

Flood Monitoring and Early Warning

DEFINITION:

Flood Early Warning System (FLEWS) is a system by which flood induced hazards can be minimized and prevented. Currently different organizations are working on flood forecasting and early warning at national, continental and global scale.

ABSTRACTS:

A flood warning system typically integrates information on telemetric precipitation and water level/flow, calculated at different places in the local area. Based on these observations, it is difficult to provide information about river conditions, flood types, etc.

Floods and excessive rainfall are unavoidable phenomena that can cause massive loss of people's lives and destruction of infrastructure. Flash floods rise rapidly in flood-prone areas, resulting in property damage, but the impact on human lives is relatively preventable by the presence of monitoring systems.

Although there are many systems widely in practice by disaster management agencies in monitoring flood levels, most of these systems are limited range and sophisticated to be used and maintained.

Furthermore, in most developing countries, the conventional flood gates in water canals are manually operated and suffer from the lack of real-time monitoring of water levels, leading to an overflow in the channels and flash floods.

On top of that, the lacking accurate data analysis in the system that can be accessed is one of the limitations of the conventional flood monitoring and warning systems (FMWS).

Therefore, in this paper, we have explored and reviewed the existing methods of flood monitoring and emphasizing their structure and sensing techniques. We have also classified and compared their advantages and limitations and accordingly suggested new solutions and improvements by utilizing new technologies based on the Internet of Things.

This paper introduces a detailed mini-review of sensing methods in the existing flood systems as reported in previous studies to serve as a quick guide to researchers who are engaging in this field. Based on the review, conclusions have been drawn.

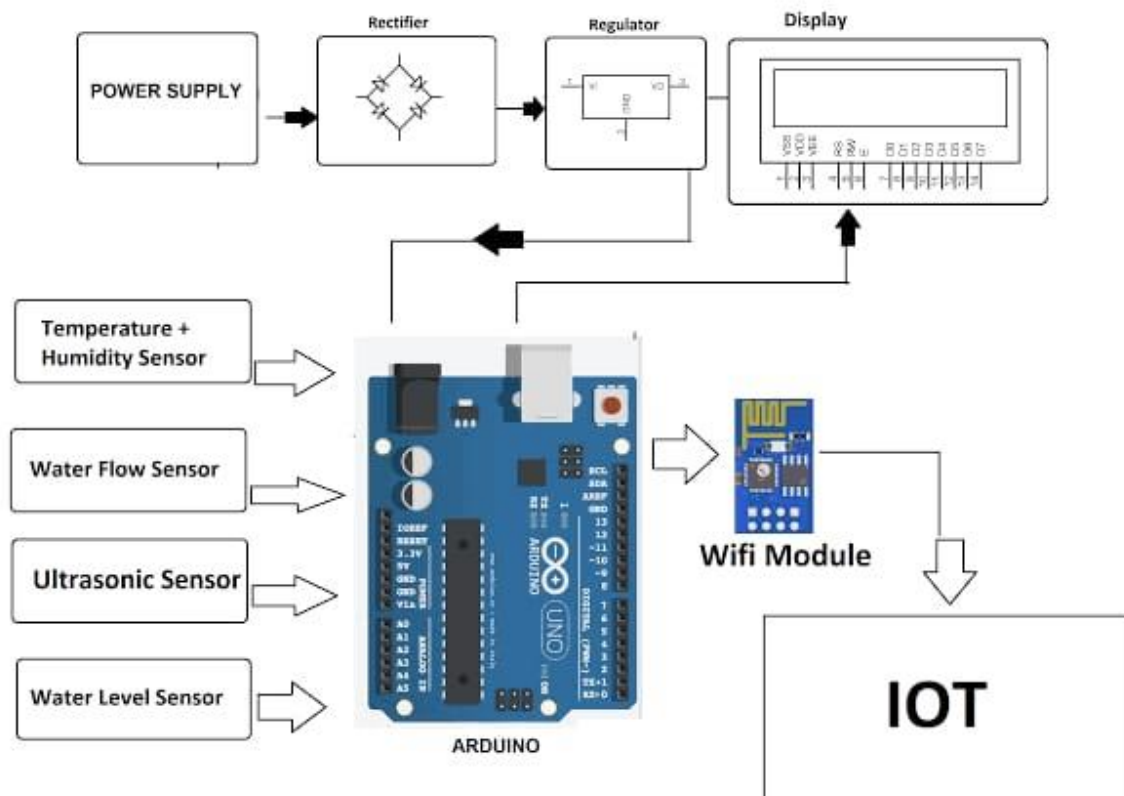
Problem Statement:

A flood warning system is a way of detecting and forecasting flood events so that the public can be alerted in advance and can undertake appropriate responses to minimize the impact. A basic flood warning system consists of sensor circuits, communication system, controller and power system.

Loss of lives and property: Immediate impacts of flooding include loss of human life, damage to property, destruction of crops, loss of livestock, non-functioning of infrastructure facilities and deterioration of health condition owing to waterborne diseases.

India is highly vulnerable to floods. Out of the total geographical area of 329 million hectares (mha), more than 40 mha is flood prone. Floods are a recurrent phenomenon, which cause huge loss of lives and damage to livelihood systems, property, infrastructure and public utilities.

Block diagram



MEASUREMENT:

Architectural Framework The two monitoring devices are composed of Ultrasonic sensor to measure the distance of the water level, Arduino micro-controller that process the signal from the sensor, GSM module to send the data or information from the micro-controller to the computer server and a power source using Solar .

PROBLEM SOLVING:

A flood warning system is an early flood monitoring solution that deploys accurate and well-maintained sensing instruments, like rain gauges, water level sensors, and flow rate sensors.

The early warning system is a web-based system that users can access which includes web flood information. The ultrasonic sensors used temperature and humidity sensors to achieve better sound waves which are further combined with flash flood sensors installed on bridges for convenient access to the river.

FUTURE SCOPE :

This study is conducted to solve the problems brought about by floods. The device shall contain with the

following features:

It has ultrasonic sensor to sense the distance of water level of flood on the road. The system provided a camera that will display the real-time image of the flood that can view via livestream.

It includes Serial Communication to send warning text message with the content of date, time, water level and road accessibility. The system has three (3) modules which are Users, Logs, and Contact Numbers. It can be modify by the admin. The unit containing the sensor is suggested to be place in front of Our system.

The position of the sensor must be placed perpendicular to the flood water; otherwise, there will be an imperfect reflection of ultrasonic waves and cause measurement errors. The sensor is suggested to be placed on a pole with a height of about 3 to 3.5 meters.

The flood sensors and microcontrollers will be powered by a Solar Power Bank with 80, 000 Ampere Ampere-Hour (mAh) for the benefit of continuous operation of water flood height detection and network data transmission.

Conclusion :

The developed flood monitoring and early warning system that utilizes ultrasonic sensor to detect water level, functions perfectly according to the specification provided. It successfully passed several tests based on the different parameters.