 as a result the needle (yellow colour) will also rise, since it connected through a rod, completing 60 degree of angle. Each 15 degrees, represent 20% of increase in water level. This component will be placed between two level marking.
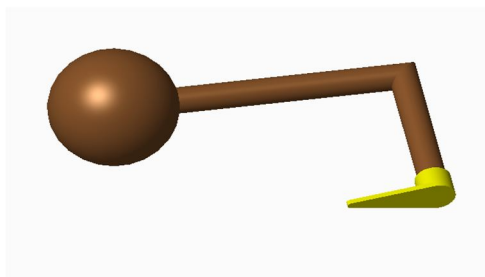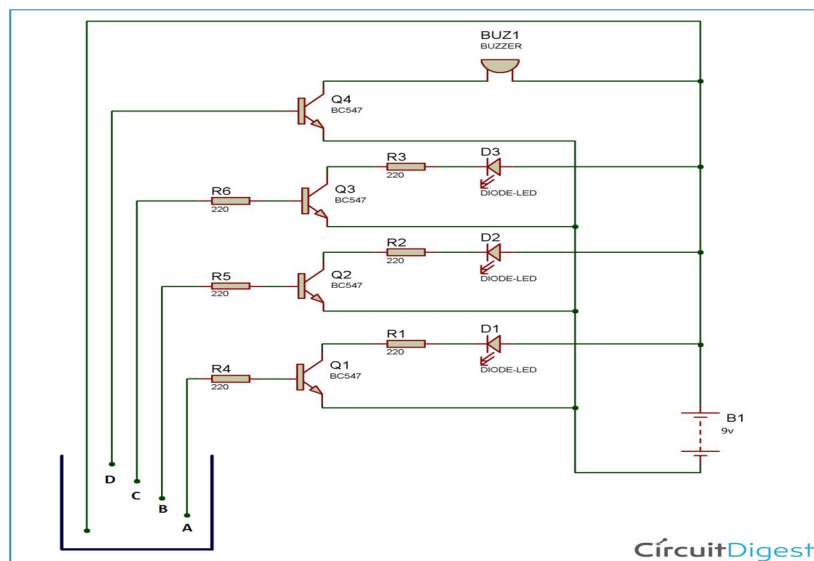
Fig 4 : Leveller-Ball

IV. CIRCUIT DIAGRAM

Fig 5 : Circuit Diagram

In fig 5, shows the circuit diagram for the setup for the proposed system. It consists of transistors, which is marked as Q1 – Q4, Resistors as R1 - R6, led as D1 - D3, buzzer as BUZ1 and a battery for powering the system marked as B1. One base wire connected to the positive terminal of the battery is placed at the bottom of the tank. Water at different level is being measured through the signals received from different level, which is done with help of wires at (A-D) indicating (25%,50%,75%,100%) of water present in the tank.
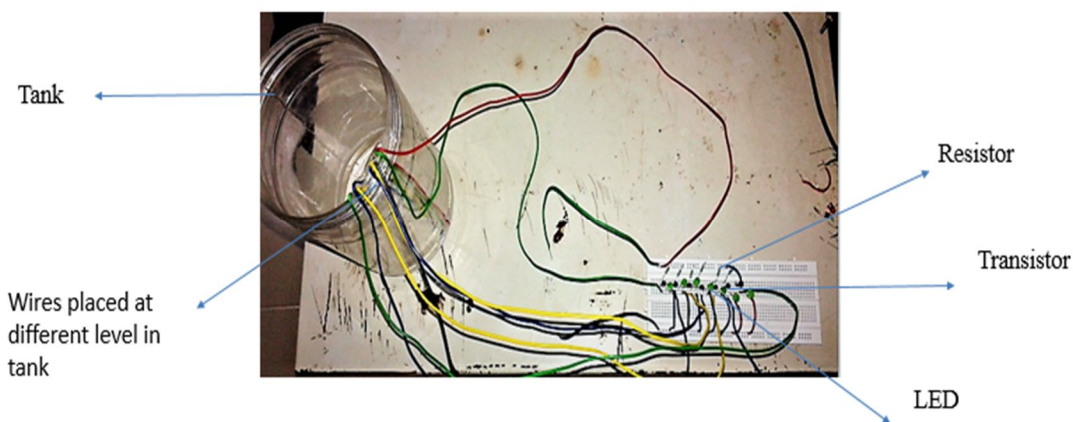

Fig 6 : Demo of Water Level Indicator system

This fig 6, shows the demo/ starting setup of the system, where the wires is being placed at different location inside the tank. The led on the breadboard gives the indication of water present at different levels inside the tank by turning ON.

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V.   PROPOSED SYSTEM AND WORKING

Fig 7: Demo of Proposed Water Level System

Fig 7, is the proposed system, which can be installed on to any reservoir which is used for agricultural purposes and ensures there is no wastage and efficient usage of water is ensured. The breadboard will be attached on to the surface of the tank where all the transistors and wires connected to it, is being placed. Led will be placed at different location on the side surface of the tank indicating the percentage of water inside the tank and gets turned ON/OFF with the help transistor acting as switch according to the water present. In this fig 7, one leveller-ball is shown in big scale, this component will be placed between two level marking for providing much more accurate reading. By usage of this Leveller- ball, the system will be able to dynamically measure the level of water inside the tank
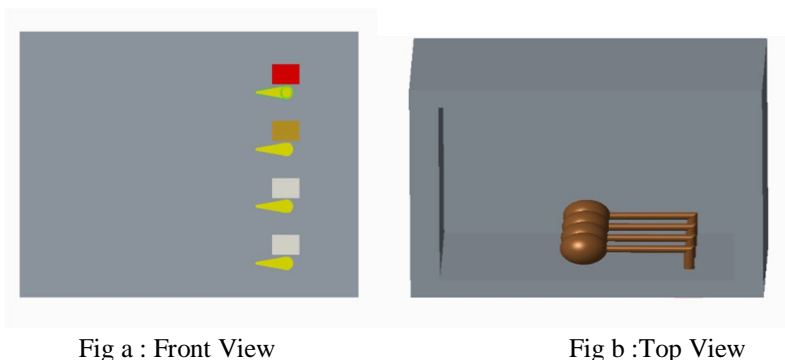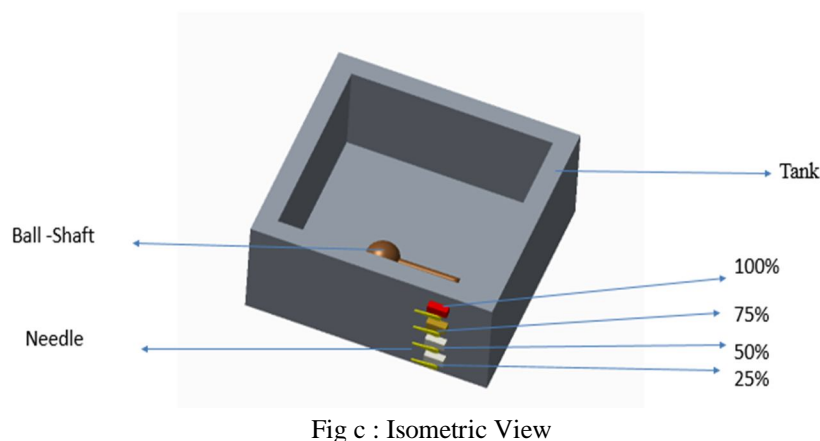

Fig a : Front View   Fig b :Top View

Fig c : Isometric View
Fig 8 : Computer aided Diagram for the proposed model

The above figure, Shows the computer aided final design for the proposed model, where the small square projection indicates the LED corresponding to that location. Ball-shaft and needle (Leveller-Ball) is being placed at all four locations for measuring the level of water rise between two level marking.

A. Working

In this system, transistor is being used as a switch. A base wire connected to the positive terminal of the battery is placed at the bottom of the tank and other four different wires is placed at four different locations in the tank (vertical distance) indicating (25%, 50%, 75%, 100%) of water is present in the tank. So, when the water is present inside the tank, the base wire gets internally connected and flow of ions takes place. When the water level rises, the water gets connected or passes the wires which is placed at the different locations of the tank, when the base wire and the other wire gets internally connected due to the flow of ions in the water. Then a small current is passed through the wire and goes to the base of the transistor, where it is being connected. Thus, allowing the flow of current from the emitter to the collector, as a result LED glows for that particular level. Like this, as the level of water rises, corresponding Led will glow and give the indication to the user about the level of water present/getting filled inside the tank. Buzzer is being used to give away indication to the user, whether it is less than or more than a particular level specified, in our case the system is proposed to the farmers, since it will be suitable for agricultural purposes because of its easily available material, cost efficient and it can be installed by any ordinary person without giving any extra money to anyone. In the previous projects, related to water level indication system. It was expensive for the rural people to get access to fully automatic system or it was not accurately giving indication, the systems which came before, just measured four different levels of water inside the tank, which will not be useful, if the system is been placed in very huge tank. In such huge tank/reservoir there should an additional mechanism, which can give an accurate result of water/liquid level present between the two levels marking (for example between 25% and 50% level mark) . For that purpose of attaining it, LEVELER- BALL is being used and assembled between two level marking, this system consists of a needle and a ball, connected by a rod. Since the density of the ball (plastic) is less than the density of water, the ball floats and rises as the water level rises, the needle which is connected with the ball-shaft also rises. The needle is placed at angle of 60^0, each 1^0 gives 1.6 % rises in water, between the two level marking, thus improving the accuracy in knowing the amount of water present inside a big tank. This is called as dynamic reading of the water level inside the tank, like of fuel meter. In our proposed model, the system is able to get dynamic reading of the level of water.

VI. CONCLUSION

The proposed model will indeed be very beneficial for agricultural purposes, based on the following reasons:

A. It is cheapest system that be available in the market which can be effort by 100% of rural people, who are working in agricultural related activities
B. The materials used in this system are readily available, cheap and efficient in cost as well in power consumption
C. The proposed model was successful in giving dynamic measured of water level inside the tank accurately, which comes in very low price.

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