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DAM WATER LEVEL MONITORING AND ALERTING SYSTEM USING IOT

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ABSTRACT: Far ago, human based resistive mechanisms towards flood control open up multitude problems like dynamic reactions of prior alert about the risky situations and stage of current water level. The growth of Internet of Things (IOT) paved the significant attention in all fields. The objective we propose in this paper is the application system with integration of Internet of Things to ensure the safety to the public about the prior alerting of flood occurrence due to the increase in the water level in dams/reservoirs. To achieve the objective cloud database technique is maintained which encapsulate the periodic monitoring water level data and vicinity information. The sensor data is collected periodically that are uploaded to the cloud database where the automatic comparison analytics about the increase in water level is noted. Thus, the prior stages of rise in water level are automatically alerted to the public respectively. Finally, it was observed that the level of accuracy is grown by this technique in comparison with ordinary method of monitoring and alerting system.

Keywords- *IOT, alerting system*

1. INTRODUCTION

Dams are man-made or artificial barriers usually built across a stream channel to store water. [1] Dams have become a very essential part of electricity generation to humans. There is basically very little work one can do without being connected to electricity. Hydroelectricity is electricity produced from hydropower. Commonly hydroelectric power plant uses a dam on a river to store water in a reservoir. Water released from the reservoir flows through a turbine, spinning it, which in turn activates a generator to produce electricity. But hydroelectric power doesn't always need a large dam. Some hydroelectric power plants just use a small canal to direct the river water through a turbine. [2] Hydropower generated 16.6% of the world's total electricity and 70% of all renewable electricity in the year 2015 and was expected to rise about 3.1% per year for the next 25 years. [3] The cost of producing hydroelectricity is relatively low, making it a very competitive source of renewable electricity. [4] The importance of hydropower is apparent. Apart from hydroelectricity, dams can also be used to reduce floods, for industrial use, for irrigation purposes, and many more. But even with these many benefits, if the

release of water from dams is not well managed and organized it can lead to destruction of the dam itself and more devastatingly, the loss of lives and property. Over the years, dams have been constructed to help produce power, to reduce floods and also, provide water for other activities such as irrigation, human consumption, industrial use and aquaculture. This has been carried out to some extent such that dams are typically provided with spillway systems to safely pass a broad range of flows over, around or through the dam. [1] Various materials are used for dam construction such as rocks, earth, timber, concrete, steel or a combination of these materials. However, most dams are constructed using earth or combinations of earth and other materials. Spillways are commonly constructed of non-erosive materials such as concrete or rock. A spillway with control mechanism is almost always provided for release of waters during excess flood inflows. Releases of water may also be carried out by control devices provided in channels in the body of the dam and tunnels. [5] The main objective of this research is to design a microprocessor based automated dam shutter system capable of sensing water levels and with GSM communication ability, purposely for dispensing emergency messages to the appropriate authority and nearby inhabitants notifying them of the opening of the dam.

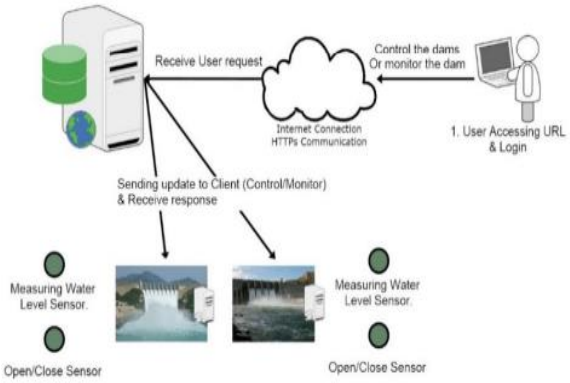

Fig.1: REMOTE MONITORING AND CONTROLLING OF DAMS

Nowadays Water management is an issue of growing concern, as there is limited availability of consumable water. Owing to unforeseen weather conditions such as heavy rainfall, sudden change of tides and other natural forces leads to natural calamities which causes problems like increase in mortality rate, contamination of consumable water, agricultural problems which may negatively impact the economy of the country. Construction of dams provides water bodies for future, protect the available water from pollution, prevents disputes and over exploitation. Therefore, dams play significant role in water management. Dams play a prominent source of water supply to the urban networks. Apart from this, dams and reservoirs play an important role in agricultural system. Even today we have been using traditional methods for managing and monitoring the dam gates and measuring the level of water and other parameters. Many factors contribute towards the failure of a dam, the most common being Overtopping which is caused due to heavy floods. This condition needs constant monitoring to avoid catastrophes such as Dam Failure, which is not To overcome the Dam Failure and for the continuous monitoring of Dam Health, the enabling technology of Internet of Things (IoT) is used. Through this the authorities have continuous availability of data about the dam health and they can take appropriate decisions.

2. LITERATURE SURVEY

2.1 Automatic Dam Shutter Senses the Water Level And Control The Dam Door Using Servo Motor:

Dams are typically constructed with a drain or similar mechanism to control water levels in an impoundment for normal maintenance or emergency purposes. By definition, a disaster is any event that causes great harm or damage, serious or sudden misfortune. Dam failures clearly fit this definition. In this paper we use the microcontroller of common 8 bit Atmel microcontroller AT89s8253.It is a low-power, highperformance CMOS 8-bit microcontroller with12K bytes of In-System Programmable (ISP) Flash program memory and 2K bytes of EEPROM data memory. It has 32 programmable input output lines.

2.2 Use and Capacity of Global Hydropower Increases:

Reducing global carbon emissions will require large-scale transitions from fossil fuels to renewable energy resources. Hydropower will likely play a role in those transitions as it provides reliable energy storage while counter-balancing intermittent renewables. However, the construction of new dams comes at significant environmental costs to river ecosystems. An optimal future considers how to maximize the benefits of hydropower while minimizing environmental impact through revitalizing existing infrastructures. Herein, we quantify this potential using a spatially comprehensive global inventory of geolocated dams used for purposes other than hydropower, and augment these results with modelled estimates of small, unmapped dams. Furthermore, we examine increases in hydropower potential from efficiency upgrades at existing hydro-plants. These opportunities afford non-invasive increases in hydropower in populated areas neighbouring biodiversity hot spots. Overall, we estimate that these contributions could potentially provide up to a 9% increase to current global hydropower, potentially reducing the costs of construction and transmission, all while offsetting impacts to biodiversity and river ecosystems incurred by planned new hydropower construction.

2.3 Auto Controlled DAM with SMS Warning System:

Water level control and safety of people are the most challenging and important facts when hydroelectric projects are considered. Lack of innovations and implementations of ideas in this field are the key factors which lead to this paper. This paper presents an efficient idea to control the flow of water by controlling the shutter or gate and there by water level management. Also it ensures the safety of people nearby and far by giving warning messages.

2.4 Automatic Gate Control and Monitoring the Water Reservoir using GSM Technology:

A micro-controller-based technology has been developed for monitoring and controlling the water quality and quantity in dam reservoirs by using various sensors. This system is able to automatically detect and measure the changes in water and turbidity levels of incoming water for hydropower production. In this project, an Arduino UNO microcontroller and GSM Technology control the operations of the system through sending messages and regulating automatic water valves according to the instant status of the dam water. The developed prototype has four units: sensing unit, processing unit, displaying unit and alerting unit. In the sensing unit, the ultrasonic sensor continuously monitors the change in water levels and the turbidity sensor takes turbidity measurements of incoming water. In the processing unit, the detected data are collected and fed to the

microcontroller for further processing. This technology is expected to reduce the time and cost incurred during the hydropower plant operations by using a small amount of manpower and will facilitate fast information collection.

3. IMPLEMENTATION

Dams did not have any automation systems. Dam gates were only controlled manually. A person was allotted to operate the dam gates. The water level of dams was only measured using a scaling measure fitted at dam ends. The person who is responsible for monitoring water level monitors and intimates when to open or close dam gates to the person who is responsible for opening the dam gate. Intimations about opening or closing of dam gates weren't given to the people who live nearby the dam banks.

It is very easy to use and definitely useful for preventing floods and other harms due to rapid changes in Dam water. Therefore, water level indicator designing is one of the technological advancements to transmit data and received by authority for controlling. If water level increases to dangerous level, the systems also give an alert to authority to take immediate action.

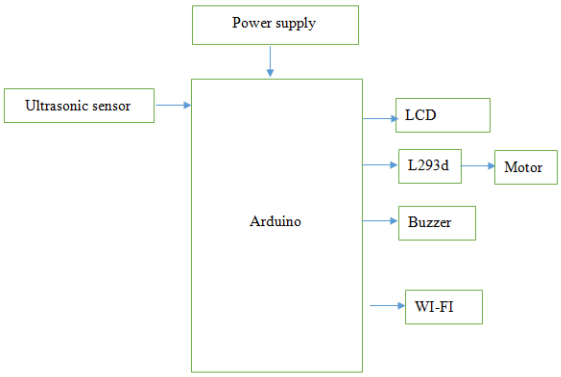

Fig.2: Block diagram

Regulated power supply:

In mains-supplied electronic systems the AC input voltage must be converted into a DC voltage with the right value and degree of stabilization. In these basic configurations the peak voltage across the load is equal to the peak value of the AC voltage supplied by the transformer's secondary winding. For most applications the output ripple produced by these circuits is too high. However, for some applications - driving small motors or lamps, for example - they are satisfactory. If a filter capacitor is added after the rectifier diodes the output voltage waveform is improved considerably. The section b-c is a straight line. During this time it is the filter capacitor that supplies the load current. The slope of this line increases as the current increases, bringing point c lower. Consequently the diode conduction time (c-d) increases, increasing ripple. With zero load current the DC output voltage is equal to the peak value of the rectified AC voltage. Figure shows how to obtain positive and negative outputs referred to a common ground. In particular they are helpful in determining the voltage ripple for a given load current and filter capacitor value. The value of the voltage ripple obtained is directly proportional to the load current and inversely proportional to the filter capacitor value. The performance of a supply commonly used in consumer applications – in audio amplifiers.

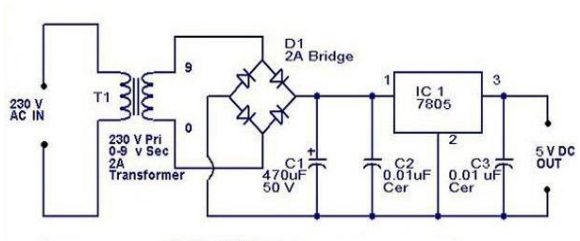

Fig.3: Circuit diagram of regulated power supply section

Ultrasonic sensor:

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. High-frequency sound waves reflect from boundaries to produce distinct echo patterns.

Fig.4: ultrasonic sensor

L293d driver:

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge Motor Driver integrated circuit (IC). The l293d can drive small and quiet big motors as well, check the Voltage Specification at the end of this page for more info.

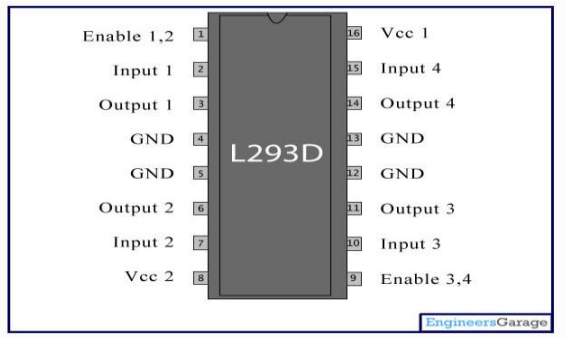

Fig.5: L293D

Buzzer:

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke.

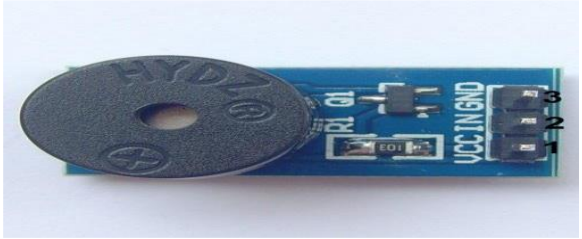

Fig.6: Buzzer

Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. Active buzzer 5V Rated power can be directly connected to a continuous sound, this section dedicated sensor expansion module and the board in combination, can complete a simple circuit design, to "plug and play."

5. EXPERIMENTAL RESULTS

Fig.7: Output screen

Fig.8: Output screen

6. CONCLUSION

In this paper, we have presented a design for an Automated Dam Shutter that would effectively tackle the issue of operating dam gates manually whilst warning nearby inhabitants. We selected components that would assure proper management and operations of dam gates. The overall inclusion of components and the design of our proposed ADS system adds the various functionalities we aimed to provide in order to make dam operation of gates more efficient, easier and safer. With these functionalities effectively implemented, there is a high probability that our system will indeed make dam operation of gates more efficient, easier and safer to the community. This would go a long way in reducing the risk of loss of lives and property and in extreme situations, damage to the dam's overall structure. Future works will include a trial with different sensors in use and a comparison to determine the most accurate of these sensors, the most cost-effective as well as the sensor which requires the least maintenance for dam operations.

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