Flood alerts system with android application

Conference Paper · May 2017

DOI: 10.1109/ICT-ISPC.2017.8075343

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Flood Alerts System with Android Application

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***Abstract*— Internet of things (IoT) is technology that connected anything and everything to the Internet. IoT is the newest technology rapidly widen in its usage. This technology brings new products such as disaster monitoring. Flood disaster is the main concern in Malaysia because every year there are flood occurred. We can use this technology to do monitoring activity that people are not able to do it in 24 hours and inform to the user in real time. In this paper, we propose IoT approach that known as flood alerts system with Android application. This system will monitor the potential drainage usually occur flooding and share the info in real time to people nearby.**

Keywords*— *Internet of Things (IoT), flood disaster, monitoring systems, smartphone.

I. INTRODUCTION

Floods are natural disasters that occur frequently in Malaysia that have two seasons of summer and rain. But in recently the climate change is already transforming Malaysia to the extreme summer and heavy rainfall above average rainfall. As we all have faced in the past year 2014, our country experienced a major flood that drowned some cities in Malaysia. The states that experienced flooding's like Kelantan, Perak, and Terengganu. The effects of these floods have damaged property and the disaster also took the lives of people during the rescue operation. Problems like this can be prevented by warning directly to the public, especially those living near the drainage. Along with advances in computing technology, as we already know each community in Malaysia has been affording to have a smartphone than the usages is rapid growth in our society.

Besides that the development of micro-controller technology which is now most developed countries have used IoT technologies in detecting the activity of natural disasters such as Japan, have adopted the technology in detecting flood likewise other countries such as America and others. Indirectly, the use of technologies and smartphones can help to warn and inform directly on the current state of the water level to the society in real time. Therefore, the society will be better prepared and alert to face the disaster that nearest to their home.

II. OBJECTIVES

The main objectives of this system are to design a new system for flood alert detection system integration in android application. In addition, to provide real-time information about the increase of drainage nearest and provide an alert notifications system to end user.

III. SCOPE

This system is a system to deliver information in real time to a user by applying IoT technologies as the monitoring system. All the data that collected will be transmitted to end user that installed the application on the smartphone.

IV. RELATED WORKS

There are a few approaches we can use in developing flood alert system. As example implement a cooperative IoT to monitor drainage water level. [10] Proposed cooperative monitoring algorithm based on node location information. Basically, IoT is a part from WSN but sometimes there are have a problem on connectivity end to end device because there are varieties of devices used in the network architecture. A consistent design system is needed to implement, where the main application requirements for low cost, fast deployment of large numbers of sensors, and reliable and long unattended service are considered at all level.

The system must be able to handle the variety of data types, providing interoperability among all the components. This is because of the various environment of the IoT device give a different perspective in term of information processing, communication capabilities, and data transferring that coming from the devices.

The communication device is important in the system [12] example using of ZigBee network protocol. The protocol had free communication frequency and used low power consumption for communication that saves the hardware cost of instead of using GPRS and reduce the cost of the whole

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system. The advantages of the ZigBee network is it can achieve mutual communication sensor nodes. It helps the system discovers sensor nodes within the range of monitoring stations in short time, reduce the scanning time to collect data, improve the reliability of the information collection and transmission.

Moreover, centralized information processing is important to handle data collected. It can prevent data duplication or redundancy, which would affect system's reliability and credibility of data collection. To solve that problem, implement device node as a services platform that works with information base stations when they receive information from others. It utilized information about the event and also as a reference to identify devices in the network. Complex programmable logic device (CPLD) can be implemented in base central as the core controller. This to ensure an effectiveness of data transferring [9] by reading the data in parallel and in real time with high speed on multiple different sensor data.

Last but not least, the novelty of our project we integrate Android technology with those technologies. This is a new thing because the increasing of development smart phone technology make possible to implement the mobile-based system for flood alert detection. In this system, basically the architecture will use the same concept with the existing approach but in different architecture, locations and more interactive output for the end user. Because of the usage of a smartphone in our country widely used by the community.

V. System Designs

We divide the system into two components where each component has its requirements:

a. Hardware
- Real time can detect water increase in three levels.
- Can process digital and analog signal into useful information.
- Low power consumption
- Availability use width range network technology
- Scalable can expands network architecture

b. Software
- Interactive user interface
- Need database to save data from WSN
- Provide other information such weather forecast
- Provide location map
- Provide communication platform for emergency
- Ease to use all the features

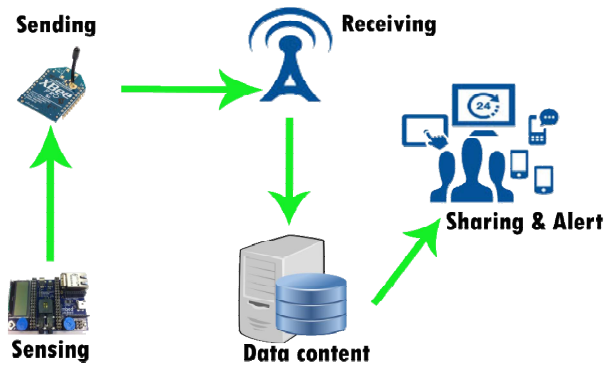


Figure 1: System flow

In this system consist of two component which is hardware component and software component. In Hardware component use a micro-controller, communication device, and a sensor. The model for micro-controller that will use in this project is embedded NXP LPC176 include it application board. This micro-controller architecture based on ARM technology. This processor type is suitable for this project because the technological advantages are of the technology can reduce costs, heat and power use. For communication device use XBEE Pro S1. This device uses ZigBee protocol for communication. The advance of use this protocol because of fewer uses of power consumption, the protocol characteristic is sent a small data packet in the large network. Then for the sensor, we use water level sensor that can measure high of drainage water level.

In software component involved a database, application programmable interface (API), web based and mobile based. All the data that collected by the sensor will store in the database before it sends to last output which is the end user. We create API for manipulation of data such as for access the data that need to be processed and also transfer data if need cross platform within a different domain.

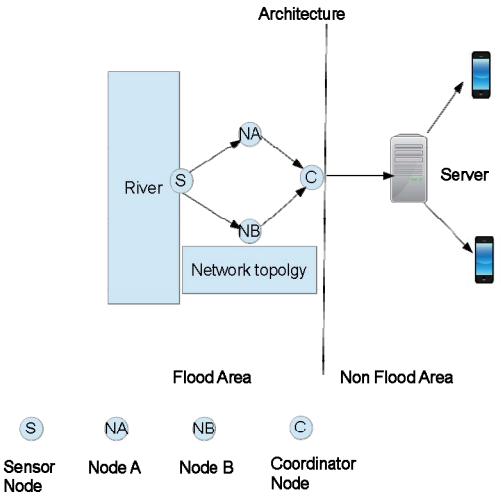


Figure 2: System Architecture

Node	Role	Function
n1	Sensor	Detects the water level and send data to router node
n2	Router	Receive and send data to the coordinator. Can be backup node
n3	Router	Receive and send data to the coordinator. Can be backup node
n4	Coordinator	Receive data and process data before sending to server(internet)

Fig 2 shows the overall architecture of the system. It divided into two part which is flood area and non-flood area. During the flood, communication between the nodes still functioning because it only uses battery power. So the communication still can be done until the data received by the main node. The main node that connects to the internet will transfer data to the server. In the server, data will be processed and then store in the database. The user will get the info based on their current location if they in the range of sensor node located. Thus, the user will be informed about nearest drainage from their current location.

a. Application Designs

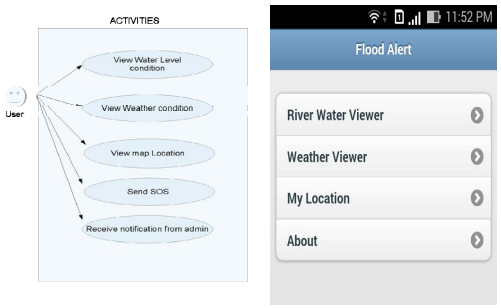
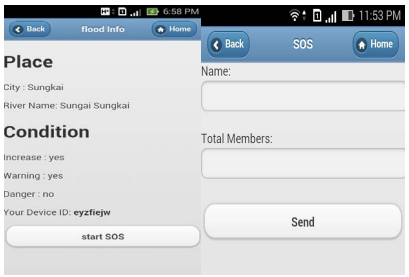


Figure 3: Features in the application & User interface in the application.

Fig 3 shows main features for this system give a warning to the user in real time regarding the flood disaster and also give other information that related.

a. View water level condition

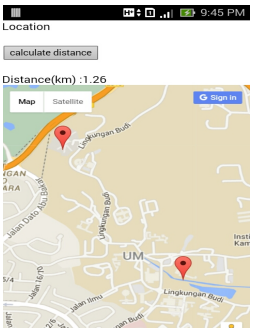


This feature shows nearest river name, city name, and its condition such increase level, warning level or danger level. Besides that, SOS features only activate when the sensor detects danger level where the flood is occurring. This SOS can be used if the user has been trapped during the flood. They can use SOS form to tell rescuer about location, and how many members with the user.

b. View weather condition

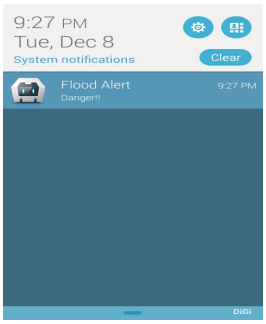
This activity only just views about weather forecast due to user current location.

c. View map location



Show current user location also the nearest drainage. The User can know their distance from user to the drainage location.

d. Receive notification



It only activates when danger level is has triggered and then notify the user with alarm on user phone.

VI. Discussion

During the implementation of this system there a few problems happened. However, we still succeed to fulfill the objectives that mention before. One of the problems is wireless sensor network topology. We managed to implement cluster tree topology using Xbee S1 pro version but there are still have some limitation because of the devices are built for peer to peer connectivity and not built in the context of mesh network thus the device not suitable implement in a large network.

Besides that, this system also needs to upgrade the user interface design to make more interactive and also user-friendly to end user. Moreover, collection data using advanced sensor is needed to ensure get a high accuracy of data measure. The system needs to collect a variety of data that can be used in future for analysis. It is useful for developing an intelligent system in future such as prediction, and autonomous system.

VII. Conclusion

The faster development of technology especially uses of smartphone and WSN brings the idea of IoT technology known as "Flood Alert System with Android app" project. Our objective for this system to give real-time info throughout user smartphone is the necessary things.

In my conclusion, there no doubt that disaster like flood we can't avoid it from happening. If, we can make people aware or alert people due the flood occurred it can help them to prepare themselves if need to go safe places. Thus this system can give big impact towards every community in our country.

VIII. Acknowledgement

Thanks to my supervisors Dr. Yamani, Dr. Ismail and Dr. Md Asri Ngadi who gave me this opportunity to do this great project on the flood monitoring system, which also helped me in doing a lot of things and came to know about so many new things I am really thankful to them.

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