



SOIL AUTOMATIC WATER CONTROLLING USING ARDUINO AND DISEASE PREDICTION OF PLANT

Vishnu s

Mechatronics Engineering
Ajeenkya DY Patil University
Pune, India,

Shashank Solanki

Mechatronics Engineering
Ajeenkya DY Patil University
Pune, India,

Basel Al-Matir

Mechatronics Engineering
Ajeenkya DY Patil University
Pune, India.

Abstract: We live in a world which is moving at such a fast pace that everything if automated will help us to keep our lives going. The project on water level Indicator will help us to know when the water in our tanks is either full or empty and automatically switch on and off the pump as and when necessary. By using the basic principle of ultrasonic sensors, i.e. the ECHO method, we calculate the time of the ultrasonic waves travelling to and for and after a few calculations the answer obtained will be the water level in the tank. By using this concept, the water pump is switched on or off automatically when the water level falls below a certain level.

Keywords- Arduino UNO, Ultrasonic sensor, GSM Modem SIM 900, IC 7806

I. INTRODUCTION

In relation with the current framework with so much work and too less time to spare, it is very difficult to keep in touch with the water level in the tanks. Water is essential in every hour of our lives. Hardly anyone keeps in track of the level of water in the overhead tanks. The objective of the project is to measure the level of water in the tank and notify the user about the water level through an SMS alert. This not only helps to keep the tank full but also making it more convenient for our day-to-day chores and also avoiding water wastage. In this project, the water is being measured by using ultrasonic sensors. Initially, the tank is considered to be empty. When the sound waves are transmitted in the environment, they are reflected back as ECHO. This same concept is applied this project. Waves generated by the ultrasonic sensors is sent to the water tank and their time of travelling and coming back is noted and after few calculations we can estimate the level of water in the tank. The motor pump is automatically turned ON when the water level becomes low and turned OFF when the tank is full. These alerts are sent as notifications in our phones through the GSM Module.

II. WORKING

When the circuit is switched on the ultrasonic sensor transmits the generated sound signal to the bottom of the water tank which is the target and whose water level is to be measured. The signal after touching the base of the tank is reflected back and is received by the receiver of the ultrasonic sensor.

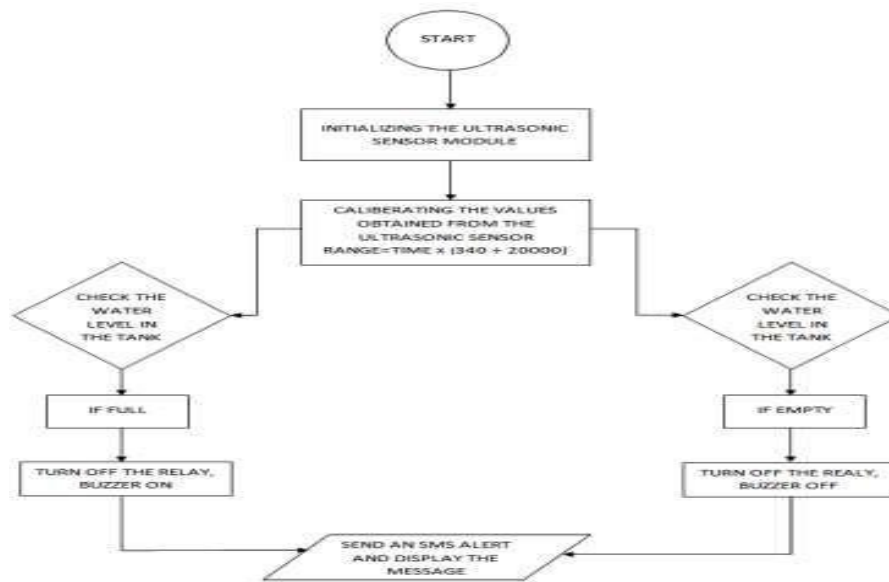


Figure 1. Data flow Diagram

II. ARDINUO

Arduino acts as the brain of the whole system. in which ultrasonic sensor and gsm module coding is done.

Arduino UNO has the micro-controller ATmega328 embedded in it. It has 14 digital I/O pins out of which 6 provide PWR output. It is an open-source and provides prototype platform. It also has a 16MHX crystal oscillator attached to it. In addition to the above features, it also has an USB connection, a power jack, an ICSP, header and reset button.

It has everything to support a micro-controller. It can simply be connected to a computer using an USB cable or power it with an AC or a DC adapter or a battery.



Figure 2. ARDINUO

III. GSM MODULE

In this project the GSM module is used to send the message about the status of the level of water in the tank and also to turn on the motor for opening and closing of the motor when the water in the tank reaches a particular level. It alerts the people living in the house by sending a SMS about the overflow of the water in the tank and to save water from wastage. .

It is widely used in mobile communication. It has a built in RS232 level converter. It has the ability to send SMS through SMS cell broadcast method.

Having a baud rate of 9600 – 115200 bps it can send or receive SMS at a very quick pace. It also has a low power consumption which is a major advantage.



Figure 3. SIM 900 GPRS/GSM module

IV. ULTRASONIC SENSOR

It is also known as the input module. First it sends ultrasonic sound waves into the tank and then these waves are reflected back. The speed at which these waves travel is in the range of 340 meters/sec and it is not affected by any barriers or obstacles that might come on its way. These waves are also not deflected so it is very convenient to use. The time at which these waves travel and are reflected back is recorded and the water depth is calculated.

It is basically a distance sensor and is used for detecting the distance using SONAR method. It has two ultrasonic transmitters namely the receiver and the control circuit. The transmitter emits a high frequency ultrasonic sound wave which bounces off from any solid object and receiver receives it as an echo. The echo is then processed by the control circuit to calculate the time and the difference between the transmitter and receiver signal. This time can subsequently be used to measure the distance between the sensor and the reflecting object.

It has an ultrasonic frequency of 40 KHZ and accuracy is nearest to 0.3 cm.

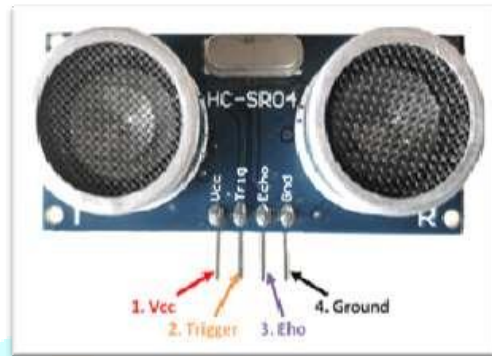


Figure 4. Pin Configurations of Ultrasonic Sensor

V. RELAY

Relays are used to connect the ultrasonic sensor (i.e. input) and the GSM module (i.e. output) magnetically when they are electrically separated from each other.

In order to isolate two circuits electrically and to connect them magnetically relays are used. They are very useful in switching from one circuit to another when they are completely separated.

The relays comprise of an input and an output section. The input section has a coil which produces magnetic field when a small voltage from an electrical circuit is applied. This applied voltage is known as the operating voltage.



Figure 5. Relays

RESEARCH METHODOLOGY

Equation

The time taken through the entire journey of the transmitted signal is recorded. Then by applying the formula,

Range = $\{(time\ taken) \times Velocity\ of\ the\ transmitted\ signal\ (i.e.\ 340\ m/s)\} / 2$ The output obtained is the required distance.

CALCULATIONS AND RESULT ANALYSIS

Considering the temperature conditions to be 28°C, an estimation is drawn regarding the distance measurement of the sensors to the base of the tank. The measurements were done using a measuring tape and the results are tabulated as follows:

Table 1: Range Measurements and corresponding errors

ACTUAL DISTANCE (CM)	MEASURED DISTANCE (CM)	Error
30	32	+2
60	61.5	+1.5
90	90	+0
120	121	+1
150	152	+2

The error percentage is calculated as:

$$\text{Error Percentage} = \frac{[(\text{Measured Distance} - \text{Actual Distance}) / \text{Actual Distance}] * 100\%}{\% \text{error}} = \frac{[(32+61.5+90+121+152) - (30+60+90+120+150)] / (30+60+90+120+150)}{100} * 100\%$$

APPLICATION

It can be used in multiple applied ways. Some of them are as follows:

- It can be used in large scale to control the water level in dams to prevent flood and other such problems.
- It can be used to control water wastage in the municipality corporation tanks which supply water in a particular area.
- It can widely be used in industrial purposes as well.
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This measured level if is below the threshold level of 2cm then the pump will automatically be switched on and an SMS alert will be received at the user's phone. Henceforth, when the water reaches a particular level the motor will automatically turn off and again a notification through SMS will be provided indicating the tank is full to the user.

This is the working principle used in our project.

The block diagram is shown as below:

DRAWBACKS

Compatibility- In spite of the fact that the quantity of brilliant sensors in building that keep on rising, various purchasers still remain a touch reluctant in shelling out gobs of cash to computerize their buildings. Rather, numerous Makers have as of now contrived associated in- house device utilizing simple to-utilize stages like Arduino and Raspberry Pi. Complicated application code can be difficult to understand. This makes it buggy and hard to test, purification, fix, maintain and develop. A common part of this problem is one of the significance that make Arduino so easy to use for simple programs; the function setup() and loop ().

For the most part compose a project by beginning basic. Strip what we need to the unclad substance, and after that compose a small code to do it. At that point augment it, include more. Include a gadget add a small code to setup and circle to command it. Need inquire network include much code. Need the gadget to cooperate with different gadgets; include much code. Include another gadget; rehash. Really soon, setup and circle are a labyrinth of twisty entries all similar.

Privacy/ Security-

We found this gadget can be used to solve many issues. These are some usual issues which I have faced in the past:

1. This venture demonstrates the significance of water in our everyday life and ought not to squander water.
2. The Automatic water level controller guarantees no floods or dry running of pump there by spares power and water.
3. Fully programmed, spares labor.
4. Consume next to no vitality, perfect for ceaseless operation.
5. Automatic water level controller gives you the adaptability to choose for yourself the water levels.
6. Never put water down the drain when there may be another use for it such as watering a plant or garden, or cleaning.

My gadget usage a Water liquid sensor to explore the water safety and this notice is deliver without wire by using a RF transmitter-receiver module to give some kind of alert. We pick a RF module for wireless movement because collate to the current wireless systems like XBee or Wi-Fi, it is user friendly and very inexpensive. You could utilize sensor, but that has a finite limit and can only work within a line of sight of the receiver. But using the inexpensive RF module we can communicate within the limit of throughout 100m.

At the end we will give you some beck to decrease the power expenditure.

We will part the general venture into 3 principle parts;

1. TRANSMITTER: To detect the human pace and handover the information to collector.
2. RECEIVER: Receive the information from transmitter and activate ready framework, begin and stop the engine appropriately.
3. SOFTWARE: That serve the general equipment utilized as a part of this venture.

D.Safety-

Water safety is a necessary task because in the upcoming days water level went down, we will not get enough water so controlled monitor the water using GSM and microcontroller Arduino or Raspberry Pi based system can reduce the wastage of power. There is unless an undeniable risk when utilizing mains power, including hazard of electric shock and peril of electrical flames if the segments are not appraised effectively. This plan much decreases any hazard by turning away the mains power by utilizing industrially accessible remote-control attachments or light fittings. Specifically, the attachment needn't bother with any work to be done on the house electrical framework, the light fitting do and should be introduced by an able grown-up or capable circuit tester. Imagine if an ignoble programmer changes your solution. On the other hand, if a store naturally, marching you an equal item that you are hypersensitive to, or a flavor that you do not care for, or an item that is now fallen. Accordingly, security is at last in the hands of the purchaser to check any mechanization.

IV. RESULTS AND CONCLUSION

4.1 Results

This circuit was simulated using the Proteus professional environment. When the water level is below 30%, the pump turns on. The pump continues to operate until the water level reaches 90% and automatically turns off. The pump can be switched off remotely from the GUI when the automatic part fails to operate. This is the futuristic method to operate the water level present in the tank.



Figure 6: Output in LCD.

CONCLUSION

Within the near future the Internet and remote advances will join unmistakable wellsprings of information, for instance, sensors cell phones and cars in a perpetually firmly way. The amount of device which interface with the Internet is evidently exponentially- growing. These billions of portions create eat up and handle information in different circumstances, for instance, calculated applications, plants and plane terminals and also in the work and common existences of people. The general public need new, versatile, good and secure answers for both the administration of the perpetually wide, unpredictably arranged Internet of Things, furthermore for the backing of different plans of action.

The point of our Internet of Things Strategic Research Agenda is both to make structure for study inside of the given field furthermore to plainly characterize the focal exploration destination.

The primary point of the exploration was is to give programmed water system to the colossal populace regions with a framework that works with less labor. This thus spares subsidize and water. The scientist customized the 8051 microcontrollers as giving the interfere with flag to the GSM, and this was utilized to control the whole framework. Water fluid level module sensor were associated with inward ports of the microcontroller by means of a comparator, and at whatever point there is an adjustment in water and gives an interfere with flag to the miniaturized scale controller it will sends the alarm to the expert and in this way the engine is actuated as needs be.

VI. FUTURE ENHANCEMENT

The project can also be installed with pH sensors which will help to regulate the acidity or alkalinity of the water.

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