IoT based Low Cost Weather Alerts for Farmers

IoT Device (ESP-32)

Introduction

India is heavily dependent of farming and climatic conditions play a key role in crop cultivation. Farmers should be aware of weather conditions so that they plan accordingly.

Hello let’s see this fascinating project – The Weather Reporting System using IoT devices

This smart system uses an IoT Device called ESP-32 which is the heart of our system, and some clever code, and a pinch of internet magic to bring real-time weather updates right on Farmers doorstep. It's like having your personal weather assistant

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Problem Statement

Nowadays due to drastic changes in weather and farmers not being aware of climate changes are facing crop failure due to rainfall, less humidity, and high-temperature changes. This will be affecting us as due to crop failure there will be a scarcity of rice, and wheat, which will cause famine. Due to this many people will not get food and may suffer from malnutrition and the prices of the crops will increase and poor people may not afford the food.

Solution

To address this problem we have created a weather reporting device that shows all the required parameters which are important for farmer. For example, weather conditions, humidity, clouds, rainfall conditions, temperature, etc.. This device will help the farmer to understand current conditions and plan accordingly. For ex, heavy rainfall forecast, farmer can do preparations beforehand to save his crops from the rain. The humidity and temperature will help farmer when to pour water into crops which can save water. In this way, the crops can be saved and there will be no crop failure and thus we have good cultivation in India. This device can be installed in panchayat offices in villages, farmer houses etc. There is a buzzer in the device which will alert as per configured parameters, for ex, heavy rainfall etc.

Details of Project

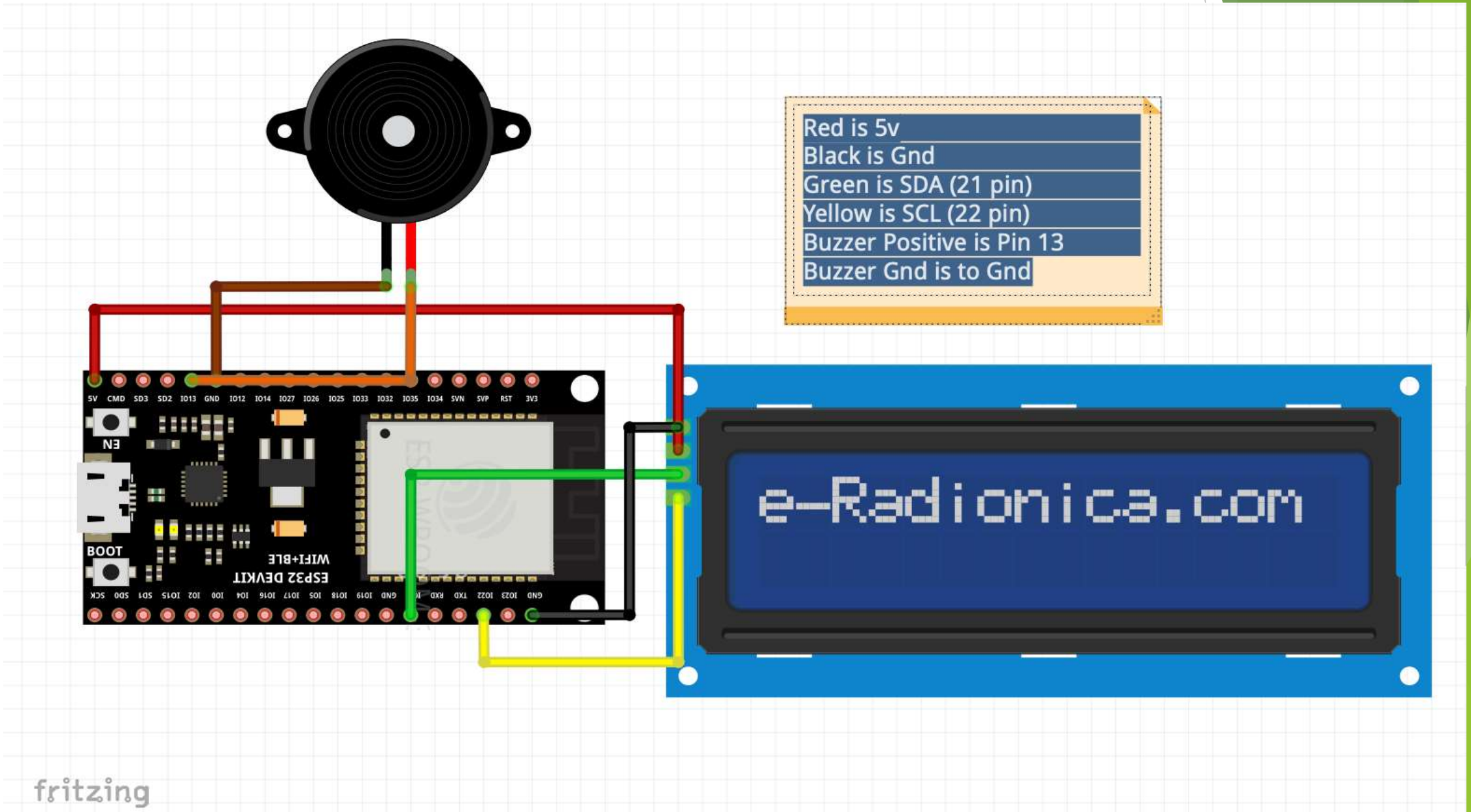
IoT based device which reads the weather conditions from an API and alert farmers based on configured parameters. There is panel which can show all the critical parameters.
The device needs Wi-Fi connection and can be installed in any rural locations, these days most of the rural villages too have internet connection. Though it is low cost based device but the impact it creates is huge, our main objective is to alert farmers so that they are prepared, rather than being reactive they can take proactive steps to cut down the damage.

Below sections and subsequent slides we are explaining the technical aspects of how the device is built

Components used to built the device are

- ESP-32
- I2c-LCD
- Mini Container to deploy the components
- Arduino IDE to program the ESP-32
- Code to fetch Weather parameters from internet

Circuit Diagram



How device is fetching weather forecast data

We have implemented code which use "OpenWeatherMap”, it is an online service that provides weather data and forecasts through its API. It collects data from various sources like weather stations and satellites.

We send a request to their server using our API key and coordinates. The data we receive includes temperature, humidity, cloud coverage, and more. We then parse this data and display it on the LCD screen, creating a simple yet effective weather monitoring system.

API Key: You get a unique API key after signing up on OpenWeatherMap. It's like a digital pass to access their data.

Endpoints: These are URLs provided by the API. Each endpoint gives you specific weather data, like current conditions or forecasts.

Coordinates: You provide latitude and longitude to specify the location you want weather data for.

JSON Format: The API response comes in JSON format, which is easy for computers to process and read.

Features of Smart IoT Weather Reporting Device

- ✓ Real-time weather data updates
- ✓ Display of temperature, humidity, cloud coverage, visibility, and rain prediction
- ✓ Buzzer alerts for predicted rain conditions
- ✓ Basic yet informative user interface
- ✓ In future can be integrated with cloud system

HELP Farmers

Thank you