IOT Based Early Flood Detection

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ABSTRACT

In developing countries, flooding due to natural disasters such as hurrica and earthquakes results in massive loss of life and property. Warning communities of the flood provides an effective solution to this by giving people sufficient time to evacuate and protect their property. However, the range of early warning system solutions introduces a tangle of conflicting requirements including cost and reliability, and creates several interesting problems from factors as diverse as technological, social, and political. The complexity of these systems and need for autonomy within the context of a developing country while remaining maintainable and accessible by non-technical personnel provides a challenge not often solved within developed countries, much less the developing. After describing this problem, the paper discusses a proposed solution for the problem, initial experiments in implementing the solution, and lessons learned through that work.

Keywords : - Flood, Wireless Sensor Network, IOT.

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' 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 smart phone than the usages is rapid growth in our society. which work by opening and closing circuits (dry contacts) as water levels rise and fall. It normally IOT Early Flood Detection & Avoidance System" is an intelligent system which keeps close watch over various natural factors to predict a flood, so we can embrace ourselves for caution, to minimise the damage caused by the flood. Natural disasters like a flood can be devastating leading to property damage and loss of lives. To eliminate or lessen the impacts of the flood, the system uses various natural factors to detect flood. The system has a Wi-Fi connectivity, thus it's

collected data can be accessed from anywhere quite easily using IOT.

The system also consist of a HC-SR04 Ultrasonic Range Finder Distance Sensor. The Ultrasonic sensor works on the principle of SONAR and is designed to measure the distance using ultrasonic wave to determine the distance of an object from the sensor. All the sensors are connected to Arduino UNO, which processes and saves data. The system has Wi-Fi feature, which is useful to access the system and its data over IOT.
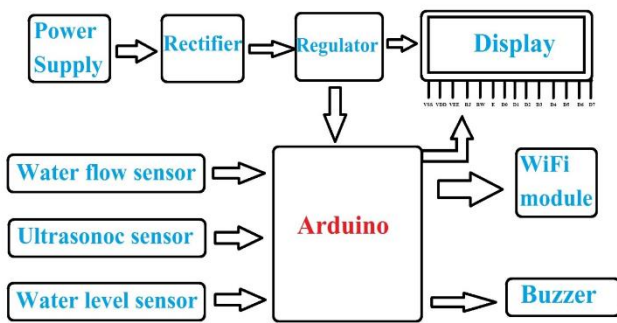
II. BLOCK DIAGRAM

Fig 1: Block Diagram of IOT Based Early Flood DetectioN

Block Diagram Description:

The block diagram of the project is shown in fig (3.1). It will be consist of the some blocks that's are power supply , rectifier ,regulator LCD display, Wi-Fi module, Arduino uno with Atmega 328p, buzzer and three sensors.That sensors are ultrasonic sensor, water flow sensor ,water level sensor. The power supply give the supply voltage at the input side .

Arduino board designs use a variety of microprocessors and controllers. Arduino board designs use a variety of microprocessors and controllers. The functions of components are given .

Ultrasonic sensor is a sensor that works by emitting a wave and then calculates the time of the reflected wave.

When water flows through the rotor, rotor rolls. Its speed changes with different rate of flow. The hall-effect sensor outputs the corresponding pulse signal. This one is suitable to detect flow in water dispenser or coffee machine. The Arduino Uno WiFi is an Arduino Uno with an integrated WiFi module. The board is based on the ATmega328P with an ESP8266 WiFi Module integrated. The ESP8266 WiFi Module is a self-contained SoC with integrated TCP/IP protocol stack that can give access to your Wi-Fi network (or the device can act as an access point).

This is function of the components .sensors and supply are present at the input side of the Arduino Uno and the display, Wi-Fi , buzzer at the output side .The measured value are shown on the LCD display.

III. HARDWARE DESCRIPTION

ATMega 328p:

Arduino, computer hardware and software company, project, and user is an open source community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL) permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it yourself kits.

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (*shields*) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a

dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

ATMEGA 328 microcontroller, which acts as a processor for the arduino board. Nearly it consists of 28 pins. From these 28 pins, the inputs can be controlled by transmitting and receiving the inputs to the external device. It also consists of pulse width modulation (PWM). These PWM are used to transmit the entire signal in a pulse modulation.

Input power supply such as Vcc and Gnd are used. These IC mainly consists of analog and digital inputs. These analog and digital inputs are used for the process of certain applications.
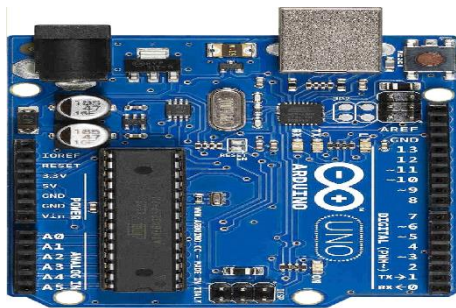
Fig 2 :Atmega328p

Node MCU:

NodeMCU is based on ESP8266 NodeMCU development board which is a true plug-and-play solution for IOT projects. NodeMCU is an open source IoT platform and runs on the ESP8266 Wi-Fi SoC from Espressif Systems. The term "NodeMCU" by default refers to the firmware rather than the dev kits. ESP8266 Core for the Arduino IDE can be used if you would like to program your Node MCU from the Arduino IDE.
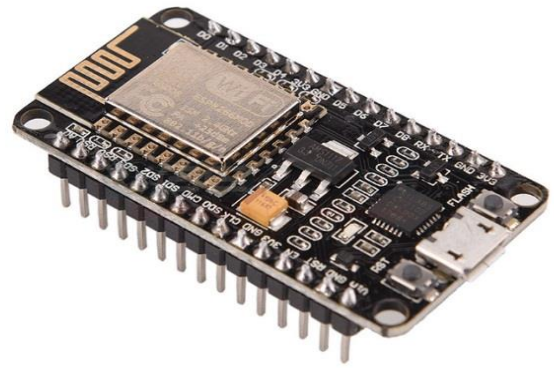
Fig 3 : Node MCU

Ultrasonic Sensor:

Fig 4 : Ultrasonic sensor HC-SR04

The ultrasonic module, HC-SR04, is chosen for the project. It has 4 pins, which are 5V pin, ground pin, trigger pin and echo pin. The ultrasonic sensor has an ultrasonic transmitter and ultrasonic receiver. Its center frequency is 40KHz with 1KHz tolerance. The ranging distance is from 2 cm to 400 cm and the resolution is upto 0.3 cm. The effectual angle of this sensor moduleis less than 15 degrees and its measuring angle is 30degrees. The trigger input pulse width is 10 µs.In this project, the ultrasonic sensor is used to measure the water level from the bridge[4].

2. WATER FLOW SENSOR:

Fig 5 : Water Flow Sensor

Water flow sensor consists of a plastic valve body, a water rotor, and a hall-effect sensor. When water flows through the rotor, rotor rolls. Its speed changes with different rate of flow. The hall-effect sensor outputs the corresponding pulse signal. This one is suitable to detect flow in water dispenser or coffee machine. It is the combination of three colour of the wire that are red,yellow,and black.

WATER LEVEL SENSOR:

Fig 6 : Water Level Sensor

sensor, which is obtained by having a series of parallel wires exposed traces measured droplet Water Sensor water level sensor is an easy-to-use, cost-effective high level/drop recognition ts/water volume in order to determine the water level. Easy to complete water to analog signal conversion and output analog values can be directly read Arduino development board to achieve the level alarm effect
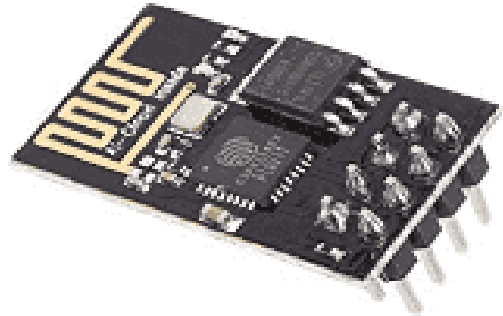
WI-FI MODULE:

Fig 7 : Wi-Fi Module

The Arduino Uno WiFi is an Arduino Uno with an integrated WiFi module. The board is based on the ATmega328P with an ESP8266 WiFi Module integrated. The ESP8266 WiFi Module is a self containedSoC with integrated TCP/IP protocol stack that can give access to your WiFi network (or the device can act as an access point).
ESP8266 is high integration wireless SOCs, designed for space and power constrained mobile platform designers.It provides unsurpassed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement.

Buzzer:

A **buzzer** is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on breadboard, Perf Board and even on PCBs which makes this a widely used component in most electronic applications.This buzzer can be used by simply powering it using a DC power supply ranging from 4V to 9V. A simple 9V battery can also be used, but it is recommended to use a regulated +5V or +6V

DC supply. The buzzer is normally associated with a switching circuit to turn ON or turn OFF the buzzer at required time and require interval. In this project, the buzzer is used as alarm in order to give indications to the peoples.
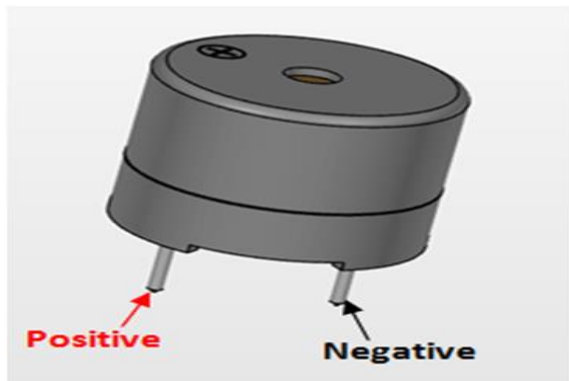

Fig 8 : Active Passive Buzzer Pinout

IV. ADVANTAGES

- IOT Early Flood Detection &Avoidance System" is an intelligent system.

- Which keeps close watch over various natural factors to predict a flood so we can embrace our slaves for caution to minimize the Damage caused by the flood.

- In Industry

V. CONCLUSION

In this paper, an implementation of Internet of Things (IOT) network for flood early warning detection system has been described. The device prototype achieves the objective of this project by having the following abilities, such as: first, the system is able to conduct and record the data frequently and post it into a website by received the sensing data from ultrasonic sensor and delivered it through GSM & GPRS module. Second, the system is able to reply the direct message from anybody who has interest in asking/knowing the condition of current water level. From experimental results, it is concluded that this system will be useful as one of solutions that could be implemented in order to reduce the number of flood casualties that might happen in the near future.

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Cite this article as :