FLOOD MONITORING AND EARLY WARNING

Submitted by

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phase - 5 project submission

I. INTRODUCTION

In recent times, the flood has becom e one of India's major natural disasters (1). It is foun d that India is one of the top ten food-threatening countries in the world. Flood, a natural phenomenon that generally r esults from heavy rains caused by monsoon, hurricanes, clo ud bursting, melting of glaciers, which exceeds the capabili ties of water bodies.

But, one of the main aspects of the sources of flashy floods is heavy rain

(2). These factors increase the risk of floods
whose management and prevention are essential for the
protection of natural environment, li fe, and possessions.
Many important steps need to be ta ken in order to mitigate
economic and human losses. Amon gst the most critical and
early steps is to alert people to the c atastrophe before it
happens. There are still some areas with early flood warning
systems, but most of them are not a s effective as they can
typically only submit the data to som e organizations with
small distances

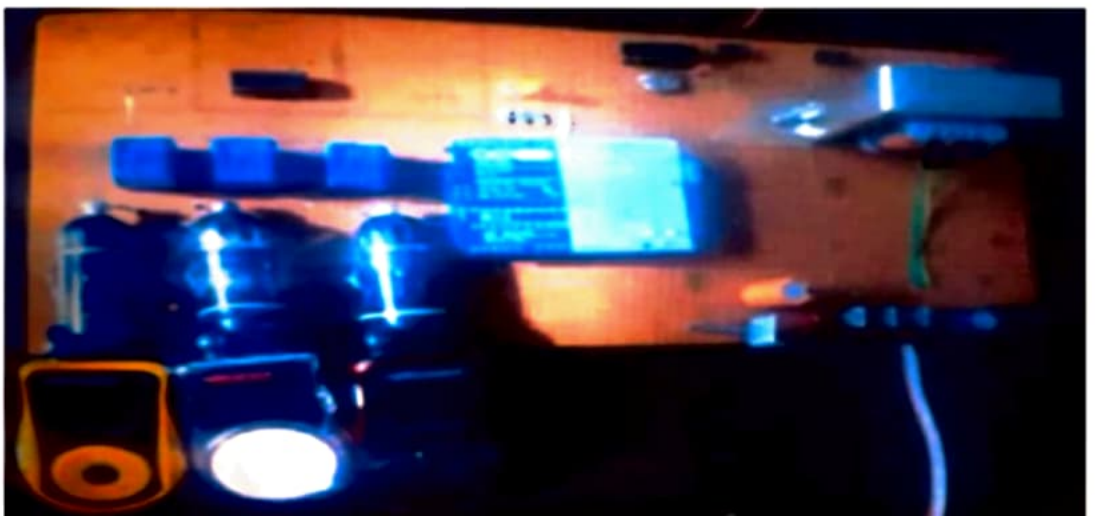
SUMMARY OF FLOOD AFFECTED AREAS IN INDIA AND THE NUMBER OF PEOPLE KILLED

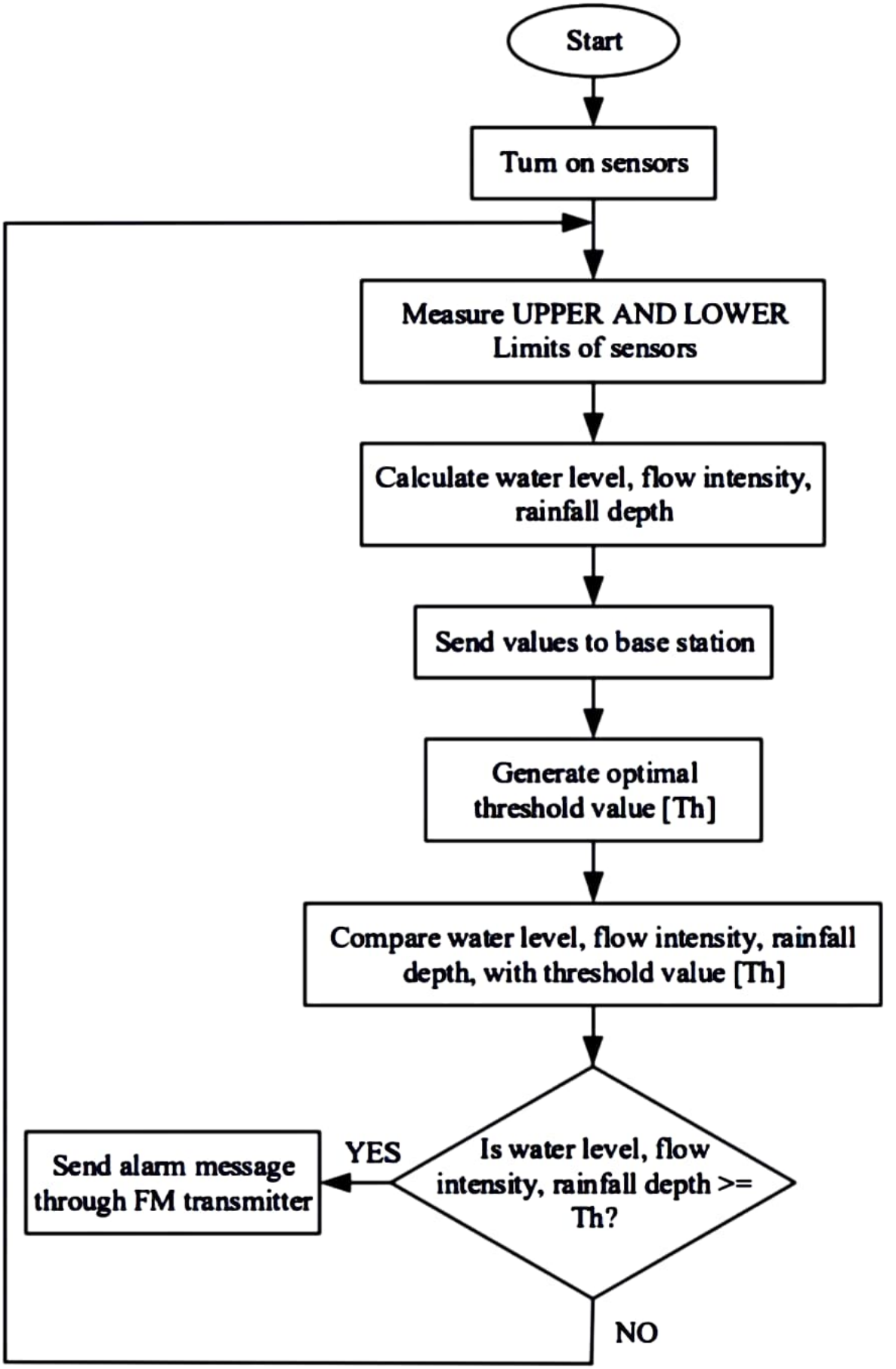
Year	Floods in different parts of India	No. of people killed
2004	Bihar	885
2013	Uttrakhand in upper Ganga Valley	1000
2014	Jammu and Kashmir in Jhelum river	227
2018	Kerala	445
2019	Kerala	101

A microcontroller can receive data from the power supplies and water level sensors. The data will be processed by the microcontroller to calculate the flow, current water level, and other power levels. A centralized storage system is used where the acquired data is stored so that the data can easily be extracted as per design search criteria is present.

A. Hardware Design

The design of the proposed model has two parts: the sensor module and the base station module. The hardware part of the proposed model consists of a sensor module deployed at the monitoring site. Such a sensor module can be easily used at multiple sites without any added cost except the cost of the sensor modules themselves. This model monitors the water level using a level sensor; a vane-meter is used for measuring water flow and udometer to capture and measure the rainfall depth. The data collected will be transmitted using a Radio Frequency (RF) transmitter at 435 MHz. These sensors will interact with the base station via an RF link, at base station processing is done. If the data from the sensor crosses the reference level, the relay system present at the base station switches on the FM transmitters, and an alarming signal will override the frequency of all the available radio stations. To drive these modules, it requires a power supply and a processing system (Microcontroller-Arduino). The power supply used for this design includes: transformer 12-0-12, battery, diode, 10k resistor, LED, 1000μF electrolytic capacitor, three 0.4 μF capacitors, regulators (7812, 7809, and 7805), heat sink. Fig. 2 gives an overview of the base station module and Fig. 3 gives an overview of the sensor module.




Start
Turn on sensors
Measure UPPER AND LOWER Limits of sensors
Calculate water level, flow intensity, rainfall depth
Send values to base station
Generate optimal threshold value [Th]
Compare water level, flow intensity, rainfall depth, with threshold value [Th]
Is water level, flow intensity, rainfall depth >= Th?
YES
Send alarm message through FM transmitter
NO

Hardware and software requirement

Under the analyses made the hardware and the software requirements are Arduino uno, microcontroller, level sensors, temperature sensor, IR, IoT Esp8266, Language embedded c, Arduino IDE.

PROGRAM

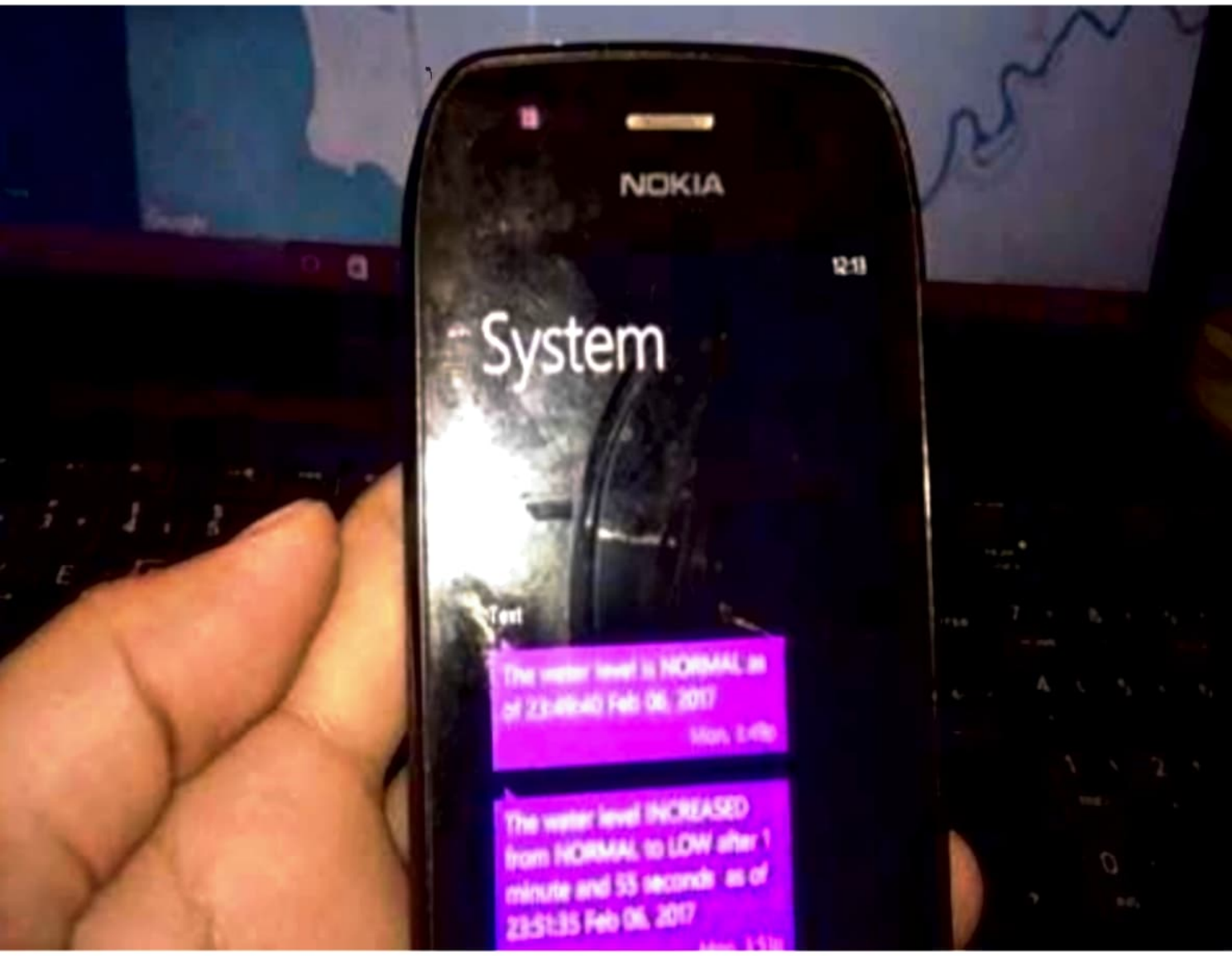
```
#include <SPI.h>
#include <Ethernet.h> // For Etherne
t connectivity
#include <ThingSpeak.h> // For IoT
integration

byte mac[] = {0xDE, 0xAD, 0xBE, 0xE
F, 0xFE, 0xED};
EthernetClient client;

const int waterSensorPin = A0; // An
alog pin for water level sensor
const int ledPin = 13; // Pin for statu
s LED

const char *api_key = "YOUR_THING
SPEAK_API_KEY";
const char *channel = "YOUR_THING
SPEAK_CHANNEL";

void setup() {
  Serial.begin(9600);
  Ethernet.begin(mac);
}
```

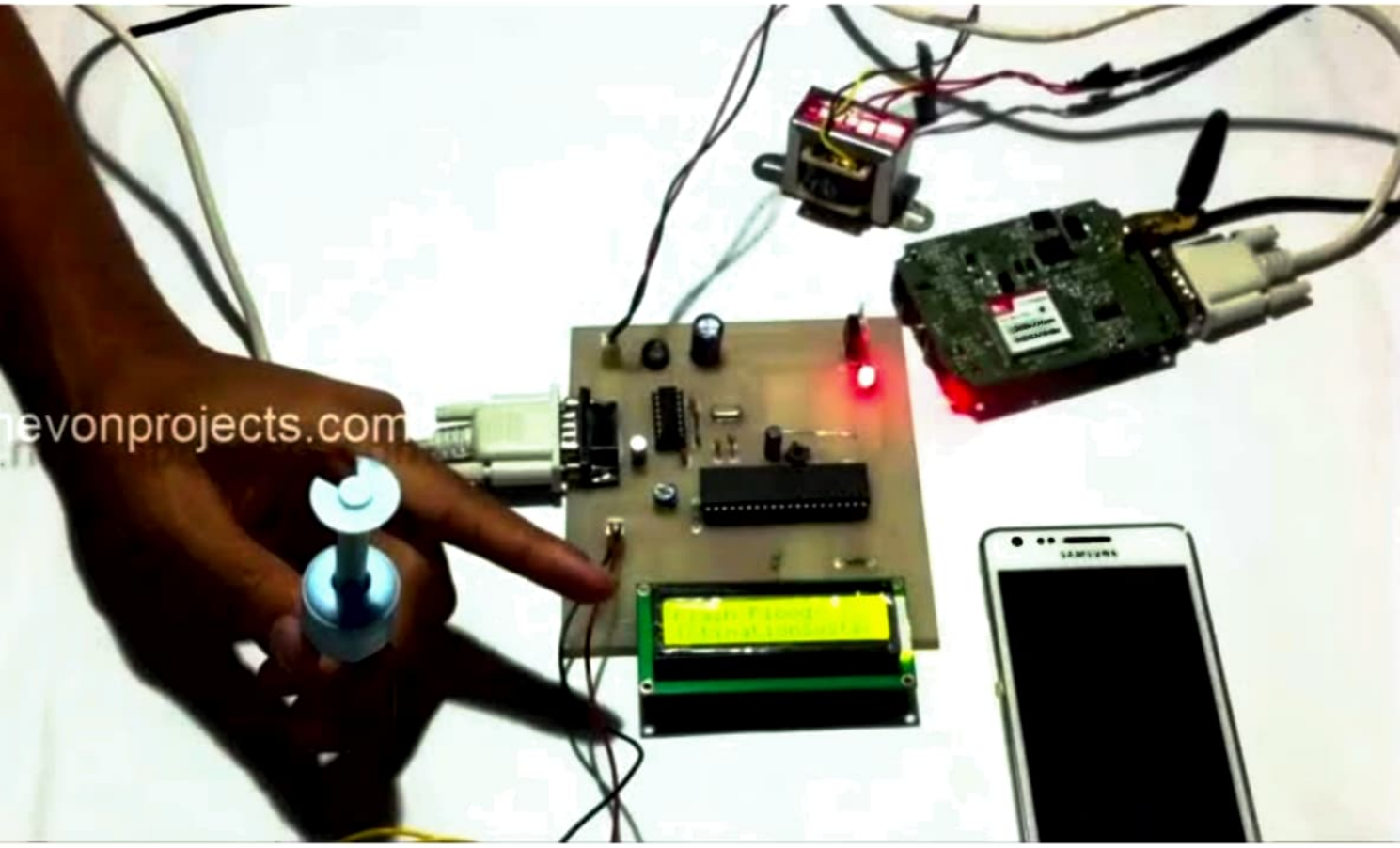
```
void loop() {
  int waterLevel = analogRead(water
SensorPin);
  if (waterLevel > THRESHOLD) {
    // Water level is above the thresho
ld, indicating a flood.
    digitalWrite(ledPin, HIGH);
    sendToFloodChannel(waterLevel)
;
  } else {
    digitalWrite(ledPin, LOW);
  }
  delay(10000); // Check water level
every 10 seconds
}
void sendToFloodChannel(int water
Level) {
  ThingSpeak.begin(client);
  ThingSpeak.setField(1, waterLevel
);
  int status = ThingSpeak.writeFields
(channel, api_key);
  if (status == 200) {
    Serial.println("Data sent successf
ully");
  } else {
    Serial.println("Data send failed");
  }
```

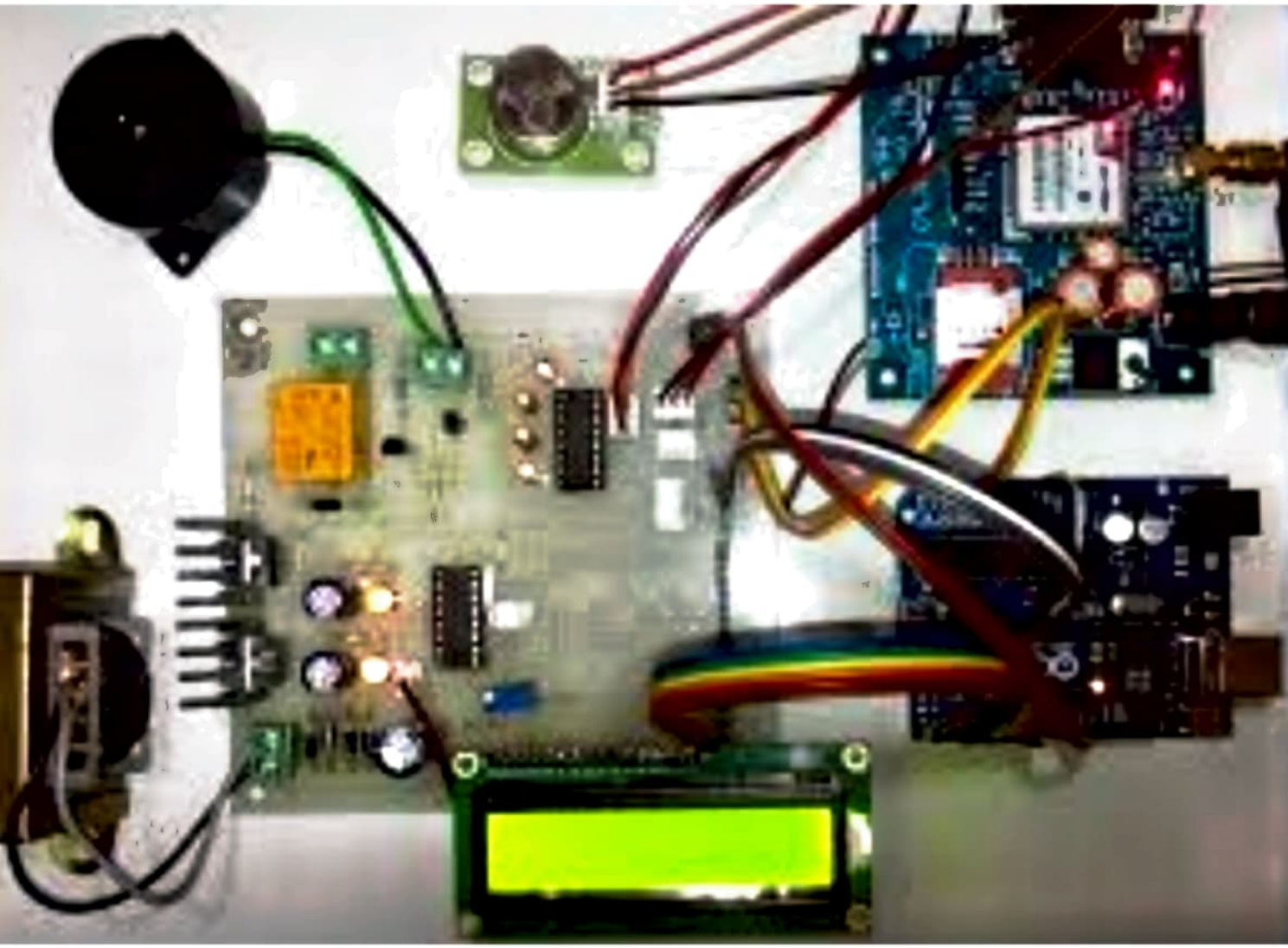
NEED OF FLOOD MONITORING

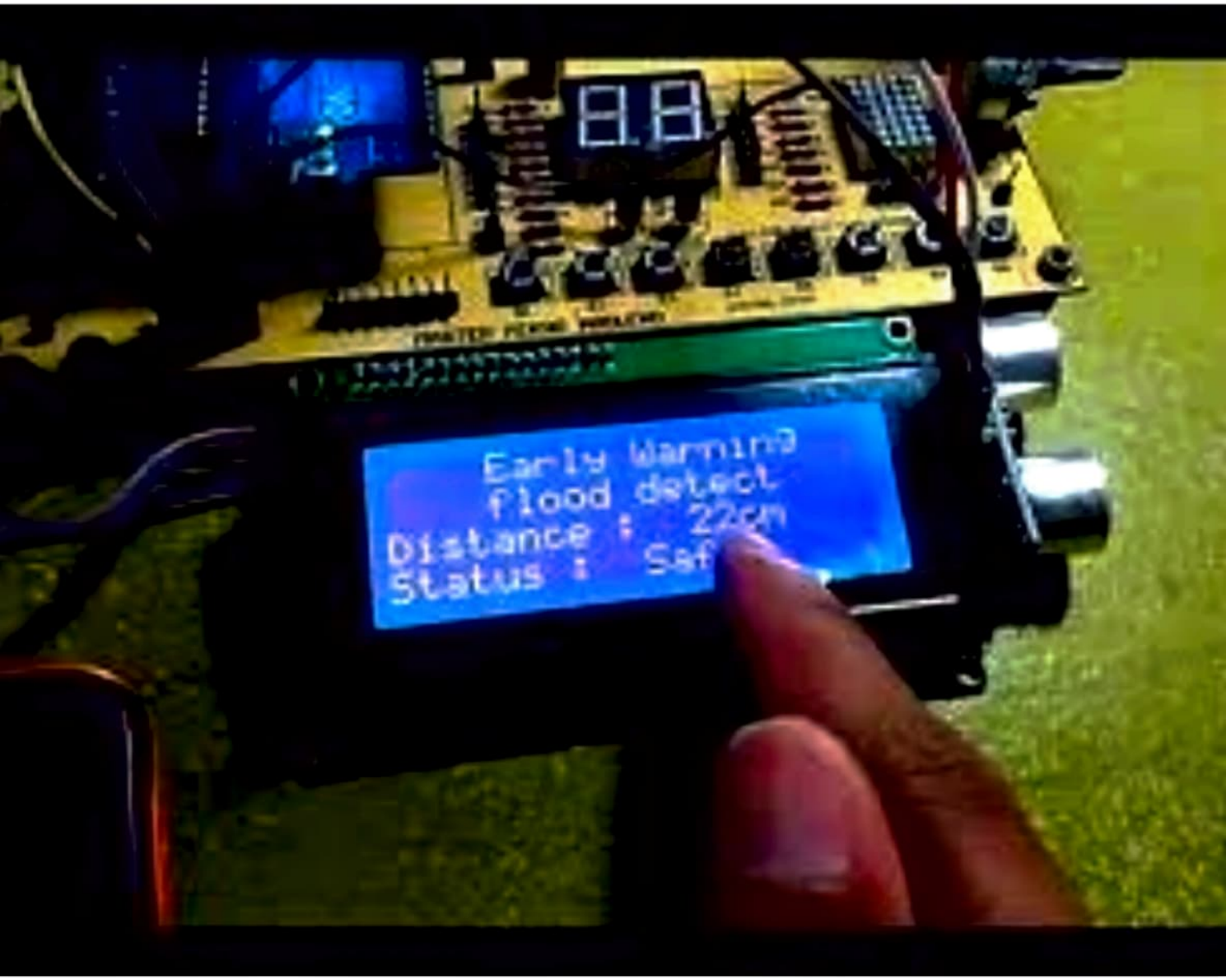
A flood monitoring system is used t o monitor a rise in water levels. The system comprises sensors that are deployed in cities or any area of int erest. The sensors can be connecte d to either the main electricity or can be solar-powered.

DEVELOPMENT IMAGES




evonprojects.com




Early Warning
flood detect
Distance : 22cm
Status : Saf

V. Conclusion

A flood-proof sensor-based system capable of over-riding the frequency of all available radio stations was proposed. The whole system is capable of measuring the information on the water level, velocity, and depth of rainfall at multiple locations. The data is appropriately encoded and transmitted through an RF link. The data will be received and decoded at the base station and send through FM transmitters to the general public for awareness.

THANK YOU