

FLOOD MONITORING AND EARLY WARNING SYSTEM

Required Components of Flood Monitoring System

These are the components required to make IoT Based Flood Monitoring System Using NodeMCU & ThingSpeak.

- NodeMCU ESP8266 Development Board
- Ultrasonic HC-SR04 Sensor
- Red and Green LEDs
- Buzzer
- Jumper wire
- Breadboard
- Power Supply

CIRCUIT DESIGN:

We have used ESP8266 NodeMCU to build many IoT projects before. The block diagram above shows the working of this IoT based flood monitoring system using the NodeMCU and IoT Platform. Here, the Ultrasonic sensor is used to detect river water levels. The raw data from the ultrasonic sensor is fed to the NodeMCU, where it is processed and sent to ThingSpeak for graphical monitoring and critical alerts. Here, the red LED and Buzzer is used to send an alert in a flooded condition. While Green LED is used for indicating Normal condition. are used to be alert in severe flood conditions, and green LEDs are used to indicate normal conditions.

Ultrasonic HC-SR04 Sensor

Ultrasonic sensors work on the principle of ultrasound waves which are used to determine the distance for an object. An Ultrasonic sensor generates high-frequency sound waves. When this ultrasound hits the object, it reflects as the echo that the receiver sense. We can calculate the distance to the target object using the time required to reach the receiver for Echo.

-
- Formula to calculate:
- $\text{Distance} = (\text{Time} \times \text{Speed of Sound in Air (340 m/s)}) / 2$
-

Ultrasonic distance sensors are of two ultrasonic transducers. One of them acts as a transmitter that converts the electrical pulse of the microcontroller into an ultrasonic sound pulse and is received by the receiver for transmitted pulses. If it receives them, then it produces an output pulse whose time period is used to determine the distance from the object.

Features:

- Working voltage: 5V
- Current working: 15mA
- Working frequency: 40HZ
- Measurement distance: 2cm - 4m
- Measuring Angle: 15 Degree.
- Triggng input pulse: 10

STEPS:

After the successful interface of the hardware parts according to the circuit diagram above. Now its time to set up the IoT platform, where data can be stored for online monitoring. Here we are using ThingSpeak to store data. ThingSpeak is a very popular IoT cloud platform that is used to store, monitor, and process data online.

Step 1: Sign up for ThingSpeak

First go to ThingSpeak and create a new free MathWorks account if you don't already have a MathWorks account.

Step 2: Sign in to ThingSpeak

Sign in to ThingSpeak using your credentials and create "New Channel". Now fill the project details like name, field names, etc. Here we need to create three field area names such as Flood Live Monitoring, and Flood Status. Then click "Save Channel".

Step 3: Record the credentials

Select the created channel and record the following credentials.

Channel ID, which is at the top of the channel view.

API key, which can be found in the API Key tab of your channel view.

Step 4: Add widgets to your GUI

Click "Add Widgets" and add two appropriate Indicator widgets. In my case, I have taken an indicator of flooding. Choose the appropriate field names for each widget.

CIRCUIT DIAGRAM:

