# IoT-based Flood Monitoring and Alerting System using Arduino Uno

**Sukanth Behera[1], Saradiya Kishore Parida[1]**

[1]Assistant Professor, [1]Department of ECE
[1]Gandhi Institute for Technology (GIFT), Bhubaneswar, India

**ABSTRACT**

The loss of properties and living population is getting enhanced by every year due to the dynamic alterations in weather conditions which results in heavy floods. Therefore, implementation of an intelligent analysis of flood risk is necessitated for the field of research in Disaster management. This article implements an intelligent IoT-based flood monitoring and alerting system using Arduino Unomodel, where water sensors and rain sensors are utilized to alert the authorities regarding the heaviness of rain and monitoring of water level in a lake or river. This system alerts the people in nearby villages since it utilizes IoT system for notifying the village people.

**Key words:**Arduino Uno, Internet of Things, Water sensor and Rain sensor.

## 1. INTRODUCTION

Flood is regular natural disasters in Malaysia which happen nearly every year during the monsoon season. In 2010, several neighbourhood's in the eastern Malaysian state of Sabah, and the states of Johore, Malacca, Negeri Sembilan and Pahang, were flooded after the continuous rain brought by the northeast monsoon winds [1]. Johore is the worst affected country within the five, which number represents more than 30,000 evacuees. During the flood, electricity was disconnected in some districts to avoid electric shock, while some shelters were reportedly to food and water shortages. This disaster is inevitable but with early response and reaction from local authority the destruction can be minimized. Therefore, this flood monitoring system has been designed to help local authority to provide more systematic solution. The overall system can be illustrated. The water level variation is measured by a sensor that is placed in the selected area such as riverbank or low-lying areas. This sensor will generate a signal and send it to 24-hours Control Centre. In this centre, the raw data collected from the sensor will be compiled and analysed. Every single variation will be displayed and saved into database. If alert condition occurs, monitoring server will send an alert will send an alert notification immediately to the responsible person for their immediate action.Flooding is usually brought on by an increased quantity of water in a water system, like a lake, river overflowing. On occasion a dam fractures, abruptly releasing a massive quantity of water. The outcome is that several the water travels into soil, and 'flooding' the region. Rivers are involving riverbanks, in a station.Aside from lack of products and house and office property, streets infrastructure flood water consists of bacteria and sewage flow of waste sites and chemical spillage which leads to a variety ofdiseasesafterwards.

Flood predictionsneedinformationlike:

- The speed of change in river stage on a real time basis, which may help indicate the seriousness and immediacy of this threat.
- Understanding of the form of storm generating the moisture, such as length, intensity and areal extent, which is valuable for discovering potential seriousness of the flood.

## 2. RELATED WORK

Earlier several researchers implemented flood monitoring and alerting system based on ARM7 processor and Arduino controller. But, ARM7 wasn't real time operating system (RTOS) [2-4], speed is very less and more expensive. Arduino is a controller and additionally it requires extra modules to interact with cloud like the global system for mobile communications (GSM), blue tooth, Wi-fi and LAN cable [5-7]. Several works like [8, 9] investigated a study on flood disaster and its management in the country of Malaysia, where they centered the significance of identifying best solutions to educate if there was a strike of disaster. In addition, author in [5] suggested four action states such as readiness, reaction, reconstruction and reduction. In this way, recent days most of the researchers tried to find out the mitigation of flood control and there by reducing the risks. Later, due to the easiness and wider range of applications in various field, IoT-based system attracts the researchers to implement an intelligent flood control and alert management system.

## 3. PROPOSED SYSTEM

Our proposed methodology includes Arduino Uno with water and rain sensors to reckon flood symptoms and alert official authorities with notification. Further, it provides an alarm to nearby villages, which alerts them to vacate from there since there will be a chance of flood occurrence. In this project, measurement of water level is done by utilizing water sensors. In addition, rain sensors also employed to assess the level of rain in particular area. Later, these sensors send the information regarding water and rain measurements to Arduino Uno over IoT. Now, at the controlling end, once it exceeds the threshold limit value then the system reckons the time duration that would assume to flood in an area and alert the village people.

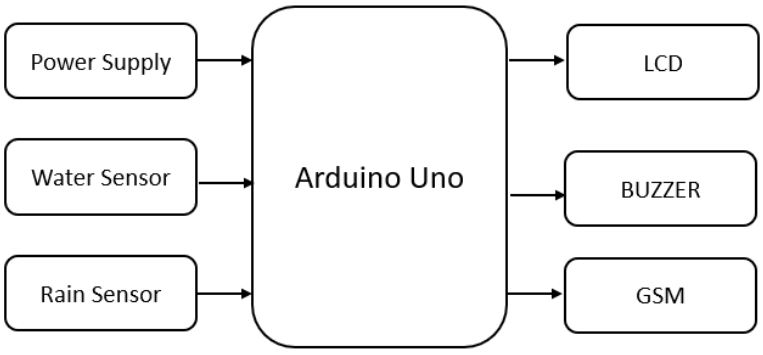


Figure 1. Block diagram of proposed system.

### Working

The sensors deployed near by the water bodies are connected to cloud which senses the level of water and rain fall, the date is stored in cloud and when they cross the threshold value it triggers a notification to the concern person and from him the notification is broadcasted.

## 4. HARDWARE DESCRIPTION

### A. Arduino

Arduino is an open-source electronic platform that is based on connection between hardware and software and it is easy to use and implement. They are designed in such a way that it read the input – water reaches a certain threshold and turn it into an output – sending the alert

### B. Rain Sensor

This is a device which activated by falling of rain on it. Practically, there are couple of major applications for rain sensors, where the first one is a device connected automated irrigation system which makes the system to turnoff in case of any rain fall and the latter is a device utilized to defend an automobile interior from rain and assist the robotic mode of windscreen wipers. The model of rain sensor is disclosed in Figure 2.

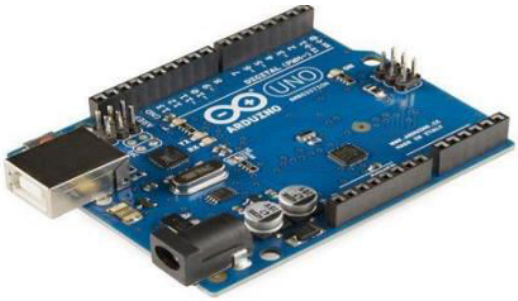

Fig 2. Arduino board

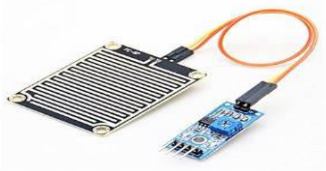

Figure 3. Rain sensor.

### C. Water Level Sensor

This is sensor utilized to detect the level of water, rainfall sensing and even the liquate leakage. Majorly, it is consisted with three parts:

1. An electric brick connector.
2. A resistor with $\mathbf{1}\boldsymbol{M\Omega}$.
3. Bare conducting wires with few lines

Figure 4. Water level sensor.

### D. Global Position System(GPS)

Global located node, at first, is a aerial radio course structure asserted by the US Flying corps. It is an overall catalogue fly system provides earth territory information Global positioning system or near view at any rate fly machine. Global positioning system doesn't customer send a data, and it works openly of, anyway advances redesign handiness arranging information, essential arranging capacities, normal, and business customers around the world. US take care of it and make it straightforwardly.

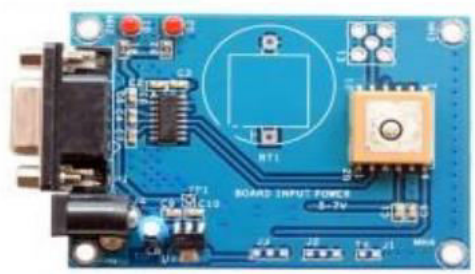

Figure 5: GPS module.

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## 5. EXPERIMENTAL RESULTS

Proposed methodology is implemented on Arduino Uno processor with Basic C programming. Underneath figure discloses the fold monitoring system with IoT, where it consists of water and rain sensors for monitoring and alerting process.Once the Arduino Uno detects that there is any emergency, it will sends an information or notification alert to the near by village people and respective higher authorized persons as well.

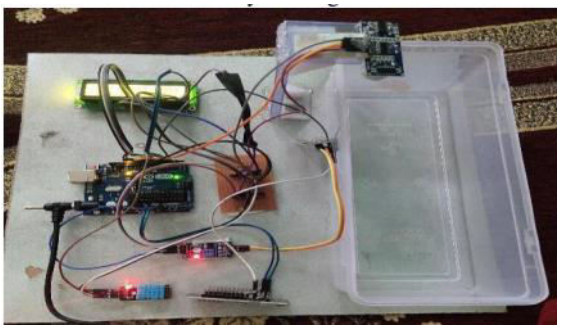

Fig. 5:Circuit of fold monitoring using Arduino.

## 6. CONCLUSION

This paper implemented an intelligent flood prediction and alerting system using IoT and Arduino Uno which utilized water and rain sensors for alerting the authorities and monitoring of water level in a lake or river. Further, we sent a notification alertto the people in nearby villages using IoT system. This system is low-cost and self-guiding, hence there is no requirement of real-time training. In addition, our system obtained good performance, low-cost and flexibility. In future, it can be recommended to utilize global positioning system (GPS), which can track the location of equipment in the target field. Furthermore, Solar power can be used rather than direct power to save the power usage.

**References**

[1] Star Publication, 3 Nov 2010, "2010 North Malaysian Floods,"
[2] D. Mysar and M.J. Babu, "Real Time Monitoring of Water Level Variation in Rivers and Flood Alerting System using ARM7", International Journal of Advanced Research in Computer and Communication Engineering, vol. 4, no. 8, pp. 392-396, 2015.
[3] S. K. Subramaniam et al.,"Flood level indicator and risk warning system for remote location monitoring using Flood Observatory System", WSEAS Transactions on Systems and Control, vol. 5, no. 3, pp. 153-163, 2010.
[4] N. Ahmad et al., "Flood Prediction and Disaster Risk Analysis using GIS based Wireless Sensor Networks: A Review", Journal of Basic and Applied Scientific Research, vol. 3, no. 8, pp. 632-643, 2013.
[5] M. Ancona et al., "On the design of an intelligent sensor network for flash flood monitoring, diagnosis and management in urban areas position paper," Procedia Computer Science, vol. 32, pp. 941–946, 2014.
[6] M. Borga et al., "Surveying flash floods: gauging the ungauged extremes," Hydrological processes, vol. 22, no. 18, 2008, pp. 3883-3885.
[7] J. T. Alfieri, "Ensemble hydrometeorological simulation for flash flood early detection", Elsevier Journal of hydrology, vol. 424-425, pp.143-153, March 2012.