Live Water Level Indicator with SMS and Voice Call Alerts using Arduino and Ultrasonic Sensor

Mohan Mali [#1], Sandeep Shinde[#2], Satish Kale[#3]
[#1 #2 #3]*Lecturer, Dept. of Information Technology,*
Bharati Vidyapeeth Institute of Technology, Navi Mumbai.

Abstract:
The project is designed to give an alert and level information of water in a tank and control a pump motor as required. The reading given is in the scale of 0 to 9. A priority encoder is interfaced to a decoder to get the display of water level on monitor displays and send SMS or voice call. This is the circuit designed for overhead tank digital water level indicator. It is built around priority encoder, raspberry pi, serial connection and a few discrete components. The Arduino Uno board used to measure water level with the help of ultrasonic sensors. Fundamental key of ultrasonic separation estimation depends on ECHO. At the point when sound waves are transmitted in condition then they come back to the starting point as ECHO in the wake of striking on any snag. Thus, we should just figure its voyaging time of the two sounds implies active time and returning time to beginning in the wake of striking on any snag. What's more, after some figuring we can get an outcome that is the separation. This idea is utilized as a part of our water controller venture where the water engine pump is naturally turned on when water level in the tank turns out to be low and demonstrate level to client where it is low or high.

INTRODUCTION

As per the ebb and flow situation, a considerable measure of water is squandered each day from neighborhoods, workplaces and doctor's facilities. Water is basic in different ways and such a gigantic measure of water wastage can prompt its shortage in future. These days everyone has overhead tank at their homes. Our Objective is utilized to quantify and show the level of water in a holder and maintain a strategic distance from flood of water. The thought can be verifiably used to discover and control the level of water in overhead tanks and counteract wastage.

In this Arduino based programmed water level indicator and controller venture the water level is being estimated by utilizing ultrasonic sensors [1]. Working of proposed system is extremely straightforward. At first consider that tank is empty, when control supply is on all the contribution of Arduino is high. The sensor used to measure water level is ultrasonic sensors which is connected to Arduino. The ultrasonic sensor works on ECHO mechanism. The Ultrasonic Sensor conveys a high-recurrence sound heartbeat and after that circumstances to what extent it takes for the reverberate of the sound to reflect. The sensor has 2 openings on its front. One opening transmits ultrasonic waves, (like a small speaker), alternate gets them, (like a minor amplifier). The speed of sound is around 341 meters (1100 feet) every second in air. The ultrasonic sensor utilizes this data alongside the time distinction amongst sending and getting the sound heartbeat to decide the separation to a question. It utilizes the accompanying numerical condition:

Separation = Time x Speed of Sound partitioned by 2

Time = the time between when a ultrasonic wave is transmitted and when it is gotten

You isolate this number by 2 claiming the sound wave needs to movement to the protest and back. At the point when sound waves are transmitted in condition then they return to the cause as ECHO in the wake of striking on any impediment. So, its voyaging time of the two sounds implies active time and returning time to starting point after striking on any obstruction is being computed. What's more, after some estimation an outcome is acquired that is the separation. This idea is utilized as a part of our water controller venture where the water engine pump is naturally turned on when water level in the tank turns out to be low. As water in tank fills we will get numeric 3, 4 ....9 to be show. The circuit consequently turns the engine OFF when the tank is full. The water level is shown, and ready message send to the client.

Problem Statement

Water is an asset in numerous parts of the world and numerous individuals depend on water tanks to supplement their water supply by putting away gathered water or water pumped from a well or bore. Be that as it may, how would you quantify how full a tank is? Tanks are developed of hazy material to forestall green growth development and are frequently kept shut to avert mosquito perversion or access by rodents, so it's badly arranged to physically peer inside. Furthermore, having an approach to gauge tank profundity electronically opens a universe of conceivable outcomes, for example, programmed control of pumps to fill tanks when they get low.

LITERATURE SURVEY

In present days, there are many parts on earth which face scarcity of water, calamities like draught etc. Energy production is laborious and cannot be misused [2]. The water tank floods as the tallness of water in the tank can't be haphazardly speculated. This prompts additional vitality utilization, which is a high worry in the present period. Individuals likewise need to pause and quit doing their different exercises until the point that the tank is full. Henceforth, here is a thought which faculties and shows the water level so the pump can be turned off on proper time and spare water, power and time also.

A. Manual method

Working of manual method: The purpose of this system is to maintain the liquid level (h) in the tank as close to the desired liquid level H as possible, even when the output flow rate is varied by opening the valve water level in tank so varies. So in manual method a human controls the liquid level close to the desired level using a sight tube. Using sight tube human compares the present level by the desired level and adjusts the valve accordingly.

Drawbacks of manual method: 1) Error due to human, 2) Error due to time wasted in opening and closing of valves, so there is a need of automatic (human less) system to increase the accuracy.

B. Automatic method

Working of automatic method: In the automatic method human is replaced by a controller to increase the accuracy. The liquid level is sensed by a float and sensed level is then fed to the controller, controller compares the sensed level with desired level and error signal is generated, according to that error signal actuator controls the output valve.

Advantage of automatic method: 1) Error is reduced by human by a controller, 2) Automatic method is more reliable as compared to manual method, it is more stable also it is costly comparatively, but accuracy and stability provided by this method can cover the cost.

C. **Design and Development of Automatic Water Flow Meter**

This research paper by Ria Sood, Manjit Kaur, Hemant Lenka[2] emphases on the need of water level controller in irrigation in agriculture. It says that every crop requires require different amount of water and this can be done by using automatic water level controller which will also help in reducing wastage of water. Here they use a technique to measure flow of rate of water in irrigation pipelines. It uses a Hall Effect Sensor to measure the rate flow. G1/2 Hall Effect water flow sensor is used as a sensing unit with a turbine rotor inside it whose speed of rotation changes with the different rate of flow of water.

D. **Automatic Water Level Controller with Short Messaging Service (SMS)**

This research paper by Sanam Pudasaini, Anuj Pathak, Sukirti Dhakal, Milan Paudel [5] presents a system of an automatic water level controller with SMS notification. SMS notification was added to automatic controller system so that water can be managed by user during load shedding. Two systems work synergistically; automatic level controller system and SMS system. The program was developed in Arduino program developing environment and uploaded to the Microcontroller. Water level in the system is controlled automatically. The controller operates on a battery power. Whenever the system encounters empty level and the status of load shedding, the SMS notification is sent to the user. The system will automate the process by placing a single sensor unit in the tank that will periodically take measurements of the water level and will control the motor automatically. This system eliminates the efforts of people for daily filling of the tank and checks for overflow.

E. **Automatic Water Level Control System**

This research paper by Asaad Ahmed Mohammedahmed Eltaieb , Zhang Jian Min [4] involves 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. It uses Arduino and uses relay to control motor. Different wires are attached at different Junctions of the Beaker. When we pour water in the beaker. The water comes in contact with the wire and tells the level of water in the tank. Accordingly, they have displayed the level of water on LCD display. And uses relay to turn ON and OFF the motor.
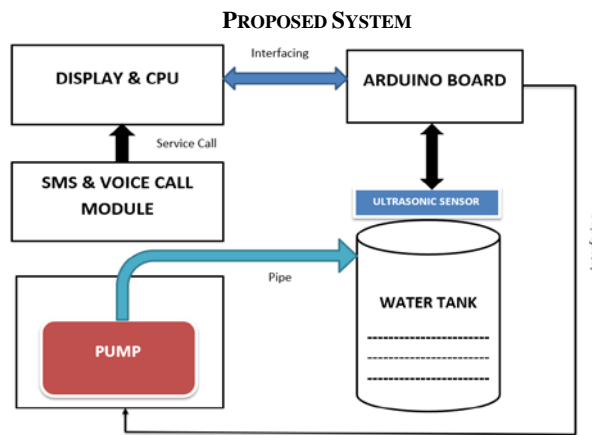
PROPOSED SYSTEM

Figure 1: System Architecture

Above figure shows the system architecture of proposed system, here ultrasonic sensor which is placed at top of the water tank is connected to the Arduino board, the ultrasonic sensor works on echo mechanism to measure the distance of water surface from top of the tank, the program written in Arduino measure or calculate the distance, from which we calculate the amount of water present in tank. Depends upon the threshold we set the motor or pump start if water level is below 5%. The SMS or voice call module work as same as pump module woks if tank is empty then notification send via SMS as well as by voice call using SMS API.
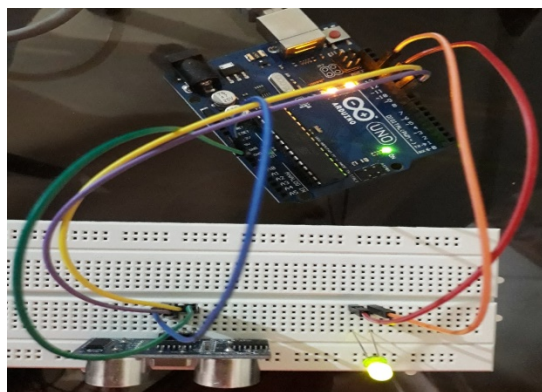

Figure 2: Arduino Connection

Figure 2 shows Arduino connection with ultrasonic sensor and LED as pump, the pin no 9 and 10 from Arduino connected to trigger and echo respectively and digital pi 12 used to connect LED.
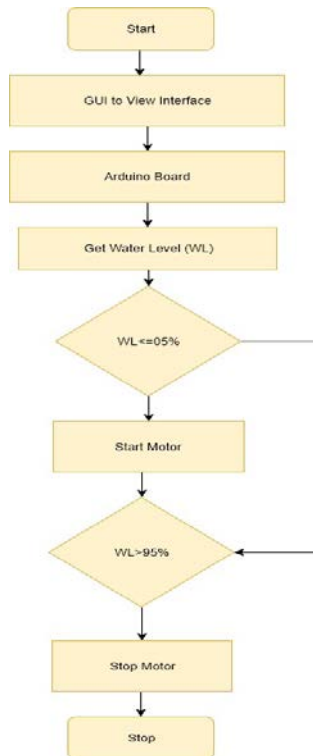
Figure 3: System Flow
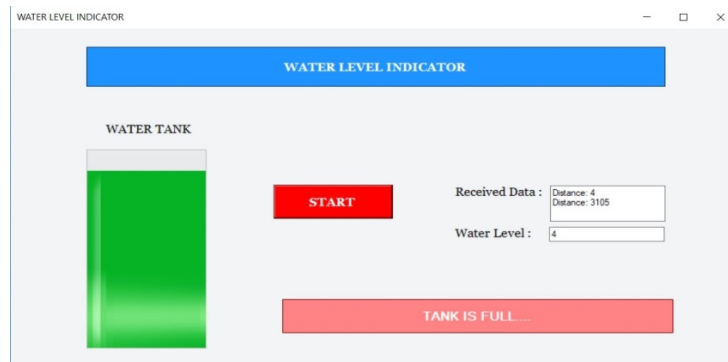
RESULT

Case 1:

Figure 4: Tank full

Above figure shows Case 1: in which live water level indication shows actual water present in the tank, when user click on start button then system get input from Arduino which is reading of water level from ultrasonic sensor connected to Arduino. The case 1 shows the Tank is full and send SMS and generate voice call to user.
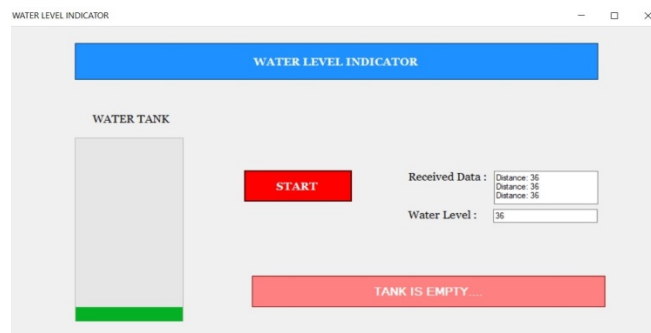
Case 2:

Figure 5: Tank Empty

Figure 5 shows Case 2 indicate Tank is Empty, for indicating water level either full/ empty we define certain threshold which may modify according to the tank size, here case 2 defined for Empty tank.

CONCLUSION

This venture will accomplish the principle targets. Besides, this task included outlining and improvement of programmed water level control framework had presented to the better method for programming and equipment engineering that mixes together for the interfacing purposes. The framework utilizes the utilization of propel detecting innovation to identify the water level.

• This framework is extremely gainful in provincial and in addition urban zones.
• It helps in the proficient use of accessible water sources.
• If utilized on an expansive scale, it can give a noteworthy commitment in the preservation of water for us and the who and what is to come.

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