A Project Report on

Smart Agriculture System

Submitted in partial fulfillment of the requirements for the award of the degree of

Bachelor of Engineering

in

Computer

by

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Approval Sheet

This Project Report entitled ***"Smart Agriculture System"*** Submitted by ***"Mugdha Asgekar"(16102023),"Shilpa Chandra"(16102004),"Samiksha Bhilare"(16102025)***is approved for the partial fulfillment of the requirenment for the award of the degree of ***Bachelor of Engineering*** in ***Computer Engineering*** from ***University of Mumbai***.

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Place:A.P.Shah Institute of Technology, Thane
Date:

CERTIFICATE

This is to certify that the project entitled ***"Smart Agriculture System"*** submitted by **"Mugdha Asgekar"(16102023),"Shilpa Chandra"(16102004),"Samiksha Bhilare"(16102025)** for the partial fulfillment of the requirement for award of a degree ***Bachelor of Engineering*** in ***Computer Engineering***,to the University of Mumbai,is a bonafide work carried out during academic year 2019-2020.

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Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the original sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Abstract

India is an agricultural country and 60-70dependent on it. Due to global warming and natural resource scarcity, we must make sure the water resources are efficiently and precisely used up for farming. We want to automate the tedious process. We propose a microcontroller based system for automatic smart drip irrigation. Taking in consideration of the weather and soil parameters we will predict the weather and the quantity of water that should flow accordingly through drip irrigation with the help of sensors. By this project we can control the moisture content of the soil in the cultivating field. The water flow will be monitored and based on the data available, analysis and prediction will be done. Not only will it help the user to use water wisely in future but also the water supply to crops will be autmated based on the conditions which is a win- win situation for both the farmer and the environment also ultimately leading to a good crop yeild.

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List of Abbreviations

ML:	Machine Learning
IOT:	Internet Of Things
KNN:	K nearest neighbour

Chapter 1

Introduction

Traditionally in farming, drip irrigation is not manual which makes it a tedious task for the farmers. In agriculture the major problems which Indian farmers face is the water scarcity and it is getting critical day by day. There are areas in India which also face droughts. To improve the usage of water the drip irrigation system is used. We can make it more effective with a method "Automated Drip irrigation system using weather prediction for efficient use of water resources." We propose a "Smart Drip automated Irrigation system" through IOT and Machine learning and data Analytics

1.1 Problem Definition

Build A DSS
Machine to Machine (M2M) Interaction
Analysis AND Intelligent Prediction

1.2 Objectives

1) Not more not less water
2) Will greatly help in saving the water resources.
3) Moisture content of the soil can be controlled.
4) Monitoring of the water flow.
5) Crop requirement is properly analyzed

1.3 Scope

Traditionally in farming, drip irrigation is not manual which makes it a tedious task for the farmers. In agriculture the major problems which Indian farmers face is the water scarcity and it is getting critical day by day. There are areas in India which also face droughts. To improve the usage of water the drip irrigation system is used. We can make it more effective with a method "Automated Drip irrigation system using weather prediction for efficient use of water resources." We propose a "Smart Drip automated Irrigation system" through IOT and Machine learning and data Analytics. The underlying idea behind the project is to help us to use the available water resources more efficiently not only just by sensing the water moisture present in the soil but also by predicting the weather by taking in consideration of the crucial temperature and humidity as parameters. The nitrogen and pH content of the soil is also of utmost importance for the crop. Different crop has different requirements of weather, soil and water requirements. Taking all into consideration through an algorithm we can control and regulate the amount of flow of water. This will benefit the environment and also the farmers.

Chapter 2

Literature Review

IEEE Paper 1
Smart Drip Irrigation System for sustainable Agriculture By Kavianand DOI: 10.1109/TIAR.2016.7801206

Mahir Dursun and Semih Ozden," A wireless application of drip irrigation automation supported by soil moisture sensors", Scientific Research and Essays Vol. 6(7), pp. 1573-1582, 4 April, 2011

Gayatri Londhe et al, "Automated Irrigation System By Using ARM Processor", IJSRET Volume 3, Issue 2, May 2014

Intelligent IoT Based Automated Irrigation System Yuthika Shekhar, Ekta Dagur, Sourabh Mishra

Proposed System by the author(s):
The system is used to turn the valves ON or OFF automatically as per the water requirement of the plants. The system is used for sensing, monitoring, controlling and for communication purpose. Different sensors are used to detect the different parameters of the soil like moisture, temperature, humidity, pH of soil and nitrogen content of the soil. Depending upon the sensors output the ARM9 processor will take the necessary action. The moisture sensor output will help to determine whether to irrigate the land or not depending upon the moisture content.

Proposed system by us: This system will predict the nature of the soil and then accordingly predict the water content that must be given to the specific crop. Humdity,temperature,moisture parameters are considered which are trained to predict the target value (which is the nature of the soil). When

live data is taken through the sensors, through KNN classification , target value is predicted.

Chapter 3

Technology Stack

Programming languages Used:

1)Machine Learning : Python and it's libraries
2)Raspberry Pi3 : GPIO (general-purpose input/output) with Python
3)GUI : HTML/PHP

How it will be used ?

We will connect the pH sensor and Nitrogen sensor with the Raspberry Pi. Then we take real time data(along with moisture sensor and temperature)and input the data in our system. Now as we will apply machine learning through python we take these real time input and output the amount of water to be used in drip irrigation.

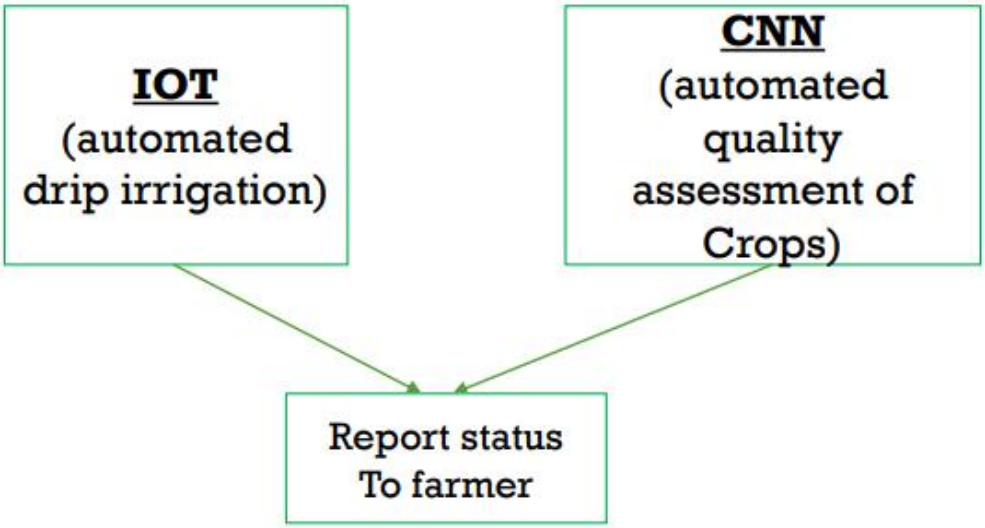
Chapter 4

Project Design

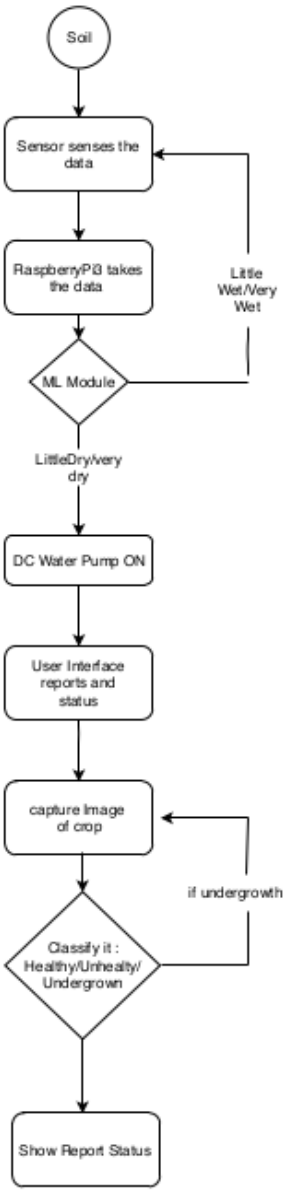
4.1 Proposed System

Agriculture is wide occupation in our densely populated country. As lot of water is needed in agriculture a lot gets wasted also. In this project it is proposed to minimise the water use by giving only the precise amount of water required by the crops. This will be done by taking the data from soil and crop into consideration and applying machine learning algorithm in it. This will help the crops to grow better as no excess water is given. Also in the next module we will take images of the crop example tomato and check whether it is healthy or not.

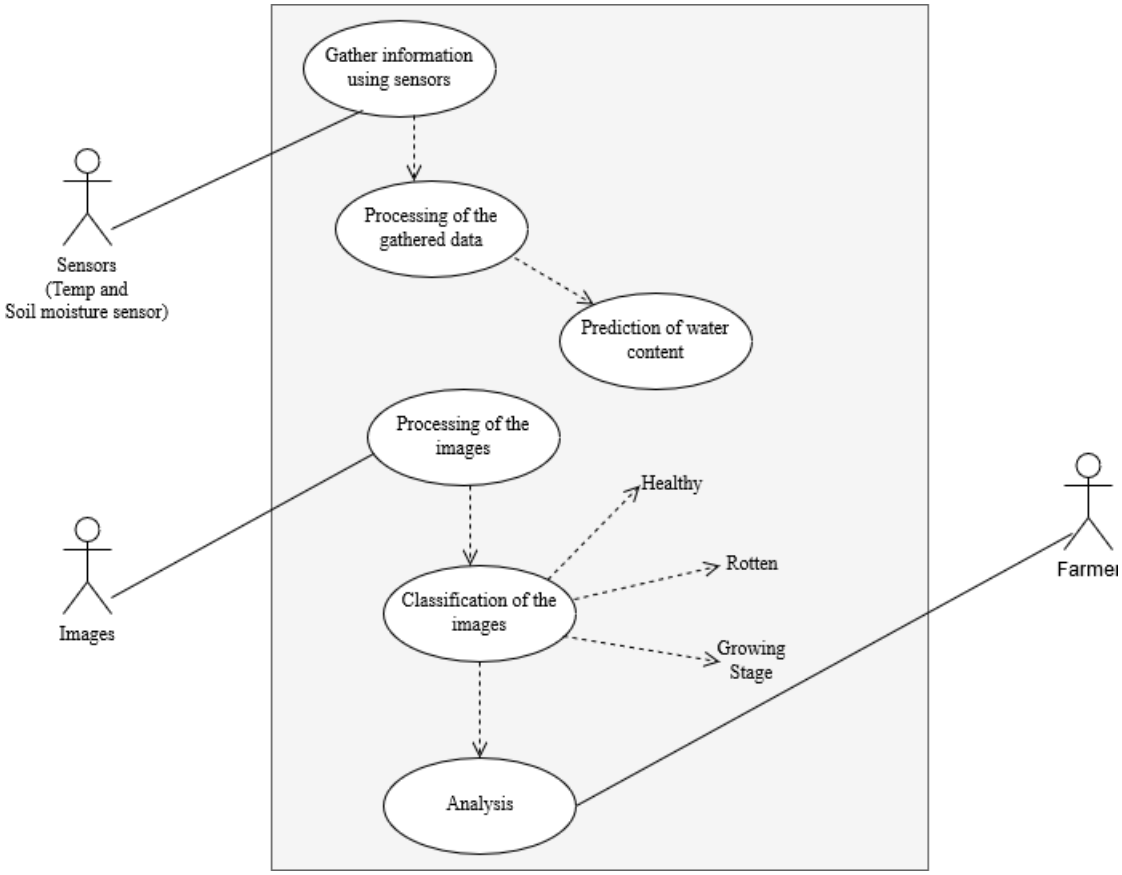
4.2 Flow Of Modules



4.3 Activity Diagram



4.4 Use Case



4.5 Description Of Use Case Diagram

The sensors will collect the data such as temperature and soil moisture and the after gathering information we will apply machine learning to the data and predict the amount of water that will go in the crop. The image sensor will capture the data and and classify the images accordingly as healthy, rotten, growing stage and analyse the data.

Chapter 5

Modules of System

The title of Chapter 1 shall be Introduction. It shall justify and highlight the problem posed, define the topic and explain the aim and scope of the work presented in the report. It may also highlight the significant contributions from the investigation.

5.1 Prediction of soil nature and water

In this module collection of data such as soil moisture and temperature will be done and categories the tuples as little dry/very dry/little wet/very wet. KNN algorithm will be used in making the classification happen.When KNN is used for classification, the output can be calculated as the class with-the highest frequency from the K-most similar instances. Each instance in essence votes for their class and the class with the most votes is taken as the prediction. KNN works well with a small number of input variables (p), but struggles when the number of inputs is very large.As the dataset contains less than 2000 tuples KNN will be perfectly suitable for the dataset. After the classes are specifies if it is very dry/little dry then only we will take those tuples and calculate the water required by using the evapotranspiration formula.

5.2 Assembling of components

In this module we require soil moisture and temperature sensors attached to the Raspberry Pi3. The machine learning module will also be present in this Raspberry Pi3.

5.3 Identification and class of crops

The image processing will be done in this module and according to the crop condition it will be classified as healthy or not.

5.4 Analysis of data

After the entire is gathered entirely the detailed review will be given as to how many crops are healthy/undergrown/unhealthy

Chapter 6

6.1 Benefits For Environment

Effective use of water is the mantra of our project.When we use the water in appropriate quantities we utilise the soil properties to it's maximum extent. Suppose for example,peanuts require less water whereas cotton requires then we should provide the water content respectively. Also how much water we can save by this process !

6.2 Benefits For Society

Agriculture sector in India contributes to a major source of income . Irrigation is an essential component of crop production in many areas. Right now in India drip irrigation systems are operated manually. Effective use of water is the main concern of our project.Traditionally people used to go to farms inorder to adjust the water requirements . The solution to this problem will be solved using automated drip irrigation system. Using automated drip irrigation system the water requirements will automatically be detected depending upon on the moisture content of soil,temperature,humidity and climate and also depending upon on the water requirements for the particular crops.

6.3 Applications

1) Will help farmers to not operate drip irrigation system manually.

2)It will only output the amount the water required by the particular crop accordingly.

3)It will also see the pH content and Nitrogen content along with moisture content and temperature of that particular area.

4)We will also alert the farmer if the fertilise value is less than the required value.

Chapter 7

Result

Preparation of the dataset

Chapter 8

Conclusions and Future Scope

Machine Learning is used when there is huge data and too many dependencies are there. And accurate prediction has to be done from the given data. In this project there is moisture and temperature which play a crucial part in determining the water content that has to given to the soil. Finally, it is concluded that with this proposed system one can save manpower and water to improve production which ultimately increases the profit.

In the future the crop assessment can be done to classify the crops if it healthy/unhealthy/undergrown or not.

Bibliography

[1] Smart Drip Irrigation System for sustainable Agriculture By Kavianand DOI: 10.1109/TIAR.2016.7801206

[2] Mahir Dursun and Semih Ozden," A wireless application of drip irrigation automation supported by soil moisture sensors", Scientific Research and Essays Vol. 6(7), pp. 1573-1582, 4 April, 2011.

[3] Gayatri Londhe et al, "Automated Irrigation System By Using ARM Processor", IJSRET Volume 3, Issue 2, May 2014

[4] Intelligent IoT Based Automated Irrigation System Yuthika Shekhar, Ekta Dagur, Sourabh Mishra

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