

# Water Tank Level Monitoring using IoT: A Implementation

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**Abstract-**Water insufficiency is one of the major problems facing major cities of the world and wastage during transmission has been identified as a major culprit. This is one of the motivations for this research, to deploy computing techniques in creating a barrier to wastage in order to not only provide more financial gains and energy saving, but also help the environment and water cycle which in turn ensures that we save water for our future. We presented our research in embedding a control system into an automatic water pump controller through the use of different technologies in its design, development, and implementation. The system used Node MCU, ULN 2003 to automate the process of water pumping in an over-head tank storage system and has the ability to detect the level of water in a tank, switch on/off the pump accordingly the status on tank.

**Keywords-**Android Devices, Ultrasonic Sensors, Water Tank, Node MCU and IoT.

## 1. INTRODUCTION

In recent years, the growth of internet is tremendous and has been further extended to connecting things through internet. IOT devices are used to collect, monitor, evaluate and notify the patient with the information. From the development of technologies (Internet of Things) is changing the human life into a new level. IOT is change the normal human life to smart life with new technology level. There are several process such as smart home, smart city, health monitoring systems water monitoring system are monitor using Internet of Things. Internet of Things is used for monitor water level. In this paper, water level monitor and indication using Node MCU.It is an one type of module comes with a built in USB connector and a rich assortment of pin outs. It is also immediately breadboard friendly.We need modern methods to protect and preserve as much water. The wastage of water through storage tanks not only waste water but also waste electrical and mechanical energy required to utilize the pumps[1].

## 2. LITERATURE SURVEY

A number of reviews on the subject of Wireless Sensors techniques were done in the past either as part of research papers/technical reports on Iot based water Monitoring System

[1]Prof. A. M. Jagtap<sup>1</sup>, Bhaldar focus on Aquarius-Smart IOT Technology for Water Level Monitoring System, The main objectives of this proposed system is used ultrasonic sensor to detect the level of water in multiple tanks, switch on or off the pump accordingly and display the status on android device. The water

level is monitored and its data is sent through notification to the intended users android device.

[2] Pragati Damor<sup>1</sup>, is used to find the solution for water monitoring & control system. For that IoT is blessing as a solution. Microcontrollers and sensors are very useful for creating that system. Ultrasonic Sensor is used to measuring water level.

[3] Manisha Rajput, focus on review of water monitoring system. The main objectives of this proposed system would be complex free as the PLC replaces the necessary sequential relay circuit for the motor control. The whole concept is to build an automatic water pump control system.

[4] Pranoti Bhatele, designed a system which is used in represents the method to check and control water level for irrigation system. This paper describes the automatic system to monitor and control water level with the help of water level sensors and wireless network system.

## 3 SYSTEM DESIGN

In this paper we have measure different water level and monitoring of water using NODE MCU. These can be done by using ultrasonic sensor and Wi-Fi module, also for isolating the two circuit relay is used. we are using Ultrasonic sensor to get distance and from that distance we are calculating the % water level in tank and accordingly we are controlling water pump, if tank level goes below 20% the pump we start automatically and will stop we tank level will reached to 95%.These sensors signals send to the ULN2003 via After connecting internet to the ULN2003 it act a server. Then the server automatically sends data to the cloud, and this can be saved on the user Gmail Using IP address anybody can monitor the water level status

anywhere in the world using laptops, tablets and smart phones We are using Blynk android application for IoT, using this it will be possible to get status of tank level as well as we can control water pump at any stage, the system will also send an email notification regarding tank level.

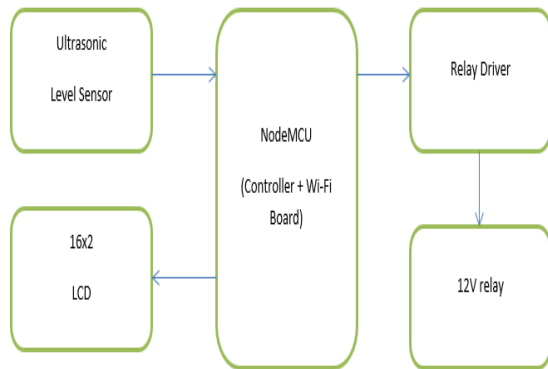


Fig. System design diagram.

### 3.1 Ultrasonic Sensor

An ultrasonic sensor transmits ultrasonic waves into the air and detects reflected waves from an object. There are many applications for ultrasonic sensors, such as in intrusion alarm systems, automatic door openers and Backup sensors for automobiles [7].The ultrasonic sensor works on following formula

$$distance = \frac{speed\ of\ sound \times time\ taken}{2}$$

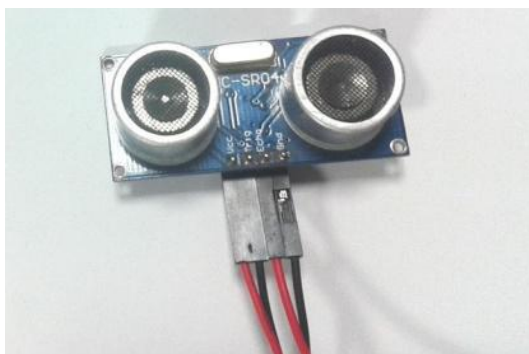


Fig. Ultrasonic Sensors

### 2.4 Node MCU

This module comes with a built in USB connector and a rich assortment of pin-outs. With a micro USB

cable, you can connect Node MCU devkit to your laptop and flash it without any trouble, just like Arduino. It is also immediately breadboard friendly [8].

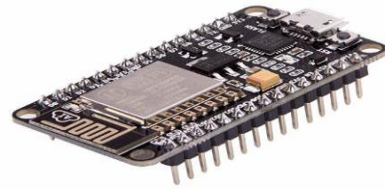


Fig.Node MCU

### 2.6 Relay

Relay is an electromagnetic device which is used to isolate two circuits electrically and connect them magnetically. They are very useful devices and allow one circuit to switch another one while they are completely separate. A relay switch can be divided into two parts: input and output[03].



Fig.Relay

### 3.6 Wi-Fi module

ESP8266 is an impressive, low cost Wi-Fi module suitable for adding Wi-Fi functionality to an existing microcontroller project via a UART serial connection.



Fig. 8266 Wi-Fi module

The module can even be reprogrammed to acts as standalone Wi-Fi connected device-just add power.

The hardware connection required to connect to the ESP8260 module are fairly straight-forward but there are couple of important items to note related to power.

### 3.7 LCD display

Liquid crystal display a type of display used in digital watches and many portable computers. It is used to display the measured data. We have used 16 x 2 Alphanumeric Display which means on this display we can display two lines with maximum of 16 characters in one line [4].



Fig. LCD display

### ULN 2003

ULN2003 is a high voltage and high current Darlington array IC. It contains seven open collector darlington pairs with common emitters. A darlington pair is an arrangement of two bipolar transistors. ULN2003 is also commonly used while driving Stepper Motors. Refer Stepper Motor interfacing using ULN2003[4].



Fig.ULN2003

### 3.8 Arduino software

After full hardware completion process, the arduino software is used for completion of full project. Arduino is a pro type platform based on easy to use hardware and software. It consist of a circuit board. Which can be programmed and ready mate software called arduino IDE which is used to write and upload the computer code to the physical board. Arduino provides the standard form factor that breaks the function of microcontroller into a more acccible package.

### 4.WORKING

Iot based water monitoring system is a NODE MCU based system which collect information of status of

water with help of ultrasonic sensor. It uses 8266 Wi-Fi module to communicate this information to the internet. The sensor electrically connected to the system and physically to the water tank. It require 12v battery supply that is transformer, After turn on the power supply the sensor senses the signal and send it to the Wi-Fi module. The ultrasonic sensors require 5v power supply except Wi-Fi module, it require 3v power supply and for that shift resistors are used. After getting value of water tank, it display on the LCD and by using the Wi-Fi module the data from the LCD display transfer to the blynk app or also the user gmail. Thus the user can get the message of different status of water level on mobile.

### FLOWCHART

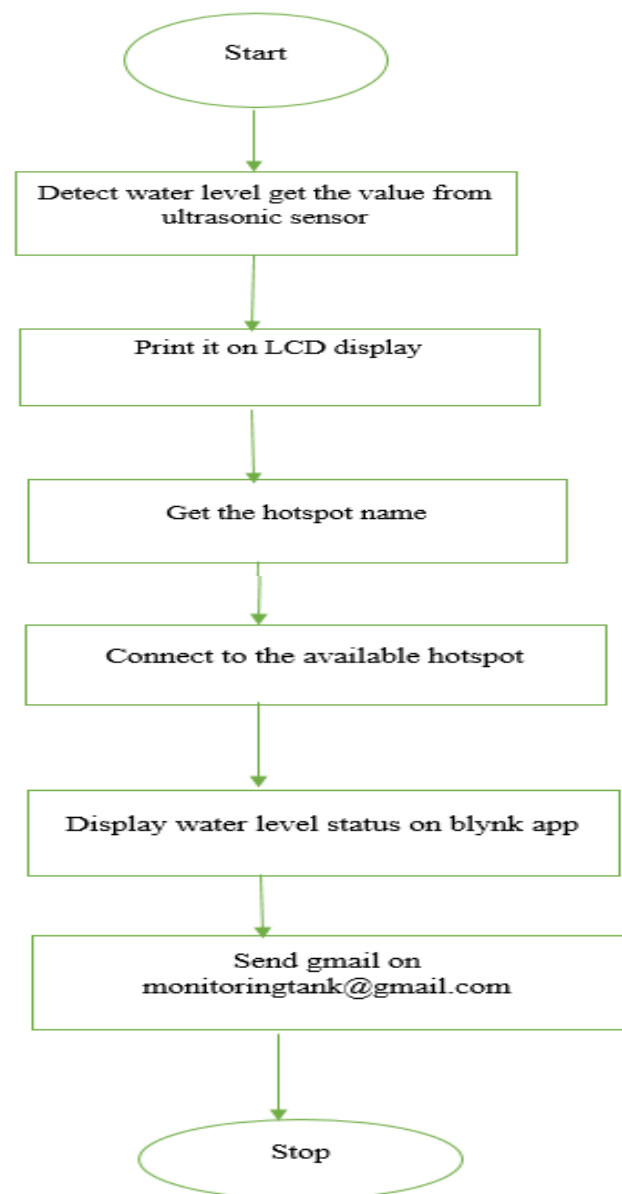


Fig: flow chart

## 5. IMPLEMENTATION

The Figure shows the Implemented board. It consists of Node MCU board, ultrasonic sensor, ULN2003, ESP8260 Wi-Fi module and LCD display.

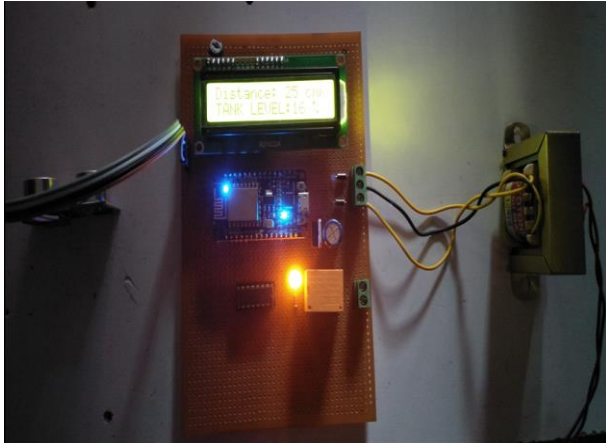


Fig: Implemented Board

Following process goes on step by step when hardware is powered.

- 1] After getting power supply give the input to the system. For detect the water level get the value from ultrasonic sensor.
- 2] Print it on LCD display.
- 3] Get the hotspot name to the system and connect to the available hotspot.
- 4] Display water level status on blynk app and also send gmail on [monitoringtank@gmail.com](mailto:monitoringtank@gmail.com).

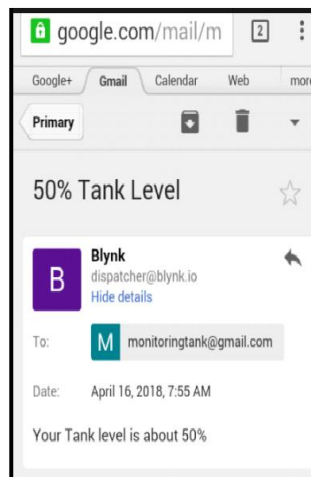


Fig. Message obtained on the mobile, and Gmail.

## 6. CONCLUSION

In this paper we focus such a system which name indicates its description. With the wide use of internet this work is focused to implement the internet technology to establish a system which would communicate through internet for better consumption

of water. Internet of things is expected to rule the world in various fields but more benefit would be in the field of healthcare and water monitoring. Hence present work is done to design a water monitoring system using NODE MCU. In this system we used ultrasonic sensor to detect the different water level. This paper is represented the water tank level indicator and its controlling and what kinds of hardware and software are used for controlling and monitoring the water tank, motor pump. And for observing the level of water the ultrasonic sensors are used which main purpose is analysis. The Future work of the project is very essential in Order to make the design system more advanced.

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