2581-4575
International Journal For Recent Developments in Science & Technology
Crossref
A Peer Reviewed Research Journal

AUTOMATIC STOP GATE AT BRIDGES FOR OVERFLOW

[1]DR.K SUDHAKAR, [2]E.SPOORTHI REDDY, [3]G.SHIVAMANI, [4]I.VARSHITHA

[1]Assistant Professor, Department of Electronics and Communication Engineering,**MALLA REDDY ENGINEERING COLLEGE FOR WOMEN,** Maisammaguda, Dhulapally Kompally, Medchal Rd, M, Secunderabad, Telangana.

[2,3,4]Student, Department of Electronics and Communication Engineering,**MALLA REDDY ENGINEERING COLLEGE FOR WOMEN,** Maisammaguda, Dhulapally Kompally, Medchal Rd, M, Secunderabad, Telangana.

ABSTRACT

Floods are catastrophic events characterized by the overflow of large amounts of water, leading to extensive damage and destruction across affected areas. Globally, floods occur annually due to excessive rainfall and inadequate drainage systems, with their severity varying by region. To mitigate the impacts of flooding, especially in flood-prone areas, it is crucial to implement effective flood management strategies. Identifying the frequency of floods and assessing risk levels can significantly reduce potential damage. Proper flood risk models, coastal development programs, and water level gauges are essential for accurate flood prediction and response. Automated flood barriers represent a proactive approach to flood control. These barriers, often installed at elevated positions on buildings, feature self-activating and self-closing mechanisms. They can automatically rise in response to rising floodwaters or be manually controlled via a push button, providing peace of mind and efficient flood management.

Keywords—Autonomous Floodgate, Arduino Uno, Motor Driver Controller.

I. INTRODUCTION

Flood barriers are a widely used solution for flood defense, consisting of two flood seals and a PVC flood board that can be adjusted to fit various door sizes. These barriers are lightweight and designed for quick installation during flood conditions, providing a practical solution for protecting properties from flooding. While building at a higher elevation is beneficial, it does not guarantee complete flood protection. Flood barriers become crucial in safeguarding properties from potential disasters, even in elevated locations. Water management remains a critical issue, with limited water supplies and complex infrastructure posing significant challenges. Effective water management requires the coordination of various subsystems, including supply, treatment, transportation, and distribution. To address these challenges, hydraulic engineers use automated control techniques to improve the real-time performance of water management systems.

This paper proposes an autonomous dam gate system designed to address these issues. The system utilizes an Arduino-based technique and low-cost sensors for accurate water level detection and automated gate control. The goal is to protect lowland areas from tidal and excessive floodwater while ensuring effective drainage.

II. LITERATURE SURVEY

In the paper titled "Design and Development of an Autonomous Floodgate," Shubhangi Kharche et al. explored the use of an AT89S51 microcontroller to address issues in PLC-based projects. This system automates the control of dam gates based on water levels. [1] Mansoor Ebrahim et al. presented a "Designing the Monitoring System for an Automated Dam," using microcomputers and data transmission networks to test a miniature dam model and verify its operational principles. [2] The paper "Low-Cost Automatic Gates for Irrigation Canals" by Fresno et al. details an autonomous gate design adapted from Bureau of Reclamation (BOR) specifications, utilizing a 12-volt linear actuator for operation. [3] Peter Allen et al., in "Operation of Spillway Gates– How to Avoid the Problems and Pitfalls," designed spillway gates with embedded systems to effectively control motors and actuators, raising flood gates as water levels increase. [4] Ganesh U. L. et al. addressed manual drainage cleaning in "Fabrication of Manually Controlled Drainage Cleaning System," proposing a semi-automatic drainage cleaner to improve water flow and efficiency in cleaning drainage systems.

III.PROPOSED SYSTEM

The proposed system integrates a variety of components to effectively manage and control water levels, ensuring optimal operation of flood barriers and gates. The system consists of a water level sensor, tactile switch, L293D motor driver, servo motor, IR sensor, and a 16x2 LCD display.

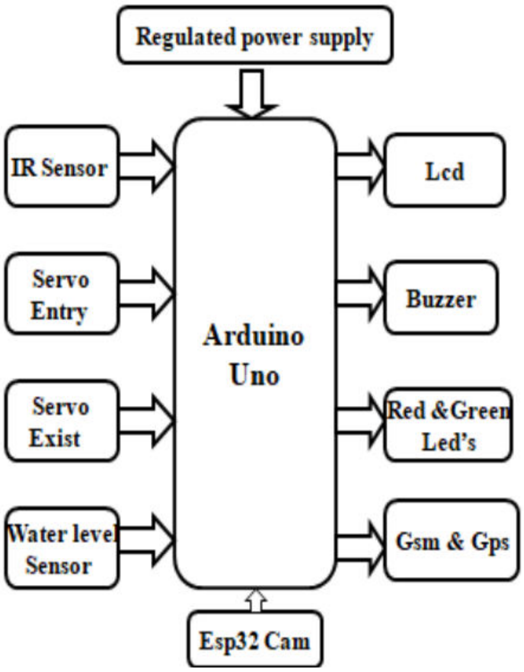
1. **Water Level Sensor**: This sensor is equipped with a series of ten exposed copper traces arranged in an interlaced pattern. The five power traces and five sense traces are bridged by water when submerged, providing precise measurements of water levels. This enables the system to detect and respond to rising water levels accurately.
2. **Tactile Switch**: The tactile switch provides perceptible feedback through a distinct click response, allowing users to feel the activation and operation of the switch. This feedback ensures reliable operation and control of the system.
3. **IR Sensor**: The IR sensor emits infrared light to detect objects and measure heat within its surroundings. It is capable of sensing motion and thermal radiation, adding an extra layer of detection and control to the system.
4. **System Overview**: In the block diagram, the Arduino Uno functions as the central processor, receiving input from the sensors and controlling the various components. A 9V AC power supply is used to power the Arduino. The water level sensor continuously monitors water levels and provides data to the system. Based on this data, the Arduino controls a DC motor through an L293D motor driver and gear rack system to open or close gates as needed.

Micro switches and push buttons are employed for manual control and switching operations. The system also features a GSM modem to communicate water level information to relevant authorities. A water

2581-4575
International Journal For Recent Developments in Science & Technology
Crossref
A Peer Reviewed Research Journal

pump, controlled by the Arduino via a relay circuit and transistor, adjusts water levels based on predefined parameters. The 16x2 LCD display provides real-time feedback on the system's status and water levels, ensuring users are informed and in control.

Overall, this system is designed to automate water level management and gate control, enhancing efficiency and response times in flood-prone areas.



Flowchart and Operational Details

The flowchart in Fig. 2 outlines the system's operation. Initially, all values are reset to their default states. The water level sensor monitors the water level in the dam. If the water level is below the designated threshold, the alarm remains off, and the gate valve remains closed. When the water level exceeds the limit, the system activates a buzzer to signal the rise in water level. Simultaneously, a message is sent to the relevant personnel, and the gate valve opens automatically. Once the water level returns to a safe range, the system completes the process and stops.

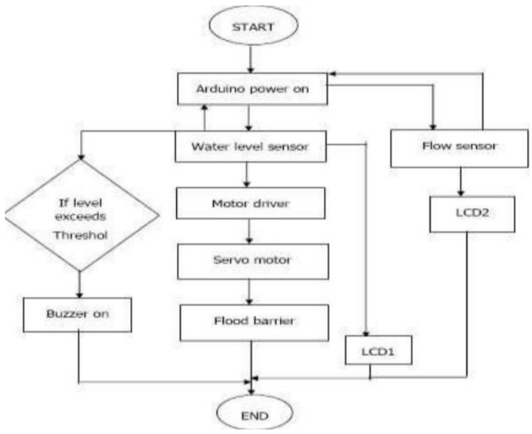


Fig2 : flow chart

IV.APPLICATIONS

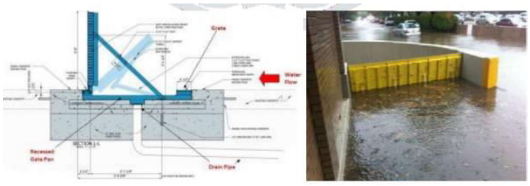
1. **Efficient Water Level Management**: This method simplifies large-scale water level management, reducing the need for manual intervention at each dam. The central command center minimizes manpower requirements and reduces the likelihood of human error through automation.
2. **Emergency Override Capability**: Authorized personnel can override the system commands in emergencies, ensuring flexibility and control when necessary. This feature helps maintain impartiality in water distribution disputes, as control is centralized and not influenced by local parties.
3. **Disaster Response**: During natural disasters such as floods, the system's automation reduces the need for human presence at the dam site. Commands for gate operation can be executed remotely from a central command center, improving response times and decision-making with real-time data.

2581-4575
International Journal For Recent Developments in Science & Technology
Crossref
A Peer Reviewed Research Journal

4. **Flood Management**: Centralized data from water levels across multiple dams enables swift decision-making regarding floodwater routing. This capability helps significantly reduce flood-related damages.

V.EXPECTED OUTCOME

The autonomous flood barrier is designed to prevent excess water from entering buildings during floods by using a barrier that remains closed during such events. Additionally, it serves as an autonomous gate that lowers when a vehicle is detected by an IR sensor, allowing vehicle entry as needed. Figure 3 illustrates the expected outcome of the proposed system.



VI.CONCLUSIONS

Water is a critical resource for human survival, yet its uncontrolled use leads to significant wastage. Existing automated water level monitoring systems serve various applications but often have limitations. This research aims to develop a flexible, cost-effective, and easily configurable system that addresses water distribution challenges and protects low-lying areas from floods. Utilizing a microcontroller to manage data and reduce costs enhances the system’s effectiveness. The automated gate lifting system responds dynamically to water levels, offering substantial benefits for efficient water management at dams and minimizing manual labor. The project demonstrates an integrated approach to software and hardware design, leveraging advanced sensing technology for precise water level detection and management.

VII. REFERENCES

[1] E. Weyer, "Control of Irrigation Channels," IEEE Transactions on Control Systems Technology, vol. 16, no. 4, pp. 664-675, 2018.

[2] S. Bilapatre, A. Rathod, and H. Kalbande, "Dam Monitoring System Using Wireless Sensor Networks," IEEE, vol. 04, no. 04, pp. 1767-1769, 2017.

[3] J. E. Okhaifoh, C. K. Igbinoba, and K. O. Eriaganoma, "Microcontroller-Based Automatic Control for Water Pumping Machine with Water Level Indicators Using Ultrasonic Sensor," IEEE Nigerian Journal of Technology, vol. 35, no. 3, pp. 579-583, 2016.

[4] B. Dhivyapriya, C. Gulabsha, S. P. Manipraphа, G. Kandaswamy, and V. Chandrasekaran, "GSM-Based Water Tank Level Monitoring and Pump Control System," International Journal of Advanced Research in Management, Architecture, and Technology Engineering (ARMATE), pp. 108-112, 2016.

[5] J. E. Okhaifoh and K. O. Eriaganoma, "Microcontroller-Based Automatic Control for Water Pumping Machine with Water Level Indicators Using Ultrasonic Sensor," Nigerian Journal of Technology, vol. 35, no. 3, pp. 579-583, 2016.

[6] V. S. W., K. M. Kavitha, K. B. Kantharaj, and M. B. Vinaya Kumara, "Microcontroller-Based Dam Gate Control System," IEEE Transactions on Scientific

Development and Research, vol. 1, no. 5, 2016.

[7] S. B., S. Sanhu, L. Santhiya, G. Sandhiya, and D. Palanivel, "Automatic Gate Control and Monitoring the Water Reservoir Using GSM Technology," IEEE International Journal of Research in Electronics, vol. 03, no. 03, 2016.

[8] T. Yuvarani and R. Archana, "Water Level Monitor, Control, and Alerting System Using GSM in Dams and Irrigation Systems Based on Season," IEEE International Journal of Scientific & Engineering Research, vol. 7, no. 4, pp. 135-137, 2016.

[9] R. R. Sorte, R. R. Sonwane, N. L. Thaku, S. A. Akhade, S. N. Kawale, N. R. Dusawar, and K. K. Lalwani, "PLC-Based Dam Automation System," IJERECE, vol. 2, no. 3, March 2016.

[10] T. E. Aung, M. Maung, and H. M. Tun, "Design and Development of Fuzzy Logic Controller for Liquid Flow Control," IEEE International Journal of Electronics and Communication Engineering, vol. 2, no. 3, 2015.