# Automatic Water Level Indicator using Microcontroller

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*Abstract*— before there was no system to track the water in the tank, then there came a secondary problem that is when their water pump is started they have no idea when it gets filled as it needs to be checked. There are situations where the pump keeps on pumping water to the tank and the water starts spilling out from the tank. There is wastage of energy as well as wastage of water. To overcome this problem we came up with a solution Automatic water level indicator which indicates the water levels at various levels through LEDs using microcontroller.

***Key words:*** Sensors, LED, Microcontroller

## I. INTRODUCTION

This article explains you how to detect and control the water level in an overhead tank or any other container. This system monitors the water level of the tank and automatically switches ON the motor whenever tank is empty. The motor is switched OFF when the overhead tank or container is FULL. Here the water level of the tank is indicated on LCD (Liquid crystal Display). Using this system, we only on DC. But, here we are designing the circuit which is used to detect and control the water level automatically in overhead tank using PV89V51RD2(8051) microcontroller can avoid the overflow of the water. We have already seen how wireless water level indicator which works. Automatic water pump controller is a series of functions to control the Automatic Water Pump Controller Circuit in a reservoir or water storage. The water level sensor is made with a metal plate mounted on the reservoir or water tank, with a sensor in the short to create the top level and a detection sensor for detecting long again made for the lower level and ground lines connected to the bottom of reservoirs or reservoir.

## II. HARDWARE REQUIREMENTS

1) Sensors
2) Comparator Circuit
3) 8051 Microcontroller
4) LED (display unit)
5) Pump
6) Reservoir

## III. SOFTWARE REQUIREMENTS

1) KEIL software
2) KEIL compiler
3) Embedded C (programming language used in C)

## IV. OVERVIEW OF DESIGN

The basic block diagram of the Implementation of automatic water level indicator using microcontroller and bidirectional visiting counter is shown in the figure below.

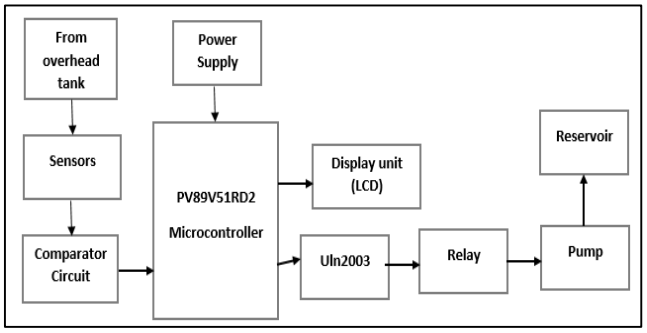


Fig. 1: Block Diagram

### A. Sensor

A float switch is a device used to sense the level of liquid within a tank, it may actuate a pump, an indicator, an alarm, or other device.

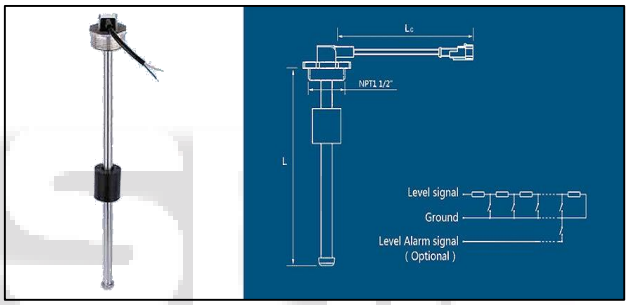


Fig. 2: Sensor

Comparator circuit: Here we are using LM324 comparator. LM324 is a 14pin IC consisting of four independent operational amplifiers (op-amps) compensated in a single package. Op-amps are high gain electronic voltage amplifier with differential input and, usually, a single-ended output. The output voltage is many times higher than the voltage difference between input terminals of an op-amp.

These op-amps are operated by single power supply LM324 and need for a dual supply is eliminated. They can be used as amplifiers, comparators, oscillators, rectifiers etc. The conventional op-amp applications can be more easily implemented with LM324.

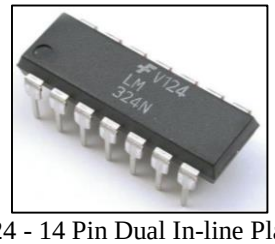


Fig. 3: LM324 - 14 Pin Dual In-line Plastic Package

### B. LCD

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred

 

over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

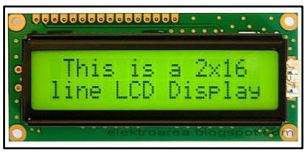


Fig 4: LCD Display

### *C. 8051 Microcontroller*

The P89V51RD2 is a 8051 microcontroller with 64 kB Flash and 1024 bytes of data RAM. A key feature of the P89V51RD2 is its X2 mode option. The design engineer can choose to run the application with the conventional 80C51 clock rate (12 clocks per machine cycle) or select the X2 mode (6 clocks per machine cycle) to achieve twice the throughput at the same clock frequency.

The Flash program memory supports both parallel programming and in serial In-System Programming (ISP). Parallel programming mode offers gang-programming at high speed, reducing programming costs and time to market allows a device to be reprogrammed in the end product under software control.

The P89V51RD2 is also In-Application Programmable (IAP), allowing the Flash program memory to be reconfigured even while the application is running.

### *D. Piezo Buzzer*

This buzzer is an piezo type audio signaling device, which has a piezo element and a oscillating circuit inside which oscillates the piezo brass base plate, which when given voltage difference produces sound of a predefined frequency.

Fig 5: Piezo Buzzer

### *E. Features of Piezo Buzzer*

These high reliability piezo buzzers are applicable to general electronics equipment. Compact, pin terminal type Piezo buzzer with 4 KHz output. Pin type terminal construction enables direct mounting onto printed circuit boards.

### *F. LED*

A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p–n junction diode, which emits light when activated. Here we are using 5mm LED. This is a very basic 5mm LED with a red lens.

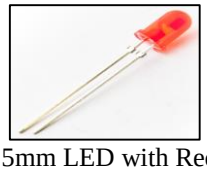

Fig 6: 5mm LED with Red Lens

### *G. Relay*

An electrical device, typically incorporating an electromagnet, that is activated by a current or signal in one circuit to open or close another circuit.

Here our microcontroller is not able to supply current required for the working of a relay. The maximum current that a PIC Microcontroller can source or sink is 25mA while a relay needs about 50 – 100mA current.

## V. SOFTWARE REQUIREMENTS

Embedded C: Embedded C is a set of language extension for the C programming language by the C standards committee to address commonality issues that exist between C extensions for different embedded system.

Embedded C uses most of the syntax and semantics of standard C. For example, main() function, variable definition, data type declaration, conditional statements , loops, arrays and strings etc.

Keil Compiler: Keil development tools for the 8051 microcontroller architecture support every level of software developer from the professional applications to the learning about embedded software development. The industry standard keil C compiler, micro assembler, debuggers, real time kernels, single-board computers and emulators support all 8051 derivatives.

## VI. ADVANTAGES

- Human effort is reduced as the system controls the motor automatically based on the water level.
- This system consumes less power.
- Simple and more reliable

## VII. APPLICATIONS

- Used in big buildings where the manual monitoring is difficult.
- Used in industries to control the liquid level automatically.
- Used for household purposes.

## VIII. CONCLUSION

Water is one of the most important basic needs for all living beings. But unfortunately a huge amount of water is being wasted by uncontrolled use. Some other automated water level monitoring system is also offered so far but most of the method has some shortness in practice. We tried to overcome these problems and implemented an efficient Automatic water level indicator which indicates the water levels at various levels through LEDs using microcontroller.

Our intension of this research work was to establish a flexible, economical and easy configurable system which can solve our water losing problem. We have been used a low cost P89V51RD2 microcontroller in this system which is the key point to reduce cost. This system reduces the human effort as it controls the motor automatically based on water level. This system is energy efficient, simple and more reliable.

REFERENCES

[1] International Journal of Innovative Research in Computer and Communication Engineering Vol. 1, Issue 6, August 2013
[2] Microcontroller chip Technology, 2001, PIC16F84A Datasheet www.microchip.com
[3] S. M. Khaled Reza, Shah Ahsanuzzaman Md. Tariq, S.M. Mohsin Reza, Microcontroller Based Automated Water Level Sensing and Controlling: Design and Implementation Issue: Proceedings of the World Congress on Engineering and Computer Science 2010 Vol I WCECS 2010, October 20-22, 2010, San Francisco, USA
[4] Roderick L. Shepherd, William S. Yerazunis and Senior Member, "Low-Cost Surface Mount LED Gas Sensor", IEEE King Tong Lau and Dermot Diamond, Sensors-00997, 2005
[5] T. S. Aye, and Z M. Lwin, "Microcontroller Based Electric Expansion Valve Controller for Air Conditioning System", World Academy of Science, Engineering and Technology, 2008

 