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Dam Water Monitoring System Using IoT

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Abstract: Dams are one of the major water sources for irrigation, electricity generation etc. in India. Dams play a vital role since the time of colonialism. Lacks of proper dam management system have been causing several losses including the recent floods. Inspired by the existing rural and socio-economic problems, an innovative and feasible automatic control system can be developed for dam management purposes. This paper also proposes a novel idea of collecting and sharing real-time information about water levels to the people living nearby its bank. Highly precise water level monitoring system and timely report to When the water level crosses the threshold condition, alert messages will be sent to the people and send notification on Iot cloud, retaining water to its normal level. Timely warnings to every person living in the locality and can thereby reduce the risks of loss of life and prevent disasters. Hence, dam water monitoring system using iot, ultrasonic sensor, GSM module and buzzer, relay and tower.

IndexTerms **– Esp8266, Wi-Fi module, Ultrasonic sensor, buzzer, GSM.**

I. INTRODUCTION

Dams are the key sources of installation in cities; they also play a vital role in high control and will assist river navigation. Most of the dams are built to serve one purpose and their benefits are manifold. it's a necessity to implement some type of communication between the metering systems and computer models to provide support in managing the complex systems of the hydropower plants. Generally, the dams are monitored through traditional surveillance techniques and also the water management except the monitoring of the extent of water in a very number of the dams which is automatized. Management of water resources through dams becomes complex because the quantity of users gazing dams is big and these users may have conflicting interests. this case gets rather more complex with the particular proven fact that the available resources are limited with high possibilities of droughts and floods. This affects the densely populated areas. Dam monitoring can be a tedious and long-run process that must be improved step by step. a fresh system for dam water monitoring and management should be established which could provide water levels in real-time and might allow us to return to quick conclusions regarding the protection operations of the dams. Internet of Things (IoT) is commonly defined as a network of devices that are interconnected. It comprises a gaggle of sensors, a communication network furthermore, and software-enabled electronic devices that enable end-users to amass accurate data from time to time through communication and allows for data interchange between users and also the connected devices.

This system is going to be used to automatize the control of dams without human interference. this might even be used to gather information on the extent of water throughout the country and could be accustomed route water supported the needs. we'll get information on the water availability during a selected region and route the water to that area if there's scarcity. This helps lots in irrigation. Keeping a check on the safety of dams from time to time is one amongst the important to point the amount of water to form sure the protection of dams. the utilization of Wireless sensors network with software for dam safety management helps in improving the functionality of dams. Differential Pressure sensors are fitted in equal spaces along most pipelines which could sense the pressure difference due to the breaking or leakage of the pipeline and might immediately be communicated to the observer. just just in case of floods the routing of flood water is usually done more efficiently considering the extent of water across different dams. Surveillance of areas near the dams is usually done using cameras that transmit live footage to the underside station and might be helpful in identifying the presence of people near the dams and might help in ensuring safety while releasing water during flash floods. Internet of Things technology focuses on making the ecosystem of sensors more and more intelligent by establishing a connection to the net.

1.1 Objectives:

The main objectives of dam water monitoring system using IoT alert to the people. The LED and buzzer on when the particular water position is detected. Position of water is detected by Ultrasonic detector. We've defined 3 situations at 10, 20 and 30 and whenever water reaches the separate situations the LED at that position will glow continuously on blynk cloud and bepeee. Buzzer is sounding's. When the water level exceeded beyond the safety level is sending SMS and alerting on blynk mbile app.

II Block Diagram

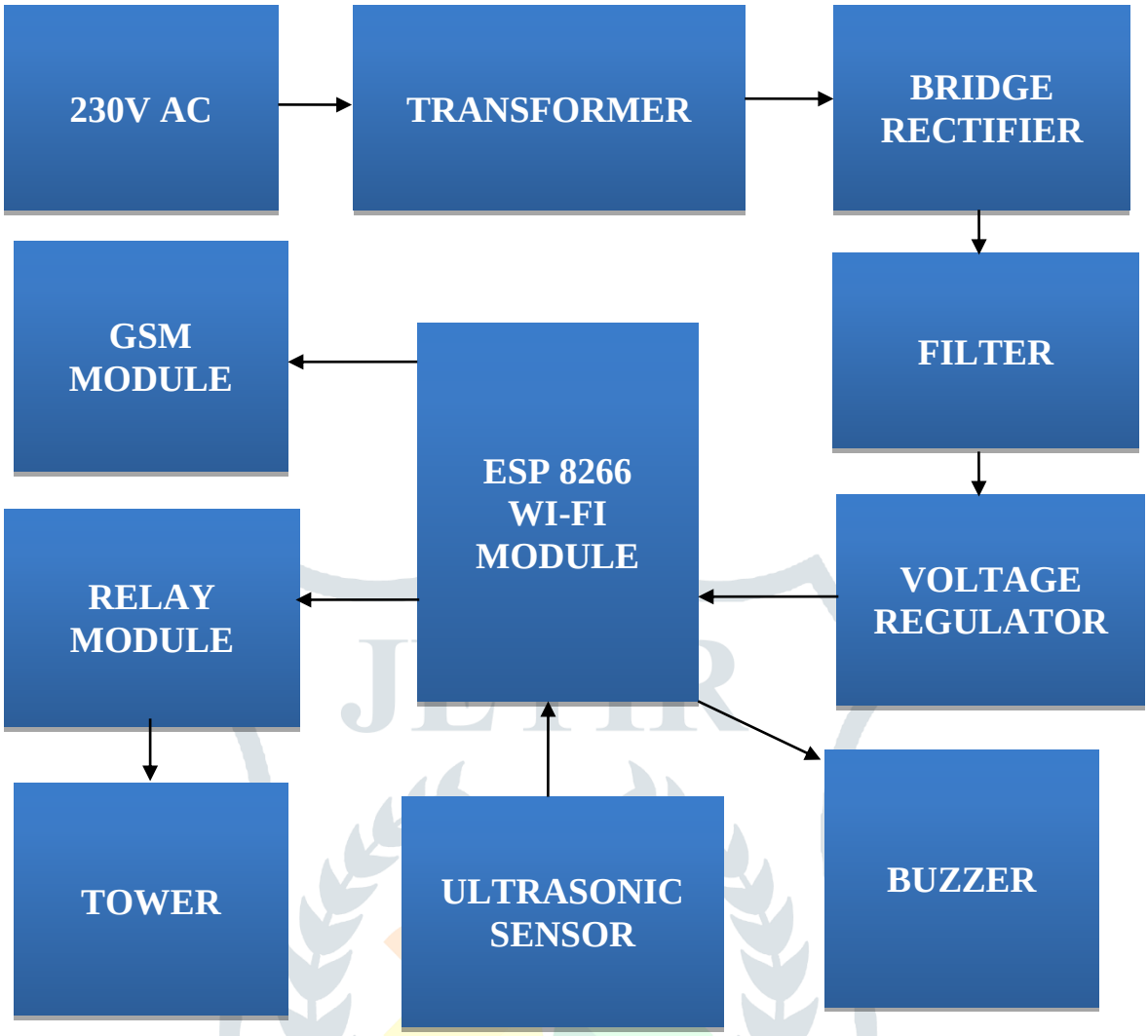


Fig.1: Block Diagram of Dam water monitoring system using iot

III Component Use:

1. **Transformer**

   It is simply a tool, which steps down or lowers the input voltage by a set ratio so as that the secondary voltage becomes but the primary voltage. This can be often essential within the case of electricity distribution, wherein the voltage from an influence plant is supplied to the connected electrical stations and thus the grid. A transformer has more primary windings than the secondary side. The induced voltage across the primary coil is larger than the applied voltage across the coil in other words the voltage has been stepped down.

2. **Bridge Rectifier**

   The bridge rectifier could also be a sort of rectifier that uses four or more diodes during a electrical device configuration to convert alternating (AC) current to a pulsating direct (DC) current.

3. **Filter**

   A capacitor-input filter might be a filter circuit within which the first element may well be a capacitor connected in parallel with the output of the rectifier during a linear power supply. The capacitor increases the DC voltage and reduces the ripple voltage components of the output.

4. **Voltage Regulator**

   It is also a circuit that creates and maintains a group output voltage, irrespective of changes to the input voltage or load conditions. Voltage regulators keep the voltages from an influence supply within a range that's compatible with the direct supply electrical components.

Fig.2: Voltage regulator

5. ESP 8266

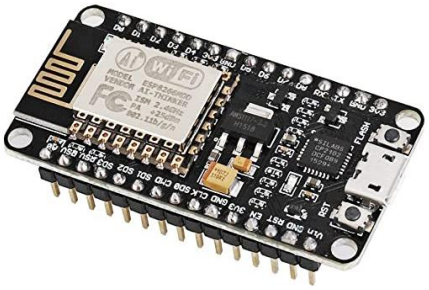


Fig.3: Node MCU

The ESP8266 may be a system on a chip (SOC) Wi-Fi microchip for Internet of Things (IoT) applications produced by Esp if Systems. Given its low cost, small size, and adaptableness with embedded devices, the ESP8266 is now used extensively across IoT devices.

6. Ultrasonic Sensor:

Ultrasonic sensors work by emitting sound waves at a frequency too high for humans to pay attention to. They then expect to the sound to be reflected back, calculating the space supported the time required. this could be almost like how radar measures the time it takes a electromagnetic radiation to return after hitting an object. Ultrasonic transducers operate at frequencies within the range of 30–500 kHz for air-coupled applications. Because the ultrasonic frequency increases, the speed of attenuation increases. Thus, low-frequency sensors (30–80 kHz) are more practical for long-range, while high-frequency sensors are more practical for short-range. It operates on 5v dc. it's four terminals VCC, gnd, trig, and echo. As shown in bellow figure.

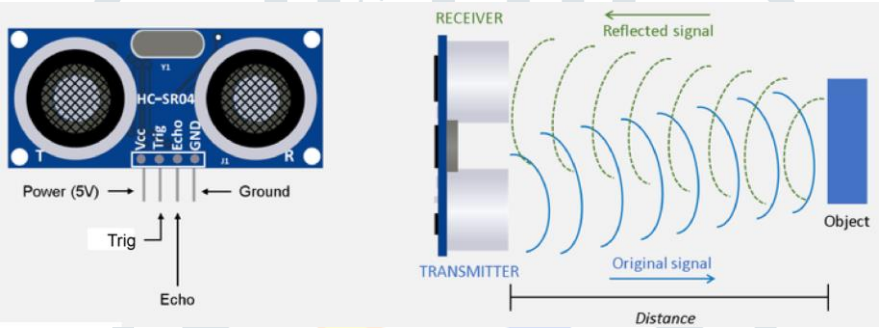


Fig.4: Ultrasonic sensor

7. Buzzer

A buzzer or beeper is an audio device, which might be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and trains.

8. Relay Module

A power relay module is a controller that's operated by an electrical switch. The electromagnet is activated by a low-power or high-power signal from a microcontroller. When activated, the electromagnet pulls to either normally open or normally close an electrical circuit.

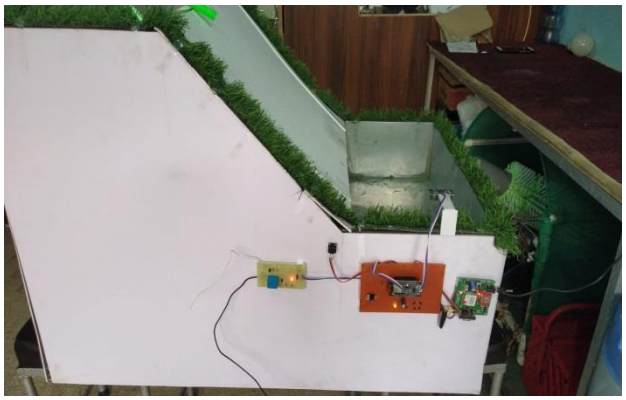
RESEARCH METHODOLOGY

In the first stage, we plan on getting the information on the extent of water using ultrasonic sensors. The ultrasonic sensors are interfaced with a Wi-Fi controller which transfers the info to a neighborhood base station using far-field/near-field communication. Components required: Ultrasonic sensors, Node MCU.

In this stage, we work on transferring the info to long distances of the order of several hundred kilometers. This helps us in gathering the info from all the nodes to a central base station which successively reads the information and sends the commands supported it. The technologies required to realize this are yet to be finalized. Some styles of communication that be used for such purposes are IoT.

IV. RESULTS AND DISCUSSION

4.1 Results of Dam water monitoring system using iot



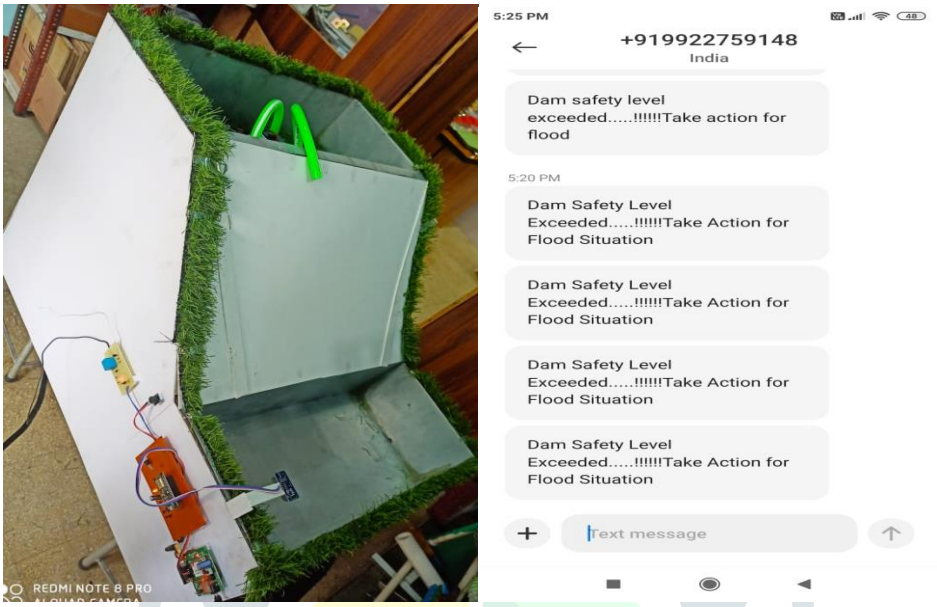


Fig.5: Dam water monitoring system using IoT and SMS

A prototype of the proposed idea has been implemented using long range communication (Wi-Fi module),Ultrasonic sensors and Node MCU (ESP8266) controller. The implementation which involves determining the level of dam water using ultrasonic sensors. The ultrasonic sensor is mounted on the top of a water container which determines the distance between the top of the container and the surface of the water. If the distance goes below a certain point it indicates that the water level in the container has shown water level is normal and if dam water level exceeded is send SMS and blynk notify me. The pictorial representation of the setup is shown above.

V Conclusion

There are dam water monitoring system using IoT in practice but they're used for various applications and have some shortness in practice. We tried to suggest ways to tackle this problem and implement an efficient water level monitoring system. Most motto of this research work is to determine a flexible, economical, and easily configurable system that could solve our water distribution problem between two regions and safeguard the low-lying areas from floods etc. among many other issues. We have been using a micro controller to manage the data and to reduce the cost. We have been successfully conducting the experiments in lab and therefore proposed a cloud based dam water level monitoring system using IoT network whose flexibility would offer us to control the system from any place via access to cloud data with different type of devices. This type of system is more helpful in situations like floods where the automated gate lifting system will check the water levels and react according the situation. This could have a substantial benefit to the research work related to the efficient management of water at dams by reducing the manual work.

1. Applications & Uses

- The above-mentioned method will ease the method of water level management on an outsized scale. we will solve many water-related issues by this method. By installing a central command center we are decreasing the manpower required at each and each dam. Since this can be a completely automated project, any quite human intervention has been avoided. that the possibility of faults has also decreased.
- In cases of emergency, the override capability are given to authorized personnel who can change the command if required. In places where there are problems with water distribution between two areas, this method helps in maintaining neutrality because the command is with the central command center and neither of the areas involved within the fight can give the command.
- During times of natural disasters like floods, this method are very helpful as we don’t have to have any human control near the particular site of the dam. Any command required for the gate opening gate closing will be given from the remote center.

This also reduces the reaction time because the water level data near the command center is real-time and also the decisions are taken almost instantaneously.

- Since the info on water levels near all the dams throughout the country are at the identical place, a fast decision on the routing of flood water may also be taken. This helps in decreasing the losses because of floods to a big extent.

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