Designing and Modeling of Water Level Indicator

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ABSTRACT

The aim of developing this project is towards providing efficient and simple method for Water level Indicator. 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 main components used in this equipment are PIC microcontroller, sensor and motor. By using this project we will be able to control wastage of water automatically and capable of managing water levels in different systems like water tanks, boilers and swimming pools, etc.

Keywords: Water crises,Automatic, water level indicator, PIC microprocessor ,sensor, motor.

I. INTRODUCTION

Water level controller is equipment used to control the water level in a field. The level of the water is controlled by using a microcontroller. Main comp -onents are PIC microcontroller, sensor, motor etc. The sensors sense the presence of water and give indication to the microcontroller. The micro-controller produces the control signals to drive the motor. If there is no water then microcontroller gives control signal to start the motor and if there is sufficient water in the field then the microcontroller give control signal to stop the motor. And also the microcontroller enables the display and displayed as "THE MOTOR IS ON" when the motor starts and disable the display when the motor is off. Hence the level of water in a field can be automatically controlled. The main components used in this equipment are PIC microcontroller, sensor and motor.

II. LITERATURE REVIEW

Pandey et.al,2011[1]-Explained Agricultural land management practices are compatible with the preservation of water resources. Hydrological diagnoses are needed in order to choose the alternative land uses, cultivation practices and their spatial arrangements.

Jaehyoung Yu Harnsoo Han,2006[2] explained the monitoring water level in a river or in a reservoir is important in the applications related to agriculture , flood prevention and fishing industry etc. The schemes developed for measuring water level can be categorized as 4 types based on measuring features: pressure, supersonic waves , heat, image .

Muhd Asran Bin Abdullah,2004[3]-His theory gave how Human supervision is limited for several hours and the accuracy is almost not perfect. Sensors introduces a better solution in accurate level measurements and automatic processing of water levels
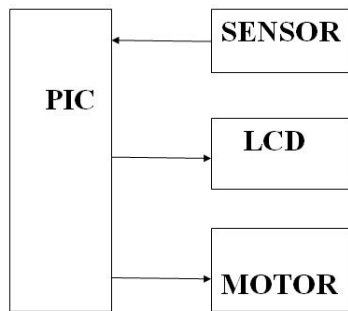
Figure 1. Block Diagram

According to Dana Gardens, By the year 2000[4],50% of all engineers will design with sensors, up from 16% who routinely used them at all beginning of the decade.

B.Y.Lee and B.Y.park,2008[5]-Gave pressure sensor which is easy to use,it has a limitation that it should be calibrated and replaced frequently due to possible breakdown by continous water pressure.Supersonic wave sensor is free from water pressure since it measures the time of supersonic wave pulse from emitter to receiver reflected by the water surface

Kon et.al,2009[6]Explained the use of image sensor for measuring water level is the most recent approach. Different from other types of sensors, it can provide the surrounding information around the sensor as well as the water level so that the measured data can be confirmed. It also has an advantage that it is unaffected by weather. Commenting on his experience with the radar sensor the environment Agency's Rikk Smith says,'We have been very pleased with this sensor because it was quick and easy to install and we have not had to touch it since it was installed over five months ago.'

Jerry C.Whitaker,2010[7]explained that Ultrasound echo ranging transducers can be used in either wetted(contact) or non wetted(non-contact) configuration for continous measurements of liquid level.An interesting application of wetted transducers is as depth finders and fish finders for ships and boats.Non-wetted tranducers can also be used with bilk materials such as grains and powders.

III. PROBLEM FORMULATION

A water-level-controller circuit monitors the level of the overhead tank and spontaneously switches on the water pump whenever the level goes below a specific limit. The water level controller circuit does not allow the pump to start if the water level inside the sump goes low, and switches off the pump even during the pumping period if the water level inside the sump sinks low while the process of pumping the water towards the overhead tank continues. A positive voltage supply is placed at the bottom of the overhead tank, and a full-level probe is placed in the tank and the other end is connected to the base of the transistor through a resistor. Whenever the water level rises to the maximum, then current flows through the base of the transistor and the collector voltage becomes low and is interfaced with the port . The programming is done in the microcontroller and sends the data to the microcontroller and LED. Indicates the level of water and the motor switches off automatically The tone system attached to the alarm system gives level information as 'tank is full' and 'tank is empty' so that a user can easily recognize the level of the water.

IV. MOTIVATION

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.

V. OBJECTIVES

The aim of developing this project is towards providing efficient and simple method for Water level Indicator. 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. A Water level Indicator and controller using microcontroller is a low-cost controller that is capable of managing water levels in different systems like water tanks, boilers and swimming pools, etc. Water level controller can be used in houses, industries, factories, power plants, chemical plants and other liquid storage systems to save power and money.

VI. METHODOLOGY

1. In our project lead wires can be dipped at different levels of the container. The other   end is

connected to the base of a transistor via a resistor. A *LCD display* is also interfaced to the *IC*.

2. The sensors sense the presence of water and give indication to the microcontroller.

3. The microcontroller produces the control signals to drive the motor.

4. If there is sufficient water in the field then the microcontroller give control signal to stop the motor. And also the microcontroller enables the display and displayed as "THE MOTOR IS ON" when the motor starts and disable the display when the motor is off Hence the level of water in a field can be automatically controlled.

HARDWARE

Microcontroller:

The main heart of this project is AT89C51 microcontroller. The water level probes are connected to the P3.0, P3.1, P3.2, and P3.3 through the transistors. Port P2 connected to the data pins of LCD and control pins RS, RW and EN of LCD are connected to the P1.0, P1.1, and P1.2 respectively. Initially when tank is empty, LCD will display the message EMPTY and motor runs automatically. When water level reaches to quarter level, now LCD displays QUARTER and still motor runs. For further levels, LCD displays the messages HALF and ¾ FULL. When tank is full, LCD displays FULL and motor automatically stops. Again motor runs when tank is empty.

Motor:

Motor is controlled by the microcontroller the microcontroller switching the power supply to motor by relay mechanism. The motor employed is DC motor which has high starting torque and constant speed DC motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. opposite (North and South) polarities attract, while like polarities(North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.

- *220 OHM RESISTORS:* Used For Controlling Current In Microcontroller.

- *COLOUR* **Led:**Used for the signal of level of water.

- *BUZZER:*It is used to produce alarm when water is full in the tank. 9V Battery &Battery Clips used to supply power to microprocessor and sensor.

VII. RESULTS

A water-level indicator with an alarm that will allow reduction in wastage of water is made. A Water level indicator and controller using microcontroller is a low-cost controller that is capable of managing water levels in different systems like water tanks, boilers and swimming pools, etc.
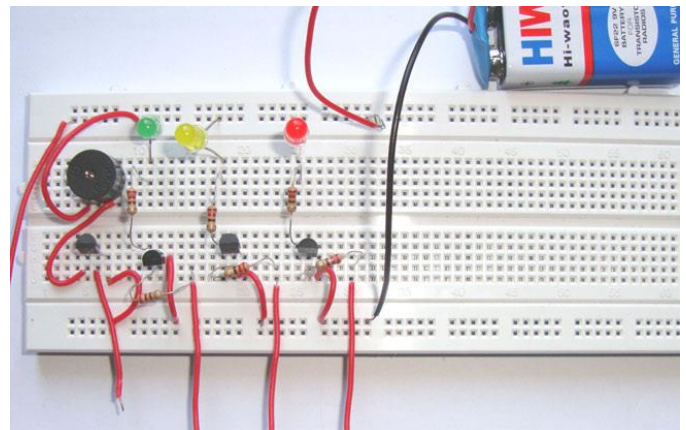

Figure 2. Actual View of Project

VIII. CONCLUSION

This paper was intended to design a simple and low cost water level indicator. This is not only for water tank but also used for oil level and chemical lab. To design this system, we used transistor as a platform and local materials for low cost. We tried to de-sign a system in such a way that its components will be able to prevent the wastage of water. The whole system operates automatically. So it does not need any expert person to operate it. It is not so expensive. This design has much more scope for future research and development. Though it is a project, we hope some modification in this project will lead to a reasonable diversity of usage .

IX. ACKNOWLEDGMENT

dedicated involvement in every process, this project have never been accomplished. We also thanks all our supporting members , who ever get indulged in making out new ideas and techniques related to the project . Thus hereby we thanks almighty in order of completing this mini project as required.

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