



Research Article

IoT-Enabled Automatic Water Level Controller for Remote Monitoring and Management

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ARTICLE INFO	ABSTRACT
Article history Received: 14 June 2026 Accepted: 24 September 2026 Published: 30 September 2026 Keywords Water Level Control, Automatic System, Real-Time Operation, IoT-Based Monitoring, Remote Water Management Correspondence Md. Shahinur Alam ✉: shahinur.fpm@bau.edu.bd  OPEN ACCESS	An automatic water level controller plays a crucial role in efficient water management. Such a system offers a convenient and efficient solution for managing water reservoirs and addresses the growing need for effective water management in various applications, from domestic water tanks to industrial reservoirs. The core functionality of the proposed system revolves around real-time water level monitoring within a tank and subsequent pump control based on user-defined thresholds. It consists of sensors to detect water levels, a control unit to process sensor data, and an actuator (usually a pump) to adjust the water level based on control unit decisions. The design considerations encompass the selection of an appropriate non-contact capacitive liquid level sensor, Arduino Uno Rev4 microcontroller, relay module, and water pump. Programming the microcontroller dictates functionalities like pump activation and deactivation at specific water levels. It can also be done remotely by using IoT-based technology. The selection of appropriate electronic components ensures reliable system operation. Software development for the microcontroller involves writing a program to translate sensor readings into control signals for the pump and user interface elements. Rigorous testing procedures are paramount to validate the system's performance. This includes verifying the accuracy of water level detection by the chosen sensor and ensuring reliable pump control based on the programmed thresholds. By automating water level management, these controllers can conserve water, prevent overflows, and ensure a consistent water supply.
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Introduction

Water is an essential resource for all living beings, serving crucial roles in personal, industrial, and agricultural activities (Sahlan et al., 2019). Freshwater, which contains relatively low levels of salt and dissolved solids, is indispensable for various human functions, including farming, manufacturing, and domestic use. However, access to this resource is limited, with approximately 69% of freshwater trapped in glaciers and polar icecaps and around 30% stored as groundwater, leaving only about 1% of the total freshwater available for human consumption (Lin et al., 2011; Nasirudin et al., 2011). The effective management of water is crucial for diverse sectors like agriculture, industry, and domestic use, particularly as global water demand rises due to population growth and urbanization. Several factors contribute to the water crisis, including the unequal distribution of resources, rapid urbanization, growing industrial

activities, and a lack of awareness regarding water consumption. A critical component of water management involves monitoring and regulating water levels in storage systems, reservoirs, and other containment facilities (Lin et al., 2011; Mittal, 2015; Shankar & Dakshayani, 2018; Suwaileh et al., 2020).

Agriculture is a major consumer of freshwater, which is crucial for meeting the growing food demands. With global food requirements expected to increase by over 50% in the next 30 years due to ongoing population growth, the pressure on freshwater resources will intensify (Adu-Manu et al., 2017). To address the challenges posed by the water crisis, various global initiatives are focusing on the sustainable management of freshwater resources (Narayanan & Sankaranarayanan, 2020). Traditional methods of water level control often involve manual inputs, which are time-consuming, prone to human error, and inefficient

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in resource use (Anyanwu et al., 2012). However, recent developments in automation and remote sensing technologies have paved the way for advanced systems that can monitor and manage water levels with minimal human intervention (Singh & Ahmed, 2021). Among these, IoT-based Water Storage Tank (IoT-WST) systems have gained considerable attention. These systems offer key features such as automatic water level monitoring, leakage detection in tanks and supply lines, automated refilling to prevent dry pump runs, and remote access for users to control and monitor system activities (Ahmed et al., 2020; Min-Allah et al., 2018; Rao et al., 2018; Redwan et al., 2019; Shankar & Dakshayini, 2018).

Automation refers to the use of control systems to operate machines, processes, or entire systems with minimal human involvement. A key component in automation is the Programmable Logic Controller (PLC), a digital computer designed to manage electromechanical operations. PLCs are known for being cost-effective, easy to troubleshoot, and highly reliable (Panchal et al., 2015; Soundhrya, 2016). The Internet of Things (IoT) enhances automation by enabling seamless data exchange between devices, users, and logistics systems. This connectivity has had a significant impact on sectors such as manufacturing, home security, and especially agriculture. IoT has introduced smart farming techniques in agriculture that boost productivity and help overcome common farming challenges (Al Mamun et al., 2025; Malavade & Akulwar, 2016). One notable trend is the growing use of Wi-Fi in agricultural IoT setups due to its scalability and fast data transmission capabilities (Lloret et al., 2021). A major advancement in this area is the development of remotely controlled automatic water level controllers. These systems provide better convenience, reduce water waste, and support efficient use of resources. They function by integrating various components such as water level sensors, microcontrollers, actuators, and communication modules to allow for real-time monitoring and control of water levels. For effective performance, these components must be designed with a focus on precision, reliability, expandability, and energy efficiency (AlGhamdi & Sharma, 2022; Ismail et al., 2022). Given the complexity of remote operations, it is also essential to implement strong communication protocols and user-friendly interfaces to ensure smooth and reliable functionality (Gade, 2021).

Numerous studies have investigated IoT-based automatic water level control systems across different applications. For instance, the system developed by Band & Anyasi (2014) utilized a mercury flow switch based on Archimedes' principle to control a motor. However, the major drawbacks were its slow response

time and the hazardous nature of mercury. In another approach (Getu & Attia, 2016), electrode-resistive sensors were paired with digital circuits to detect water levels and activate a pump using a relay-based driver. Researchers (Pudasaini et al., 2014; Sood et al., 2013) advanced the concept further by incorporating IoT technology with SMS alerts and modern sensing tools, enabling real-time monitoring and better management of water systems. These systems proved particularly useful during power outages, as they allowed users to monitor and maintain water levels remotely. Additional studies (Ajao et al., 2019; Shankar & Dakshayini, 2018; Shrenika et al., 2017) have implemented solutions involving ultrasonic sensors, Arduino microcontrollers, and relay drivers. Such configurations automate the water pumping process in multi-tank environments, reducing human intervention and minimizing water wastage. Recent innovations (Asha & Srija, 2020; Rakshitha & Maheshan, 2020) focus on mobile-based interfaces and the use of sophisticated sensors like ultrasonic and radar types. These systems not only measure water levels accurately but also offer remote operation through Bluetooth and Wi-Fi, making them ideal for environments that demand continuous water monitoring and control.

In this context, the present paper proposes a remotely operated IoT-enabled automatic water level controller, emphasizing the seamless integration of both hardware and software components to achieve dependable and efficient water management. The system is designed to be versatile, catering to applications ranging from household water tanks to industrial-scale reservoirs. By employing modern technologies such as Wi-Fi connectivity, advanced capacitive sensors, and app-based control mechanisms, this system aims to overcome the shortcomings of traditional methods and deliver a sustainable, scalable solution for managing water resources effectively in today's world.

Methodology

The methodology outlines the development of an automatic water level controller with remote monitoring capabilities using an Arduino Uno Rev4 development board and appropriate sensors. The system aims to automate water tank filling/emptying based on predefined levels and provide real-time water level data remotely.

System Architecture

The system architecture (as shown in Fig. 1) consists of an Arduino Uno Rev4 microcontroller connected to two non-contact capacitive liquid-level sensors and a Wi-Fi module for remote monitoring. These sensors continuously measure the water level in the tank and

send real-time data to the microcontroller. Based on this input, the microcontroller automatically turns the water pump on or off to maintain the desired water level. The Wi-Fi module allows the system to send this data to the Blynk app, a cloud-based platform that users can access through their smartphones or web

browsers. This provides a convenient and easy-to-use interface for monitoring water levels and controlling the pump remotely. In addition to its automated functionality, the system also supports manual pump control through the Blynk app whenever needed.

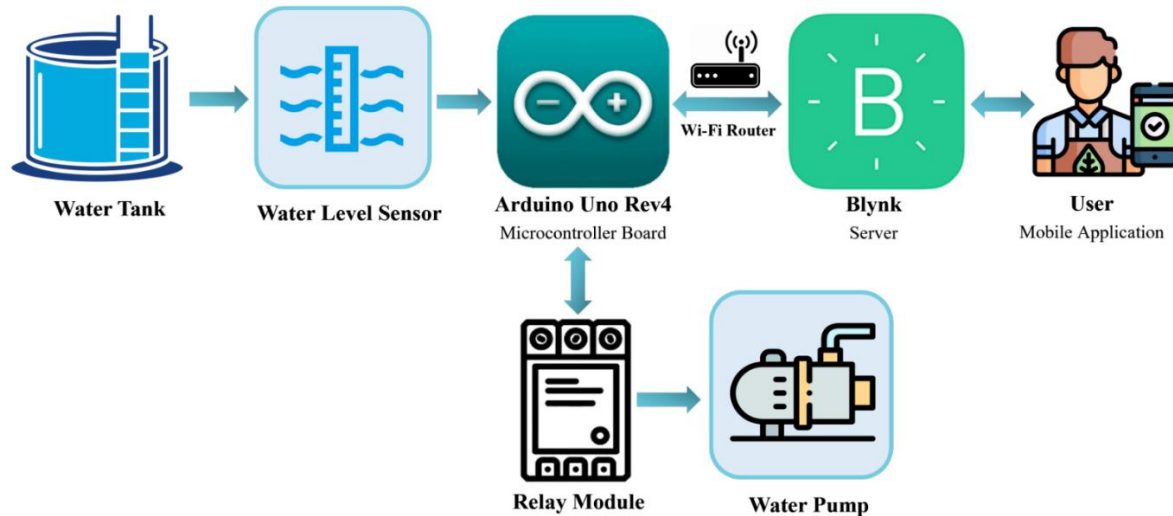


Fig. 1: System architecture of the automatic water level monitoring and control system

Hardware Design

The central aspect of the proposed prototype is the hardware component, which includes essential elements for implementing the system. It integrates a microcontroller, sensors, a Wi-Fi module, and a relay to enable real-time water level monitoring and control.

Microcontroller

The Arduino Uno Rev4 Wi-Fi (Fig. 2 (a)) is a flexible and user-friendly board that offers ample processing power for this research. It is equipped with the Renesas RA4M1 microcontroller, which features an ARM Cortex-M4 processor running at 48 MHz, providing strong performance for handling real-time data. The microcontroller includes 256 KB of flash memory and 32 KB of SRAM, allowing it to manage the complex tasks required for this application. The board has 14 digital I/O pins that can be set as either inputs or outputs, making it compatible with sensors, relays, and other electronic components. Six of these pins support Pulse Width Modulation (PWM), allowing precise control over devices like motors. In addition, the six analog input pins enable the board to read analog signals from various sensors, which is crucial for monitoring factors like water levels. The ESP32-S3 Wi-Fi module on the board enables wireless connectivity, allowing the Arduino to communicate with the cloud platform.

Sensors

The system uses a non-contact capacitive liquid level sensor (as shown in Fig. 2 (b)) to detect water levels. This sensor works by measuring changes in capacitance as the liquid level rises, providing real-time feedback without coming into direct contact with the liquid. It is highly sensitive and offers adjustable sensitivity. The sensor is ideal for use in non-metallic containers and pipes (with an outer diameter greater than 11mm) and is resistant to corrosive substances such as acids and alkalis. It features a 4-pin adapter for easy connection to microcontrollers like Arduino and operates within a voltage range of 5-12V. With a quick response time of 500ms, high stability, and IP65-rated waterproofing, this sensor ensures reliable and accurate monitoring of water levels in tanks and other liquid containers.

Wi-Fi Module

The system uses a GP 4G Pocket Router ZTE MF937U, which features a Cortex-A53 processor operating at 624 MHz. It connects through a 2.4 GHz single-band Wi-Fi frequency and supports a data speed of up to 300 Mbps. The router has a micro-USB port for power and a SIM card slot for mobile data access, allowing the system to connect to a Wi-Fi network and transmit data remotely. Additionally, the ESP32-S3 Wi-Fi module integrated into the Arduino Uno Rev4 enables the microcontroller to wirelessly send water level data to a

remote server or cloud platform for real-time monitoring and control, as depicted in Fig. 2 (c).

Activators

The system utilizes a Centrifugal Water Pump (Fig. 2 (d)) to manage the water flow in response to signals from the microcontroller. This pump is designed to efficiently circulate water, making it suitable for both domestic and industrial water management applications. It operates by drawing water into the pump and

discharging it through an outlet, ensuring automatic control of the water level in the tank.

The activation and control of the pump are facilitated by a Gravity: Digital 16A Relay Module (Fig. 2 (e)), which acts as a bridge between the Arduino Uno Rev4 and the pump. This relay module is capable of handling the required current to switch the pump on and off based on the water level readings from the sensors. The pump is activated when the water level drops below the predefined threshold and is deactivated once the water level reaches the desired point.

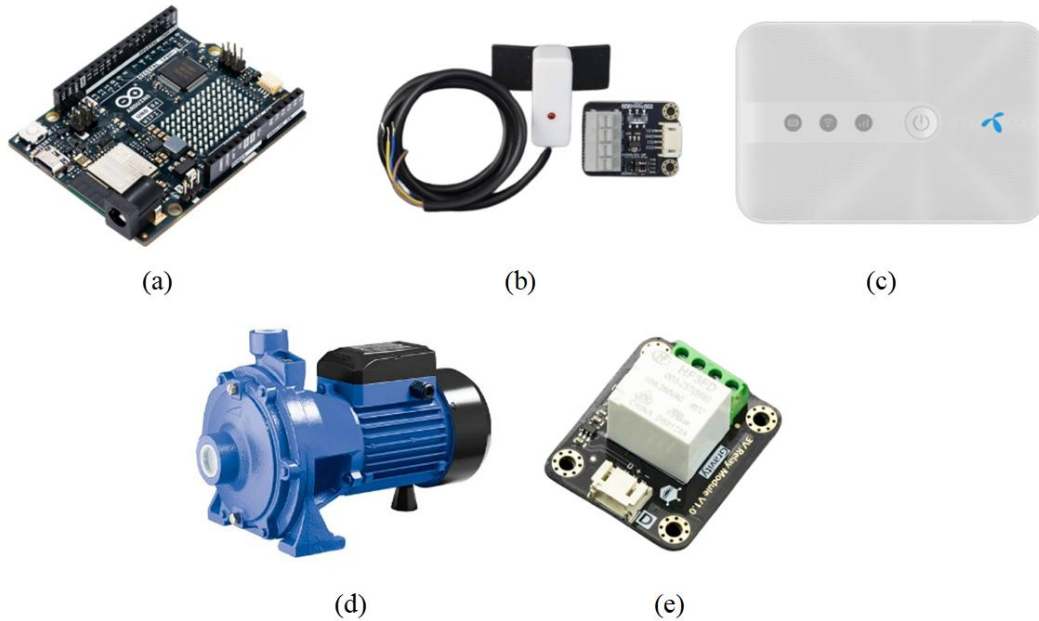


Fig. 2: Basic components: (a) Arduino Uno Rev4, (b) non-contact capacitive liquid level sensor, (c) GP 4G Pocket Router (ZTE MF937U), (d) Centrifugal Water Pump, and (e) Gravity: Digital 16A Relay Module

The circuit diagram demonstrated in Fig. 3 connects two non-contact capacitive liquid level sensors to the Arduino Uno Rev4, which processes the sensor data. The Arduino is linked to a relay module that controls

the centrifugal water pump. The relay module acts as an intermediary between the Arduino and the pump, enabling the pump to turn on or off based on the water level readings.

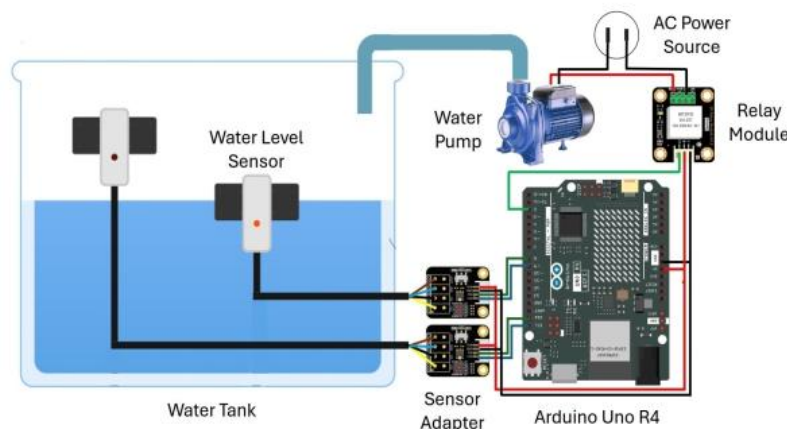


Fig. 3: Circuit diagram of the system

Software Design

This research used the Blynk IoT platform to enable remote monitoring and control. The sensor modules were programmed using the Arduino Integrated Development Environment (IDE), which utilizes a modified C++ language with custom methods tailored for Arduino hardware. The programming was done independently, ensuring accurate sensor calibration without the use of external libraries. The software version used was 2.2.1. A virtual pin was assigned to the Blynk app to connect the sensors to Blynk. The Blynk version for this study was 2.0. Additionally, a manual

button was implemented to control the actuator, which could be operated through the web dashboard or a mobile device.

Logical Structure

Fig. 4 illustrates the logical structure of the proposed task. The flowchart describes a system that automatically controls a water pump based on the water level in a tank or reservoir. It uses two sensors, one at the top and one at the bottom, to determine the water level.

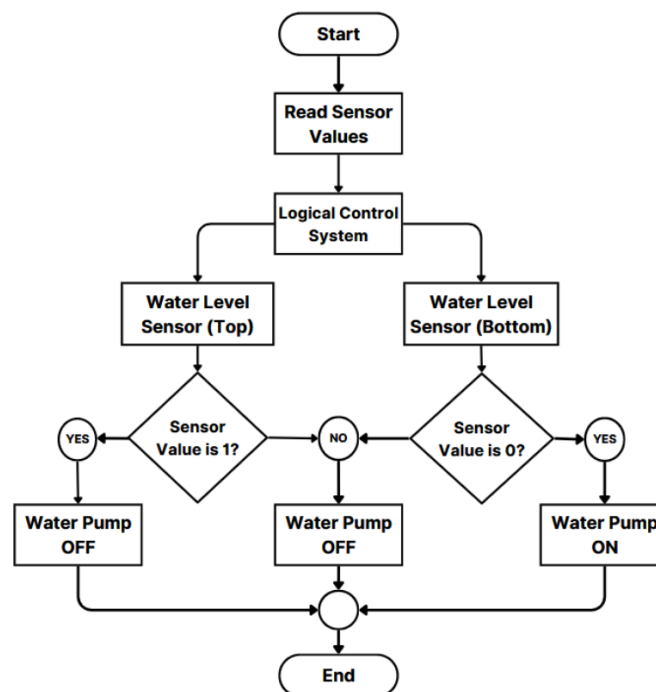


Fig. 4: Flowchart of the water level monitoring and management system

Start: The process begins.

Read Sensor Values: The system reads the values from both the top and bottom water level sensors. These sensors likely output a digital signal:

1 indicates the sensor is submerged in water (the water level is at or above the sensor).

0 probably indicates the sensor is not submerged (the water level is below the sensor).

Logical Control System: This is where the logic of the system resides. Based on the sensor readings, the system decides whether to turn the water pump on or off.

Water Level Sensor (Top):

Diamond Shape (Decision): "Sensor Value is 1?" This checks the reading from the top sensor.

YES: If the top sensor reads 1 (water is at the top), the path goes to "Water Pump OFF". There's no need to pump more water if it's already full.

NO: If the top sensor reads 0 (water is below the top sensor), the path goes to the next decision.

Water Level Sensor (Bottom):

Diamond Shape (Decision): "Sensor Value is 0?" This checks the reading from the bottom sensor.

YES: If the bottom sensor reads 0 (water is below the bottom sensor), the path goes to "Water Pump ON". This means the tank needs water, so the pump is turned on.

NO: If the bottom sensor reads 1 (water is at or above the bottom sensor), the path goes to "Water Pump OFF". This means there's enough water, so the pump is turned off.

Water Pump ON/OFF: These boxes represent the actions taken by the system – turning the water pump on or off based on the sensor readings.

End: The process ends, likely to loop back to the "Read Sensor Values" step to continuously monitor the water level.

Results and Discussion

The hardware setup for the automatic water level monitoring system, as shown in Fig. 5, consists of an Arduino Uno Rev4 microcontroller connected to non-contact capacitive liquid level sensors and a relay module. The system was successfully tested in a lab trial, where the water levels were monitored in real-

time via the Blynk app, allowing for remote control and ensuring accurate pump operation. The non-contact capacitive liquid level sensors were thoroughly tested to ensure their accuracy in detecting water levels. These sensors are designed to detect the capacitance changes as the water level rises or falls. The system demonstrated high accuracy in reading water levels and responded promptly to changes in water level conditions. These tests were crucial in ensuring that the sensors reliably activated the pump when the water level fell below the predefined threshold and deactivated it once the desired water level was achieved.

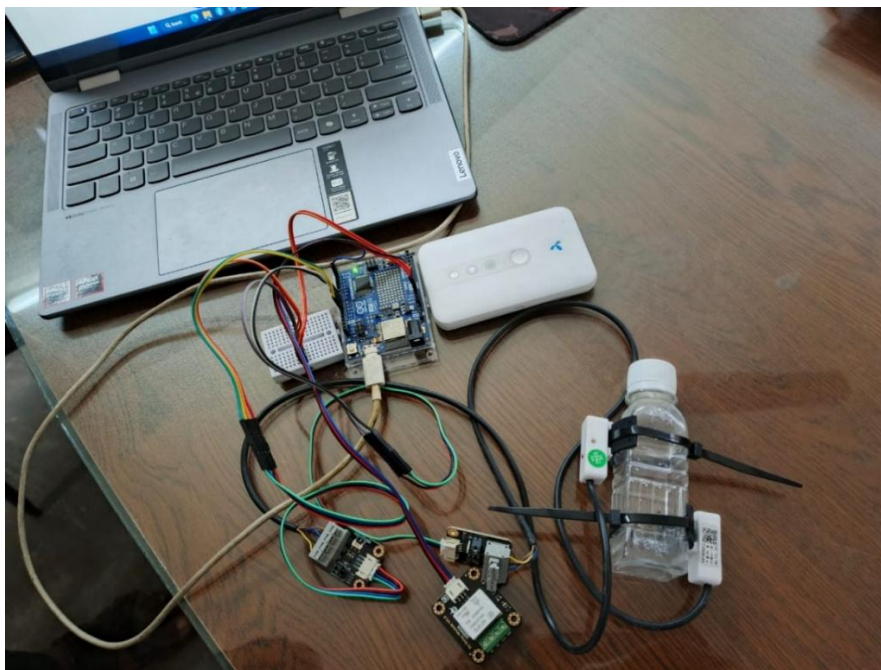


Fig. 5: Automatic water level monitoring and management system

Table 1. Operational activity

Condition	Action	Picture
Water at the lower sensor level	Pump Turn On	

Water at the upper sensor level
Pump Turn Off



The system also accounted for potential discrepancies in sensor readings by calibrating the sensors during testing, minimizing any potential errors in the pump's operation. As a result, the system maintained a high level of reliability under various operating conditions.

Table 1 summarizes the operational activity under various water level conditions and corresponding actions taken by the system.

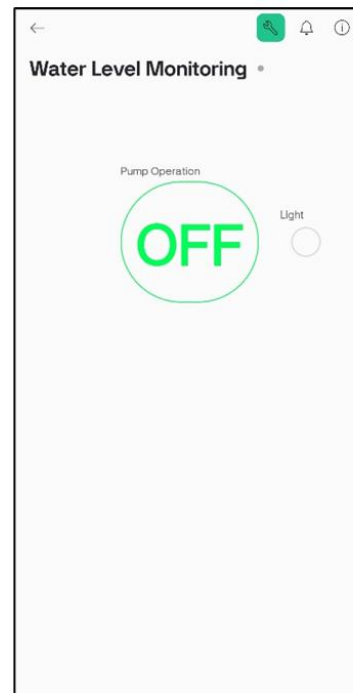


Fig. 6: Manual control through the Blynk application

The system was designed to operate with minimal human input, automatically adjusting the water pump based on the water level detected by the sensors. The Arduino Uno Rev4 processes this data and controls the pump accordingly. However, the system also offers manual control via the Blynk IoT platform. Users can override the automatic settings through the Blynk app, which includes virtual buttons or switches to manually turn the pump on or off, as seen in Fig. 6. This manual control is particularly helpful for urgent situations or when users need to test or modify the system's settings. During testing, this feature proved effective, allowing users to remotely control the pump through the app, even during temporary network interruptions or connectivity problems.

The system was deployed in a real-world field setup to evaluate its performance under practical conditions. During the trial, the system continuously recorded sensor data, allowing the app to display water levels and enabling manual control of the pump if necessary.

The graph in Fig. 7 illustrates the correlation between water level changes and relay-controlled pump operation over time. When the water level falls below the predefined threshold, the relay is activated, turning the pump on, as shown by an upward spike indicating water input.

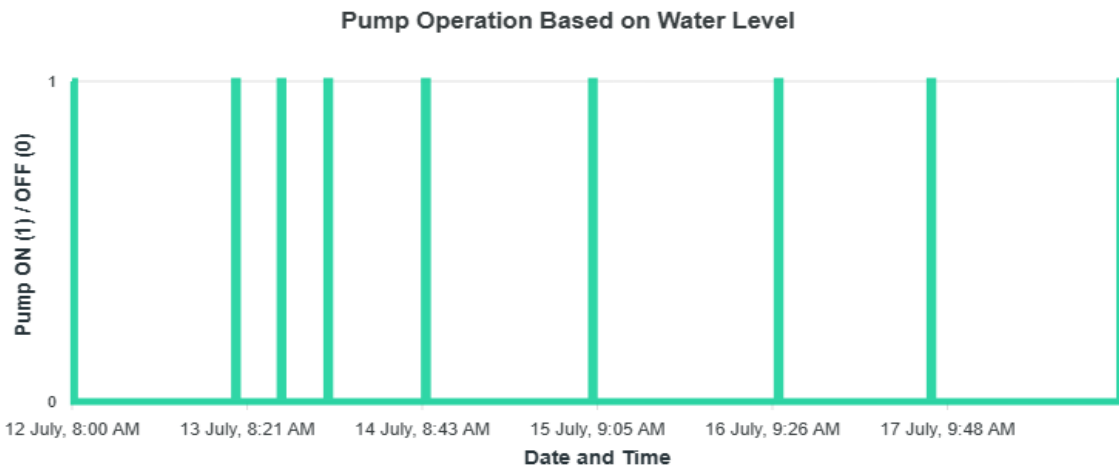


Fig. 7. Pump operation based on water level

Conversely, when the water level reaches the upper threshold, the relay deactivates, turning the pump off, and the graph shows a steady state or a decrease in water input. These transitions are clearly marked, demonstrating the system's response to water level fluctuations, ensuring that the reservoir maintains the optimal water level. The graph effectively showcases how the relay-controlled pump operates automatically based on sensor readings, highlighting the system's efficiency and responsiveness. The results confirmed that the system effectively maintained the desired water level, accurately responded to fluctuations, and adjusted the pump operation accordingly, ensuring reliable water management with real-time monitoring accessible remotely.

Conclusion

The combination of non-contact capacitive liquid level sensors, the Arduino Uno Rev4, and a relay module creates a robust and efficient water level control system. This setup is ideal for applications in agriculture, home automation, or industrial processes, where maintaining precise liquid levels is critical. By leveraging Arduino's programmability, the system can be easily customized to suit specific requirements, making it a versatile and cost-effective solution for liquid-level monitoring and control. The combination of real-time monitoring, automated control, and manual override capabilities makes this system highly versatile and user-friendly. Whether for agricultural irrigation, home water storage, or industrial applications, this setup ensures optimal water management while providing users with the convenience of remote access and control. By integrating IoT technology with Arduino and capacitive sensors, this system represents a modern, efficient, and scalable solution for water-level monitoring and management.

Authors' Contributions

Ehsanul Kabir: Conceptualization, Funding acquisition, Investigation, Project administration, Resources, Supervision, Writing – original draft. Md. Rostom Ali: Investigation, Supervision, Validation, writing – review and editing. Md. Rasel Al Mamun: Investigation, Methodology, Software, Visualization, Writing – original draft. Nafis Shahriar Ahmed: Formal analysis, Methodology, Visualization, Writing – original draft. Md. Shahinur Alam: Data curation, Formal analysis, Validation, Visualization, writing – review and editing.

Ethics Approval and Consent to Participate

Not applicable.

Consent for Publication

All contributing authors approve the publication of this work.

Conflicts of Interest

There are no competing interests to disclose.

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Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

Nothing to disclose.

Availability of Data

The data supporting the findings of this study can be obtained from the corresponding author upon reasonable request.

Code Availability

Related Codes are not available for others now. The authors would like to make the related codes available through an online repository in the future.

References

- Adu-Manu, K. S., Tapparello, C., Heinzelman, W., Katsriku, F. A., & Abdulai, J.-D. (2017). Water Quality Monitoring Using Wireless Sensor Networks. *ACM Transactions on Sensor Networks*, 13(1), 1–41. <https://doi.org/10.1145/3005719>
- Ahmed, U., Mumtaz, R., Anwar, H., Mumtaz, S., & Qamar, A. M. (2020). Water quality monitoring: from conventional to emerging technologies. *Water Supply*, 20(1), 28–45. <https://doi.org/10.2166/ws.2019.144>
- Ajao, L. A., Abisoye, B. O., Agajo, J., Ajao, A. O., Muazu, M. B., & Salami, F. A. (2019, March). Automated multiple water tanks control system using ATMEGA and FPGA technology. *2019 IEEE 1st International Conference on Mechatronics, Automation and Cyber-Physical Computer System*.
- Al Mamun, Md. R., Ahmed, A. K., Upoma, S. M., Haque, M., & Ashik-E-Rabbani, M. (2025). IoT-enabled solar-powered smart irrigation for precision agriculture. *Smart Agricultural Technology*, 10, 100773. <https://doi.org/10.1016/j.atech.2025.100773>
- AlGhamdi, R., & Sharma, S. K. (2022). IoT-Based Smart Water Management Systems for Residential Buildings in Saudi Arabia. *Processes*, 10(11), 2462. <https://doi.org/10.3390/pr10112462>
- Anyanwu, C. N., Mbajorgu, C. C., & Anoliefo, E. C. (2012). Design and implementation of a water level controller. *Nigerian Journal of Technology*, 31(1), 89–92.
- Asha, Mrs. T., & Srija, Mrs. V. (2020). Design and Implementation of Wireless Based Water Level Monitoring System Using Arduino and Bluetooth. *International Research Journal of Engineering and Technology (IRJET)*, 7(1), 745–749.
- Band, E. J., & Anyasi, F. I. (2014). Design of an Automatic Water Level Controller Using Mercury Float Switch. *IOSR Journal of Electronics and Communication Engineering (IOSR-JECE)*, 9(2), 16–21.
- Gade, D. S. (2021). Reinventing Smart Water Management System through ICT and IoT Driven Solution for Smart Cities. *International Journal of Applied Engineering and Management Letters (IJAEML)*, 5(2), 132–151.
- Getu, B. N., & Attia, H. A. (2016). Automatic water level sensor and controller system. *2016 5th International Conference on Electronic Devices, Systems and Applications (ICEDSA)*, 1–4. <https://doi.org/10.1109/ICEDSA.2016.7818550>
- Ismail, S., Dawoud, D. W., Ismail, N., Marsh, R., & Alshami, A. S. (2022). IoT-Based Water Management Systems: Survey and Future Research Direction. *IEEE Access*, 10, 35942–35952. <https://doi.org/10.1109/ACCESS.2022.3163742>
- Lin, Z., Duo Wang, Gao, C., & Gao, Z. (2011). Impacts of seawater desalination on environment. *2011 Second International Conference on Mechanic Automation and Control Engineering*, 2228–2233. <https://doi.org/10.1109/MACE.2011.5987422>
- Lloret, J., Sendra, S., García-Fernández, J., García, L., & Jimenez, J. M. (2021). A WiFi-Based Sensor Network for Flood Irrigation Control in Agriculture. *Electronics*, 10(20), 2454. <https://doi.org/10.3390/electronics10202454>
- Malavade, V. N., & Akulwar, P. K. (2016). Role of IoT in agriculture. *IOSR Journal of Computer Engineering*, 2016, 2278–0661.
- Min-Allah, N., Farooqui, M., Alwashmi, A., Almahasheer, S., Alsufayyan, M., & Altulaihan, N. (2018). Smart Monitoring of Water Tanks in KSA. *2018 International Conference on Computational Science and Computational Intelligence (CSCI)*, 1044–1047. <https://doi.org/10.1109/CSCI46756.2018.00203>
- Mittal, V. (2015). Automatic water level controller. *International Journal of Science and Research (IJSR)*, 6(5), 136–138.
- Narayanan, L. K., & Sankaranarayanan, S. (2020). IoT-based water demand forecasting and distribution design for smart city. *Journal of Water and Climate Change*, 11(4), 1411–1428. <https://doi.org/10.2166/wcc.2019.019>
- Nasirudin, M. A., Za'bah, U. N., & Sidek, O. (2011). Fresh water real-time monitoring system based on Wireless Sensor Network and GSM. *2011 IEEE Conference on Open Systems*, 354–357. <https://doi.org/10.1109/ICOS.2011.6079290>
- Panchal, P., Patel, A., & Barve, J. (2015). PI control of level control system using PLC and LabVIEW based SCADA. *2015 International Conference on Industrial Instrumentation and Control (IIC)*, 1196–1201. <https://doi.org/10.1109/IIC.2015.7150929>
- Pudasaini, S., Pathak, A., Dhakal, S., & Paudel, M. (2014). Automatic Water Level Controller with Short Messaging Service (SMS) Notification. *International Journal of Scientific and Research Publications*, 4(9), 1–4.
- Rakshitha, M. R., & Maheshan, C. M. (2020). A Review on Water Level & Quality Monitoring System. *International Journal of Engineering Research & Technology (IJERT)*, 8(14), 78–80.
- Rao, K. R., Srinija, S., Bindu, K. H., & Kumar, D. S. (2018). IOT based water level and quality monitoring system in overhead tanks. *International Journal of Engineering & Technology*, 7(2), 379–383.
- Redwan, F., Rafid, S., Abrar, A. H., & Banik Pathik, B. (2019). An Exploratory Approach to Monitor the Quality of Supply-Water Through IoT Technology. *2019 International Conference on Automation, Computational and Technology Management (ICACTM)*, 137–142. <https://doi.org/10.1109/ICACTM.2019.8776805>
- Sahlan, S., Mazlan, M. M., Nasir, N. M., Rosli, K. I., Manaf, M. S. A., & Yamin, A. H. M. (2019). Fully Automated Control and Monitoring For Liquid Level System. *2019 2nd International Conference on Applied Engineering (ICAE)*, 1–4. <https://doi.org/10.1109/ICAE47758.2019.9221690>
- Shankar, S., & Dakshayani, M. (2018). IoT-Mobile Enabled Smart Water Level Controlling System to Regulate Water Wastage. *2018 International Conference on Advances in Computing, Communications and Informatics (ICACCI)*, 2045–2048. <https://doi.org/10.1109/ICACCI.2018.8554373>
- Shrenika, R. M., Chikmath, S. S., Kumar, A. V. R., Divyashree, Y. V., & Swamy, R. K. (2017). Non-contact Water Level Monitoring System Implemented Using LabVIEW and Arduino. *2017 International Conference on Recent Advances in Electronics and Communication Technology (ICRAECT)*, 306–309. <https://doi.org/10.1109/ICRAECT.2017.51>
- Singh, M., & Ahmed, S. (2021). IoT based smart water management systems: A systematic review. *Materials Today: Proceedings*, 46, 5211–5218. <https://doi.org/10.1016/j.matpr.2020.08.588>
- Sood, R., Kaur, M., & Lenka, H. (2013). Design and Development of Automatic Water Flowmeter. *International Journal of Computer Science, Engineering and Applications*, 3(3), 49–59. <https://doi.org/10.5121/ijcsea.2013.3306>
- Soundhrya, V. (2016). Automation in water board using PLC with SCADA. *Int. J. Adv. Res. Biol. Eng. Sci. Technol.*, 2.
- Suwaileh, W., Johnson, D., & Hilal, N. (2020). Membrane desalination and water re-use for agriculture: State of the art and future outlook. *Desalination*, 491, 114559. <https://doi.org/10.1016/j.desal.2020.114559>