FLOOD MONITORING EARLY WARNING SYSTEM

INTRODUCTION:

Floods are among the most devastating natural disasters, causing loss of lives, property damage, and economic disruptions worldwide. Flood monitoring and early warning systems are crucial tools for minimizing the impact of floods by providing timely information and alerts to vulnerable communities. This paper explores the key concepts and components of flood monitoring and early warning systems, their significance, and the technologies involved in their implementation.

HARDWARE REQUIRED:

- NODE MCU
- 16*2 LCD DISPLAY (12 CM MODULE)
- CSM 900A MODULE
- ULTRASONIC SENSOR
- FLOAT SENSOR
- ZERO PCB
- 5V 2A DC POWER SUPPLY

PROGRAM:

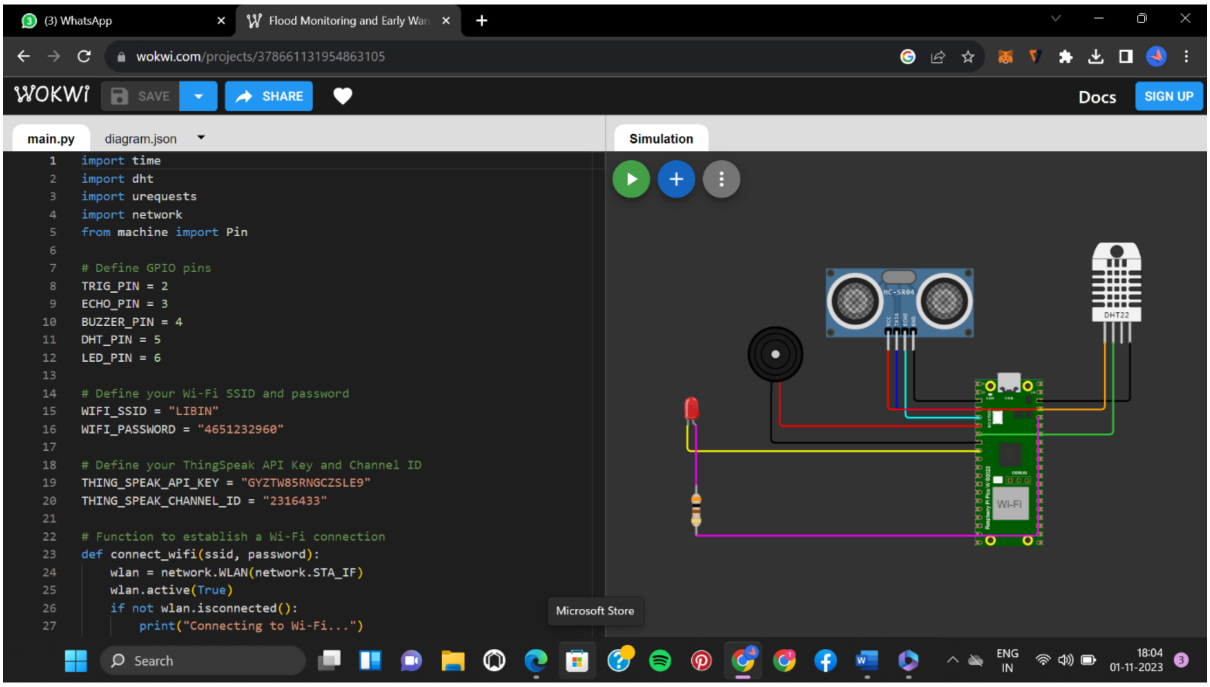
```
import time
import dht
import urequests
import network
from machine import Pin

# Define GPIO pins
TRIG_PIN = 2
ECHO_PIN = 3
BUZZER_PIN = 4
DHT_PIN = 5
```

```
LED_PIN = 6

# Define your Wi-Fi SSID and password
WIFI_SSID = "LIBIN"
WIFI_PASSWORD = "4651232960"

# Define your ThingSpeak API Key and Channel ID
THING_SPEAK_API_KEY = "GYZTW85RNGCZSLE9"
THING_SPEAK_CHANNEL_ID = "2316433"

# Function to establish a Wi-Fi connection
def connect_wifi(ssid, password):
    wlan = network.WLAN(network.STA_IF)
    wlan.active(True)
    if not wlan.isconnected():
        print("Connecting to Wi-Fi...")
        wlan.connect(ssid, password)
        while not wlan.isconnected():
            pass
    print("Connected to Wi-Fi:", wlan.ifconfig())

def distance_measurement():
    # Trigger ultrasonic sensor
    trigger = Pin(TRIG_PIN, Pin.OUT)
    trigger.on()
    time.sleep_us(10)
    trigger.off()

    # Wait for echo to be HIGH (start time)
    echo = Pin(ECHO_PIN, Pin.IN)
    while not echo.value():
        pass
    pulse_start = time.ticks_us()

    # Wait for echo to be LOW (end time)
    while echo.value():
        pass
    pulse_end = time.ticks_us()

    # Calculate distance
    pulse_duration = time.ticks_diff(pulse_end, pulse_start)
    distance = pulse_duration / 58  # Speed of sound (343 m/s) divided by 2

    return distance

def read_dht_sensor():
    dht_sensor = dht.DHT22(Pin(DHT_PIN, Pin.IN))
    dht_sensor.measure()
    return dht_sensor.temperature(), dht_sensor.humidity()

buzz_start_time = None  # To track when the buzzer started

# Connect to Wi-Fi
connect_wifi(WIFI_SSID, WIFI_PASSWORD)

while True:
    dist = distance_measurement()
    temp, humidity = read_dht_sensor()
    status = "No Flooding Detected"

    if dist < 50:
        # Turn on the buzzer and LED
        Pin(BUZZER_PIN, Pin.OUT).on()
        Pin(LED_PIN, Pin.OUT).on()
        status = "Flooding Detected"
        buzz_start_time = time.ticks_ms()
    elif buzz_start_time is not None and time.ticks_diff(time.ticks_ms(), buzz_start_time) >= 60000:  # 1 minute
        # Turn off the buzzer and LED after 1 minute
        Pin(BUZZER_PIN, Pin.OUT).off()
        Pin(LED_PIN, Pin.OUT).off()

    print("Distance: {:.2f} cm".format(dist))
    print("Temperature: {:.2f}°C, Humidity: {:.2f}%".format(temp, humidity))
    print("Status:", status)

    # Send data to ThingSpeak
    try:
        data = {
            "api_key": THING_SPEAK_API_KEY,
            "field1": dist,
            "field2": temp,
            "field3": humidity,
        }
        response = urequests.post("https://api.thingspeak.com/update.json", json=data)
        response.close()
    except Exception as e:
        print("Error sending data to ThingSpeak:", e)

    time.sleep(2)
```

LINK:

https://wokwi.com/projects/378661131954863105

SIMULATION:



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