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Real Time Flood Monitoring and Prediction of Water Accumulation based on Deep Learning

V.Sudha[1] , S.Kalai Selvi[2] , B.Liyona[3]

Asst.Prof Department of ECE & Krishnasamy College Of Engineering & Technology[1]

Department of ECE & Krishnasamy College Of Engineering & Technology[2,3]

Abstract -In this project, we are going to introduce the pre-intimation for breakage of dam alert for peoples who are living around near the dam/lake.To achieve this we are using different kind of sensor network. The entire system should be controlled by Microcontroller.The level sensor may find out the water level of the dam and it sends the dam water level to the concern in charge for every one min.The Water flow motor will on find the force of the water coming to the dam from various river kinds of source.After that it will do some calculation with compared result of both water level and force of water. Artificial learning Algorithm is used to predict the future time value and send SMS to the near living people.And one user App was developed to find the people who struck in the flood.A prototype system was developed to support dam-breakage alert system.

Key Words: Flood, Alert, Water Level, Rain detector, Machine Learning, IoT

1.INTRODUCTION

Flood monitoring has developed very fast in world since 1950. There are now 17,526 dams 15-30m high and 4,578 dams exceeding 30m. These projects bring huge benefits in flood control, irrigation, power generation. However, hidden troubles exist in some dams due to hydrology, geology, design, construction and aging. There is no appropriate system in place due to lack of care and safety measures that could help prevent or at least mitigate the destruction wreaked by the flooding. Residents of this flood prone region do not receive timely information or the notification system is so bad that no warnings can reach the community. A number of trials were carried out to assess the accuracy and timing of the sensors used to reach end users for the flood risk warning. In a controlled environment, these tests were conducted. We conducted five trails for testing and reset ESP-32 Devices after each check and calculation of the target value again. Below are the findings of these studies. The primary purpose of the tests was to evaluate the accuracy of the sensor data. The outcome of the experiment carried out to test the reading accuracy of both unit's ultrasonic sensor, which is used to determine the level of water.

2. LITERATURE SURVEY

DESIGN OF WIRELESS DAM SECURITY INFORMATION SYSTEM

This project proposed design proposal of wireless dam security information system through the GPRS technical superiority, introduced hardware system set up based on the GPRS dam security information system in detail, proposed the functional requirements of software modules, has the actual application value. Using the GPRS technology to carry on the network data transfer, easy to use, no region limit, in the field of remote monitoring and control, especially in hydraulic engineering security information system, it has a very good application prospect.

DESIGN AND IMPLEMENTATION OF WATER ENVIRONMENT MONITORING SYSTEM USING GSM TECHNOLOGY

A dam is a barrier that impounds water or underground streams. Dams generally serve the primary purpose of retaining water, while other structures such as floodgates or levees (also known as dikes) are used to manage or prevent water flow into specific land regions. When the water level in the dam exceeds certain level, the dam is in danger of collapsing. To avoid this, we should constantly monitor dam water level so that dam structure does not give way under the pressure of the water. This can be done by controlling the flood gates if the water level exceeds certain limits. Also water being a scarce resource, it becomes necessary to preserve and maintain its quality. In order to do so, various water related parameters should be under constant check and evaluation.

The main water pollution related parameters that need to be monitored are Temperature, Turbidity and pH. This paper explains the theoretical aspects related to the project we are doing and the details regarding the demonstration of the automation of dam gates.

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DESIGN AND IMPLEMENTATION OF DAM FAILURE RISK ASSESSMENT SYSTEM BASED ON FUZZY MATHEMATICS

Protecting the security of the dam is a vital problem for the reasonable use of the water resources, so it is important and meaningful to research methods of assessing the safety of dam for which is related with the national economy and the people's livelihood, and it is necessary to build a system to estimate the security risk of dams. The dam failure disaster risk is regarded as main researching object in this thesis. The theory and method, such as risk analysis, analytic hierarchy processing, fuzzy mathematics and so on, together with the knowledge of dam engineering, are introduced into the thesis, which performs relatively detailed study on method of comprehensive risk assessment, synthesis assessment structure system, method of measuring assessment index of the dam, and develop the system of multi-level fuzzy comprehensive risk assessment for dam failure.

COST ALLOCATION IN DAM REMOVAL PROJECT OBJECTIVE

In many countries, the dam is removed in consideration of several reasons such as safety. When removing a dam, the polluted sedimentation flowing out of the dam may have an impact to the environment of the river and sea. Thus, dam owners may prefer to wait its removal rather than remove now. This is because they are motivated to wait in order to learn the impact caused by other owners' removal. In this case, the dams may not be removed efficiently. We discuss the cost allocation which leads to an efficient dam removal by using dynamic game.

3. Proposed Methodology

It is necessary to generate refined predictions of urban floods, such as the prediction of water accumulation processes at water accumulation points, which is of great signicance for supporting water-related managers to reduce flood losses.
In proposed system of rainfall sensitivity indicators were used to determine the optimal scheme for predicting the depth of accumulated water, and the algorithm in deep learning was used to build a prediction model of the accumulation process of urban stormy accumulation points.

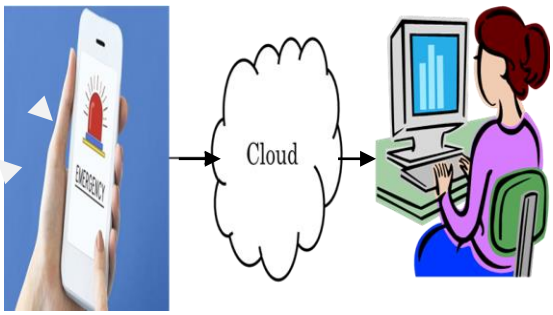

Figure 3.1 Block diagram of the Proposed USER APP

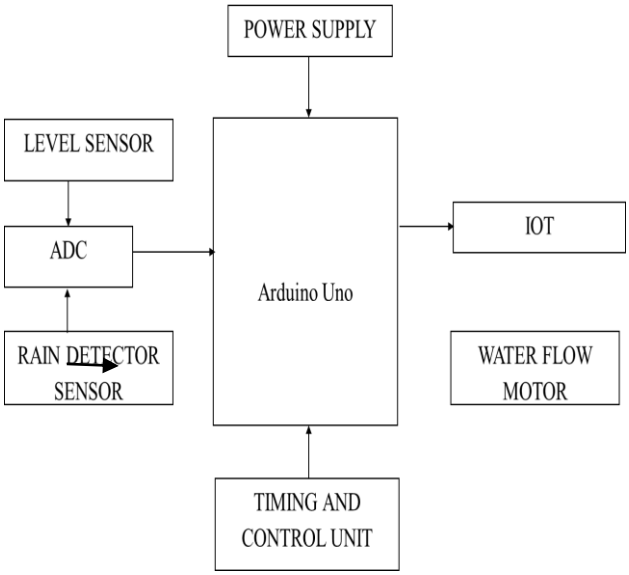

Figure 3.2 Block diagram of the Proposed System

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BLOCK DIAGRAM EXPLAINATION

The system is constructed through the use of Arduino Uno, Esp8266 IoT Device and rain detector, level sensors and water flow motor. The early warning device will be communicating through artificial intelligence algorithm and then the system will send an SMS notification to the people in the community. A water level monitoring sensor will also be connected with this arduino microcontroller to keep track of the water level. An SMS approach was used for transmitting data from the monitoring system to the computer server and for sending notification to the concern stakeholders. The User application was installed in the smart phone and to process the emergency received data sends to server and make proper action.

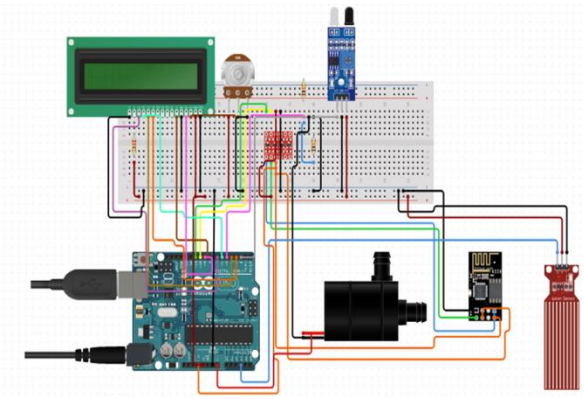

Figure 3.3Circuit Diagram

This water level sensor module has a series of parallel exposed traces to measure droplets/water volume in order to determine the water level. Very Easy to monitor water level as the output to analog signal is directly proportional to the water level. This output analog values can be directly read via ADC and can also be connected directly Arduino's analog input pins.

LEVEL SENSOR

Specifications

Working Voltage	: DC 3-5V
Working Current	: <20mA
Sensor Type	: Analog
Detection Area	: 40 mm x 16 mm
Size	: 65 mm x 20 mm x 8 mm
Humidity	: 10% -90% non-condensing

RAIN SENSOR

This sensor module permits to gauge moisture through analog output pins & it gives a digital output while moisture threshold surpasses.

This module is similar to the LM393 IC because it includes the electronic module as well as a PCB. Here PCB is used to collect the raindrops. When the rain falls on the board, then it creates a parallel resistance path to calculate through the operational amplifier.

Pin Configuration

Pin1 (VCC): It is a 5V DC pin
Pin2 (GND): it is a GND (ground) pin

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Pin3 (DO): It is a low/ high output pin
Pin4 (AO): It is an analog output pin

Specifications

The required voltage is 5V
The size of the small PCB is 3.2cm x 1.4cm
For easy installation, it uses bolt holes
It uses an LM393 comparator with wide voltage

WATER MOTOR

Micro DC 3-6V Micro Submersible Pump Mini water pump for dam outlet water circulation System.
This is a small size Submersible Pump Motor which can be operated from a 3 ~ 6V power supply. It can take up to 120 liters per hour with very low current consumption of 220mA.

4. Results and Discussions

The Hardware collects the water level, Rainfall measure to detect the levels of the flood. The hardware consists of Wi-Fi enabled controller which connects to the server and allows sharing the data to through internet.

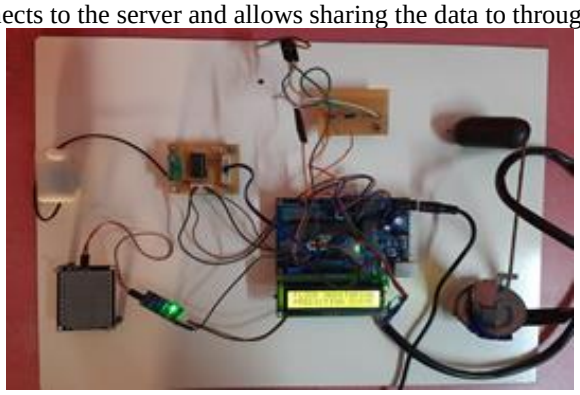

Figure 4.1 Prototype of the proposed method

Figure 4.1 shows the prototype of the proposed system which interfaces all the sensors and actuator associate with the flood monitoring system. The architecture contains Server and database which handles the data coming from the devices and saves it in the database.

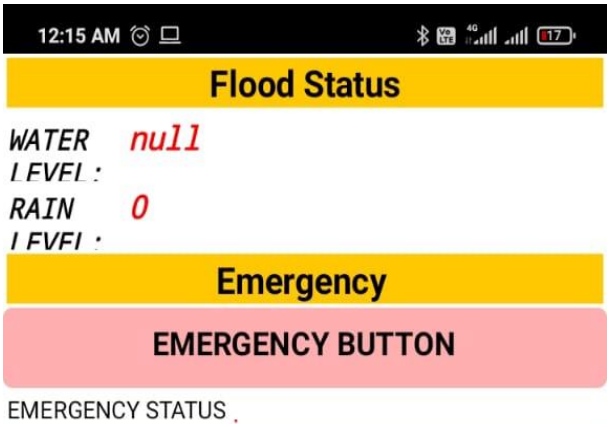

Figure 4.2 Android User

The Front end apps will have http client to establish connection to device and backend. All these communication will be done over the internet though http protocol. The remote correspondence between Arduino and Things peak web

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server and Things peak to Android app is successfully achieved. The data was updating the field in things peak channel and triggering is also done successfully. This prototype is tested on location and the results are shown below.

Figure 4.2 shows the Android user app which can give the status of the flood and user can give any emergency to the control room via thinks peak.

5. CONCLUSION

In proposed method is implemented the flood warning and management system in our architecture design. The management system is used to curtail the damage caused by floods with the help of actuator(spillway) that perform preventative actions based on labeled data of the flood risk fetched from the cloud. We have added robustness in our system by employing multiple Units in close proximity. We also developed an android application for flood notification. It displays the level of risk and also has a feature to contact the user's local safety authority in case of an emergency. Prediction of flood is done by Machine Learning Algorithm. Through this system one can monitor & predict the flood the proposed system will be efficient because it has better coordination of monitoring, communication and transmission technologies which are adaptable to background condition. The proposed system also ensures increased accessibility for assessment of emergency situations and enhances effectiveness and efficiency in responding to catastrophic incidents. In summary, the proposed system would be beneficial to the community for decision making and evacuation planning purposes.

FUTURE WORK

This project aims at monitoring the water level in one particular water body. In future it may be enhanced to monitor multiple locations at the same time and the web page must be able to display the information based on the selection done by the authority.

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