

Don Bosco Institute of Technology
Department of Information Technology
IoT Mini Project Report format

Introduction:

- Arduino based automatic water level indicator and controller.
- Measuring the water level by using ultrasonic sensors.
- Calculate its traveling time outgoing time and returning time to origin after striking on any obstacle.
- Motor turned on/of.

Problem Statement :

If any leakage occurs in tank or cracks ,the ultrasonic sensor will not show .

Motor gets heated too much when it is applicable for bigger tanks.

Scope of the Project :

- Real-time water level updates on the android app.
- Automatically turn ON the water pump when water reaches below a minimum level.
- Automatically turn OFF the water pump when water reaches above a maximum level.
- Manual option to control the water pump at any water level.
- Automatic water level monitoring system has a good scope in future especially for agriculture sector.

Current Scenario :

- Can be used in overhead tanks to control the water wastage without any man power.

- Can control/monitor water level from anywhere in the world.

Need for the Proposed System:

To control water level so that water does not get wasted.

Is also applicable in vehicles to measure the fuel level.

The liquid level containers are large huge in the companies so there also we can control the wastage.

Review of Literature:

Summary of the investigation in the published papers/web pages referred/ existing applications

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.

This system is very beneficial in rural as well as urban areas.

It helps in the efficient utilization of available water sources.

If used on a large scale, it can provide a major contribution in the conservation of water for us and the future generations.

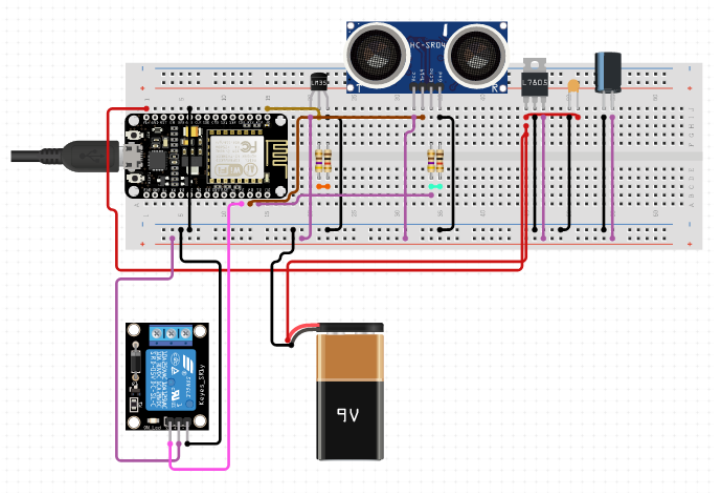
Water source is necessary and an important factor in agricultural and farm production and is a key of our quality of life as well. Monitoring water level of a water source, such as water tank or borewell etc., plays a key role in agricultural. For example if a water level drops below the threshold level for pumping in a borewell, the pump motor may get damaged due to dry running. In such case monitoring water level and controlling the water pump accordingly becomes necessary task. There are many other situations where water level monitoring is an important task. It may be used to preserve water or to study the water usage of a water source. This paper proposes a prototype system design, implementation and description of required tools and technologies to

develop Internet of Things (IoT) based water level monitoring system which can be implemented in future smart villages in India.

- <https://www.ijsr.net/>
- https://www.researchgate.net/publication/313902369_Internet_of_Things_IoT_Based_Water_Level_Monitoring_System_for_Smart_Village

Analysis and Design

Circuit diagram of hardware and explanation



NodeMCU ESP8266 development board

HCSR04 ultrasonic sensor

Breadboard

Single channel relay board (to control water pump)

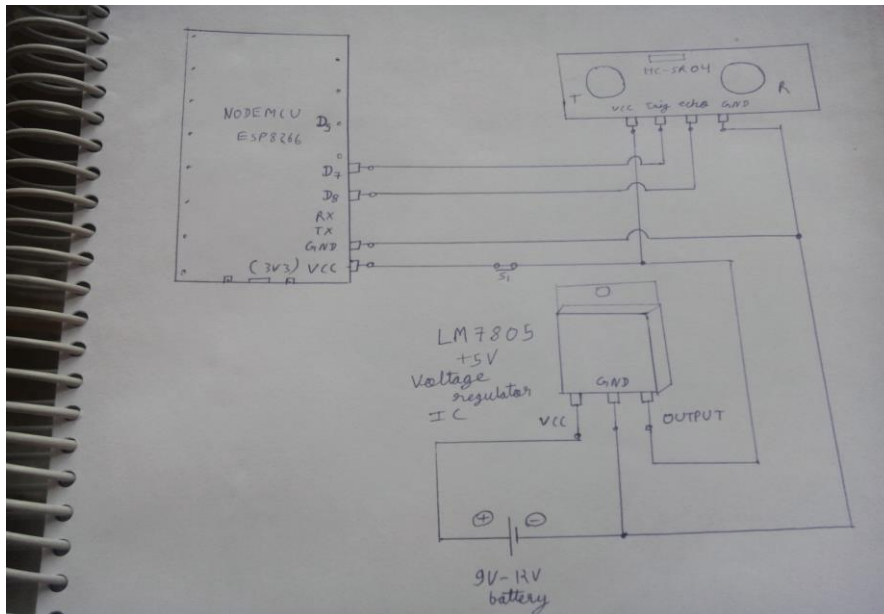
LM7805 +5V voltage regulator IC.

Battery (9V-12V).

The ultrasonic sensor module works on the natural phenomenon of ECHO of sound. A pulse is sent for about 10us to trigger the module. After which the module automatically sends 8 cycles of 40 KHz ultrasound signal and checks its echo. The signal after striking with an obstacle returns back and is captured by the receiver. Thus the distance of the obstacle from the sensor is simply calculated by the formula given as

$$\text{Distance} = (\text{time} \times \text{speed}) / 2.$$

Hardware are connected as shown in the block daigram



Software Architecture

Create a new real-time database.

Get real-database URL and secret key to access the database from the app.

We are going to use MIT app inventor 2 to create our Android app. Its very simple to use and easy to integrate win Google firebase.

Configure Arduino IDE for Nodemcu Esp8266

First of all, configure Arduino IDE for Nodemcu esp8266. I would recommend this step by step tutorial on NodeMCU basics by Armtronix.

Thanks Armtronix for this helpful tutorial.

After that, add these two libraries (as shown in screenshot) :-

1. Arduino Json
2. Firebase Arduino

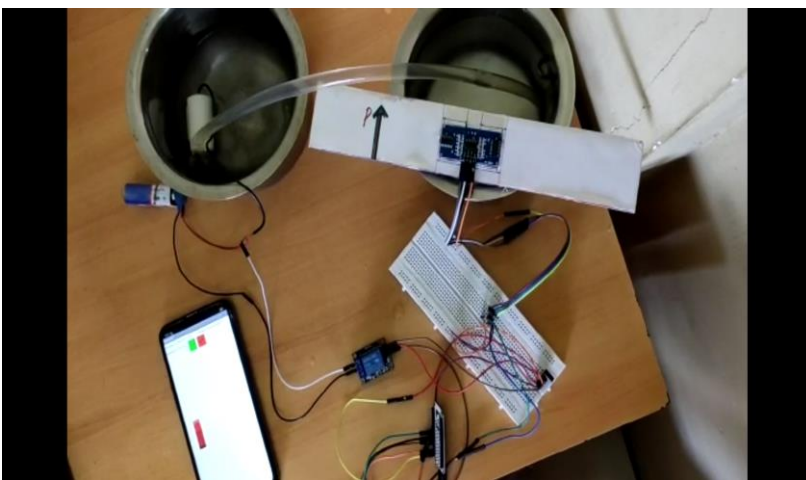
A enter database URL without 'https://'.

enter database secret key. don't forget to update WiFi SSID and Wifi password (to which you want to connect NodeMCU ESP8266).

Scroll down a little bit and update minimum water level, maximum water level, and margins according to the depth of your own water tank.

After that, upload program to NodeMCU ESP8266.

Results and Discussion



Create a circuit as shown in the above figure. You can use either a 9V or 12V battery.

Put ultrasonic sensor at the top of the water tank.

Connect water pump using a relay board (optional during testing).

Install the app (created in step 2) on your Android device.

Supply power to the setup.

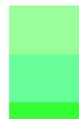
Wait for NodeMCU to connect to the hotspot (you can use either router or portable hotspot).

All Done! Now you can control/monitor water level from anywhere in the world.

Status Of Motor:- OFF Water Level > 8cm
Manual Control:- ON OFF



Status Of Motor:- ON Water Level 5cm
Manual Control:- ON OFF



Conclusion:

Thus we conclude that the design of IoT based water level monitoring using ultrasonic sensor, NodeMCU and MIT App Inventor has been achieved. This model can be used in various applications like factories, apartments, colleges and in agriculture. There may be other software used for designing this model but we opted for MIT App Inventor .