HIGH LEVEL DESIGN DOCUMENT

IMPLEMENTATION OF PERCISION AGRICULTURE MONITORING SYSTEM USING RASSBEERY PI AND CROP PREDICITION USING MACHINE LEARNING

UE17CS490A – Capstone Project Phase – 1

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1. Introduction

Agriculture is the primary occupation in our country for age's .But now due to migration of people from rural to urban there is hindrance in agriculture. In olden days they used to predicate climate condition based on their previous days, soil moisture, type, rainfall etc. So to overcome this problem we go for smart agriculture techniques using IoT.
This project includes various features like GPS based remote controlled monitoring, moisture & temperature Sensing, intruders scaring, security, leaf wetness and proper irrigation facilities.

Controlling these parameters are through any remote device or internet services and the operations are performed by interfacing sensors, Wi-Fi, camera with microcontroller.
It makes use of wireless sensor networks for noting the soil properties and environmental factors continuously. Various sensor nodes are deployed at different Locations in the farm.

The existing method and one of the oldest ways in agriculture is the manual method of checking the parameters. In this method the framer they themselves verify all the parameters and calculate the reading.

In the olden days farmer used to guess the fertility of the soil and made assumption to grow which type of crop. They didn't know about the moisture, level of water and particularly weather condition which terrible effect a farmer more.

They use pesticides based on the some of assumption which made lead a serious effect to the crop if the assumption is wrong. the productive depends on the final stage of the crop on which farmer depends.

2. Design Considerations

2.1. Design Goals

A system is proposed to need of modern technology in farming which is integrated to have control on all the deployed systems in a single system. Also the system will keep the farmers well notified about the every minute event that occurs in the field based on the farmer can take a better action

2.2. Architecture Choices

An alternate choice of our approach is better because

- To get the precision parameter values i.e., tmep, humidity etc.
- In olden day farmers used to get the manually get the parameters values based on their previous yield.
- So if the farmer doesn't get accurate values he may lose the crop.
- The raspberry pi acts as the operating system which analyzes the data Collected by the sensors in the deployed model and notify the farmers about it. Based on the notification and constant check of the field with the help of deployment board (sensors), the farmers can take appropriate decisions for the betterment of the field.

2.3. Constraints, Assumptions and Dependencies

Constraints:

Network feasibility for GSM and things speak and productivity may or may not be more. We cannot estimate weather conditions as pollution is increasing gradually etc.

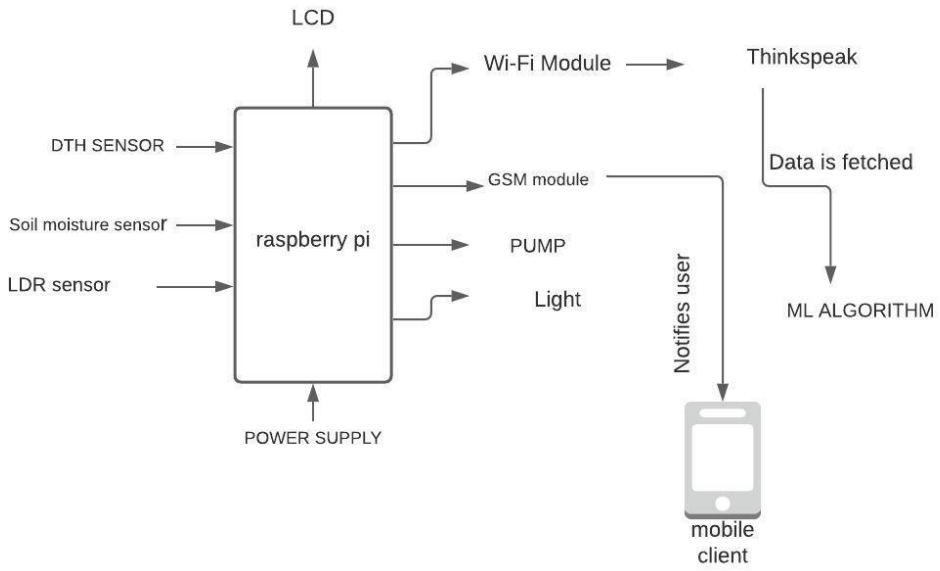
Software dependencies:

- Pycharm IDE
- Thingspeak
- GSM module

Hardware dependencies:

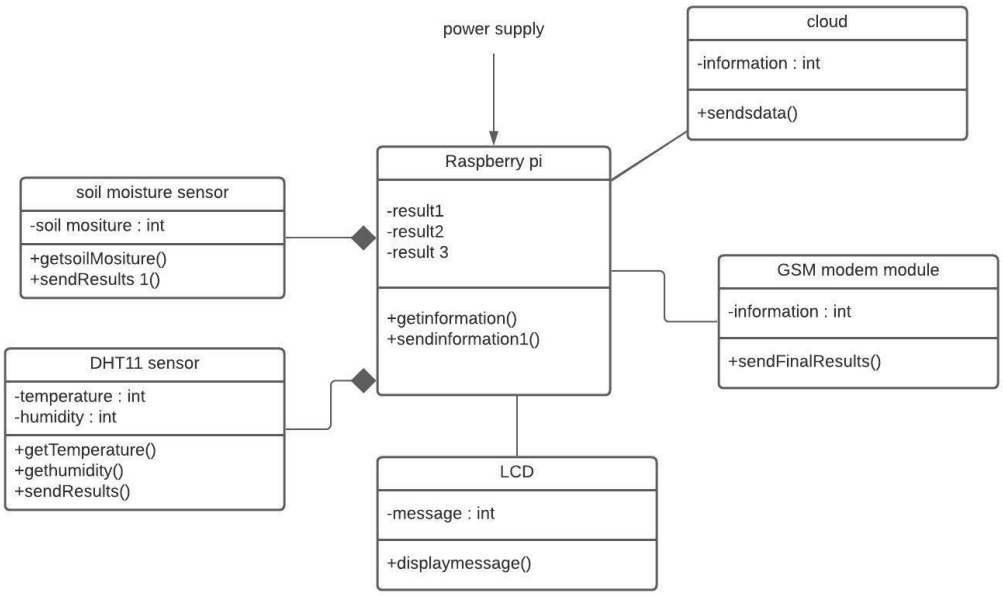
- Raspberry pi3
- LCD
- DTH sensor
- Soil moisture sensor
- Color sensor
- Light sensor
- Pump
- Power Supply

3. High Level System Design



4. Design Description

4.1. Master Class Diagram



4.2. Reusability Considerations

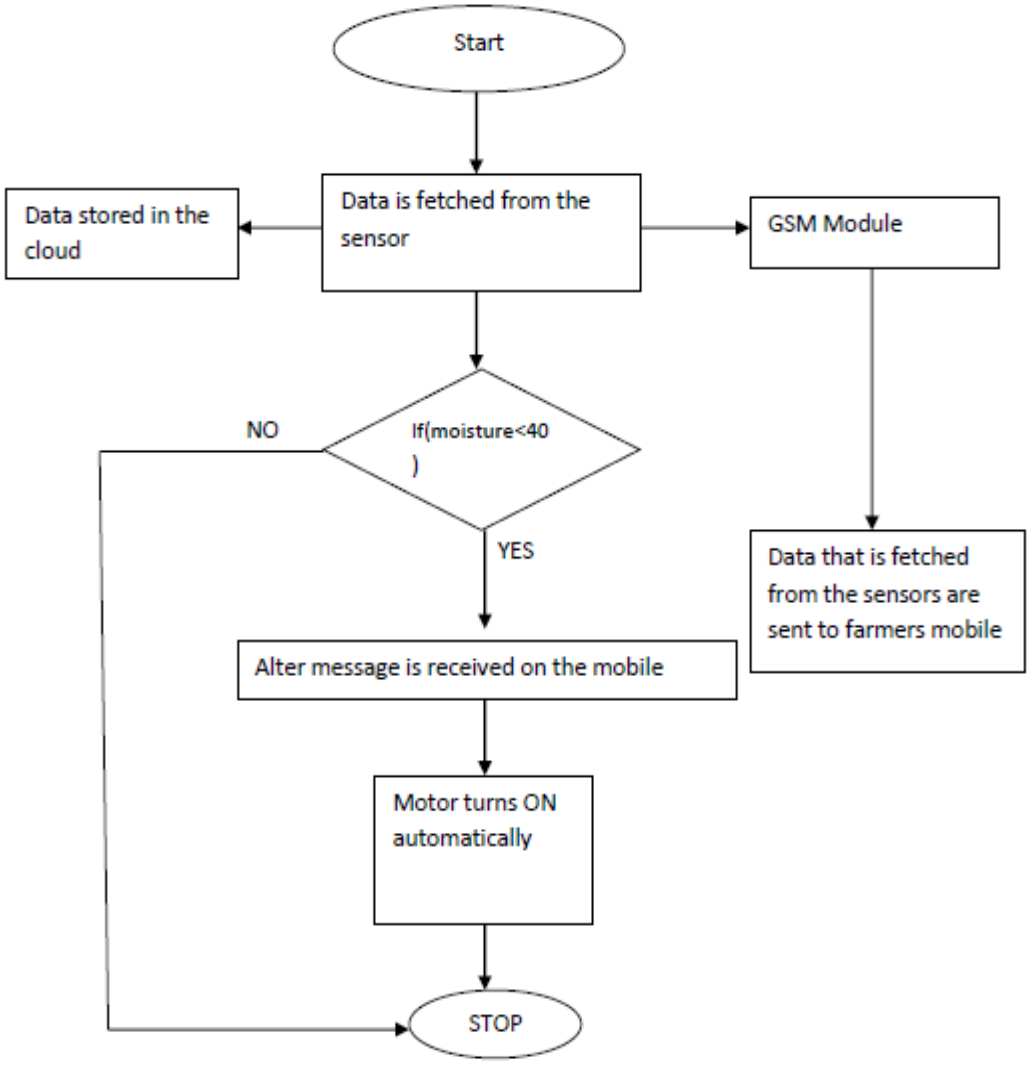
Project Components that are and can be generated with available reusable components are:

- The dataset which contains the details of parameters (Temperature, Humidity) and will give brief information of the yield and the data will be stored in the cloud.

Project Components that can be built in the project for reuse in the project:

- The previous dataset can be reused for the improvement of the yield.

5. State Diagram



Data which is collected through the sensor will store in the cloud that in thing speak thorough Wi-Fi. And also sent to mobiles using GSM, user can easily get to know about the field condition. If the temperature is higher than the minimum value then it notify the user and automatically fan will be switched ON. Similarly as water level reduces to its minimum level then user get notified and automatically motor turns ON

6. User Interface Diagrams

The parameter details will be sent to the user mobile and to the cloud through respective GSM and Thingspeak. As our system doesn't have any screen. It has only the interface which the user can interact (notification).

7. External Interfaces

The system will be connected with the Wi-Fi module. Diagram is same as High Level System Design.

1) Wi-Fi Module: Used to connect to Thingspeak.
2) Power pins: Used to supply power to microcontroller.
3) Analog pins: Used to provide analog inputs to the microcontroller.
4) Digital pins: Used to provide the inputs in the digital form to the microcontroller.
5) Pump : Used to connect to motor from Raspberry pi.

8. Help

We referred Survey papers and Published papers, those were helpful for us.

- http://www.siesgst.edu.in/teacher/uploads/publication574020.pdf

9. Report Layouts

The project contains the report for verification and validation for following:

1) Sl.No.
2) The material used for testing.
3) Class of the material output by the system.
4) Actual class of the material.

10. Design Details

10.1. Performance :

Sensors get the accurate value of the parameter which further helps in crop prediction.

10.2. Maintainability :

If the water level reduces to less than the minimum level, then the soil losses its moisture level the sensor notifies the user through GSM so user can maintain the moisture level.

10.3. Reusability :

The previous dataset can be reused for the improvement of the yield.

10.4. Application compatibility

GSM is the mobile application which is used to notify the user.

Appendix A: Definitions, Acronyms and Abbreviations

Abbreviations:

- **GSM: G**lobal **S**ystem for **M**obile Communication.
- **GPS :** Global Positioning System.
- **LDR :** Light Decreasing Resistance.

Appendix B: References

- Agricultural Crop Monitoring Sensors using IoT A Study International Journal of Engineering Research Technology (IJERT)2018.
- Nikesh Gondchawar Prof Dr R S Kawitkar „"IoT based Smart Agriculture" International Journal of Advanced Research in Computer and Communication Engineering Vol 5 Issue 6 ISSN(Online) 2278 1021 ISSN (2319 5940 June 2016).
- S Sivachandran, K Balakrishnan, K Navin „"Real Time Embedded Based Soil Analyser International Research Journal of Engineering and Technology (Volume 3 Issue 3 March 2014).
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