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Internet of Things (IoT) based Smart Water Tank Level Monitoring and Motor Pump Control System for Prevent Water Waste

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Abstract - *The water tank level monitoring and motor pump control system is a critical aspect of ensuring an adequate supply of water. Due to an excessive supply of water, the majority of residents in residential areas experience water shortages and water tank overflows. Users find it challenging to gauge the amount of water in water tanks, which increases the risk that they will run out of water when they need it most. Users won't notice when the water tank is filled even when the motor pump is active, which could lead to an overflow. To resolve problems with water tanks, a water tank level monitoring and motor pump control system is used. It is also feasible to employ a sensor to monitor the water level of the tank so that anytime the water falls below a predetermined threshold user can turn on the motor pump and monitor the water level using an Android application. Also, when a water tank overflows, a sensor is used to monitor the water level. If the water level rises above a certain threshold, the motor pump can be turned off by the user. Water waste is prevented by this system.*

Key Words: **Internet of Things (IoT), Node MCU, Arduino UNO, Water Tank, Ultrasonic Sensor, Water Level Depth Detection Sensor, Relay Module, LCD Display, LED, Submersible Motor Pump, Blynk.**

1. INTRODUCTION

Water is the main element used in daily living, whether for home or commercial purposes. Overuse of water is now a significant problem that is harming our environment. Lack of water may result from excessive wasting, which can also cause other environmental issues like climate change, droughts, rising pollution, and rising human demand. As there is a limited supply of fresh water, it is crucial to use and manage it properly. Monitoring water waste in different sectors, such as residential, commercial, or industrial locations, is urgently necessary [1].

Depending on the various fields [2], it may be for survival or economical or other different field's water has its own level of importance. Therefore, saving water is one of the challenging aspects for the survival of human race. Monitoring the water level in tanks is crucial to ensure that the water supply is sufficient. Traditional methods of monitoring water levels are manual, time-consuming, and prone to errors. In recent years, the Internet of Things (IoT) technology has gained significant attention due to its potential in various applications, including water tank level monitoring and motor pump control system. IoT allows for the integration of sensors, microcontrollers, and web as well as android applications, providing real-time monitoring of water levels. Most of the authors [14-17], used IoT to their works on water level monitoring.

Water tanks are a popular way of storing water in many parts of the world, especially in areas where water supply is unreliable. However, monitoring water tank levels can be a challenging task, as it requires constant attention to ensure adequate water supply. Due to an excessive supply of water, the majority of individuals experience water shortages and water tank overflow issues [1], [8]. Hence, there is a requirement of water tank level monitoring and motor pump control system, which will check the water level from the water tank and users can take necessary actions immediately to save water from wastage. Water tank level monitoring and motor pump control system can be employed in various applications like food grains storage units, industrial locations, commercial and residential areas.

This work aims to design and develop an Internet of Things (IoT) based water tank level monitoring and motor pump control system that analyses the level of water and to takes necessary steps to prevent water waste from water tank. It also intimates the user about the water level of tanks, if it reaches beyond the maximum level.

2. LITERATURE REVIEW

An automatic water tank level and pump control system was created by Premi et al. [1]. The system's sensor devices monitor and regulate the water level in the pump as well as the overhead tank. The sensor detects the level of the overhead tank and transmits various signals to the Arduino, which are used to turn the motor pump on and off. The circuit has a buzzer that will sound when the water level in the overhead tank reaches a certain level.

Kulkarni et al. [2] proposed a system that can be implemented in domestic areas, residential areas, storage

rooms, and work places with only few components, providing accurate readings of water level and alerts the user through phone calls. Without internet or Wi-Fi connections, alerts are sent to the user via regular phone calls using the GSM Module. By alerting maintenance engineers to leaks and taking the necessary action, future improvement can be accomplished.

Malche et al. [3] proposed a system that can be used to obtain real-time information about a water source's water level from any location using any Internet-connected device. It can be used to monitor and analyze water use as well as environmental data, including location data, water quality, temperature, and other variables. It can also be used to remotely collect, analyze, and forecast real-time data about a specific water source's usage and other factors at a specific location.

A capacitive-type sensor is presented by Loizou et al. [4]. It is intended to be immersed in a water tank and its capacitance varies with the level of the water. A city-scale water distribution network's 4 m water storage tank has been used to assess the sensor's performance.

Gama-Moreno et al. [5] proposed The InteRface for Monitoring Water Tanks (IRMA) as a system that would allow users to control and manage their water tank facilities and keep track of how irrigation is carried out. It can be used in a variety of scenarios and is constructed with electronic and software components. The main features of IRMA are the ability to start and stop watering at anytime and anywhere using a smartphone or mobile device with SMS functionality. You can also control and monitor the watering facilities online using any mobile device.

A system created by Getu et al. [6] checks the level of the tank's water using a level detector, and then it adjusts the water pump's status based on the information it collects. This design makes use of a motor pump and a seven-segment display. The suggested system consists of a digital logic processor circuit and a water level sensor. The suggested technology eliminates the need for manually controlling water needs in urban and rural areas.

Shrenika et al. [7] created a non-contact water level monitoring system using LabVIEW and Arduino. The water depth in the tank is calculated by an ultrasonic sensor. The program will collect data from the sensor and transmit it to the Arduino board, which will then use the data to either turn on or off the pump. This idea gets around the problems with most existing systems that use SS sensors, which corrode when in contact with water-based chemicals.

Shah et al. [8] proposed a system for monitoring the water in tanks that makes use of IoT and an android application. The microcontroller used in this system is the ESP 8266. The maximum and minimum water levels are obtained from the Firebase cloud using ESP. When the water level is halfway between the maximum and minimum levels, the user can control the status. The shortcomings of conventional tanks, which are unable to both monitor and control the water level in the tank, are overcome by this system.

Santra et al. [9] introduced a system that gauges the water level using ultrasonic sensors. The system makes use of a microcontroller, water level sensor and indicator, and water level pump controlling system. In this system, Arduino Uno R3 is supplied by DC SMPS. The system receives power supply from SMPS. When an ultrasonic sensor detects a change in water level, it sends a signal to the microcontroller and begins to echo pulses. The primary drawbacks of this project are the costs associated with the devices that are used.

Ahmed et al. [10] suggested using fuzzy logic for water level monitoring and control. The water level controllers can be designed in a variety of ways. For level control, the proportional integral derivative controllers have become renowned. Proportional-Integral-Derivative controllers are unable to properly maintain liquid level during low power operations. Therefore, it is essential that the performance of the current liquid level regulators be improved.

Perumal et al. [11] proposed an IoT-based protocol for the purpose of real-time water level monitoring in disaster prone areas, the working theory behind this prototype was based on the water level, a crucial parameter for controlling the system's flow, particularly in areas that are prone to flooding. The water level was assessed using ultrasonic sensors, and the information gathered from the sensors was shown on an LCD and stored on a server. On the host, this managed water monitoring system is installed. Results were displayed on a remote dashboard and social media platforms like Twitter handles once the water level exceeded.

For the purpose of warning users about problems like water contamination, tank breakage, and other common leakages, as well as the consumption rate with respect to these environments, De Paula et al. [12] focused on usable scenarios like building apartments or smart buildings and related working environments. It not only identifies risky

situations, but also aids in preventing and limiting the damages that may result from these uncertain circumstances, keeping the damage rate to a minimum. The suggested solution is adaptable enough to allow for actions to be taken depending on the circumstances, such as turning on and off the water supply to prevent further water waste. The middleware displays and serves as a storage medium for data coming from the sensors. The middleware serves as a storage medium for data coming from the sensors, displays the data as needed, and then resumes the flow of the data to other IoT devices as necessary.

Min-Allah et al. [13] developed a prototype which uses the concept of the IoT in android application for observing water levels of tanks in KSA. The proposed system is composed of three layers: presentation, service, and physical. The android application is utilized at the presentation layer to provide information to the user. The physical layer is made up of an ultrasonic sensor that measures the water level. This data is provided to the service layer, which stores it on a cloud server.

An IoT tool that can be assist in monitoring and controlling water use suggested by Wadekar et al. [16]. The data on the water level is updated continuously through sensors that are positioned inside the tank. This data is loaded on the cloud. A person can use an Android application to visualize the data related to water levels. The operation of the water pump is automated and controlled according to the tank's water level. If there is insufficient water in the tank, the water pump activates and turns off as the tank is about to be filled.

Gupta et al. [17] suggested a smart strategy to use IoT to determine the water level and purity. The suggested method measures the purity and level of the water, respectively, using turbidity sensors and ultrasonic sensors. The sensor-read data is uploaded to the cloud. Using a mobile app, the motor can be remotely connected to and turned on or off depending on the water level using the Wi-Fi module built into the Raspberry Pi controller.

Sulistyowati et al. [18] developed a river water level monitoring system using a microcontroller-based Android smartphone and ultrasonic sensors. The microcontroller evaluates the information the sensor system continuously transmits regarding the river's water level before disseminating the findings to the general public. According to test results, ultrasonic sensors have an average error rate of 1.121% and a 1 cm error rate for the rate at which the water level changes. The average delivery time for SMS messages sent from smartphones is 5.414 seconds. The device, which will be built using a microcontroller and an Android smartphone as a flood early warning system, will be designed for further research.

Kumar et al. [19] proposed a simulation model using Blynk tool for remote monitoring and controlling of water tank level. It uses a virtual water tank in Proteus with the help of logic gates whose water level in indicated. The data is sent to the arduino as well as transferred to the blynk cloud, allowing users to control and monitor the water level from their mobiles. Their paper mainly focuses on saving water, energy and time.

Dhillon et al. [20] introduced an IoT based SMS enabled system that monitors the water level and switches motor automatically when water goes above or below a certain level. With the help of this system user can know the information about the pH level of water. The user receives all of the stated information via SMS.

3. PROPOSED SYSTEM

The proposed system is named as Internet of Things (IoT) based smart water tank level monitoring and motor pump control system. The components that are being used in development of the proposed system model are NodeMCU [8], Arduino UNO [2], [7], Relay module [1], [8], Water depth level sensor [2], [14], Ultrasonic sensor[8], [15], [20], which calculate the water level accurately, LCD display [20], LED indicator, submersible motor pump[2], [9], to flow the water from water storage tank to water tank and Blynk tool [19] for control, and monitoring real time data of water level from the tank.

3.1 Block diagram of the proposed system

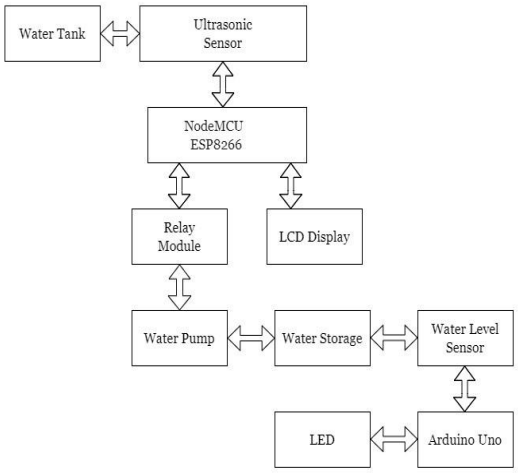

Fig.1: Block diagram of Internet of Things (IoT) based Smart Water Tank Level Monitoring and Motor Pump Control System

In the block diagram shown in Fig.1, NodeMCU [8] is connected with Ultrasonic sensor [15], Relay Module [1] and LCD Display [20]. Ultrasonic sensor will monitor the water level of the water tank and send it to the LCD display through NodeMCU and LCD display will show the real time data of water level. On the other hand, Relay module is connected with submersible motor pump. Submersible motor pump, Water level sensor and LED is connected with Arduino UNO [2], [7]. Water level depth detection sensor [2], will sense the water level of water storage tank and depending on the water level of water storage tank the LED bulb will blink in the three different color indicators which is Red for Low level, Yellow for Medium level and Blue for High level.

3.2 Flowchart of the proposed system

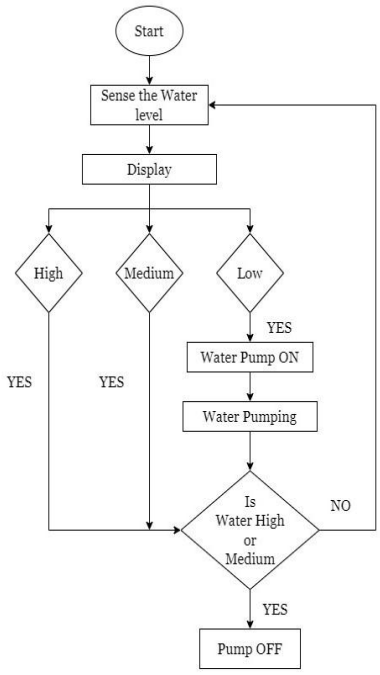

Fig.2: Flowchart of Internet of Things (IoT) based Smart Water Tank Level Monitoring and Motor Pump Control System

Fig.2 shows, the Flowchart of the project which is Internet of Things (IoT) based smart water tank level monitoring and motor control system. Ultrasonic sensor which is adjusted with the water tank, sense the water level. Than depending on the water level ultrasonic sensor will send the data to the LCD display. LCD display will show the real time data of water level as high, medium and low. If the water level will low, the pump will be ON until its show the water level high into the display and when the water level will reach to the certain level where the LCD display will show the level high, the pump will be OFF.

4. METHODOLOGY

4.1 Component connection of Water Tank

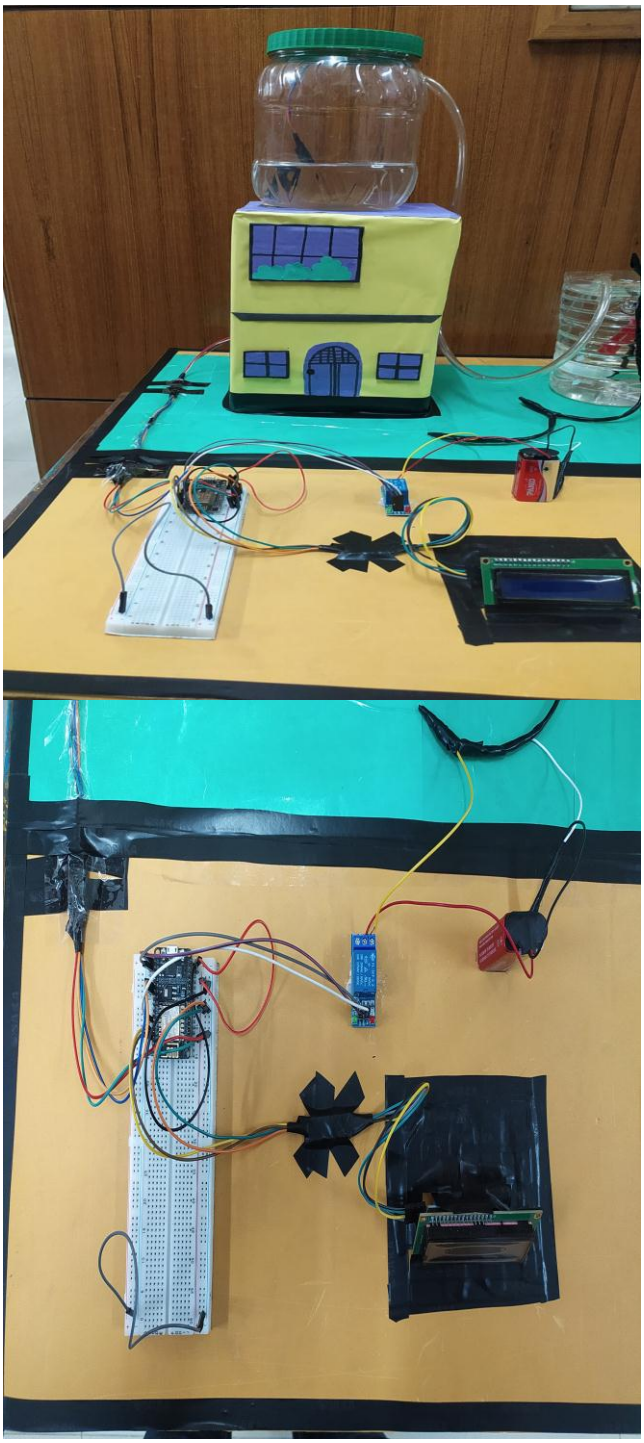

Fig.3: Water tank component connection

In Fig.3, the connection and setup of NodeMCU, Ultrasonic Sensor, Relay Module, LCD display for water tank is fully complete.

4.2 Component connection of Water Storage Tank

Fig.4: Water Storage Tank component setup

Fig.4 shows, the component connection of water storage tank, where the connection and setup of Arduino UNO, water level depth detection sensor, submersible motor pump and LED indicators are done.

4.3 Complete setup of the proposed system

Fig.5: Complete setup of System Prototype

The full setup of the proposed system which is IoT based smart water tank level monitoring and motor pump control system shows in the Fig.5.

4.4 Advantages of the proposed system:

Internet of Things (IoT) based smart water tank level monitoring and motor pump control system has several advantages, including:

I. Real-time monitoring of water levels: The system provides real-time monitoring of water levels, which helps in efficient management and prevent the wastage of water.

II. Low-cost: The system is low-cost, making it affordable for various applications.

III. Easy to install: The system is easy to install and requires minimal maintenance.

IV. User-friendly application: The Blynk application used in the system for control as well as monitoring real time data is a user-friendly dashboard that displays the water level in real-time.

5. RESULT AND DISCUSSION

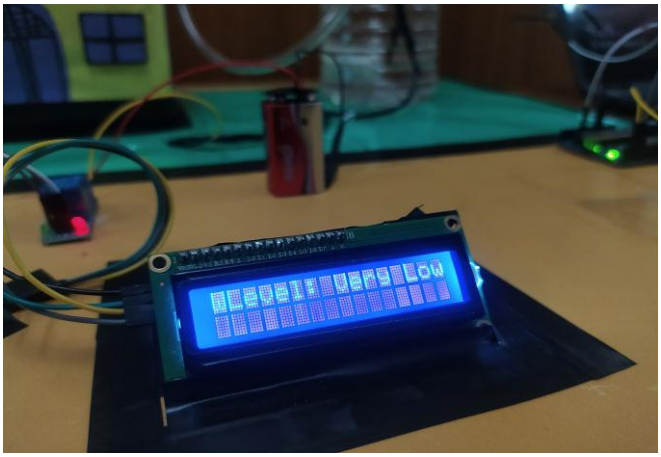

Fig.6: Water level status Low in LCD Display

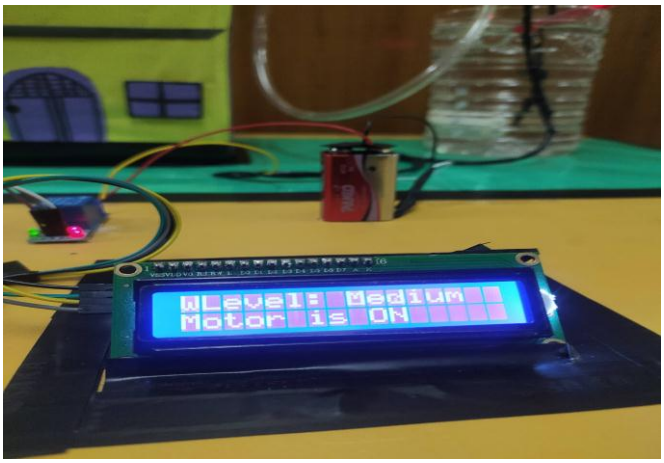

Fig.7: Water level status Medium in LCD Display

Fig.6 shows the water level status of water tank. When user uses the Blynk application and turned ON the motor, the ultrasonic sensor will monitor the water level and user can show the status in LCD display. So, in Fig.6 it shows the water level is Low. In Fig.7, the water level status is Medium and the motor is ON. So, the water is flowing from water storage tank to water tank. Fig.8 indicates the Full status of water level of water tank into the LCD display. By monitoring the LCD display user can easily turned OFF the motor pump using Blynk application so that water wastage can be prevented and user can monitor the water level of water tank accurately.

Fig.8: Water level status Full in LCD Display

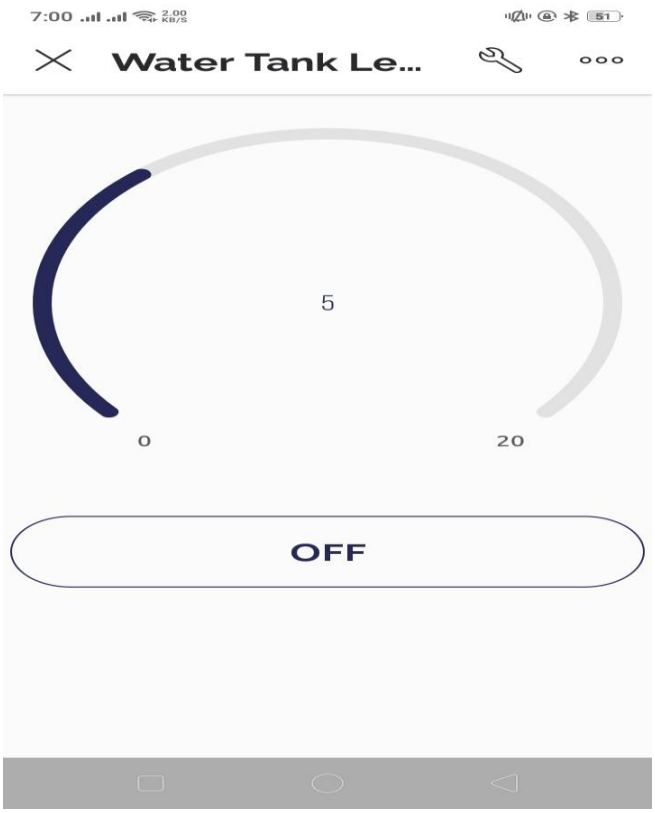

Fig.9: Interface of water level monitoring and motor pump control in Blynk application

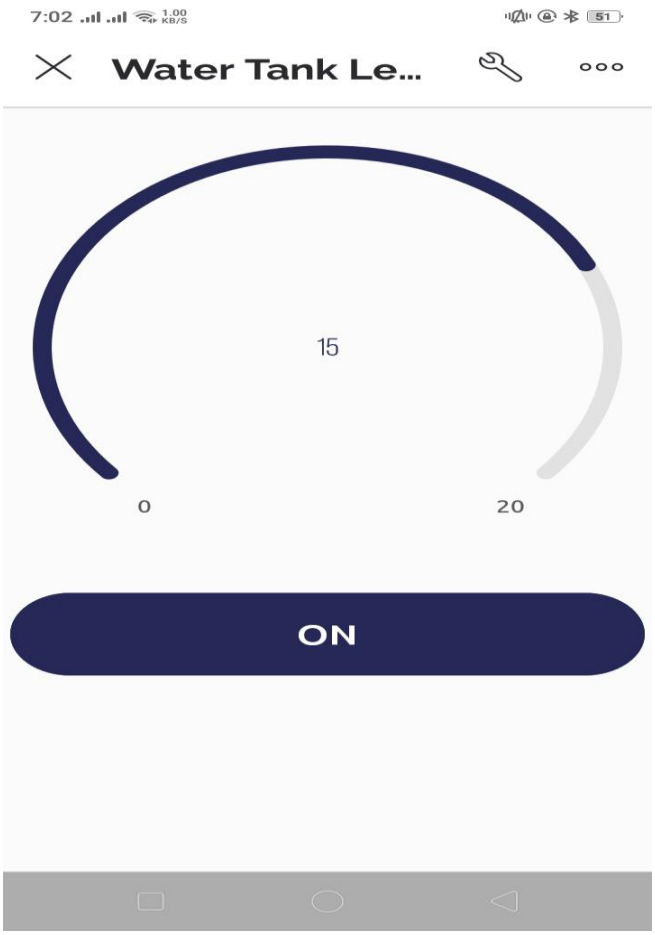

Fig.10: Real time water level monitoring in Blynk application and motor pump controlling

Fig.9 and Fig.10 shows the interface of the application and accurate water level monitoring data and submersible motor pump control using Blynk tool.

Table-1: Status of water level in water tank based on motor pump condition using Blynk

Sl. No.	Controlling Blynk	Motor Pump Condition	Status of Water level in Blynk
1	ON	ON	Starts increasing water level
2	OFF	OFF	Stops increasing water level

Whenever user taps ON to the Blynk application the Motor will be ON and water level in water tank starts increasing. Similarly, when motor is in OFF state that mean, Blynk application is OFF by the user, water level stops increasing. This can be illustrated from the Table-1.

Table-2: Monitoring Water level of water tank using Blynk application based on motor pump condition, ultrasonic sensor and LCD Display

Sl. No.	Controlling Blynk	Motor Pump Control	Water level in Blynk	Status of Ultrasonic sensor	Status of LCD Display
1	ON	ON	Starts increasing	Detecting the water level	Water level: LOW
2	ON	ON	Starts increasing	Detecting the water level	Water level: Medium
3	OFF	OFF	Stops increasing	Detecting the water level	Water level: Full

Table-2 shows that, when user click to the ON button through Blynk application motor will ON, water level starts increasing, ultrasonic sensor detecting the water level and water level is low will be displayed in the LCD display. Similarly, when the button is ON in Blynk application that means the motor is also in ON state, ultrasonic sensor detects the water level and water level medium is showing in the LCD display. Finally, when user turns OFF the motor from Blynk application and ultrasonic sensor detects the water level High, the LCD display will show the water level is Full.

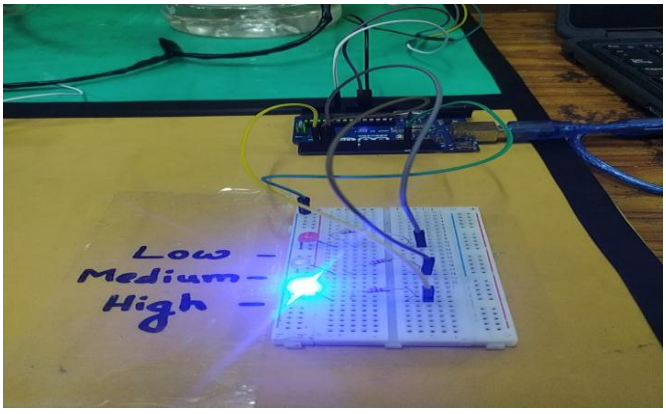

Fig.11: LED indication High

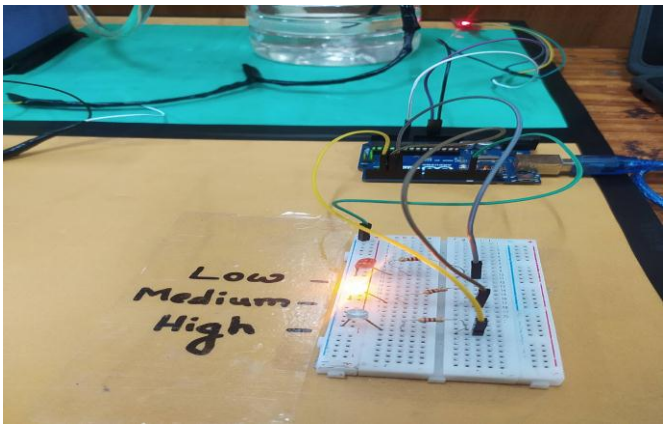

Fig.12: LED indication Medium

LED indication of water storage tank shows in the Fig.11, Fig.12 and, Fig.13. When water is full the Blue color LED will blink which indicates High that means the storage tank is full in water. Yellow color LED is for medium and Red color LED is for the indication of low level of water in the water storage tank.

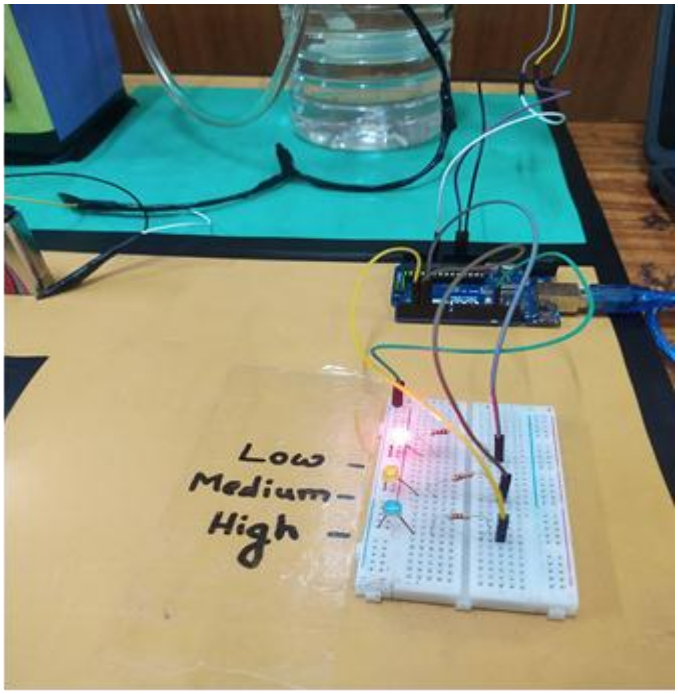

Fig.13: LED indication Low

Table-3: Status of LED and water level of water storage tank using Blynk application and water depth level sensor

Sl. No.	Controlling Blynk	Motor Pump Condition	Water level status using water depth level sensor	Status of LED
1	ON	ON	High	Glows in Blue
2	ON	ON	Medium	Glows in Yellow
3	ON/OFF	ON/OFF	Low	Glows in Red

Table-3 shows the controlling of Blynk, motor pump condition ON or OFF, water level status, and status of LED indication which is for water storage tank. When LED glows in Blue that means water level is High. Similarly, when LED blinks in Yellow it means water level is medium and Red means low water level.

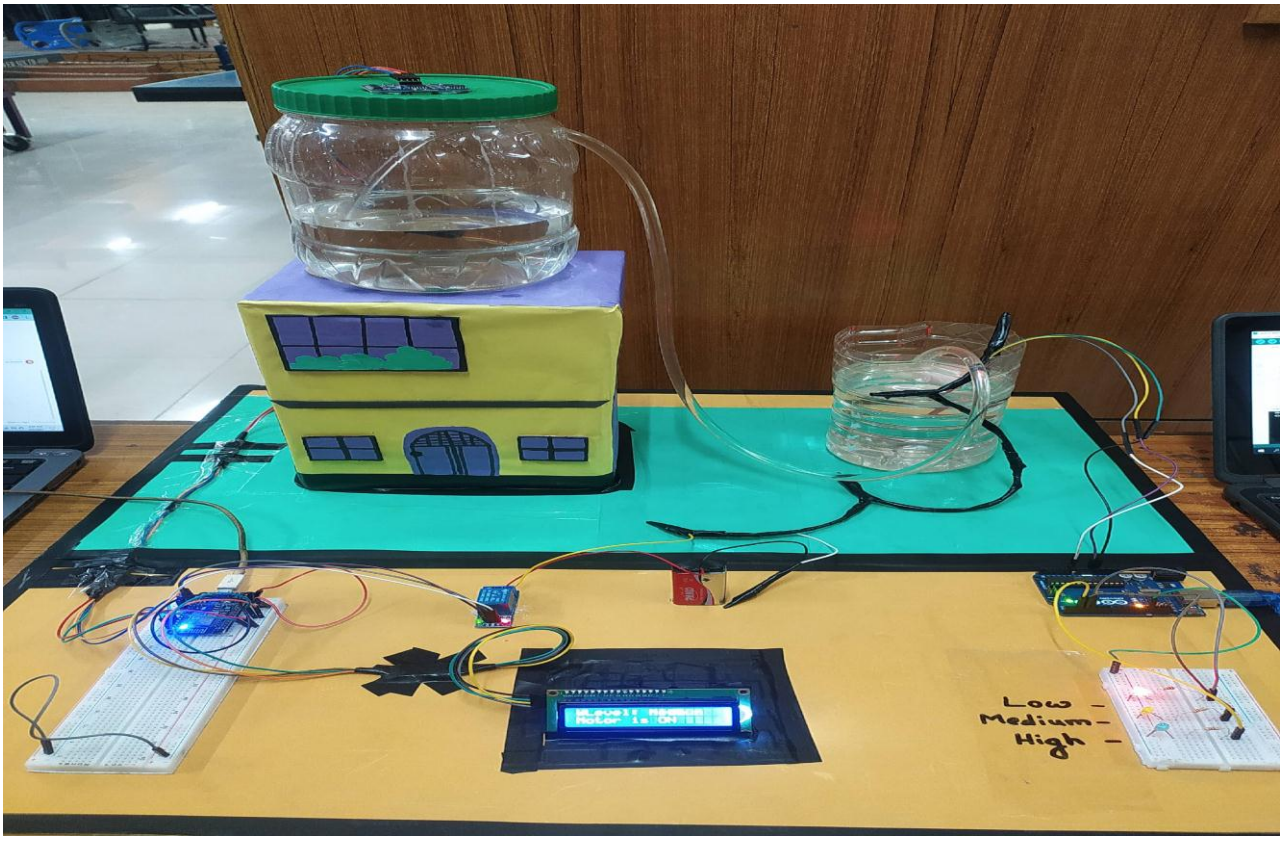

Fig.14: Internet of Things (IoT) based Smart Water Tank Level Monitoring and Motor Pump Control System

The complete proposed system which is Internet of Things (IoT) Based Smart Water Tank Level Monitoring and Motor Pump Control System is showed in the Fig.14.

5. CONCLUSIONS

A smart water tank level monitoring and motor pump control system using Internet of Things (IoT) technology is an innovative and efficient way to prevent water waste. This system allows remote monitoring and management of water tank levels through the use of sensors, communication devices, and cloud-based platforms. Through the integration of IoT technology, the water tank level monitoring and motor pump control system can provide real-time data on the water level in the tank. This information can be used to optimize water usage and prevent overflows or shortages. Overall, the use of IoT technology in water tank level monitoring and motor pump control systems can bring significant benefits in terms of prevent water waste, efficient water management, cost savings, and environmental sustainability.

REFERENCES

[1] Premi, MS Godwin, and Jyotirupa Malakar. "Automatic water tank level and pump control system." In 2019 International Conference on Intelligent Computing and Control Systems (ICCS), pp. 401-405. IEEE, 2019.

[2] Kulkarni, Sandhya A., Vishal D. Raikar, B. K. Rahul, L. V. Rakshitha, K. Sharanya, and Vandana Jha. "Intelligent Water Level Monitoring System Using IoT." In 2020 IEEE International Symposium on Sustainable Energy, Signal Processing and Cyber Security (iSSSC), pp. 1-5. IEEE, 2020.

[3] Malche, Timothy, and Priti Maheshwary. "Internet of things (IoT) based water level monitoring system for smart village." In Proceedings of International Conference on Communication and Networks: ComNet 2016, pp. 305-312. Springer Singapore, 2017.

[4] Loizou, Konstantinos, Eftichios Koutroulis, Dimitrios Zalikas, and Georgios Liontas. "A low-cost capacitive sensor for water level monitoring in large-scale storage tanks." In 2015 IEEE international conference on industrial technology (ICIT), pp. 1416-1421. IEEE, 2015.

[5] Gama-Moreno, L. A., A. Corralejo, A. Ramirez-Molina, J. A. Torres-Rangel, C. Martinez-Hernandez, and M. A. Juarez. "A design of a water tanks monitoring system based on mobile devices." In 2016 International Conference on Mechatronics, Electronics and Automotive Engineering (ICMEAE), pp. 133-138. IEEE, 2016.

[6] Getu, Beza Negash, and Hussain A. Attia. "Automatic water level sensor and controller system." In 2016 5th International Conference on Electronic Devices, Systems and Applications (ICEDSA), pp. 1-4. IEEE, 2016.

[7] Shrenika, R. M., Swati S. Chikmath, AV Ravi Kumar, Y. V. Divyashree, and Roopa K. Swamy. "Non-contact water level monitoring system implemented using labview and arduino." In 2017 international conference on recent advances in electronics and communication technology (ICRAECT), pp. 306-309. IEEE, 2017.

[8] Shah, Priyen P., Anjali A. Patil, and Subodh S. Ingleshwar. "IoT based smart water tank with Android application." In 2017 International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud)(I-SMAC), pp. 600-603. IEEE, 2017.

[9] Santra, Madhurima, Sanjoy Biswas, Sibasis Bandhapadhyay, and Kaushik Palit. "Smart wireless water level monitoring & pump controlling system." International Journal of Advances in Scientific Research and Engineering (IJASRE) 3, no. 4 (2017).

[10] Ahmed, C. Ihedioha, and I. Eneh Ifeanyichukwu. "Water Level Monitoring and Control Using Fuzzy Logic System." International Research Journal of Engineering and Technology (IRJET) 2, no. 08 (2015).

[11] Perumal, Thinagaran, Md Nasir Sulaiman, and Chui Yew Leong. "Internet of Things (IoT) enabled water monitoring system." In 2015 IEEE 4th Global Conference on Consumer Electronics (GCCE), pp. 86-87. IEEE, 2015.

[12] de Paula, Heitor TL, Joao BA Gomes, Luis FT Affonso, Ricardo AL Rabelo, and Joel JPC Rodrigues. "An IoT-Based water monitoring system for smart buildings." In 2019 IEEE International Conference on Communications Workshops (ICC Workshops), pp. 1-5. IEEE, 2019.

[13] Min-Allah, Nasro, Mehwash Farooqui, Abrar Alwashmi, Sarah Almahasheer, Malak Alsufayyan, and Najla Altulaihan. "Smart monitoring of water tanks in KSA." In 2018 International Conference on Computational Science and Computational Intelligence (CSCI), pp. 1044-1047. IEEE, 2018.

[14] Shankar, Siddartha, and M. Dakshayini. "Iot-mobile enabled smart water level controlling system to regulate water wastage." In 2018 International Conference on Advances in Computing, Communications and Informatics (ICACCI), pp. 2045-2048. IEEE, 2018.

[15] Jisha, R. C., G. Vignesh, and D. Deekshit. "IOT based water level monitoring and implementation on both agriculture and domestic areas." In 2019 2nd International Conference on Intelligent Computing, Instrumentation and Control Technologies (ICICICT), vol. 1, pp. 1119-1123. IEEE, 2019.

[16] Wadekar, Sayali, Vinayak Vakare, Ramratan Prajapati, Shivam Yadav, and Vijaypal Yadav. "Smart water management using IOT." In 2016 5th International Conference on Wireless Networks and Embedded Systems (WECON), pp. 1-4. IEEE, 2016.

[17] Gupta, Kaushik, Mandar Kulkarni, Manas Magdum, Yash Baldawa, and Shivprasad Patil. "Smart water management in housing societies using IoT." In 2018 Second International Conference on Inventive Communication and Computational Technologies (ICICCT), pp. 1609-1613. IEEE, 2018.

[18] Sulistyowati, Riny, Hari Agus Sujono, and Ahmad Khamdi Musthofa. "A river water level monitoring system using android-based wireless sensor networks for a flood early warning system." In Proceedings of Second International Conference on Electrical Systems, Technology and Information 2015 (ICESTI 2015), pp. 401-408. Springer Singapore, 2016.

[19] Kumar, GV Nagesh, C. Bhavana Reddy, K. Vijay Kumar, D. Prasanna Kumari, P. Sunil, and G. Lokesh Pavan Krishna. "Real Time Monitoring and Controlling of Water Levels in Tank with Improved Blynk Features." In 2021 International Conference on Recent Trends on Electronics, Information, Communication & Technology (RTEICT), pp. 366-370. IEEE, 2021.

[20] Dhillon, Javed, Sourov Das, Nerob Kumar Mohonto, Mehedi Hasan, Sajib Ahmed, and Sajal Chandra Das. "IoT based Water Level Monitoring and Motor Control System." In 2021 4th International Conference on Recent Developments in Control, Automation & Power Engineering (RDCAPE), pp. 30-34. IEEE, 2021.

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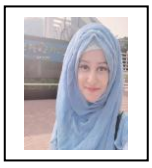

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