Low Cost Automatic Water Level Indictor and Microcontroller

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ABSTRACT

The drinking water crisis in India is reaching alarming proportions. It might very soon attain the nature of glob al crisis. Hence, it is of extreme importance to preserve water. In home based water tank, the on e 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 t o 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. T here the circuit is made with various components like transistors (BC547.BC548) Resistors, Leds and etc. After we discussed that how to make the circuit without transistors 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 transistors to make the circuit cheap and easy installation to all. The other liquid control circuits , which we have seen those are very critic al than this circuit.

Index Terms— *Water, Circuit, Leds, Signals etc.*

I.   INTRODUCTION

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 vulnerability. The   presence of water level indicator in reservoir can help control wastage and water inadequacy 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 be-hind it. We also try to justify how a system as simple as ours can compete with those available commercially. Ground water level is receding day by day and situation is expected to take alarming dimensions in future if we do not put in place efficient measure to check wastage of this precious natural resource. This project is designed to indicate various levels of water in any domestic water storage tank. These levels have broadly classified as low (L) high (H) and full (F). There is another level called Overflow level after which buzzer starts buzzing; indicating that water tank is full and supply of water should be stopped. The circuit used is extremely simple and used only a few digital gate IC's for monitoring circuit. 8051 has been introduced to act as a controller for the purpose of switching on and switching off of the supply to the tank. We have also kept a provision of

displaying these levels on the LCD panel which are driven by the output of digital IC's like AND, NOT. The input of IC's is given by the water level directly or indirectly. The different inputs are provided in the water tank.

A Water Level Indicator may be defined as a system by which we can get the information of any water reservoir. Wa-ter 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 pro-vides no calories or organic nutrients.

II. INDUSTRY VISITED

For the industrial defined project I visited Royal Engineering (Metoda). The industry is located in Metoda. The best part of this industry is the beautiful environment and friendly atmosphere. The people working in this industry are very genuine and down to earth. They co-operated on my visit to this industry. And helped in every possible manner.

Royal engineers was founded in 1955 by Mr. sanjiv vsdodaria. The company adopted advanced automativ spares. After visiting ROYAL industry and interacting with the industry persons I discovered following problems:

- The water was flow out from the tank.

- One person is necessary for monitoring water level.
- High amount of water was wastage.

    Out of these problems the major problem according to my point of view is that to maintain the level of water in tank. Due to this all work of the factory is affected. After detailed analysis of the problem on water level indication in tank and reference books we decide to make our efforts to solve this problem if possible

III. PROBLEM DEFINITION

Water is over flow from the tank because of no water level control system.

All ground level tanks are to be constructed in a fire proof material such as pre-cast or cast in situ concrete, bolted

steel or welded steel. All tanks are to be constructed so that they are resistant to fire. All are to include a manhole

entry at the top and are to be fitted with a suitable access ladder and landing to enable safe and secure access for cleaning and maintenance purposes . Tank access hatch and work platform design guideline for details. 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 ringingas 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 p

- • Now no need to go on the room to look the water level.
- • It shows the water level in your room like 1/4 tank, 1/2 tank, 3/4 tank
- • And full tank.
- • Alarm starts ringing as soon as tank becomes full.
- • Suitable for every tank.

IV. CIRCUIT DECRIPTION

Here is a simple, versatile circuit which indicates the level of water in a tank. This circuit produces alarm when water level is below the lowest level L1 and also when water just touches the highest level L12. The circuit is designed to display 12 different levels. However, these display levels can be increased or decreased depending upon the level resolution required. This can be done by increasing or decreasing the number of level detector metal strips (L1 through L12) and their associated components.

- • At the same time base voltage for transistor T1 becomes high, which makes it forward biased and its collector voltage falls to near-ground potential.
- • This disables IC1 (UM66) and alarm is inhibited.
- • Depending upon quantity of water present in the tank, corresponding level indicating LEDs glow
- • It thus displays intermediate water levels in the tank in bar-graph style.
- • When water in the tank just touches the highest level detector strip L12, the DC voltage is developed across capacitor C2.
- • This enables melody generating IC1 (UM66) and alarm is again sounded.
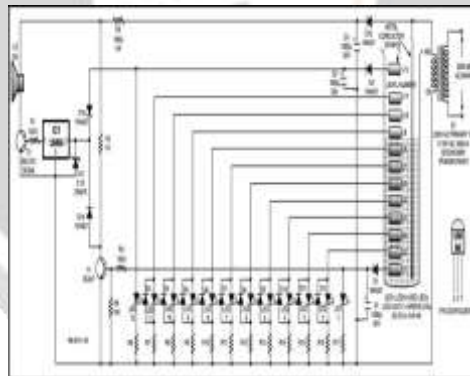
V. RESULT

As we keep on pouring more and more water, the respective levels are displayed on the 7 segment display as shown in the above table. This project can be used for home applications like water tanks so as to prevent the wastage of water etc.

LEVEL	L	H	F	BUZZER
Low	On	Off	Off	Off
High	Off	On	Off	Off
Full	Off	Off	On	Off

Overflow	Off	Off	On	On

Working

Water level with indicator alarm Snap Shots of Project while operating

- In the circuit, diodes D1, D2 and D13 form half-wave rectifiers.
- The rectified output is filtered using capacitors C1 through C3 respectively.
- Initially, when water level is below strip L1, the mains supply frequency
- oscillations are not transferred to diode D1.
- Thus its output is low and LED1 does not glow. Also, since base voltage of transister T1 is low, it is in cut-off state and its collector voltage is high, which enables melody generating IC1 (UM66) and alarm is sounded.
- When water just touches level detector strip L1, the supply frequency oscillations are transferred to diode D1.
- It rectifies the supply voltage and a positive DC voltage develops across capacitor C1, which lights up LED1.

Signifying the HIGH level of water tank

Signifying FULL level of water in the tank

Future Extensions

This project can be done by using sensors which can measure pressure. By using transducer and the a analog to digital converter we can give this to microcontroller to display any level.

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.

C CODE FOR 8051 µC

```
#include<reg51.h>
#define PORT P2 sbit low =P2^0; sbit high =P2^1;
```

```
sbit full=P2^2;
sbit buzzer = P2^3; sbit OUT = P2^6; void main( )
{
low = 0 high=0 full=0 buzzer=0, OUT=0; While(1)
{ If
(low=1| high=1| full=1) OUT=1; delay (2); If
(buzzer=1 & full=1) OUT=0; delay(2);
}
}
```

Learning Outcomes

The best learning outcome for us was to have extended our project to include the control part. This was conceived by us during the project work. This has added one more dimension to the project by making it self regulating. Also we learnt how to interface 8051 to other devices and have a control over it. As it is introduced only in 3rd semester to us we can now interface it to any device .also we learnt how to clear an error in the circuit .we also learn that how to change C into hex code using Keil and how to burn it on the chip.

CONCLUSION

Automatic water pump control system employs the use of different technologies in its design, development, and implementation. The system used microcontroller to automate the process of water pumping in an over-head tank storage system and has the ability to detect the level of water in a tank, switch on/off the pump accordingly and display the status on an LCD screen. This research has successfully provided an improvement on existing water level controllers by its use of calibrated circuit to indicate the water level and use of DC instead of AC power thereby eliminating risk of electrocution. 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.

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