INTRODUCTION

In most countries of the world, the flood caused large damage and involved it in significant amounts of loss to individuals and its properties. Even so, we can forecast rain or to track the path of the storm exactly from satellite image, the need to have real-time monitored data is important to make a rational decision on the actions needed to be taken and have good flood response operating system to manage all the movement of the floods.

Every year, it causes lives and damage to infrastructure, agricultural production and serious damage to local economic development. In recent years, high rates of removal, extensive area clearing, and communal forest intrusion, in addition to ineffective protection of cut-over forests, have accelerated the increasing need to address flood risk in the urban and even the rural region. *Due to the significant reduction of forests, peak floods can travel faster to generate higher risk within a short period of lead in populated areas. Problems also include heavy local rainfall, storms may result to typhoon and inadequate drainage, which is causing floods.* Where in this research study is made to track the map of the affected areas, to inform the individual user and they can manage their plan far from possible flood risk. Using this system, the user can view flood movement and status using red color coding of the areas where high flood levels occur caused by heavy rainfall or result of natural disaster.

Many studies have been conducted on research and development of early mobile warning systems communication and information-based technologies. This is mobile communication technologies are well known devices and machines are growing rapidly in the

industry and the global world. Previous research was developed using mobile based technologies such as floods monitoring systems and early warning based on SMS

Where in this research, it is necessary to design an Internet-based warning system are an early warning shows flood height information along with location of real-time flooding. The study was constructed using ultrasonic sensor as a water level detector and U-Blox GPS module as a flood coordinate location detector. Same water level data and location coordinates are processed by Arduino and transmitted through the GSM SIM900 module to SMS flood information station. The information is displayed as a map using data the height of the flood through the browser.

Methods

The system design uses the Arduino Uno as a data processor. The Arduino Uno as shown in Figure 1 is a processing board using an 8-bit Atmega328 Microcontroller as the primary chip. The Arduino Uno runs at a voltage of 5 Volts. Arduino provides 2 kB SRAM, 1 kB EEPROM, 14 digital pins, 6 analog pins, 32 kB flash memory and 16 MHz clock speed and a USB connection.

Figure 1: Arduino Uno

The GSM sim900 module is a module that provides the intermediary microcontroller with the SMS sending process. The SIM900 GSM module as shown in Figure 2 is a GSM / GPRS Quadband GSM / GPRS that uses LPC2148 single chip processor. Features within the GSM SIM900 are capable of sending SMS and voice data.

Figure 2: GSM SIM900 Module

The U-Blox 6m GPS module as shown in Figure 3 is a type of GPS receiver that features high performance as a mechanical positioning. With the optimized architecture, power, and memory of this module it is ideal for devices that use batteries as a resource with the limited cost and space possible to use by having 50 channels of positioning machines, it can speed up Time-ToFirst-Fix (TTFF) in less than 1 second.

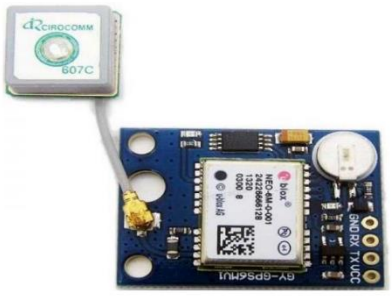

Figure 3: GPS U-Blox Neo 6M Module

The HC-SR04 sensor is used in designing this prototype as useful as measuring water level. The HC-SR04 sensor as shown in Figure 4 detects the object's distance by emitting ultrasonic waves (40 KHz) during t = min 10 μs and then exploring the reflection. The HC-SR04 sensor emits ultrasonic waves according to the microcontroller control (pulse triggered at a tout min of 10 μs). Sensor measurement limit is 2cm - 400cm, TTL pulse-positive input, 10μS, Echo stops at 50 uS from pulse and end before next measurement is 60 mS.

Figure 4: Ultrasonic Sensor HC-SR04

The prototype system diagram is done in two stages: integrated module construction stage and programming. Generally, the construction of the integrated component or module is designed using the block diagram method as shown in Figure 5 and it can be explained that the system design starts with an ultrasonic sensor and the GPS module transmits the data level of water and flood location coordinates to Arduino Uno as a data processor. The same data is sent in the form of SMS data to the information center received by the modem. Computer and processor data have been received to become a Google Maps water level information system and via the internet through a web app it can be accessed by a mobile phone.

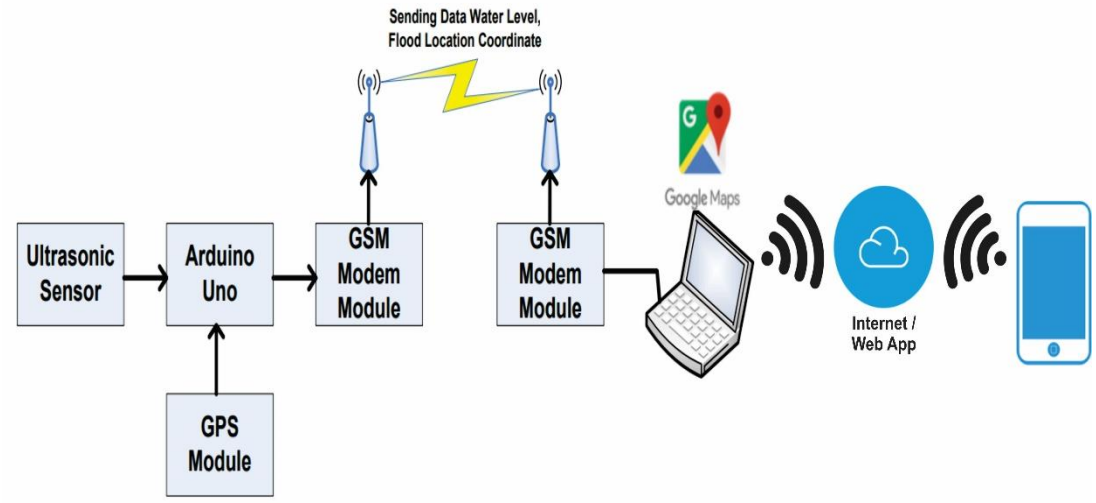

Figure 5: Block Diagram of Prototype System

Because the prototype construction of the water level detection level as seen in Figure 6 is a construction constructed by using a Parallon pipe with a float plate as a water level object. The ultrasonic sensor is placed on the top of the pipe that emits signals from the trigger components and can be seen on the ultrasonic sensor taken by the echo element. The signals are processed by the system to become water level data.

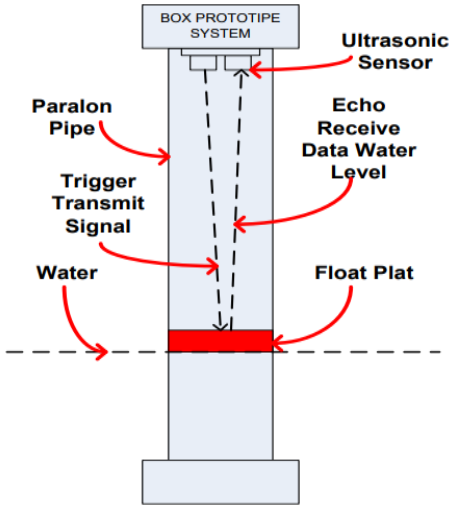

Figure 6: Prototype Construction of Water Height Detection

Result

The design of a prototype system constitutes a flood information system based on Google Maps with water level data and flood location coordinates. The prototype circuit system was successfully developed as shown in Figure 7. The prototype system consisted of ultrasonic sensors, U-Blox Neo 6m GPS modules, Arduino Uno and GSM modules.

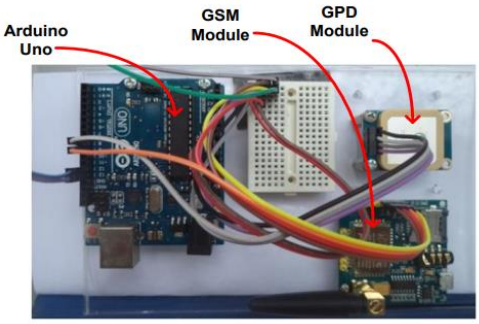

Figure 7: Prototype System Circuit

Water level data were obtained from water level detection devices constructed using the Parallon pipes as shown in Figure 8.

Figure 8: The Construction of Water Level Detection Device

Water level data and location coordinates from the UBlox Neo 6m GPS module were delivered to the system information station and then received by the Wavecom USB Fast Tracking modem as shown in Figure 9.

Figure 9: Information System Station based GSM Modem

The data processed by the flood location information system generates flood location and location information based on Google Maps as shown in Figure 10. The flood information system is programmed using PHP and DBMS MySQL along with the Google Maps API integrated into the program structure.

Figure 10: Information of Water Level and Flood Location based on Google Maps

Discussion

Based on the results, the flood in the information system through Google Maps has been made as what output will be. Using ultrasonic sensors, the Arduino Uno, the U-blox neo 6m GPS module and SIM900 GSM module can send water level data and flood location coordinates to the system information station. The flood information station receives data through the GSM modem of the data processor and displays the water level information and flood locations in the form of a marker label or red color on Google Maps. This prototype is expected to provide information on flood levels and flood location.