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RESEARCH ARTICLE OPEN ACCESS

REAL TIME DATA ANALYSIS FOR CROP PREDICTION USING IOT

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Abstract:

This paper helps the users to choose their own crop or plant according to their soil type and the climate, where the soil is present. It also deals with some other factors like the current market price of the crop or plant. This details are used to predict the best crop to be grown, economical methods, and an innovative farmer collaboration method. This paper is also used to predict the climatic hazard and helps to prevent it, or reduce is hazards. We help to improvise the agricultural system with regular data analysis to create and maintain a predictable and sustainable crop growth and enrich its development

Keywords — **IoT, Rasberry Pi, Mysql, Tensor Flow, PH Sensor, MQTT**

I. INTRODUCTION

Modern Smart farming is a concept quickly catching on in the agricultural business. It offers high-precision crop control, useful data collection, and automated farming techniques, advantages a networked farm can offer. A recent report entitled towards Agriculture Embracing the IoT Vision predicts that food production must increase by 70 percent in the year 2050 in order to meet our estimated world population of 9.6 billion people. It also describes growing concerns about farming in the future: climate change, limited arable land, and costs/ availability of fossil fuels.

A device will be placed in the user ‘s land. The device will consist of sensors and it will be interfaced with a Raspberry Pi board or a raspberry pi board. The data about the type of the soil and the nutrition content in the soil is identified by the sensor and the data is sent via the Raspberry Pi board to the application. The nutritious level of the soil is predicted by checking its pH level in the soil. So the plant or crop which can grow in that type of soil, in that pH level, in that climate and amongst which has the higher market price is recommended to the user. The weather and climate are determined by using the weather and climate API’s and similarly the price of a particular crop in the market is also determined by using a API. All the data about a plant will be stored in a database. The data will be, in which soil the plant.

II. EXISTING SYSTEM

Drones, which were once a reserve of the military, are now utilized for precision agriculture. The number of farmers adopting the use of drones in farming is growing steadily because extreme weather conditions are on the rise. Owing to these circumstances, many more farmers are expected to embrace drone technology. With the growing world population, agricultural consumption is expected to grow tremendously.

DRAWBACKS:

- Flight Time and Flight Area
- Interference Within the Airspace
- Connectivity
- Weather Dependent
- Government Laws
- Heavy Cost for Good Feature Drones

III. PROPOSED SYSTEM

A. SENSORS

There are two sensors that are employed in this project. Those two are
1. Soil PH level sensor
2. Soil Moisture sensor

1.Soil PH level sensor

The soil having pH value between 0 to 7 are acidic with large concentration of hydrogen ions whereas soil having pH value between 8 to 14 are basic with small hydrogen concentration. The soil having pH value of 7 are neutral. Measuring the pH gives the measure of alkalinity or acidity of a soil. The above sensor actually measures the alkalinity in the soil. The nutrients distributed in the soil may vary depending upon the pH level present in the soil. The nutrient content will be more if the pH level in the soil is between 6.5 to 7.5. The pH level sensor is interfaced with the Raspberry Pi board and the pH level is obtained by the application using Raspberry Pi as a communication device. So the quality of the soil can be determined by measuring the pH level. This sensor consists of a glass tube which has a solution of pH level 0. When this is inserted in the sand then the pH level changes and an voltage is induced. The pH level corresponding to the voltage is theoutput.

FIG (1) PH SENSOR

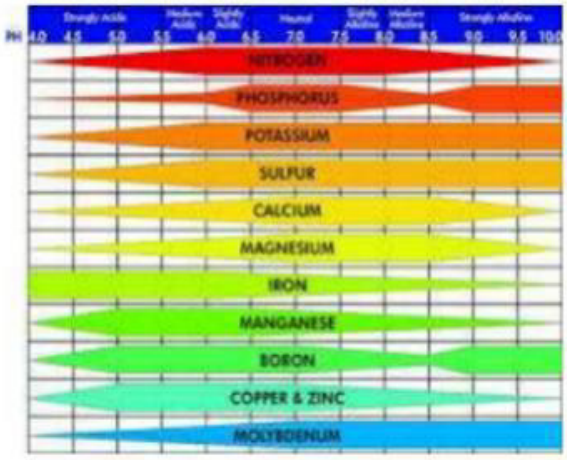


FIG (2) PH VALUES REFERENCE

2.Soil Moisture Sensor

This sensor is the soil moisture level indicator sensor can survive and what climate and weather, it needs to survive. Each plant will be also assigned with their requirement of pH level in the soil in the database. So the data from the sensors about the soil type and nutritious content, will move to the application and the data about the climate and weather will be received from the API. At last the plant is recommended from the database which contains the name of the plants which can grow in that circumstances. and it is interfaced with an Raspberry Pi board. The type of the soil can be determined with the moisture content and the pH level of the soil. The information about the moisture and the pH level is passed to the application using the Raspberry Pi board. The two sensors mentioned above are connected to the Raspberry Pi board. If there are more than one choice of plants, the database will check for the market price of those plants or crops and recommends the crop which has the maximum market price among those. The market price is received by using an API. The information from the user is received and the data related to the information is collected by the application from the sensors, API's and Databases.

The result is the recommended crop for the user. This project also provides a virtual identity to the users. This will help to know what others in that area or any other area are going to plant and the profit or loss of the previous year's plants or crops. For the purpose of creating a virtual identity the user has to initially register with the application with a login id and password. Initially he has to enter the details of his/her location, land and then he can use the application to meet his/her needs. The user can also see about the current weather of the location where the crop is sown. The application will also predict the climate in future and the user can make some pre-adjustments according to the climate. The weather will include the amount of rainfall, wind speed, temperature and moisture.

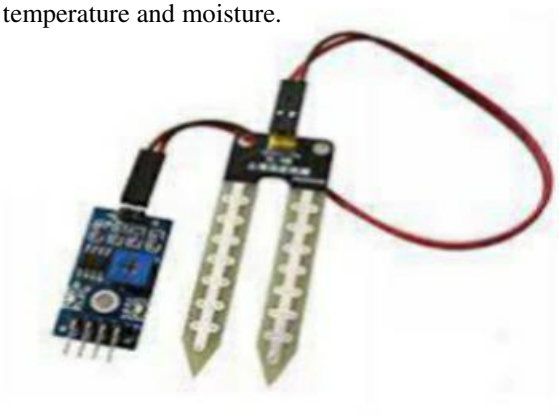


FIG (3) MOISTURE

B.API

There are mainly two API's involved in the project. One is for the weather and climate and another one is for the current market price of plants or crops.

- Online WeatherMap's API is used to predict the weather of a particular location
- Data.gov's API is used to get the price of a particular plant or crop.

C. DATA TRANSMISSION

a. MQTT

MQTT[1] (MQ Telemetry Transport or Message Queuing Telemetry Transport) is an ISO standard (ISO/IEC PRF 20922)[2] publish-subscribe-based messaging protocol. It works on top of the TCP/IP protocol. It is designed for connections with remote locations where a "small code footprint" is required or the network bandwidth is limited. The publish-subscribe messaging pattern requires a message broker.

MQTT, on the other hand, is a publish-subscribe messaging protocol that also was developed for resource-constrained devices. When a device or service publishes data to a topic, all of the devices

subscribed will automatically get the updated information. MQTT, on the other hand, is a publish-subscribe messaging protocol that also was developed for resource-constrained devices. When a device or service publishes data to a topic, all of the devices subscribed will automatically get the updated information.

D. A/D Converters:

a MCP3008:

The MCP3008 10-bit Analog-to-Digital Converter (ADC) combines high performance and low power consumption in a small package, making it ideal for embedded control applications. The MCP3008 features a successive approximation register (SAR) architecture and an industry -standard SPI serial interface, allowing 10-bit ADC capability to be added to any PIC® microcontroller. The MCP3008 features 200k samples/second, 8 input channels, low power consumption (5nA typical standby, 425µA typical active), and is available in 16-pin PDIP and SOIC packages. Applications for the MCP3008 include data acquisition, instrumentation and measurement, multi-channel data loggers, industrial PCs, motor control, robotics, industrial automation, smart sensors, portable instrumentation and home medical appliances.

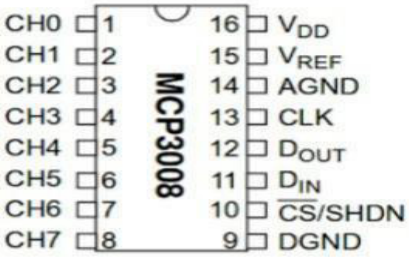
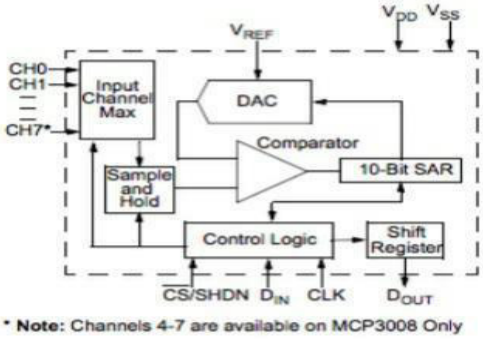


FIG (4) MCP3008 PIN DIAGRAM



IV.HARDWARE DESIGN

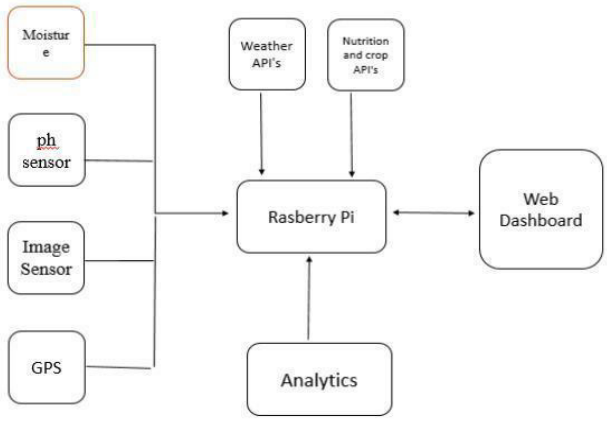


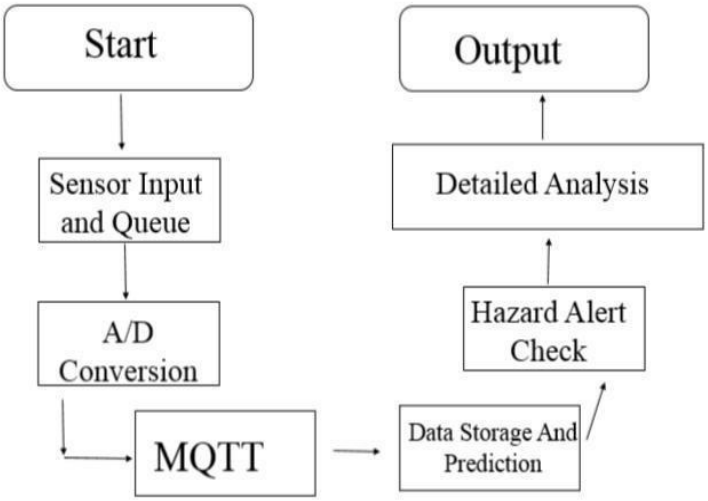
FIG (5) BLOCK DIAGRAM

A. GENERAL INFORMATION

The information about the moisture and the pH level is passed to the application using the Raspberry Pi board. The two sensors mentioned above are connected to the Raspberry Pi board. If there are more than one choice of plants, the database will check for the market price of those plants or crops and recommends the crop which has the maximum market price among those. The market price is received by using an API.

All the data about a plant will be stored in a database.The data will be, in which soil the plant.

B. SUBROUTINE FLOWCHART



C. FETCHED DATA

1. Moisture Sensor:

This Graph shows the sensor data form the moisture sensor recorded for 9 days with 5 data's each day at various intervals.

It will be used to analyse the water usage during various climatic conditions and provide certain measures to maintain a stable water level for the crops.

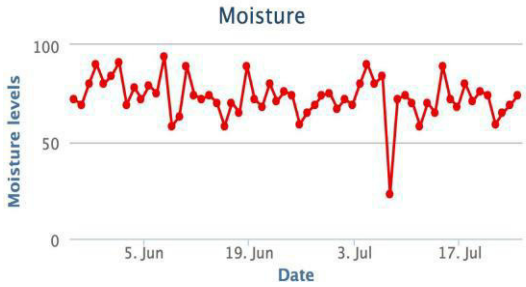
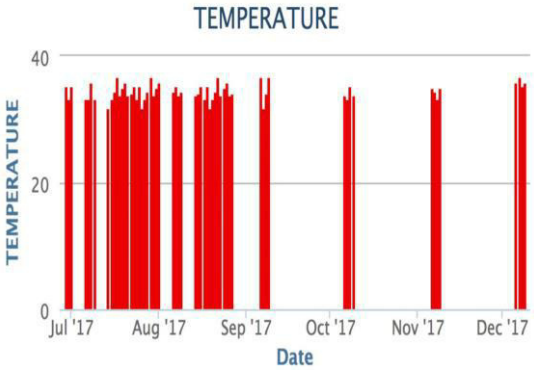


FIG (6) MOISTURE DATAPOINTS

2..Temperature Sensor

We receive temperature data from open weather Api.It is useful to receive 15 day weather for cast and for regular storm alerts

Governing temperate and plant growth together would help to analyze and improve the optimal temperature required for the plant growth



V.CONCLUSION

Our paper helps to Govern and analyze crops in a better way, as nowadays the inputs to crop preparation become costlier, site-wise specific crop management (precision agriculture) is slowly becoming more widely adopted in Florida citrus production. When used properly, precision can contribute to reduce waste, increase profit and lead to protection of the environment.

VI. REFERENCES

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