Water Level Control System

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Abstract— In this paper, we investigate the design of a water level sensor device that is able to detect and control the level of water in a certain water tank or a similar water storage system. The system firstly senses the amount of water available in the tank by the level detector part and then adjusts the state of the water pump in accordance to the water level information. This electronic design achieves automation through sequential logic implemented using a flip flop. A seven segment display and a relay-based motor pump driving circuit are part of this integrated design. When automatic mode The water pump automatically turns on and starts filling the tank when the water level is empty and turned-off and stop filling the tank when water level reaches maximum-level.

Keywords: Water Level Control System, Sensor Device, Michroontroller (UNO) Module

I. INTRODUCTION

The project "automatic water level control with an automatic pump control system" is design to monitor the level of liquid in the tank. The system has an automatic pumping system attached to it so as to refill the tank once the liquid gets to the lower threshold, while offering the pump once the liquid gets to the higher threshold. Sustainability of available water resource in many reason of the word is now a dominant issue. This problem is quietly related to poor water allocation, inefficient use, and lack of adequate and integrated water management. Water is commonly used for agriculture, industry, and domestic consumption. Therefore, efficient use and water monitoring are potential constraint for home or office water management system. Moreover, the common method of level control for home appliance is simply to start the feed pump at a low level and allow it to run until a higher water level is reached in the water tank. This water level control, controls monitor and maintain the water level in the overhead tank and ensures the continuous flow of water round the clock without the stress of going to switch the pump ON or OFF thereby saving time, energy, water, and prevent the pump from overworking Besides this, liquid level control systems are widely used for monitoring of liquid levels in reservoirs, silos. Proper monitoring is needed to ensure water sustainability is actually being reached with disbursement linked to sensing and automation, such

II. METHODOLOGY

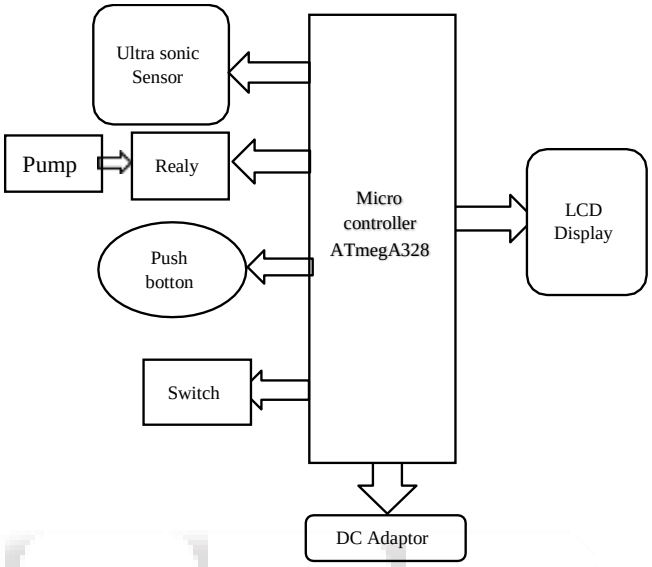

Fig. 1: Block Diagram of Water Level Control System

III. HARDWARE DESCRIPTION

A. *Michroontroller (UNO) Module*

Fig. 2: Pin Diagram of Microcontroller UNO ATmegA328

Programmatic approach entails microcontroller based automated water level sensing and controlling or using UNO

B. *LCD DISPLAY*

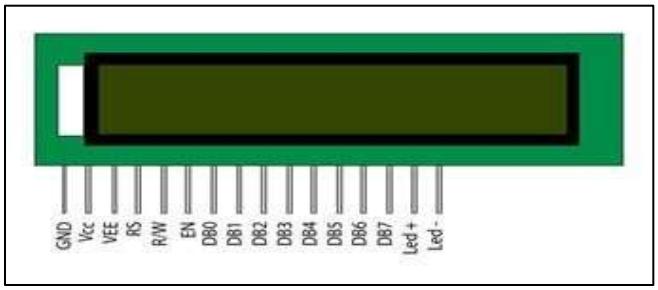

Fig. 3: LCD Display

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 LCDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom character (unlike in seven segments), animation and so on. A 16x2 LCD means it can display 16 characters per line and there are2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data [4].

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling displayetc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD

C. Ultrasonic Distance Sensor - HC-SR04

Fig. 4: ultrasonic senor

The ultrasonic sensor (or transducer) works on the same principles as a radar system. An ultrasonic sensor can convert electrical energy into acoustic waves and vice versa.

Arduino Uno is a microcontroller board based on the ATmega328P datasheet. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong. The worst case scenario is that you would have to replace the chip and start again

The Arduino Uno board can be powered via a USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and Vin pin headers of the POWER connector. The board can operate on an external supply from 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may become unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

IV. ADVANTAGE

The advantages of water level control system

1) Power Saver.
2) Money Saver.
3) Automatic.
4) Water Maximization. .
5) Reliable Electronic Design. .
6) New Control Minimize Fouling & Deterioration. .
7) Easy Installation with display Monitoring.
8) Design materials are cheap
9) Easy to design circuitry
10) Fast response
11) Can be used in factories, commercial complexes, apartments, home,
12) Remote monitoring liquid

V. FUTURE SCOPE

Automatic water level monitoring system has a good scope in future especially for agriculture sector. There are any areas where we need water level controller. It could be agricultural fields, overhead tanks. We can make this project wireless by using NRF transmitter and receiver. We can also add Ethernet shield so that we can get all the information using mobile phones and control it accordingly.

- By switching the pump on and off automatically, power is conserved
- By switching the tank off when the tank is full, water is conserved
- By having water pumped into the tank when the tank is near empty makes water readily available in the tank
- The system ensures that water is not littered in the environment, hence keeping the surroundings clean and dry.
- The system is a test of technology and scientific application.

VI. CONCLUSION

This project has achieved the main objectives. Moreover, this project involved designing and development of automatic water level control system had exposed to the better way of software and hardware architecture that blends together for the interfacing purposes. The system employs the use of advance sensing technology to detect the water level.

Automation of the various components around us has been widely increased to reduce human intervention and save time. It is known that improper water management can have harmful effects on both the system and the environment. The main objective of this project is not only to reduce manual labour but also help save water in an efficient manner. Finally, a conclusion can drawn that this project can definitely be useful on a large scale basis due to its minimum requirement of man power and also the installation process being easier making it more compatible for everyone to use.

The acoustic wave signal is an ultrasonic wave traveling at a frequency above 18kHz. The famous HC SR04 ultrasonic sensor generates ultrasonic waves at 40kHz frequency.

Typically, a microcontroller is used for communication with an ultrasonic sensor. To begin

measuring the distance, the microcontroller sends a trigger signal to the ultrasonic sensor. The duty cycle of this trigger signal is 10µS for the HC-SR04 ultrasonic sensor. When triggered, the ultrasonic sensor generates eight acoustic (ultrasonic) wave bursts and initiates a time counter. As soon as the reflected (echo) signal is received, the timer stops. The output of the ultrasonic sensor is a high pulse with the same duration as the time difference between transmitted ultrasonic bursts and the received echo signal.

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