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Internet of Things (IoT) based Flood Monitoring & Detection Using Ultrasonic Sensor HC-SR04

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ABSTRACT:

Nowadays natural calamities like flooding turn up drastically, and it severely affects standard of living. In this paper the development of flood monitoring system using IOT to keep track of the conditions nearby the reservoir with the help of Arduino. In present condition it is necessary to develop the design of accurate smart flood monitoring system using sensors and IOT thus the system efficiency can be increased and can be imposed as the real time monitoring system. In this research the main objectives are to implement a system which covers both the Arduino technology, sensor network components with IOT for detecting the floods for sending an alert to the organization.

Keywords: IoT, Arduino UNO, HC-SR04

1. Introduction of IoT:

The Internet of things (IOT) is a system of interrelated computing devices, mechanical and digital machines provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to human or human-to-computer interaction. The definition of the Internet of things has evolved due to the convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems. Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the Internet of things.

2.WORKING PRINCIPLE OF ULTRASONIC SENSOR

Ultrasonic sensors measure distance by sending and receiving the ultrasonic wave. The ultrasonic sensor has a sender to emit the ultrasonic waves and a receiver to receive the ultrasonic waves. The transmitted ultrasonic wave travels through the air and is reflected by hitting the Object. Arduino calculates the time taken by the ultrasonic pulse wave to reach the receiver from the sender.
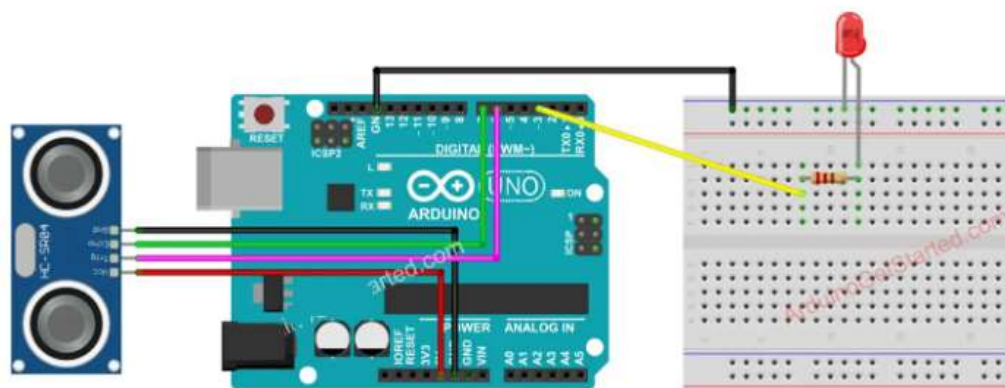

Fig.1: Ultrasonic Distance measurement circuit

3. OBJECTIVES OF THE STUDY

- To design, develop and build a flood monitoring system.

- To implement a proposed work which covers both the IOT based system and the sensor network interfaced with both Ultrasonic Sensor HC-SR04 and the Arduino Uno.

4. PROPOSED ALGORITHM USED

const int TRIG_PIN = 6;

const int ECHO_PIN = 7;

const int LED_PIN = 3;

const int DISTANCE_THRESHOLD = 10;

float duration_us, distance_cm;

void setup() {

 Serial.begin (9600);   // initialize serial port

 pinMode(TRIG_PIN, OUTPUT);

 pinMode(ECHO_PIN, INPUT);

 pinMode(LED_PIN, OUTPUT);

}
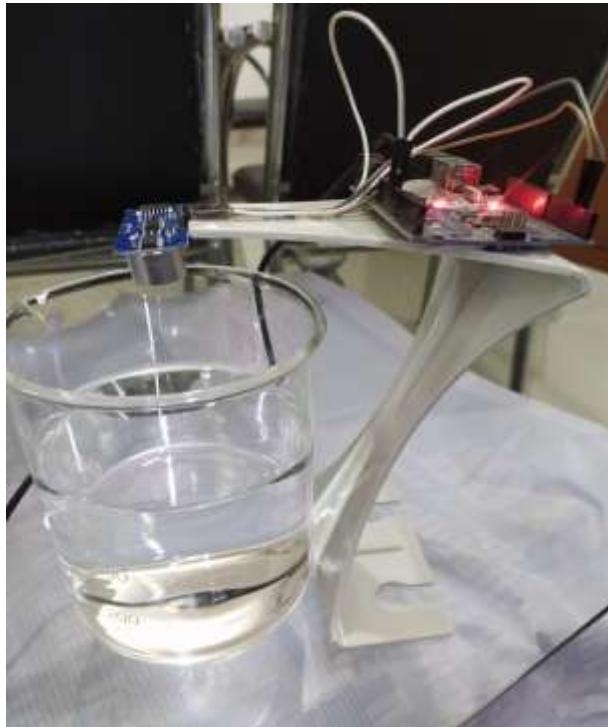
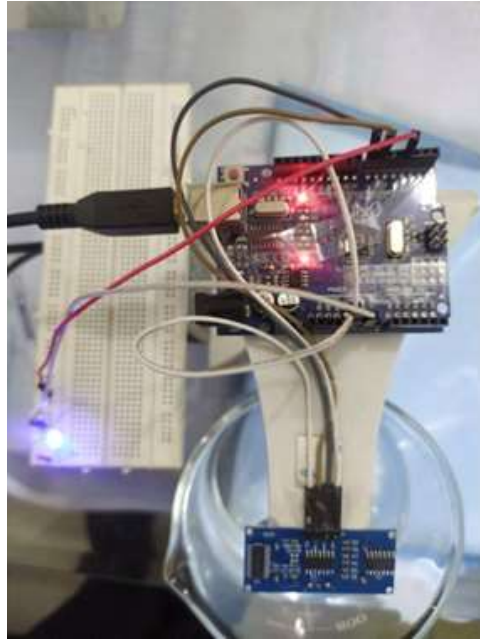**Fig.2: Measures the distance to an object (water level) using ultrasonic sensor.**

Fig.3: Display the BLUE LED if the distance of water level is less than 10cm away from the sensor

Table 1: Distance (cm) values collected by Ultrasonic Sensor

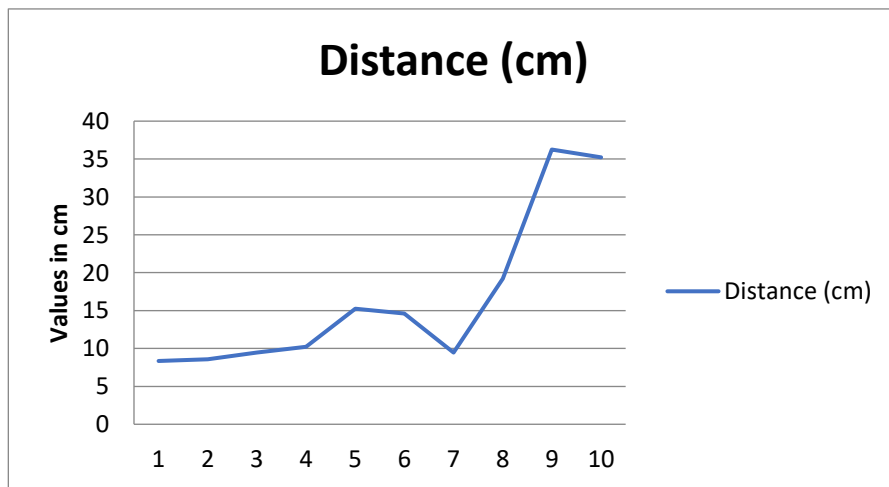| Distance (cm)	Flood Detection
8.35	NO
8.56	NO
9.45	NO
10.23	YES
15.23	YES
14.62	YES
9.45	NO
19.21	YES
36.25	YES

Fig.4: Shows the Distance (cm) Values collected by Ultrasonic Sensor

5. Conclusion and Future Scope

This research highlights the possibility to provide an alert system that will overcome the risk of flood. As the project is enabled with IOT technology and hence the sensor data can be monitored from anywhere in the world. More sensors can be integrated into the system in order to create more accurate and efficient flood detection system. It can also contribute to multiple government agencies or authority that ultimately help the society and mankind about the flood like hazardous natural disaster. It will monitor each and every aspect that can lead to flood. If the water level rises along with the speed, it will send an alert immediately. It also ensures increased accessibility in dealing and reverting to this catastrophic incident. In summary, it will help the community in taking quick decisions and planning against this disaster mankind about the flood like hazardous natural disaster.

The Future scope of the research is , flood can also be related to the intensity of rainfall, which is the height of the water layer covering the ground in a period of time. Hence the development of a rainfall forecasting sensor eventually turn up to the early flood monitoring and detection, Scholarly studies are ongoing and can be implemented to our existing system in future.

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