A PROJECT REPORT
ON
IOT-BASED WATER LEVEL MONITORING
&
CONTROL SYSTEM

Project Submitted in Partial Fulfillment of the Requirements for the Degree of Bachelor of Technology in the field of Computer Science and Engineering

BY

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CERTIFICATE

This is to certify that **Anupam Dutta (123200803202), Birottam Biswas (123200803205), Ritesh Saha (123200803207), Shubhranil Mazumder (123200803209), Suvajit Paul (123190803118)** has completed his project entitled **A PROJECT REPORT ON IOT-BASED WATER LEVEL MONITORING & CONTROL SYSTEM,** under the guidance of   **Prof. Anirban Ghosal** in partial fulfillment of the requirements for the award of the **Bachelor of Technology in Computer Science and Engineering** from JIS College of Engineering (An Autonomous Institute) is an authentic record of their own work carried out during the academic year 2021-22 and to the best of our knowledge, this work has not been submitted elsewhere as part of the process of obtaining a degree, diploma, fellowship or any other similar title.

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Signature of the Supervisor   **Signature of HOD**

Place:

Date:

ACKNOWLEDGEMENT

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We also express our sincere gratitude to Dr. Dharmpal Singh, Head of the Department of Computer Science and Engineering of JIS College of Engineering and all the respected faculty members of the Department of CSE for giving the scope of successfully carrying out the project work.

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Abstract

Internet of Things is becoming so popular in today's era, Now-a-days people are used to implementing the features of the IoT in verities of fields. Now, with the evolution of the technology with IoT, we are able to control and monitor our electronic, and electrical devices from anywhere in the world. Here in our project, we have introduced a smart IoT-based water monitoring and controlling system which will eventually reduce the wastage of the water. The system we have developed can be able to control the electric water pumps and eventually our system can switch on and off the pump based on the capacity of the water inside the water tank. Our proposed concept and project are very helpful and will eventually reduce the wastage of water. In this project, we have used NodeMCU ESP 8266 board as the main microcontroller board, the ultrasonic sensor module used to detect the water level of the tank, and one relay module which will control the electric pump. In this project work, the Blynk platform has been used to get connected with the internet and control and monitor purposes. The Blynk is a cloud platform where anyone can build projects related to the Internet of Things. So, we actually plan the whole project to build a specific device enabled with IoT to meet our holy goal to save water and reduce the wastage of water in the time of filling the water tanks in our houses and government water tanks.

Introduction:

Water is the basic necessity and most significant resource of our planet, for the functioning of all life forms that exist on earth water is the prime necessity. Without water, we cannot imagine any life form that exists in the world. But, In the present scenario due to the increase in pollution and other harmful effects caused by humans the global average temperature is rising day by day. It is very painful to see that we are wasting water where lots of people are not getting proper drinking water.

One of the major problems we are facing in our houses and society is the wastage of drinking water. Today, even in our village areas the people are installing the electric water pump which is used to pump the water from the ground and store that water in tanks but in this process sometimes water overflowed from the water tank due to lack of concentration of the person who is responsible for controlling the electric pump. For that stated reason, lots of gallons of water are wasted in a whole day.

This project is dealing with IoT-based water level monitoring and controlling system. Our system is IoT-based for that reason anyone can control our system remotely from anywhere in the world.

This system can monitor the water level in the water tanks and can control the pump based on the water level with or without any human interactions.

Only the person or organization has to set up the whole system at once only for one time and the system will work automatically even without human interactions.

Literature Survey:

In the year of 2017 Priya J, Sailusha Chekuri published a paper named "Water LEVEL Monitoring System using IoT" in the "International Research Journal of Engineering and Technology (IRJET)" [1] they proposed the method by using IoT and Raspberry Pi microprocessor board.   In the year of 2020 Sandhya.A. Kulkarni; Vishal D Raikar; B K Rahul; L V Rakshitha; K Sharanya; Vandana Jha published a paper named "Intelligent Water Level Monitoring System Using IoT" in the "2020 IEEE International Symposium on Sustainable Energy, Signal Processing and Cyber Security (iSSSC)" [2]. Previously In the Year 2018 Rupalir. Shevale, Shweta Karad, Maryam Merchant, Vijeyata Mishra published a paper named "IOT Based Real time water Monitoring System for Smart City" in the "International Journal of Innovative Science and Research Technology"[3]. Later on in the year of 2019 R. Sundarrajan, S. Dhakchanamoorthy, C. Ganesh Ram, S. Sriram Babu published a paper named "Multiple Water Level Recognizing System using IoT" in the "International Journal of Engineering and Advanced Technology (IJEAT)"[4]. In the year 2017 Palaghat Yaswanth Sai published a research paper on "An automated smart water level indicator using iot-an effective practice of smart irrigation" in the "International Journal of Computer Science Engineering (IJCSE)" [5]. Again, in the year 2018 Arjun Dalal, Rahul Gupta, Rakshanda Shende published a research paper on "Water Level Monitoring App using Arduino and Wireless Network" in the "Helix Vol. 8(5): 3901- 3903" [6]

Methodology:

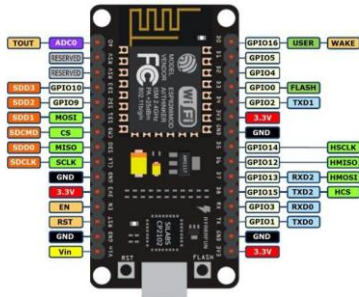**Hardware Requirements:**

ESP 8266 NodeMCU

Fig.1   NodeMCU ESP 8266

: A NodeMCU is a 32bit microcontroller used in IoT projects. It is an open-source microcontroller. It has a total of 11 I/O Digital Pins and 1 Analog Input Pin, it has an ESP 8266 Wi-Fi module on chip for communication and internet connectivity. It has 4MB of flash storage and the clock frequency is 80MHz. The NodeMCU is a very low-cost IoT platform and it has an initial firmware that runs on esp8266 SoC. The firmware of NodeMCU uses Lua-based firmware. It has also a memory of 128Kb. It has a total of 30 pin headers. It can be easily programmed with Arduino IDE.

Relay Module

Fig.2   Relay Module

: Relay is one kind of electro-mechanical component that functions as a switch. The relay coil is energized by DC so that contact switches can be opened or closed. A single channel 5V relay module generally includes a coil, and two contacts normally open (NO) and normally closed (NC). This article discusses an overview of the 5V relay module & it's working but before going to discuss what is relay module is, first we have to know what is relay and its pin configuration.

Ultrasonic Sensor

Fig.3   Ultrasonic Sensor

: This ultrasonic sensor module can be used for measuring distance, object sensors, motion sensors, etc. The highly sensitive module can be used with a microcontroller to integrate with motion circuits to make robotic projects and other distance, position & motion-sensitive products.

The module sends eight 40Khz square wave pulses and automatically detects whether it receives the returning signal. If there is a signal returning, a high-level pulse is sent on the echo pin. The length of this pulse is the time it took the signal from first triggering to the return echo.

Proposed Method:

This project contains several electronic components like NodeMCU ESP 8266 board as the main microcontroller board, the Ultrasonic sensor module, and the relay module. In our project, we have used the Blynk webservice for the actual IoT purpose and for monitoring and controlling the system from anywhere in the work through the internet and by using the Blynk web or application interface. Initially, the system has to be connected to the internet by using Wi-Fi then by using the Blynk website dashboard the person can be able to view every static about the water tank like the water level in the water tank not only that by using the application and website dashboard the user can control the eclectic pump as per their needs. Although this system has an Auto button through which the system can operate without any human interaction.
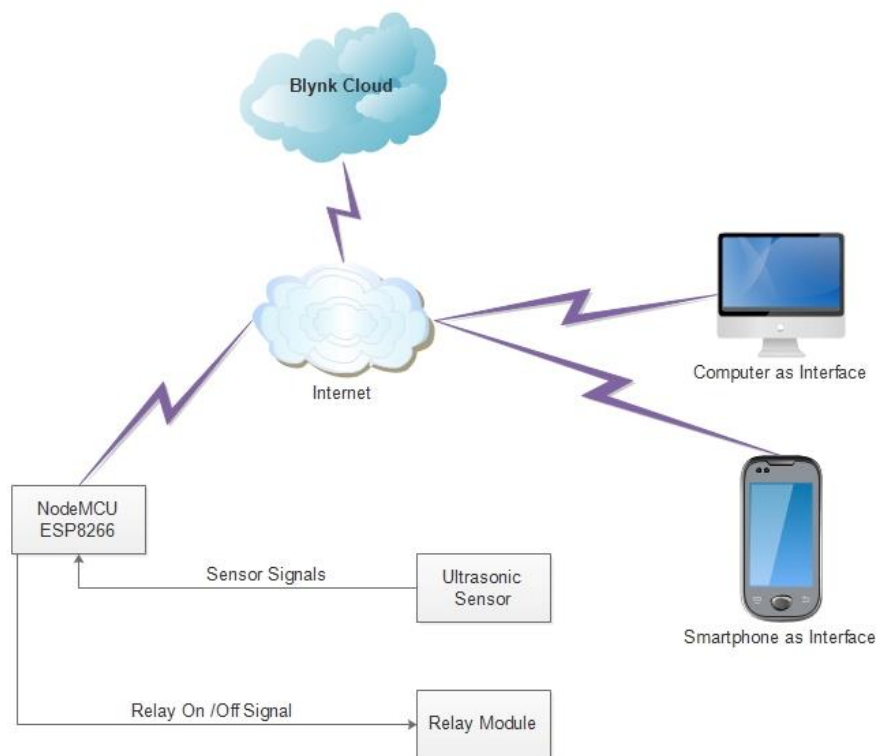
Workflow Diagram (Fig. 4):

Fig.4 Workflow Diagram

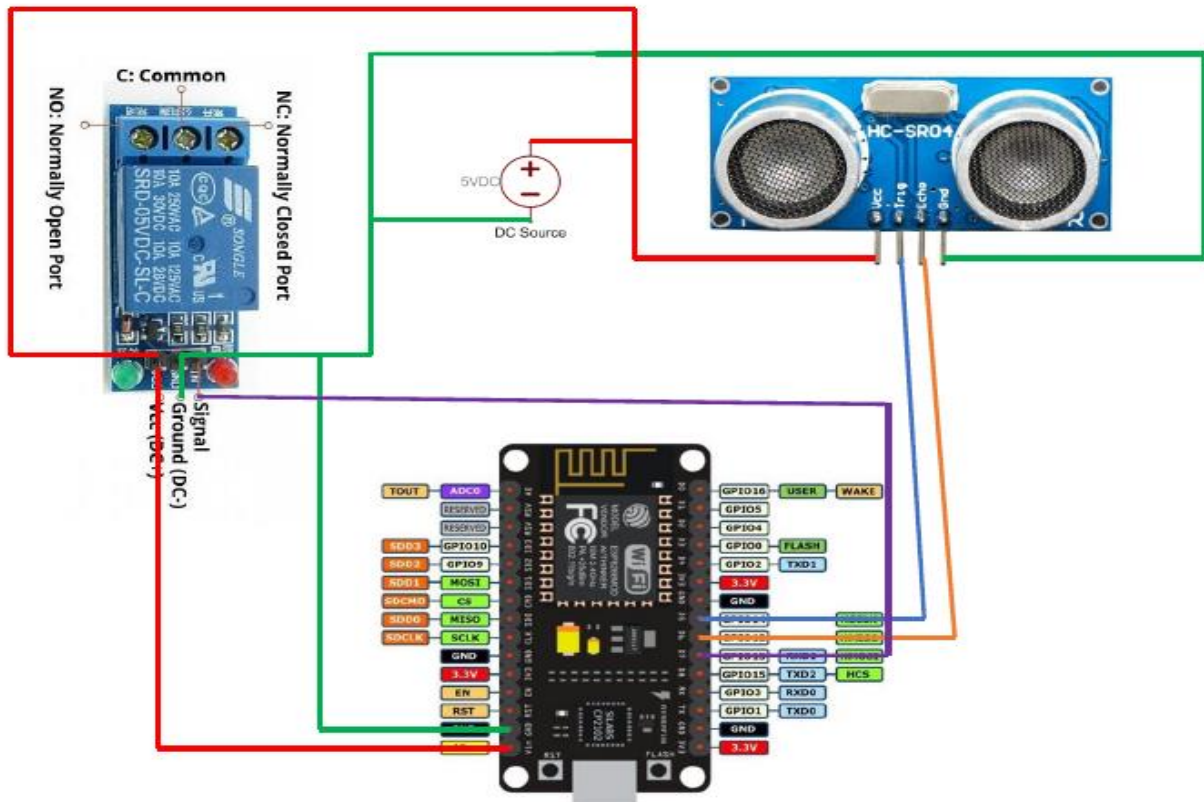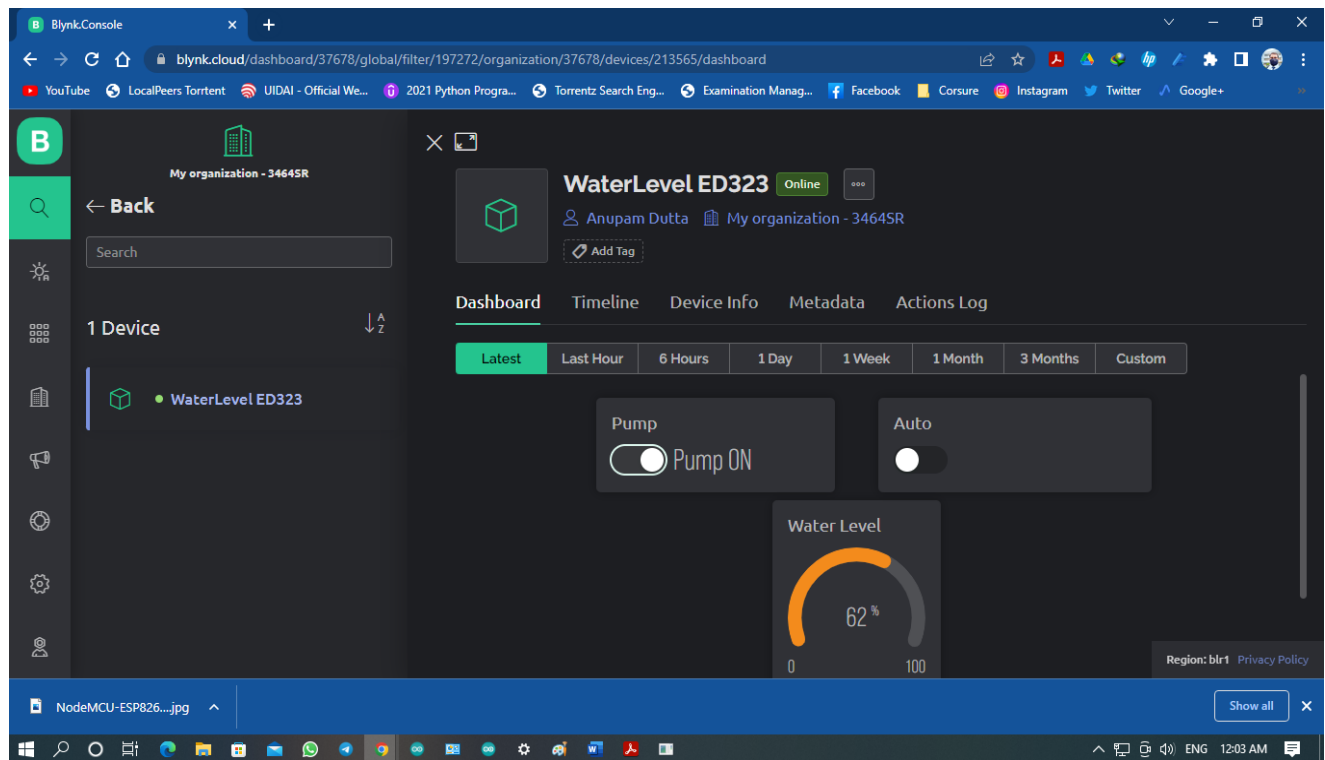**Circuit Diagram(Fig. 5):**

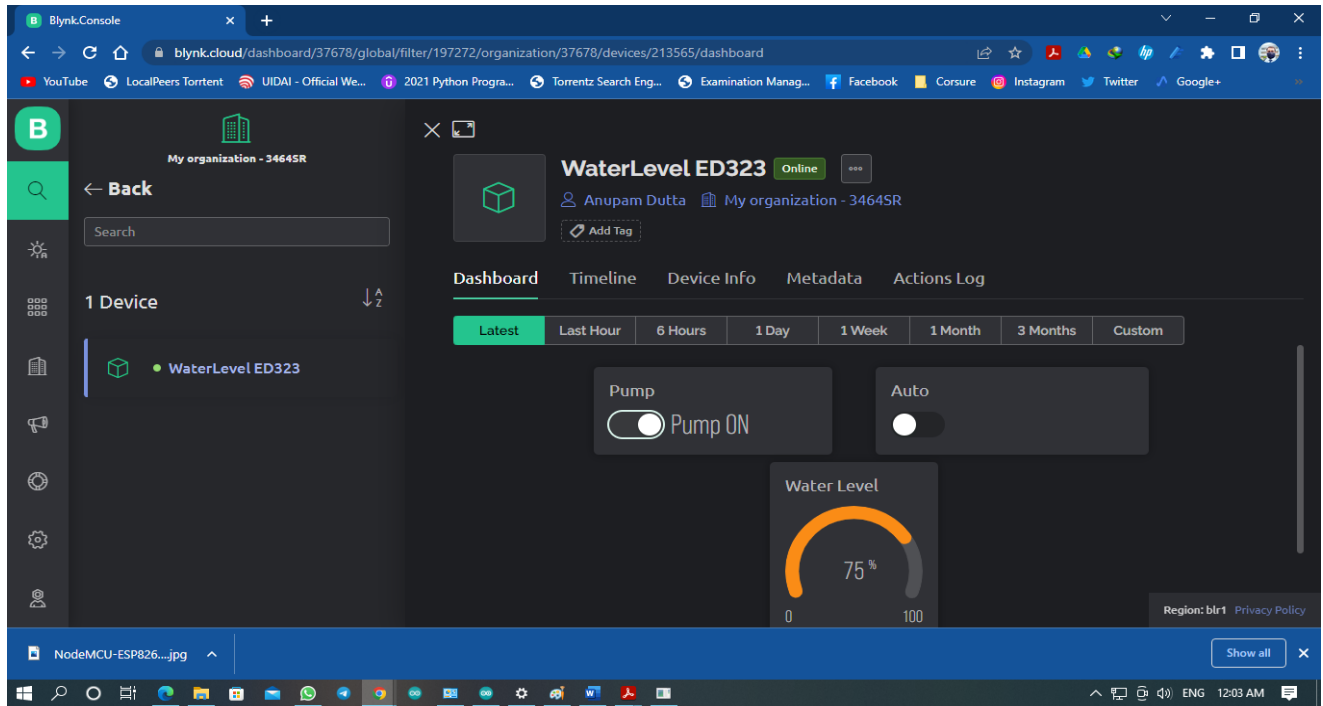**Fig.5** Circuit Diagram

Result and Discussion:

Fig.6 Web dashboard View

Fig.7 Android Application View

The main outcome of our project is to save water. The wastage of water is not just a joke. Water is the most important resource in our world. If we can save water, we can eventually save our future. Wastage of water leads our society to the darkest future for making our future beautiful we have to save drinkable water as much as possible. In this NodeMCU ESP8266-based automatic water level indicator and controller project we are going to measure the water level by using ultrasonic sensors. The basic principle of ultrasonic distance measurement is based on ECHO. When sound waves are transmitted in the environment then they return back to the origin as ECHO after striking any obstacle. So, we have to only calculate the traveling time of both sounds means outgoing time and returning time to origin after striking on any obstacle. And after some calculation, we can get a result that is the distance. This concept is used in our water controller project where the water motor pump is automatically turned on when the water level in the tank becomes low.

Here we have used NodeMCU ESP8266 as a microcontroller, relay module, and ultrasonic sensor for measuring the distance of water level.

The automatic water level controller minimizes the need for any manual switching and human interference. The machine helps to detect the level of water or any liquid. For this ultrasonic sensor is used. It detects the distance between the top of the tank and to the level of liquid and with help of programmed NodeMCU ESP8266 it displays the information on the Blynk IoT mobile application and Blynk's web dashboard. And as the water level goes below a certain level it turns the relay on and starts the water flow with help of a motor. Similarly, as the water level reaches the top of the storage tank means 80% of the capacity of the water tank which is being detected by the ultrasonic sensor, then with help of a programmed NodeMCU ESP8266 the relay automatically turns off which shuts the motor off and thereby closes the water flow.

Our Objective is used to measure and display the level of water in a container and avoid overflow of water. The idea can be implicitly used to ascertain and control the level of water in overhead tanks and prevent wastage. In this NodeMCU ESP 8266-based automatic water level indicator and controller project the water level is being measured by using an ultrasonic sensor module.

Conclusion:

With the help of this project, we aim to save electricity as well as water. It is very important to save natural resources. When the water in the bucket /tank reaches at a particular level we don't realize that the tank is overflowing. This leads to more water as well as energy consumption. People too get engaged in that and stop doing other work until the tank is full which can cause a lot of unnecessary time consumption. So, to overcome this situation this project can sense and indicate the water level in the tank when it reaches at a particular level, and then the pump/tap turns on/off which will save water and electricity. Therefore, the water level monitoring and controller using the NodeMCU ESP8266 project can prove very helpful in minimizing the use of manpower. Its application is not only limited to households but can also be used in the industrial and agricultural sectors.

Automation of the various components around us has been widely increased to reduce human intervention and save time. The water tank overflows as the height of water in the tank cannot be randomly guessed. This leads to extra energy consumption, which is a high concern at the present. People also need to wait and stop doing their other activities until the tank is full. Hence, here is an idea that senses and indicates the water level so that the pump can be switched off & on at the appropriate time and save water, electricity, and time as well. Therefore "IoT-Based Water Level Monitoring & Control System" project can definitely be useful on a large-scale basis due to the minimum requirement of manpower and also the installation process being easier making it more compatible for everyone to use.

Reference:

[1]   Priya J, Sailusha Chekuri Paper on "Water LEVEL Monitoring System using IoT" published in *"International Research Journal of Engineering and Technology (IRJET) 2017"*

[2]   Sandhya.A. Kulkarni; Vishal D Raikar; B K Rahul; L V Rakshitha; K Sharanya; Vandana Jha Paper on "Intelligent Water Level Monitoring System Using IoT" published in the *"2020 IEEE International Symposium on Sustainable Energy, Signal Processing and Cyber Security (iSSSC)"*

[3]   Rupalir. Shevale, Shweta Karad, Maryam Merchant, Vijeyata Mishra published a paper named "IOT Based Real-time water Monitoring System for Smart City" in the *"International Journal of Innovative Science and Research Technology"*

[4]   R. Sundarrajan, S. Dhakchanamoorthy, C. Ganesh Ram, S. Sriram Babu Paper on "Multiple Water Level Recognizing System using IoT" published in the *"International Journal of Engineering and Advanced Technology (IJEAT)"*

[5]   Palaghat Yaswanth Paper on "An automated smart water level indicator using iot-an effective practice of smart irrigation" published in the *"International Journal of Computer Science Engineering (IJCSE)"*

[6]   Arjun Dalal, Rahul Gupta, Rakshanda Shende paper on "Water Level Monitoring App using Arduino and Wireless Network" published in *"Helix Vol. 8(5): 3901- 3903"*.