

Microcontroller Based Water Level Indicator and Controller

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ABSTRACT

An Electric Water Pump Controller and Level Indicator (EWPCLI) has been designed, constructed and tested. The EWPCLI exploits the electrical conductivity of water to give indication of water level in a storage tank and ultimately, the automatic control of the water pump. The EWPCLI employs a number of metallic conductors or probes, each positioned at separate levels along the tank height to act as sensors. Comparators monitor the presence of water at the probes (utilizing the conductivity of ionized water due to its impurities) and give out corresponding digital outputs which are used by the microcontroller to drive digital outputs which turn on visual display LEDs that indicate various water levels in the tank. The microcontroller also controls a switch to turn the water pump on (when water goes below the preset minimum level) or off (when water goes above the chosen maximum level). EWPCLI when tested turned the water pump on or off depending on the water level in the tank as designed. The required visual LEDs were also turned on at the corresponding water level. The system will help to eliminate the cost and inefficiency of human interference associated with monitoring and controlling the pump while maximizing the performance and life span of the electric water pump.

Keywords: Microcontroller, Comparators, LED display and EWPCLI.

1. INTRODUCTION

Water is the most important nature's gift to mankind. Without water there is no life. In the present era/decade water crisis is one of the important aspects of global risk. More than 750 million people around the world lack access to safe water [1] hence we should take necessary initiatives to save water. Modern science has provided the art of automated design system that has helped in reduction of human effort. Since it is not easy to measure the water level in large architectural structures physically we have deployed microcontroller techniques in creating a barrier to wastage of water. The design of Water Level indicator is done to monitor the level of water and to get informed when the water in a tank is full [2]. Application for Water Level Indicator:

- 1) Overflow problems
- 2) To prevent wastage of energy
- 3) To prevent wastage of water
- 4) Attention
- 5) Observation
- 6) Automatic switch off

Water level indicator might be characterized as a framework by which we can get the data of the amount of water stored.

2. METHODOLOGY

This system mainly works on a principle that "water conducts electricity". 4 wires are dipped into the tank with a certain gap between each will indicate the different water levels. Based on the outputs of these wires, microcontroller displays water level on LCD as well as controls the flow of water by controlling the motor.

In the 1st phase the program is burnt on the microcontroller. Then the necessary connections are made as depicted in the circuit diagram. As per construction 4 copper wires are placed on the tank at a marginal distance which will actually

indicate the level of water in the tank and the motor will control the flow of water accordingly. After the system is powered the motor starts running and water is slowly filled into the tank.

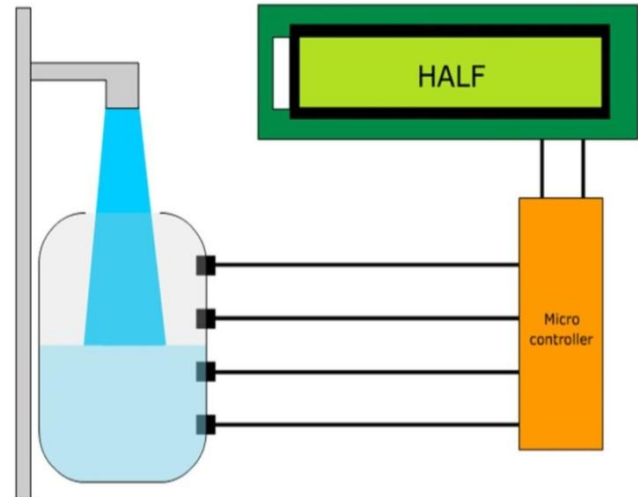


Fig 1. Layout Diagram

When the level of water increases in the tank the 4 wires detect the level of water and send the signal to the microprocessor where the microprocessor detects and displays the water level on the LCD display. The microcontroller not only displays the water level status but also sends a signal to the electric motor which controls the flow of water transferring capacity as per necessity.

Outcomes of the above discussed technique are as follows:

- a) Controls the motor automatically.
- b) Reduces human effort.
- c) Cheap, reliable and user-friendly.
- d) It can be used in any industry concerned with fluids.

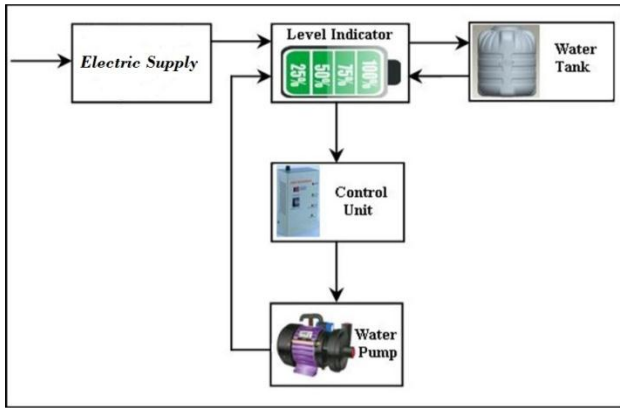


Fig 2. Block Diagram

3. COMPONENTS USED

- ✚ At89c51 controller: The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4 Kbytes of Flash Programmable and Erasable Read Only Memory (PEROM). The device is manufactured using Atmel's high density nonvolatile memory technology and is compatible with the industry standard MCS-51 instruction set and pin out [3].
- ✚ 16*2 LCD - LCD16X2: 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.
- ✚ Relay: 5V.
- ✚ One Buzzer: 5-15 volt.
- ✚ Transistors: BC547 (NPN).
- ✚ Resistors: 200 ohm, 330 ohm.
- ✚ Water Level Sensor: To make special water level sensors some convenient materials such as Iron rod, nozzles, resistance and rubber are used. A connecting rod is made by iron or steel. This is connected with ground potential and needs at least four nozzles, which is connected with +5V via a 1kΩ resistance and bind them together by putting a rubber at the joint point which will act as an insulator for every nozzle. When the sensor touches water, nozzles and connecting rod get electric connection using water conductivity [4].
- ✚ AC Motor: An induction motor is an AC electric motor in which the electric current in the rotor needed to produce torque is obtained by electromagnetic induction from the magnetic field of the stator winding.
- ✚ Pot: 10k.

4. CONCLUSION

Water level indicator is one of the most promising applications with the implementation of microcontroller. The purpose of our project is to save water by controlling the flow of water. With the flexibility of the technique it can be used in any industry concerned with fluid.

REFERENCES

- [1] Yuihana, J. B.(2014),World Health organization (WHO) yearly magazine "Burden of disease from inadequate water, sanitation around the world" Volume 19, pp 89-90.
- [2] Shandong Jinzhou "Design of intrinsically safe intelligent water-level monitor used in coal mine ", *IEEE Trans. on Industrial Applications*, vol. 19, pp.1052 -1056 1983.
- [3] AT89C52 Datasheet; Atmel Corporation. Modified May, 2000. www.microchip.com.
- [4] P. Dietz, W. Yerazunis, D. Leigh, Very Low-Cost Sensing and Communication Using Bidirectional LEDs, *UbiComp 2003: Proceedings*, vol. 2864, pp. 175-191, 2003.