Computer Engineering Department

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UNIVERSITY OF MUMBAI

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A Project Report on

Smart Agriculture System

Submitted in partial fulfillment of the degree of

Bachelor of Engineering(Sem-7)

in

Computer Engineering

By

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Under the Guidance of

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1.Project Conception and Initiation

1.1 Abstract

- India is an agricultural country and 60-70% of our economy is dependent 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 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.

1.2 Objectives

- Not more not less
- Will greatly help in saving the water resources
- Moisture content of the soil can be controlled
- Monitoring of the water flow
- Crop requirement is properly analyzed

1.3 Literature Review

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

- BUILD A DSS
- Machine to Machine (M2M) INTERACTION
- ANALYSIS AND INTELLIGENT PREDICTION

1.5 Scope

- WHAT WE PLAN TO DO? { ML and IOT }
- Which ML Algorithm? (KNN)
- Target Value? (4 target values)
- Output- flow of water through DC water pump

1.6 Technology stack

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

1.7 Benefits for environment & Society

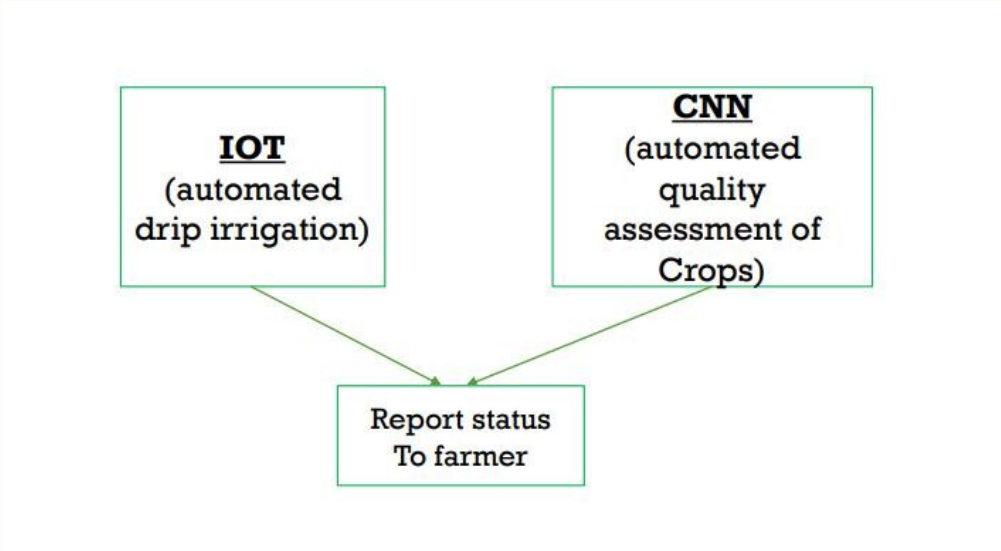
- Effective use of water is the mantra of our project.
- Some crop requires more water than others.
- Water requirements will automatically be detected depending upon on the
- moisture content of soil, temperature, humidity and climate and also depending
- upon on the water requirements for the particular crops

2. Project Design

2.1 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.

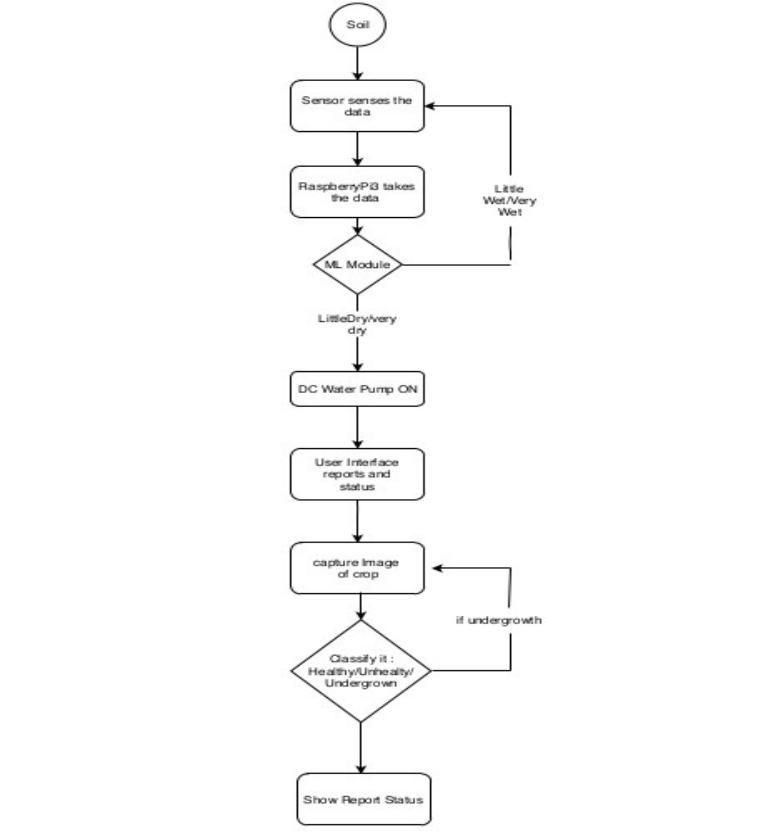
2.2 Design(Flow Of Modules)



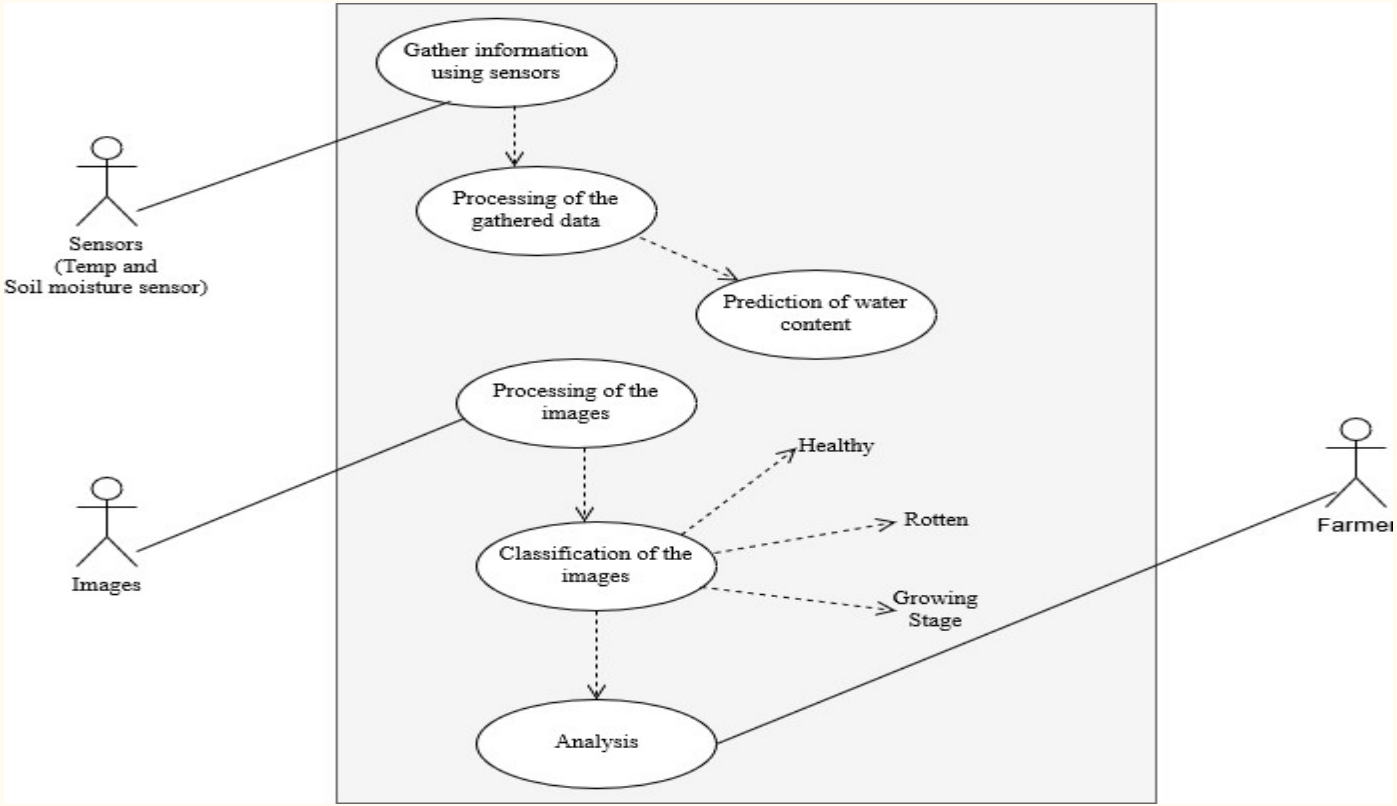
2.3 Description Of Use Case

- 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.

2.4 Activity diagram



2.5 Class Diagram



2.6 Module-1(Prediction of soil nature and water)

- Collect data.
- Apply KNN Algorithm
- Predict Soil nature and water accordingly.

KNN

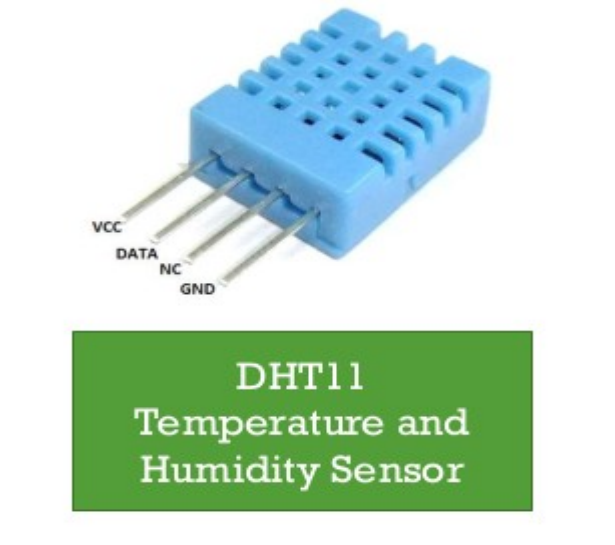
- Lazy Learning:

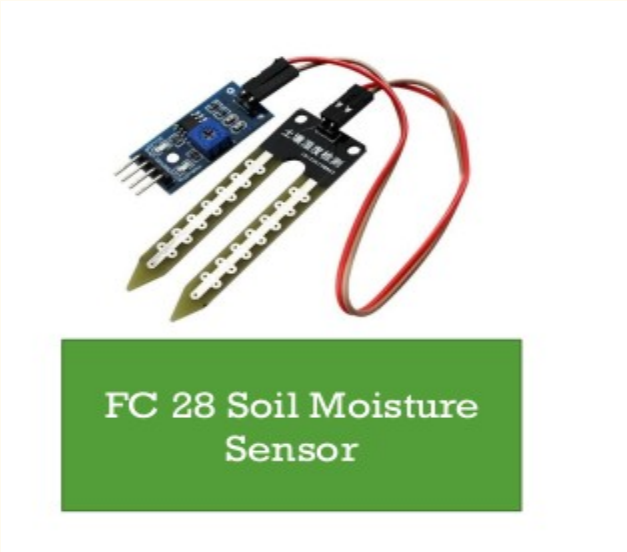
No learning of the model is required and all of the work happens at the time a prediction is requested. As such, KNN is often referred to as a lazy learning algorithm.

- The model representation for KNN is the entire training dataset.
- Predictions are made for a new instance (x) by searching through the entire training set
- for the K most similar instances (the neighbours) and summarizing the output variable for
- those K instances.
- Euclidean distance is calculated as the square root of the sum of the squared differences
- between a new point (x) and an existing point (xi) across all input attributes j.
- Euclidean Distance (x , xi) = sqrt(sum((x j – x i j)^2))
- Hamming distance, Jaccard, Mahalanobis and cosine distance
- (Euclidean best when ?)
- (Manhattan best when ?)
- (if Unsure which to use then?)

Module-2(Assembling of components)

- Attach the sensors to the RaspberryPi3.
- Add the ML module to the RaspberryPi3





Module-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.

Module-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.

2.7 References

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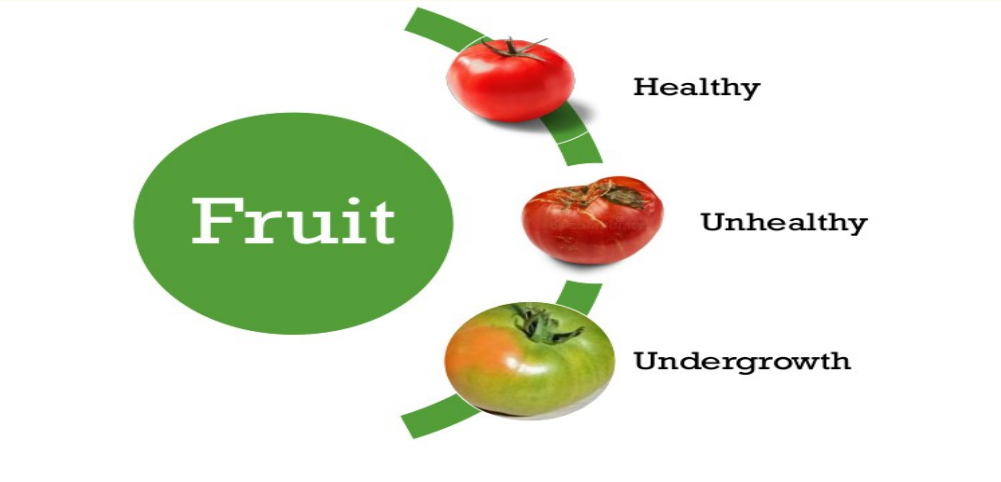
3.Planning for next semester

Planning

- Crop Classifictaion



Thank You