

An Intelligent System To Detect Urban Flash Flood Using Wireless Sensors

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Abstract: Urban flash flood are the most interminable type of unforeseen event worldwide resulting from intense storms leading to large amount of rain within a concise period. These are notably pernicious because of the short timescales on which they occur, and because of the population size of cities. Since most flood casualties are caused by a lack of information on the impending flood ,sensing such catastrophes is critical to generate authentic and detailed warnings .To provide short term forecasts to address this issue we are deploying a wireless sensor detection system to accurately detect the water level and sense the intensity of rainfall to alert the counterminous areas. This is based on the combination of arduino uno with two RF modules along with sensors .Firstly we intend to have a threefold methodology to identify a potential benefits in measuring the water level. Secondly using GSM module notification is sent via SMS and also triggers the buzzer. There are many existing technologies for flash flood measurements, but they have many drawbacks and hence give unreliable results and are not real time based. In this system the delay of the warning is less and will be operating 24 hours so that it can detect flash flood adequately and is very economical

Keywords: Urban flash flood, Arduino Uno, sensors, RF module, GSM module, SMS, Wireless Sensor Network(WSN).

I.INTRODUCTION

A flash flood is nothing but a rapid flooding of geomorphic low-lying areas such as rivers, washes, basins and dry lakes. It is due to heavy rain along with a severe thunderstorm, tropical storm, hurricane or melt water from snow or ice flowing over ice sheets.

Flash floods is due to collapse of debris dam or natural ice or a man-made dam. Flash floods can be distinguished from regular by a timescale of which is less than six hours. The water that is provisionally available is frequently used by shrubbery with rapid germination and short growth cycles, and by particularly modified animal life.

Flash floods occurring quickly is due to various things, but it is due to enormously deep rainfall from thunderstorms. It is due to Dam or Levee Breaks and debris flow. Flash flooding may occur due to the various reasons like the location, intensity of the rainfall, distribution of the rainfall, topography, vegetation types, soil type and soil water control. So, as discussed many factors influences where the

Flash floods may occur. Occasionally, rainfall over an urban area will cause flooding faster and more-severe.

In the urban areas the solid surfaces do not allow water to penetrate the ground, hence the water runs off to the lower region rapidly.Flash Flooding occurs so fast that people are jammed off-guard. Their circumstances may become hazardous if they come across high, vigorous water while traveling. If people are at their homes or businesses, the water may increase rapidly and shut in them, or cause harm to the assets without them having a possibility to guard the assets.

II.EXISTING SYSTEMS

In past decades various flood detection methods were introduced. Among them one of the system uses images. Images are here captured by satellite in different ways which detect the areas where flood has been occurred. These techniques are useful only in flood localization but they cannot foresee whether flood occurs or not in the next hours. A prototype intelligent system was developed for flood warning and alert in real time. It uses an ARM Microcontroller, Marvel 88F6281 and for Interface and Data Integration Unix FreeBSD was used. The data will be transmitted using radio communication technique to make proper decision.A flood warning system was introduced by E.Tate and K. Cauwenberghs where in cluster of servers collect the data and process data from the hydrological observation station in the real time.the available results can be then displayed on client computer by distant access.

The flood warning system used in the most developed country are costlier and it depends on the proficient hydrologists who supervise real-time data 24 hours a day and run complicated computational models at a centralized place. These kinds of possessions are excessive & unreasonable for poor counties as well as emergent country. Floods ends with the loss of abundant lives and leaves the flooded area with enormous demolition of assets every year, particularly the temper of flash flood in the deprived and emergent countries is most conspicuous, where people are the sufferer of the natural mercy.

III.SYSTEM MODEL

Intense rain dropping can be the main reason for flash flood that too in short span of time.

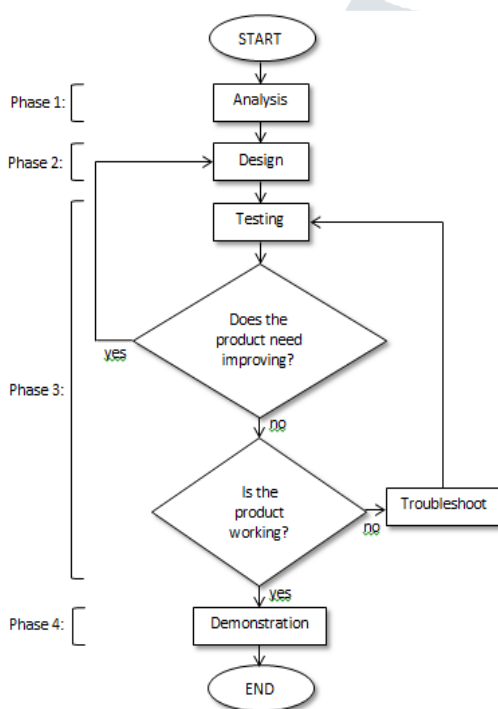
Flashflood occurs with very light warning or nil warning and can reach to the maximum in very short span of time before we take any action. As and when the intensity of the rain increases major portion of the rain water runoff and very light will be absorbed by the land. The extra overflow water

can be very dangerous and can result into fast swelling rivers and streams. Low areas will also be pooled.

Streams that were just dried up or light wet few minutes before can be now a raging torrent few in few minutes.

In addition, city sewer systems can quickly become overwhelmed and back up, resulting in street and overland flooding. It is the sum of these factors that creates a flash flood. So a system is necessary to spread the news quickly during the flood disaster to the general public.

Rapid application development(RAD) model is used in the proposed algorithm, which shortens the construction cycle to build the project.



Many advantages lies in this model. The development time can be the main advantage of the system which is very less. Next advantage can be increased reusability of the component and

Integration from very beginning solves a lot of integration issues.

The main disadvantage is this model is this requires an individual who is experienced and familiar with the system to be developed.

To identify the requirements of the system depends on the individual performance and the strong team. This model can be built using system that is modular.

This needs highly expert designers. This requires high enslavement on modeling skills.

The team may be tempted to rush the product, skipping important forecast and design consideration.

IV.SYSTEM PROPOSED

In our system , audunio uno microcontroller is used. The controlled at the transmitter is interfaced with the sensor used. Sensor used in our system are water level sensor, raindrop sensor ,temperature and humidity sensor.

The raindrop sensor used determines the intensity of the rainfall.

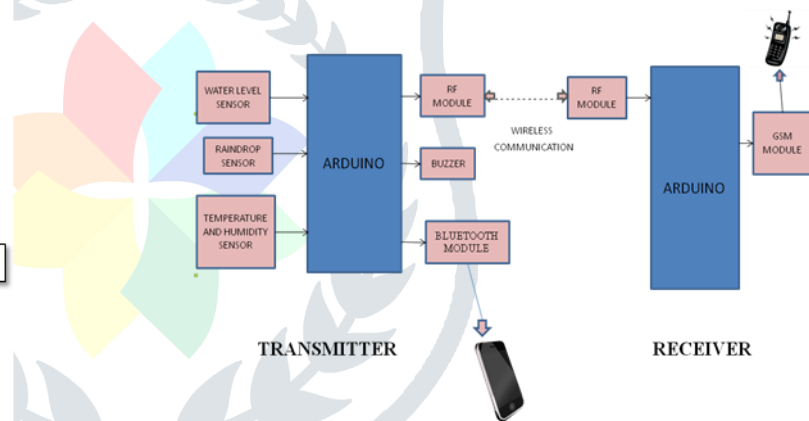
The temperature sensor and humidity sensor at the transmitter is used to foretell the persistency of rainfall causing flood.

The high risk of flood can be identified using the water level sensors that is placed at a position called bottom line, when it touches the bottom line indicates moderate risk of flood and the higher level indicates high risk of flood.

The levels of risk can be indicated by using LED / Alarm system that is placed one at the transmitter and another at the receiver. Once the sensors are actuated it sends the signal to the micro-controller.

The signal is processed at the transmitter and sent to the receiver using RF module attached to the receiver.

The GSM module is attached to the microcontroller at the receiver side to sense alert messages to the number stored in the database system. As the water level increases this process is repeated.



g 1 : Wireless communication between Transmitter and

Receiver

V.CONCLUSION

The system will find out the present water level by using wireless sensor network, which will also provide warning of SMS using GSM modem. SMS is very much supportive cautious information exchange tool that can give out the information to floods sufferer in a particular region. This system is able to notice a level of water and fling that data to the main flood control centre close or too far away from the sensor that senses the level of water. The need of radio communication module in this project is used as the medium to transmit the information from transmitter module to the receiver module.

Flood is alarmed with the valuable lives and wealth of a country that is why it is required to take crucial actions to avoid and contract with the after consequence .The Flood Observatory System is designed to be an intelligent system

which is capable of sending real time water level information from a remote location to a monitoring station which could be at a distance away, regardless of time. The self monitoring in the Flood Observatory System ensures that the system performs efficiently and reliably for the monitoring station. The flood monitoring and detection system monitors and know the development of floods and then send flood notification SMS to the residents of such zones for necessary action. The main purpose of this project is to send alert to riverside people so they can safely move from flood area it gives advanced alert through SMS. We design a system with low-cost, small-sized, easily configurable and extensible WSN systems to monitor, detect, and track various environmental phenomena and events.

This technology could be further customized or enhanced as per the individual necessitate and interests. We have discussed some basic thoughts of this technology and depending on ground-breaking applications, user can upgrade as per prerequisite.

System can be upgraded to increase the distance between transmitter and receiver by using different frequencies of RF Module for which special permission is required. A Bluetooth module can also be interfaced to get updates about various parameters involved for flood detection in the smart phone. The features/hardware can be added/modified to suit any application. This project is subjected to future work.

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