Flood Monitoring and Alerting System

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Abstract— One of the major disasters occurring in the world is flooding. To monitor the water conditions such as water level and velocity of flow, wireless sensor network system architecture for real time monitoring has been developed. The main aim of the proposed work is to send real time information of flooding to the concerned welfare authorities so that suitable action could be taken. This system architecture is composed of sensor network, processing/ transmission unit and a server. Sensors are distributed in rivers so that changes of the water level can be effectively monitored. In this paper monitoring the water related data like water level and flow rate in rivers and flood conditions is done using arduino UNO processor will process the data and GPRS/GSM SIM 900a module is used to transmit measured data to the LCD display and if the values measured are different from the normal values alerts are generated and sent as an SMS through the GSM modem. This wireless sensor network system could remotely monitor the real time data of water condition in the identified areas.

Key words: Water Level, Flow Rate, GSM Modem, SMS Alert, Arduino

I. INTRODUCTION

Flooding is the most common natural disaster worldwide happens without prior warning. Floods have been known to do some significant damage. They destroy homes, crops, cars, buildings and anything in their path. Animals and people get caught in the current of the flowing water and can't get out before rescue attempts are made. Although flooding was an abnormal phenomena agers ago, but now it is considered a life treating natural disaster for the mankind [1].

Flooding has always resulted in enormous anxiety on countries across the continents whereby lost of life's, people displaced, agricultural land submerged in mud's, roads, bridges and houses washed away [2,3]. As a result of flooding, the damages on properties are clearly visible. The problem of warning communities of impending disasters quickly becomes complex due to its multifaceted nature. At the most basic level, the problem breaks down to predicting the event, communicating that prediction to the proper authorities, warning the communities affected, and evacuating those communities. Each step listed subdivides into its own set of tasks and problems, which are dealt with below.

II. RELATED WORK

Previous work on sensor networks for flood detection is sparse with only two different examples discovered in the literature. Castillo-Effen [10] suggests an architecture for a system, but is unclear on the basin characteristics and no hardware details are suggested. Closest to our work is a paper by Hughes [11], describing a flood-predicting sensor network that uses Gumstix sensor nodes, which require significant power but allow for a Linux operating system to run on the node. As described, the system had been tested in the lab, but no field tests were performed by time of the paper. The planned field test would consist of 13 nodes along 1 km of the river. It is unclear what flood prediction model they are using and if it is currently running on their lab test system. Given lack of information on the flood prediction side, the known details of the hardware platform dismiss it as an immediate solution to the problem owing to its multifarious nature. They studied the flood detection drawback in Republic of introduced here as it has limited geographic range, high cost, and large power requirements.

A. Flood Alarming Seal et al

Here the author used multiple variable strong rectilinear regression that is simple to grasp and easy and price effective in implementation, is speed economical. It low resources utilization and nevertheless provides real time predictions with reliable accuracy, therefore having options that square measure fascinating in any world algorithmic program. The central node is mentioned during this model however it's not taken into consideration. This model is simply predicting the flooding scenario and warning folks concerning flood by ringing the alarm however it's no role in preventing the flooding scenario. During this paper they need unbroken the economical energy consumption half for future work.

B. Honduras Flood Detection Basha et al

This presents a quick description concerning implementation of the detector network in Republic of Honduras for AN early detection of flood & alert the community. They need analysed on the importance on detector networks in developing countries, detector networks for flood detection and therefore the offered current operational systems for flood detection. This paper mentioned concerning the flood detection drawback of warning communities in close at hand disasters quickly becomes complicated Honduras and projected an answer. Victimisation wireless detector network (WSN), they divided the answer into four tasks (event prediction, authority notification, community alert, and community evacuation) between CTSAR (name of NGO) and themselves. They need conducted completely different experiments to validate the projected answer. They tested it with the varied ranges necessary for the system to confirm concerning the communication over those ranges.

C. Early Flood Warning System Basha et al

It describes a system design and readying to satisfy the look needs and to permit model-driven management for optimizing the prediction capability of the system. This design is employed to explore the applying of watercourse flood prediction and it's describing the work on a centralized kind of the prediction model, network implementation, and part testing and infrastructure development in Republic of Honduras, readying on a watercourse in Massachusetts, and results of the sector experiments. They have ready this model

in relevancy Sacramento Soil wet Accounting (SACSMA) that may be a terribly economic model which will observe flood terribly simply however SAC-SMA is incredibly dearly-won that couldn't be cheap for a developing country to use for flood detection. This approach is the disadvantages a part of the model. Concerning power consumption the full structure computationally easier than standard approaches to flood modeling and prediction, utilizing period knowledge from multiple device nodes. This counts the advantage of this model over SAC-SMA.

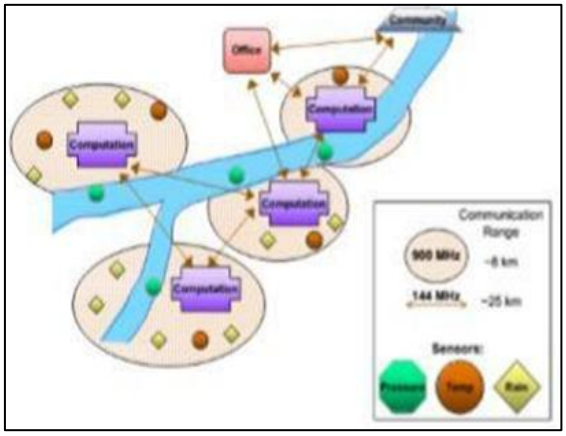

Fig. 1: Multiple Line Regression Model

D. Local and Remote Sensing Hughes et al

The author planned GridStix detector platform that uses powerful embedded hardware, heterogeneous wireless networking technologies associate degreed next generation grid middleware to implement an pliant WSN. It doubles as a light-weight grid, permitting nodes to not solely ship information to remote mounted grids, however conjointly to perform native grid computations. For Image-based flow prediction a sequence of high resolution pictures is employed. These area unit large for off-site transmission to be possible victimization GSM or GPRS technologies and thus the strategy is impractical for this detector network. It adds to runs at the expense of accrued power consumption. This is often another disadvantage.

E. Flood Monitoring and Warning System Sunkpho et al

This represents 2 main objectives of the developed system that serve a) as info channel for flooding between the concerned authorities and consultants to reinforce their responsibilities and collaboration and b) as an internet primarily based info supply for the general public, responding to their would like for info on water condition and flooding in Nakhon Si Thammarat, a southern province in Asian country. The developed system (as in Fig.4) consists of 3 major components: detector network, process and sending modules and info and application server [6]. Sunkpho et al have done a awfully noble work however they might have improved it by that specialize in the dependability, ability, security and economic power consumption within the real time flood observance and warning system. During this approach there's no steps area unit taken relating to security purpose. This adds to the disadvantages of this developed system.

F. Brazil Flood Monitoring Degrossi et al

Open Geospatial Consortium's (OGC) device net Enablement (SWE) standards that collects information to be shared in associate degree practical and versatile manner. An abstraction information Infrastructure (SDI), geospatial software system platforms that was accustomed manage the environmental risks.

A new hardware platform is tried with the aim of getting an honest vary of wireless communications between the nodes, with an honest cost/benefit. Betting on this, the platform victimization Xbee motes is developed. This platform has the benefits like lower energy consumption, a smaller physical size, and a bigger vary of communication between every node.

This approach provides a true world application of wireless device networks and geospatial services to watch the stream water level within the city of São Ilich Sanchez in Brazil, likewise on use the information provided by the sensors aimed toward detection floods.

III. PROPOSED WORK

The two principle destinations of the created flood alerting system is to serve

- As knowledge channel for flooding between the enclosed authorities to upgrade their obligations and joint effort for precaution steps and
- To send alert for involved authorities normally serving to them to react to their demand for knowledge on water condition and flooding. There are a unit 2 main sections for the flood alerting system .one section is to sense the info mistreatment the device and also the alternative section is to gather the info and to come up with alert employing a GSM. This motivates North American country to utilize the work of data communication technology & device network to solve the networks to beat many issues associated with developing and poor country for fighting with the flood. This might conjointly facilitate in a method to balance the tokenish price demand.

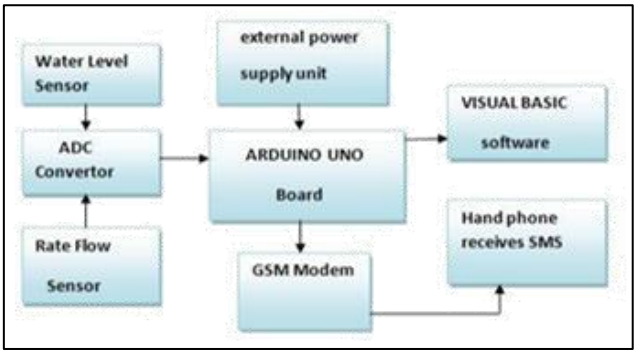

Fig. 2: Block Diagram

IV. RESULT ANALYSIS OUTPUT

The analysis of the output is as follows

- Output on Visual
- Basic Software

The sensed data is sent to the visual basic software. This is done by using arduino coding. A mathematical model or the graphical representation of the continuously sensed values appears on the screen whenever the pc is connected to the arduino through USB terminal or by any other means. When the values sensed are abnormal alert is generated and it is indication in the block above the graph.

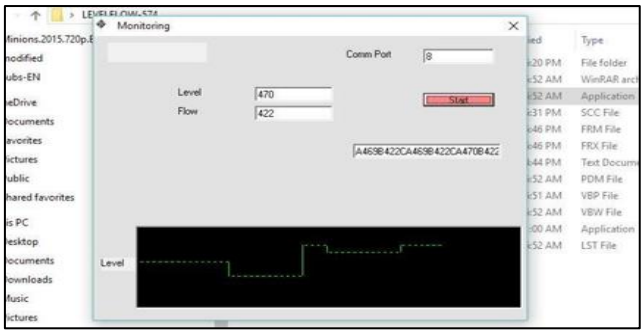

Fig. 3: Graph

A. LCD Output

Fig. 4: LCD unit

LDU (LCD display unit) connected to the hardware model shows the values which the sensor senses and sends to the arduino as shown in the above figure.

V. CONCLUSION

In this report we have discussed the system for monitoring and alerting the concerned authorities in case of flood and indicates them to take precautionary measures if needed. The paper describes our work on the flood prediction algorithm that will eventually run on the system and the implementation of the sensor network architecture for this application. With the help of water level and flow rate sensors we are able to sense the data from the vitual area and then using the gsm we are able to generate alert incase of flood. The datas are also used in the visual basic software to show the graph for the corresponding values

REFERENCES

[1] Chang, N. and Guo Da-Hai. 2006. Urban Flash Flood Monitoring, Mapping and Forecasting via a Tailored Sensor Network System, Proceedings of the 2006 IEEE International Conference on Networking, Sensing and Control 2006, issue 23-25, pp. 757-761, April 2006.
[2] Chang, Y., and Chang, N. 2002. The design of a web-based decision support system for the sustainable management of an urban river system, Water Science and Technology 46(6), 131-139.
[3] Chen, S.P. 1990. Remote Sensing Analysis in Geoscience. Beijing Mapping Press, Beijing, China.
[4] Creutin, J., Muste, M., Bradley, A., and Kim, S. 2003. River Gauging using PIV Techniques: A Proof of Concept on The Iowa River, Journal of Hydrology 277, 182194.
[5] DeRoure, D. 2005. Improving Flood Warning times using Pervasive and Grid Computing, Quarterly of Royal Academy of Engineering, UK, 2005
[6] Manusthiparom, C., and Apirumanekul, C. 2005. Flood Forecasting and River Monitoring System in the Mekong River Basin, Second Southeast Asia Water Forum, August 29th-September 3rd, 2005.
[7] MeteoClima2010.PrecipitationSensor. http://www.fischerbarometer.de/english/index.htm?niederschlag/nied menge.htm
[8] NXN Technology 2010. GT-511 GPRS Data Transceiver, http://www.nxn.com.tw/GT-511.php OAS. 1990. Disaster, planning and development: managing natural hazards to reduce loss. Department of Regional Development and Environment, Organization of American States, Washington, DC, p. 80
[9] D. Mysar, M.Jagadeesh Babu, Real Time Monitoring of Water Level Variation in Rivers and Flood Alerting System using ARM7 on International Journal of Advanced Research in Computer and Communication Engineering Vol. 4, Issue 8, August 2015.
[10] Danny Hughes, Phil Greenwood, Gordon Blair, Geoff Coulson, Florian Pappenberger, Paul Smith and Keith Beven, An Intelligent and Adaptable Gridbased Flood Monitoring and Warning System,
[11] Introduction to Embedded Systems-By SHIBU K V
[12] Siva Kumar Subramaniam, Vigneswara Rao Gannapathy Sivarao Subramonian and Abdul Hamid Hamidon
[13] http://ijetae.com/ [6]https://www.google.co.in/?gfe_rd=cr&ei=uMOxVtXHEIjK8Aet7YKICQ&gws_rd=ssl#q=microcontroller

