

# IoT Based Early Flood Detection and Avoidance System

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**ABSTRACT:** The purpose of flood warning is to detect and forecast threatening flood events so that public can be alerted in advance. Flood warnings are highly adaptive where protection through large scale, hard defenses, is not desirable. Sensors, GSM and wifi modules which will helpful to give information about the flood. In this proposed design, the alerting system will monitor near by dams regarding the status of the floods with sensors and the information can be sent using GSM module.

**KEYWORDS:** Flood Monitoring, Arduino Uno R3, Sensors, Web Page.

## I. INTRODUCTION

The worlds climate is changing drastically due to human activities such as pollutions, cutting trees, global warming, excessive gas emission etc. The main objective of this project is to close watch over the various natural factors and to minimize the damage caused by the flood. The System has the wifi connectivity, thus it's collects the information which can be accessed from anywhere using IoT. The idea of an SMS based alert system was proposed because mobile phones has now become a popular communication one among the people all over the world. The result is sent as the alert to a mobile phone using GSM through Short Message Service (SMS).

## II. PROBLEMSTATEMENT

The main problem related to the natural disaster was property damage and loss of lives. To eliminate the impacts of flood, the system uses various natural factors to detect the flood. We present a sensor to measure a water level in rivers, lakes and streams based on IoT.

## III.OBJECTIVES

The main objective of this project is to design a flood detection and avoidance system that will detect and send the information about the flood automatically to the nearby Government Unit and to protect the damage caused by the flood and to residents using an Arduino.

- 1.To style a circuit and make a programming code using the microcontroller.
- 2.To detect the present level of the flood where the system contains temperature and humidity, water level sensor.
- 3.To watch the present level of the flood the collected datas are updated within the website.
- 4.To warn the residents when it reaches the predetermined level of water, it'll send the SMS alert through GSM.

## IV. ARDUINO MICROCONTROLLER

Each Arduino board has its own microcontroller. The main IC (integrated circuit) on Arduino is slightly different from board to board. Arduino UNO R3 sort of the microcontroller has been used for this project. Arduino may be aopen source hardware. The Arduino UNO is predicated on ATmega 328p microcontroller. it's the brain of the Arduino and it's a high performance Atmel pico power 8bit AVR. RISC based microcontroller which is capable of executing powerful instruction in single clock cycle.

### Arduino UNO R3:

The foremost important element in Arduino Uno R3 is ATmega 328P. Arduino board can be powered by using USB cable from your computer. Some of the memories are EEPROM, SRAM, FLASH etc.

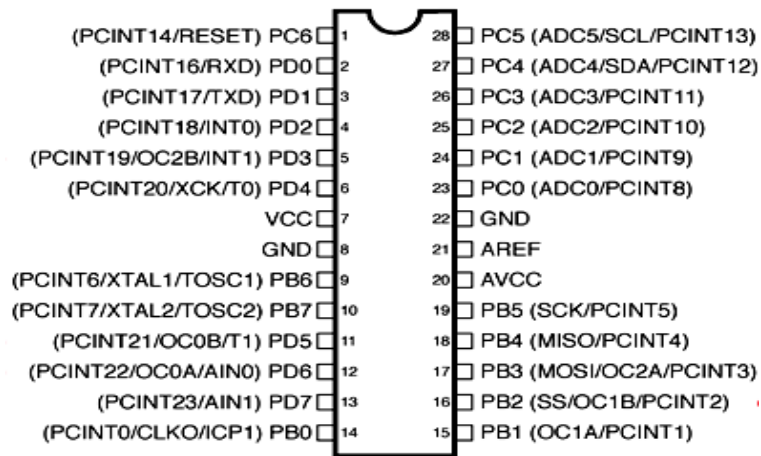


Fig1.Pin configuration

### V. SENSORS

Temperature and Humidity Sensor (DHT11): The DHT11 sensor features a calibrated digital signal output with the temperature and humidity capability. It uses a capacitive humidity sensor and a thermistor to live the encompassing air, and spits out a digital signal on the info pin.

It is integrated with a high-performance 8-bit microcontroller. Its technology ensures the high reliability and excellent long-term stability.

DHT11 may be a ratio sensor. DHT11 sensor consists of a capacitive humidity detector and a thermistor for sensing temperature. This sensor includes a resistive element and a sensor for wet NTC temperature measuring devices. It has excellent quality, fast response, anti-interference ability and high performance.

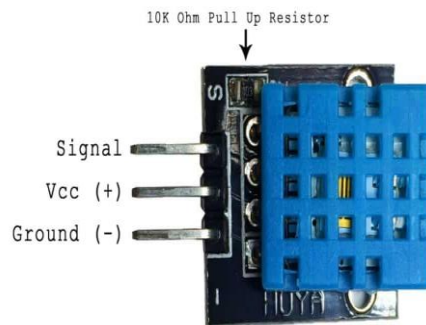


Fig2.DHT11 Sensor

### Water Level Sensor



Fig3.Water level sensor

The Water Level Depth Detection Sensor for Arduino has Operating voltage DC3-5V and Operating current less than 20mA. The Sensor is the Analog type which produces analog output signals according to the water pressure with its Detection Area of 40x16mm. Water level sensor detect the level of the water. The level measurement are often continuous or point values. Continuous level sensors measure the level within a specified range and determine the precise amount of substance during a certain place, while point-level sensors only indicate whether the substance is above or below the sensing point.

### VI. WIFI MODULE

The ESP8266 is with a full TCP/IP stack and has microcontroller capability. It offers an entire and self-contained Wi-Fi networking solution, allowing it to either host the appliance or to offload all Wi-Fi networking functions from another application processor.

When ESP8266 hosts the appliance, and when it's the sole application processor within the device, it's ready to boot up directly from an external flash.

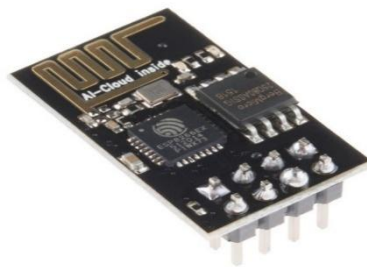


Fig4.WIFI Module

### VII. GSM SIM900

GSM stands for Global System for Mobile Communications and is that the global standard for mobile communications. The SIM900 GSM/GPRS shield is meant to surround the SIM900 chip with everything necessary to interface with Arduino. This is a GSM/GPRS-compatible Quad-band telephone, which works on a frequency of 900MHz and which may be used not only to access the web, but also for speech (provided that it's connected to a microphone and a little loud speaker) and for SMSs. The GSM900 device integrates an analog interface, an A/D converter, an RTC, an SPI bus, an I<sup>2</sup>C, and a PWM module.

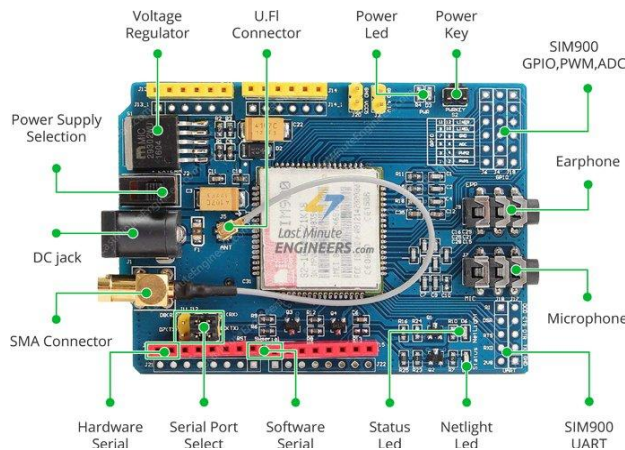


Fig5.GSM Module

### VIII. METHODOLOGY

There are two sensors used for this project. the primary one is water level sensor. this is often the extent of the potential flood which will be anticipated. When the water reaches this level, it triggers the water sensor and data is transmitted to arduino and pass to GSM module for generating SMS aware of the residents, as a warning to take care and ready. If the

water continues to rise and reaches the edge level, it's considered now as dangerous, an alert SMS once more sent to the resident and authorities. Another one is dht11 sensor. it's wont to detect temperature level of environment. These details are viewed in lcd display continuously. This informations are viewed in website through wifi module.

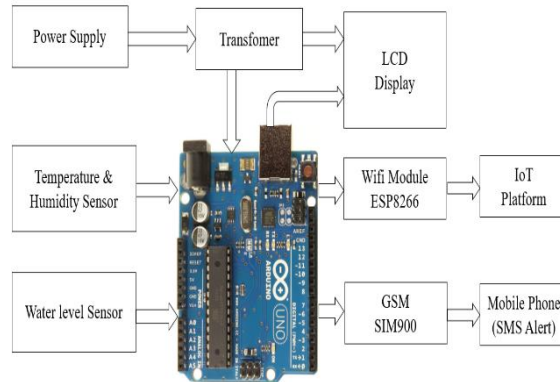


Fig6.Block diagram

### IX. EXPERIMENTAL RESULT

LCD Display:



Fig7.LCD Output

GSM Output:

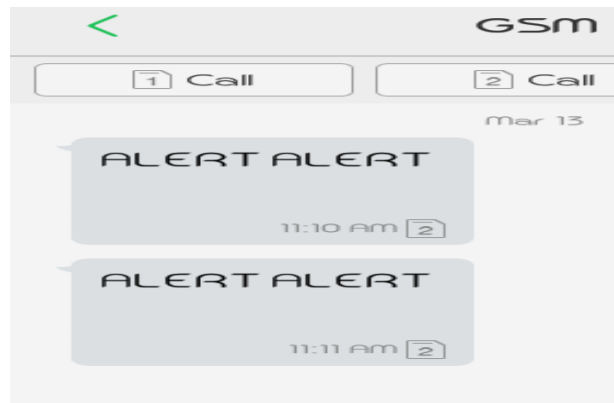


Fig8.GSM Output

Web Page:

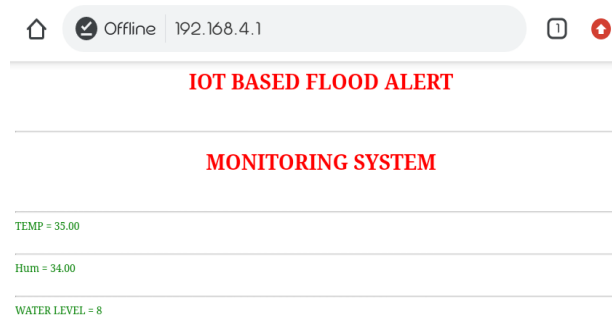


Fig9.GSM Output

For real implementation, several sensors might be integrated for accurate detection such as pressure sensor and also camera.

## X. CONCLUSION

This work enlighten the possibility to provide an alert system to overcome the flood risk. It can also contribute to the authority or company such as firefighter or any government state agency that can help the society about the flooding or any natural disaster. The proposed prototype system has been tested and it works as proposed. It is able to send an alert message to the user with the time of the water rise also with the speed of the water rises for prediction how quick is the flood is happening. It also has been tested in a controlled environment to evaluate the performance. For real implementation, several sensors might be integrated for accurate detection such as pressure sensor and also camera.

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