ISSN No:-2456-2165

Real-Time Flood Supervising and Forecasting using Simulated Neural Network

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Abstract:- As the monsoon kicks in, brings the hope to the farmers for good yield, where as darker side of it can be disastrous, FLOODS. They have adverse effect both economically and socially across globe while some artificial measures are been taken to overcome one of them like dams, How long do they could prevent? Here is our help to the society, where in by using the technology the social life could be saved. Our design of the project mainly concentrates on supervising characteristics like level of water, humidity, temperature and rainfall. These parameter help vitally in flood forecasting.

As the parameters are aggregatted and are collected by using from the controller and it sends the message over the internet. This affects the locals. After flood, also there is drastic effect, the victams can be detected by image processing are immersed. For the greater precision purpose ANN is used and further the information is passed to the rescue team near by via IOT. Along with this digital image processing technique is implemented to save life of victims. Our project mainly focuses on the flood forecasting and detecting the victams using IOT and Artificial neural network.

Keywords:- *Floods, Artificial Neural Network, Internet of Things, Digital Image Processing.*

I. INTRODUCTION

The peninsular region of southern India and the areas around the perennial rivers are mostly prone to the disaster floods, during monsoon. Melting glaciers in the Himalayas are also one of its characteristic. The monsoons are weakened by Lanina effects, but still the Global warming plays the crucial role in floods, and parallel increasing in the ocean level any melting of glaciers. The monsoon winds can be tracked using the current technology. However, several other factors play major role in floods too like water level, flow rate which can be collected through the seasons.

The IOT along with the WSN, communication framework, rapidly transmit the data to the nearby center. The centers take the counter measures to tackle the flood. Other interdependency parameters like the flow rate, rainfall pressure are also the cause of floods. However significant numbers of seasons are then used for the accurate prediction. Our project proposes a system which uses IOT based flood forecasting using various seasons like humidity, temperature, rain, float etc. We also detect the victims via image processing and ANN.

II. RELATED WORK

First, in paper "An Energy Efficient Communication Protocol for Low Power Energy Harvesting Sensor Modules" by D. Purkovic, M. Hönsch, T. R. M. K. Meyer [1] states that, in IOT market, energy consumption has become one of the main parameters in evaluating sensor systems. Long range sensor systems have application in outdoor environment where it combines energy harvesting mechanisms with the low power features. Techniques and mechanisms for harvesting and saving energy are presented in this paper and low power, energy efficient communication protocol is described. The protocol optimizes the information collected from environment, pack and transmits for long distance with minimal energy. The gathered information is transmitted in a form of two different packet types called Teach-in and Data telegrams, respectively. A detailed structure of these packets and the energy required for transmission is explained in this paper, along with a deeper protocol physical layer analysis.

In paper “Flood Modeling and Predicting using Artificial Neural Network” by A. R. Sanubari, P. D. Kusuma and C. Setianingsih [2] states that, in order to predict flood the flood water level prediction is very important. Flood is the most common natural disaster which causes huge losses to life n property. For early warning of the flood the ANN modeling is placed at the output for better performance. ANN works on the algorithm fed to it. The algorithm helps in reducing the error value function based on the complexity and performance of the Artificial Neural Network.

In paper, "Connectivity-based virtual potential field localization in wireless sensor networks" by Chao Yang, Zhu Weiping, Wei Wang, Lijun Chen, Chen Daoxua and Cao Jiannong [3] states that, in wireless sensor networks, due to low cost and no requirement for special hardware the

connectivity based localization protocols are widely studied. Many connectivity-based algorithms are dependent on estimation of distance between nodes according to their hop count, which often yields large errors in anisotropic sensor network. In this paper, virtual potential field algorithms estimate the position of unknown nodes and are iteratively adjusted by eliminating the inconsistency to the connectivity constraint. Unlike current connectivity-based algorithms, VPF effectively exploits the connectivity constraint information, regardless of distance estimation between nodes, thus achieving high localization accuracy in both isotropic and anisotropic sensor networks.

In paper "Wireless Sensor Networks for Cultural Property Protection" by J. Sung, S. Ahn, T. Park, S. Jang, D. Yun, J. Kang, S. Yoo, P. Chong, D. Kim [4] states that, wireless sensor network technology has been proved that it has a very strong impact on our daily life for many applications. In this paper, WSN has been deployed in one of the most important UNESCO cultural property sites in Korea at Bul-guk-sa temple. It gives the information about monitoring and protecting cultural property from the aspect of application design to network system management.

In paper "A Real Time Video Processing Based Surveillance System for Early Fire and Flood Detection" by C. L. Lai, J. C. Yang, Y. H. Chen [5] states an effective and simple method for real-time automatic detection of disaster by video analysis. By analyzing the specific feature vectors like spatial-temporal spectra variation, colour histogram concentration, etc., a fully automatic process is developed to substantially improve the performance, especially in early detection thus to reduce the loss caused by natural disaster.

III. METHODOLOGY

The System Architecture of the proposed IOT based Real-time Flood Supervising and Forecasting using Neural Network is as shown in the fig 1. It consists of PIC16F877A Microcontroller board, LCD display, GSM module and different types of sensors like temperature, water level, humidity, PIR and rain sensor.

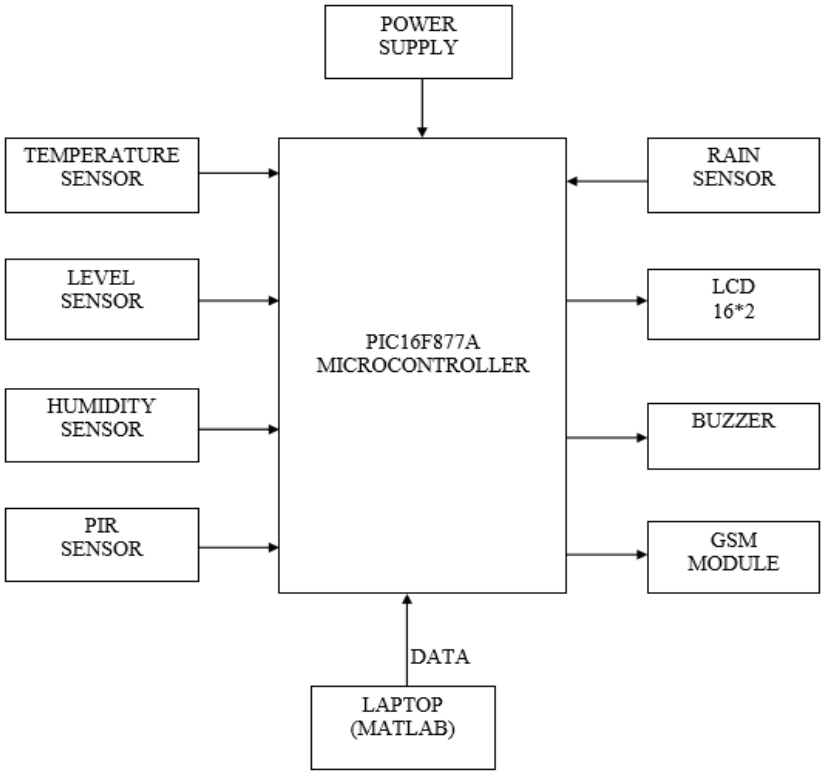

Fig 1:- System Architecture

The Government spends ton of cash for flooding injury. In order to cut down the value spent, government has to implement Flood monitoring technology acts as a system which alerts and continuously keep a track on the critical places that are been exposed to floods frequently. PIC16F877A is 8-bit microcontroller which acts as a brain of the hardware gathers all the received inputs from various sensors and the embedded controller toils with a DC power supply of 5V and there is a built in A/D converter. The different types of sensors used sense the conditions and the data is provided to the microcontroller and also delivered to the locals as SMS using GSM. Finally, siren alert is given as the flood alert and the digital image processing is used to detect the victims during flood. The image is obtained through a camera via WSN which is received by the IPC and further compared using MATLAB. For the greater precision purpose ANN is used.

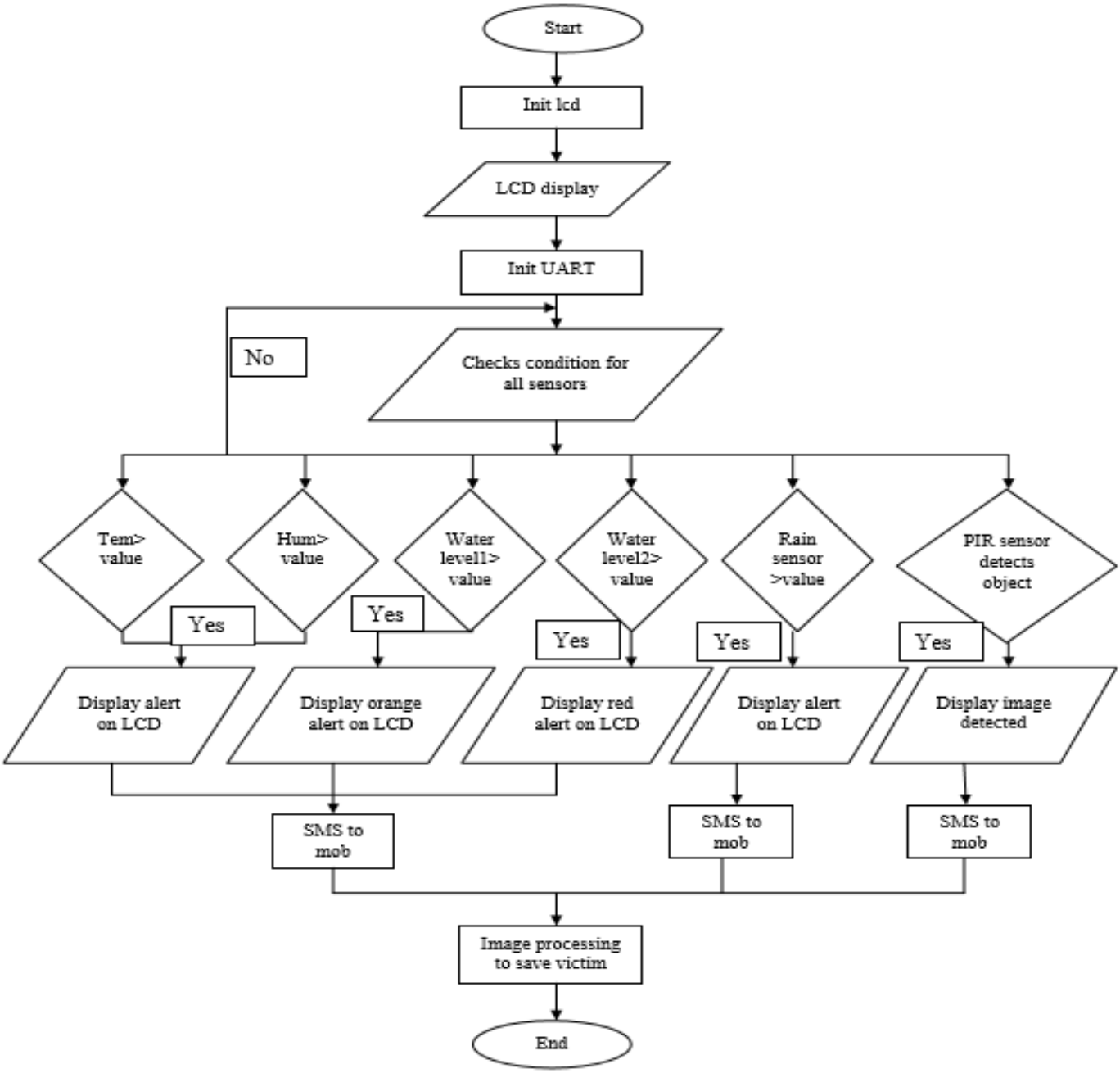

Fig 2:- Data flow diagram

IV. WORKING

In IOT Based Real-time Flood Supervising Using ANN, wireless sensor networks (WSN) are used everyplace i.e., both residential areas, and undeveloped places. Therefore embedded system plays an important role in reducing the risks caused due to rise of water level in flood prone areas. The caution or warning alert to the local people regarding the flood is given via by sending SMS and siren. To give any microcontroller accessibility to the Wi-Fi network Wi-Fi Module is used. The controller unit receives inputs from various sensors and is described as follows:

The temperature sensor is a device that measures the temperature through an electrical signal as it requires thermocouple or RTD (Resistance Temperature Detectors). A thermocouple is made up of two dissimilar metals which generates electrical voltage. If the difference in voltage is amplified, the analog signal is generated by the device and is directly proportional to temperature.

The water level sensors are used to detect the level of substances that flow. Basically level sensors can be used to identify the point at which a liquid falls below minimum or rises above maximum level. Hence, any person can identify the level of water which is displayed on LCD.

The moisture content and air temperature present in the air is sensed, measured and reported by the humidity sensor. The ratio of moisture in the air to the highest amount of moisture at a particular air temperature is called relative humidity. Humidity sensors services by identifying the changes that modify electrical currents or air temperature.

The rain sensor or rain switch is a switching device activated by rainfall through the raining board and also for measuring the intensity of rainfall. The rain sensor module attributes a rain board and control board which is separately modeled for more favorability, power indicating LED and an adjustable sensitivity though a potentiometer. It works as an input device. The details about detection of rain are displayed on the screen by controller.

The PIR sensor consists of two slots in it and each of the slots is sensitive to IR which is made up of such special materials. When the sensor is idle, both slots detect the same amount of IR and when the heat source body is detected in front of the slots there is a change in the output signal. The controller acting as a brain of hardware module gathers the details from sensors and does the further processing with output unit and displays them on LCD screen as well.

The PIC16F877A microcontroller is used in a prevalent way as it is rich in peripherals and therefore number of devices can be interfaced to it easily, since it has flash memory it can be reprogrammed any number of times and programming is ease. There are variety of embedded controllers available to device various tasks, among them PIC is used superiorly. The PIC microcontroller obtains all the information from different sensors used here. The WSN collects this information's from controller and transfers it to the internet data processing centre which could be viewed in the webpage. The information's are also delivered to the locals as SMS using GSM. The siren alert is also given to the locals. The Digital Image Processing is used to detect the victims during flood. This is done by comparing the image in the MATLAB. Here ANN is used for better accuracy to detect the victims during flood. An artificial neural network (ANN) consists of simple processing units which communicate by sending signals to each other over a large number of connections. ANN is the computational model inspired by the human brain.

V. CONCLUSION

Floods are the natural disaster which cause hazards and damage to the human lives and other properties. But the silver lining could be its forecasting and saving the maximum of living lives on the terrestrial body. In our project work, we approach the IOT, and collect the required data via WSN, by using a learning model for flood prediction. Some commercial sensors like water level, rain, temperature and humidity sensors are being integrated with the system and atmosphere using information and communication technologies. By using PIR sensor and the MATLAB simulation results show the number of victims affected by the flood and the proposed system indicates the better performance. The approach combines the power of ANN for greater precision to handle the data provided by WSN, and also provides effective communication between these two components.

Implementing the network and using the data from the network for flood prediction is the next step for this project work. Moreover, alerting people about the threatening floods is a challenge for the future.

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