

# **GANDHINAGAR INSTITUTE OF TECHNOLOGY**

**Computer Engineering Department**

**Design Engineering-2A(3150001)**

## **Automatic Irrigation System**

**Presented By**

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# Outline

- Introduction of Automatic Irrigation System
- Detail Functionalities of Automatic Irrigation System
- AEIOU Framework
- Mind Mapping
- Empathy Canvas
- Ideation Canvas
- Product Development Canvas(PDC)
- Rough Prototyping
- Future Work
- References

# Introduction

- In daily life it is seen, that it is a time consuming and frustrating task to maintain wet field for appropriate plant. To save time, water and power, and to develop an efficient irrigation system, we have developed the idea of Automatic Irrigation System. With this, the people using the Automatic Irrigation System, there will be prevention of wastage of water, power and time.

# Detail Functionalities

- The traditional irrigation system involves most manual labor-intensive task. Farmers usually work on large portions of land to grow different types of crops. It is not always possible for one person to be able to keep track of entire farmland about crop and the soil moisture due to health problems, age and unavailability of person. To overcome this problem a solution is proposed to automate the irrigation system using Arduino and monitoring the farm field by using photos captured by the camera. Depending upon the level of soil moisture content, the system supplies the water to a farm field by sensing the soil moisture by photo conversion. The process of producing appropriate amount of water to plants avoids some of situation like mud cracks, plant disease etc. When the water level reaches the threshold value it automatically stops, sends the notification of a farm field to the farmers. This helps in irrigating the field even during nighttime, so it doesn't require the farmer to switch on motor manually. Ultimately a farmer can monitor the condition of farm field from anywhere.

# Existing Systems for Irrigation :-

- Types of Existing System
  1. Surface Irrigation
  2. Drip Irrigation
  3. Sprinkler irrigation
- Limitations of Existing System
  1. Phytophthora disease

# Types of Existing System

- **Surface Irrigation**



FIG 2.1 SURFACE IRRIGATION

- **Drip Irrigation**

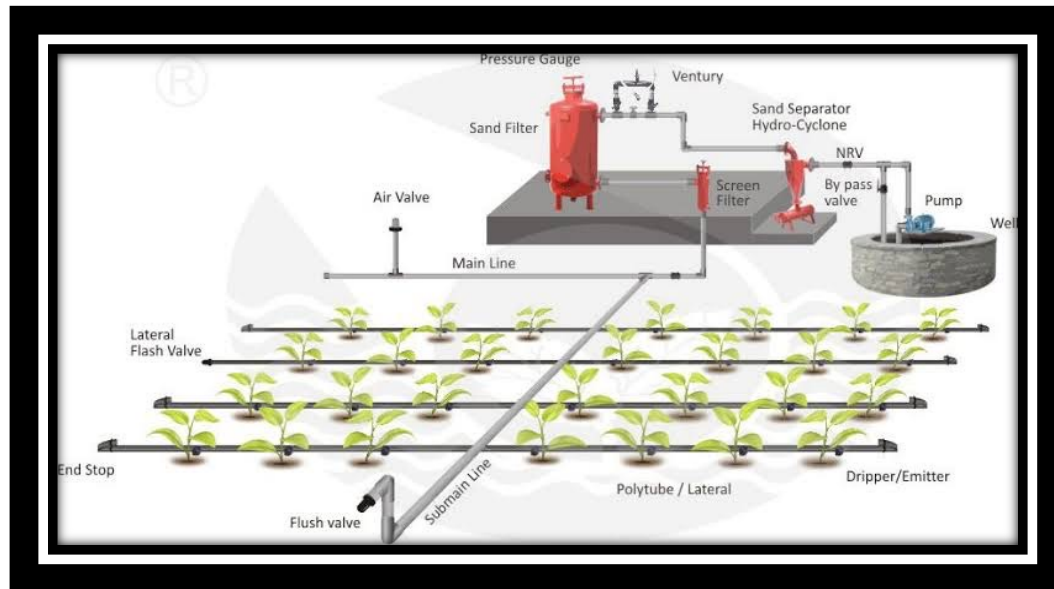


FIG 2.2 DRIP IRRIGATION

- **Sprinkler irrigation**



FIG 2.3 SPRINKLER IRRIGATION



# Limitations of Existing System

- **Phytophthora disease**



FIG 2.4 PHYTOPHTHORA DISEASE

# CANVASES

- AEIOU CANVAS

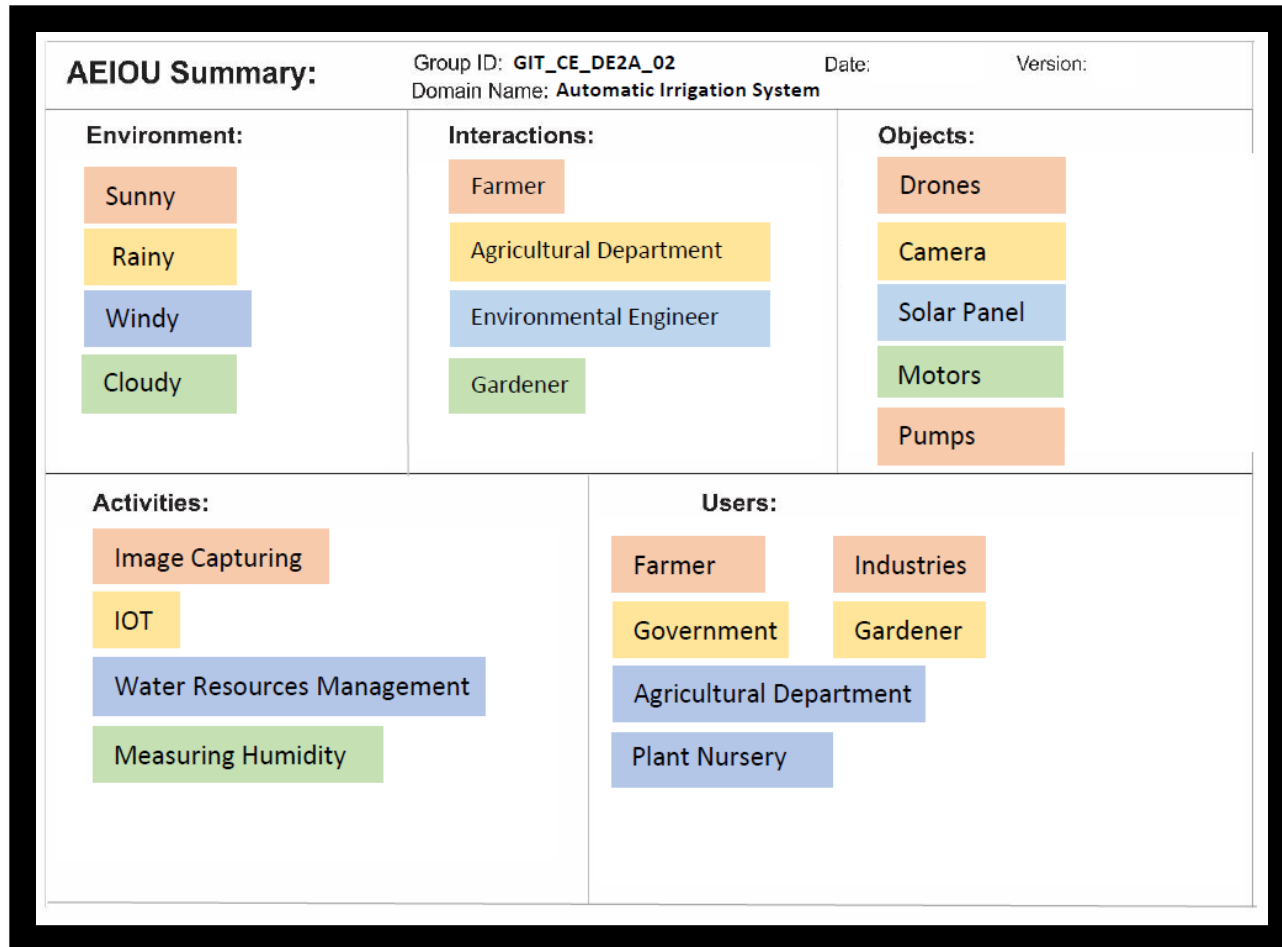


FIG 3.1 AEIOU CANVAS

- # EMPATHY CANVAS

Design For Date	Design By Version
<b>USER</b> <div>Nursery</div> <div>Government</div> <div>Gardener</div> <div>Industries</div>	<b>STAKEHOLDERS</b> <div>Farmer</div> <div>Agronomist</div> <div>Agricultural Department</div>
<b>ACTIVITIES</b> <div>Image Capturing</div> <div>Soil Erosion Prevention</div> <div>IOT</div> <div>Humidity and Water Level Checking</div> <div>Smart Irrigation</div> <div>Water Management</div>	
<b>STORY BOARDING</b> <p><b>HAPPY</b></p> <p>A farmer was happy as automatic irrigation system as it save time and money too. Time because things became much faster then it used to be and money because after this time of system it had no need of any labour work so it saved enough amount of money.</p> <p><b>HAPPY</b></p> <p>Farmers were much happy then before. It helped them by preventing soil erosion, as automatic irrigation system were much effective and as soil erosion is prevented so good quality of water is saved.</p> <p><b>SAD</b></p> <p>Groups of labourer were not happy because of automatic irrigation system as it decreased the needs of labour work, all the work was done by machines and labours were facing financial problems and unemployment.</p> <p><b>SAD</b></p> <p>A farmer faced difficulties because of automatic irrigation system as he was not educated enough to make use of it because it needed high knowledge of machines and it working.</p>	

FIG 3.2 EMPATHY CANVAS

- IDEATION CANVAS

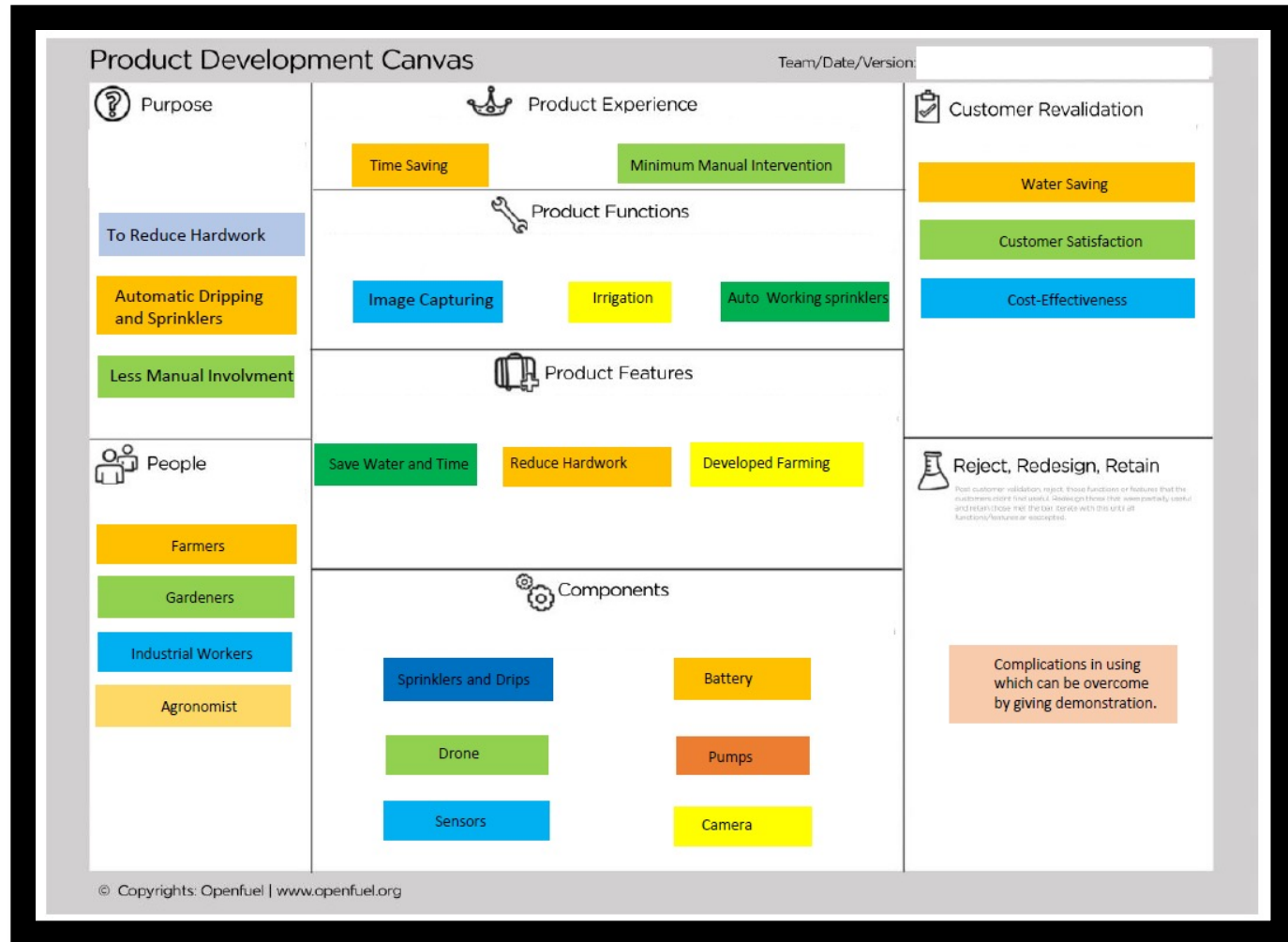


FIG 3.3 IDEATION CANVAS

# • PRODUCT DEVELOPMENT CANVAS

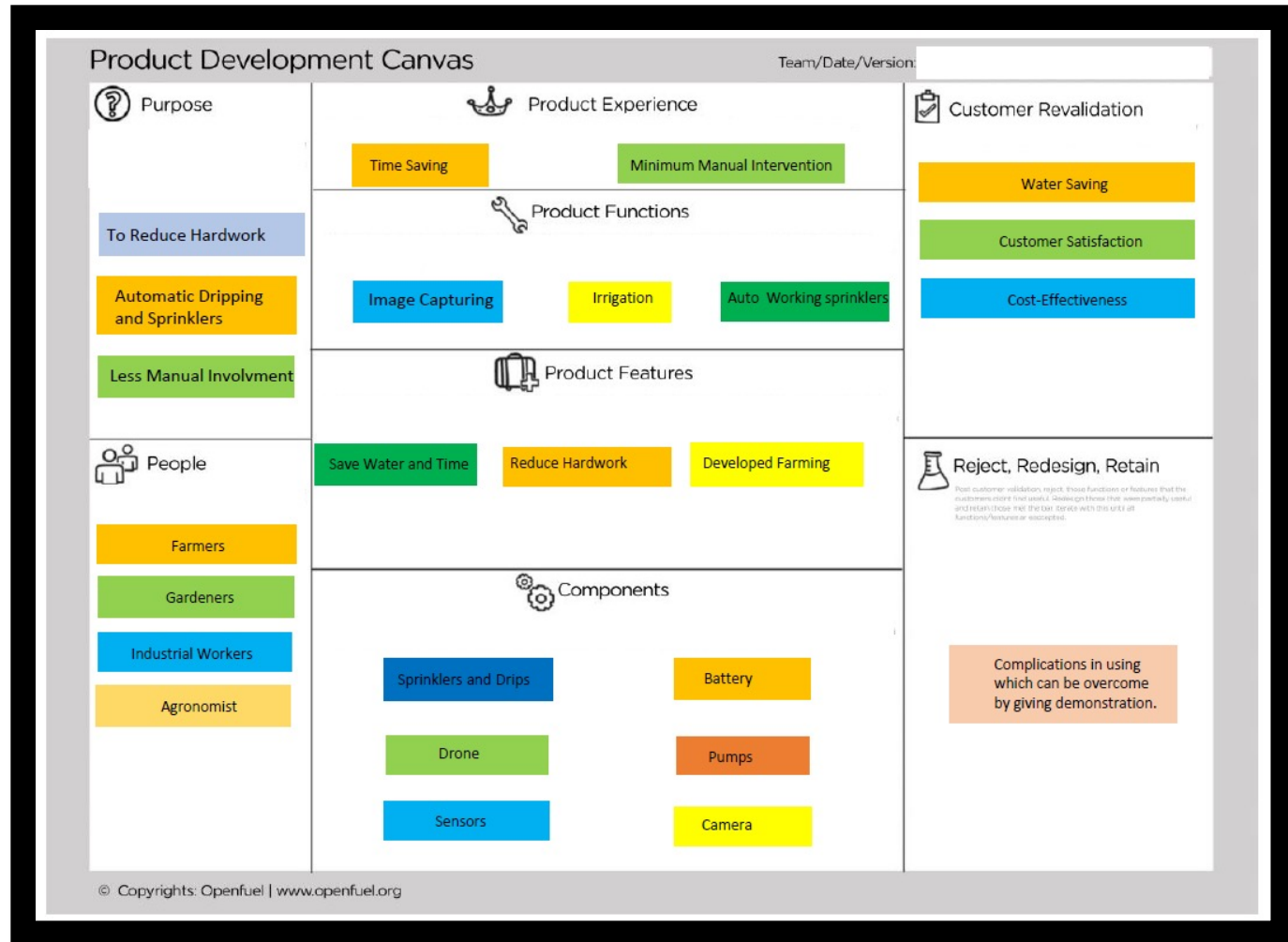


FIG 3.3 PRODUCT DEVELOPMENT CANVAS

- LEARNING NEED MATRIX

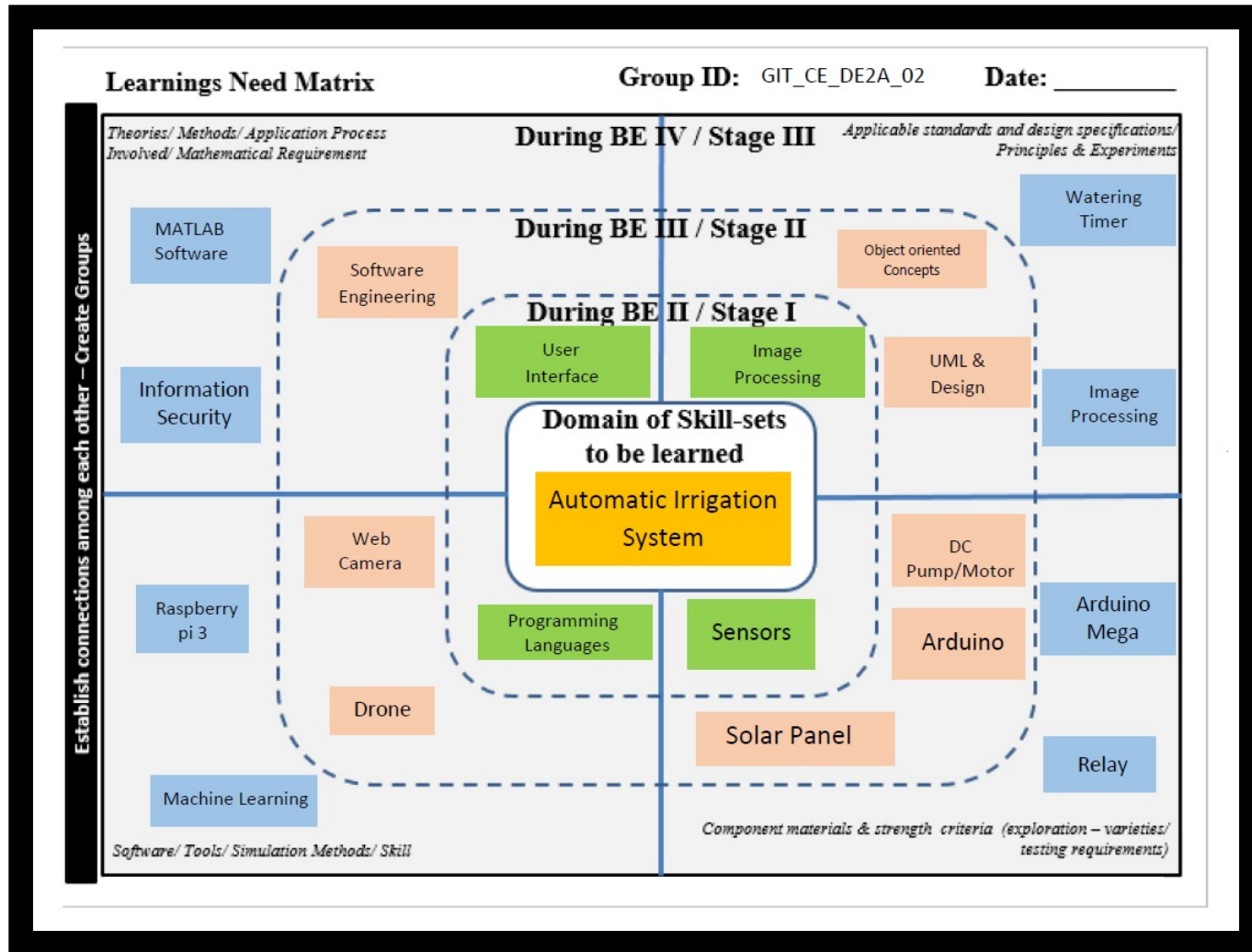


FIG 3.5 LNM CANVAS

- MIND MAP

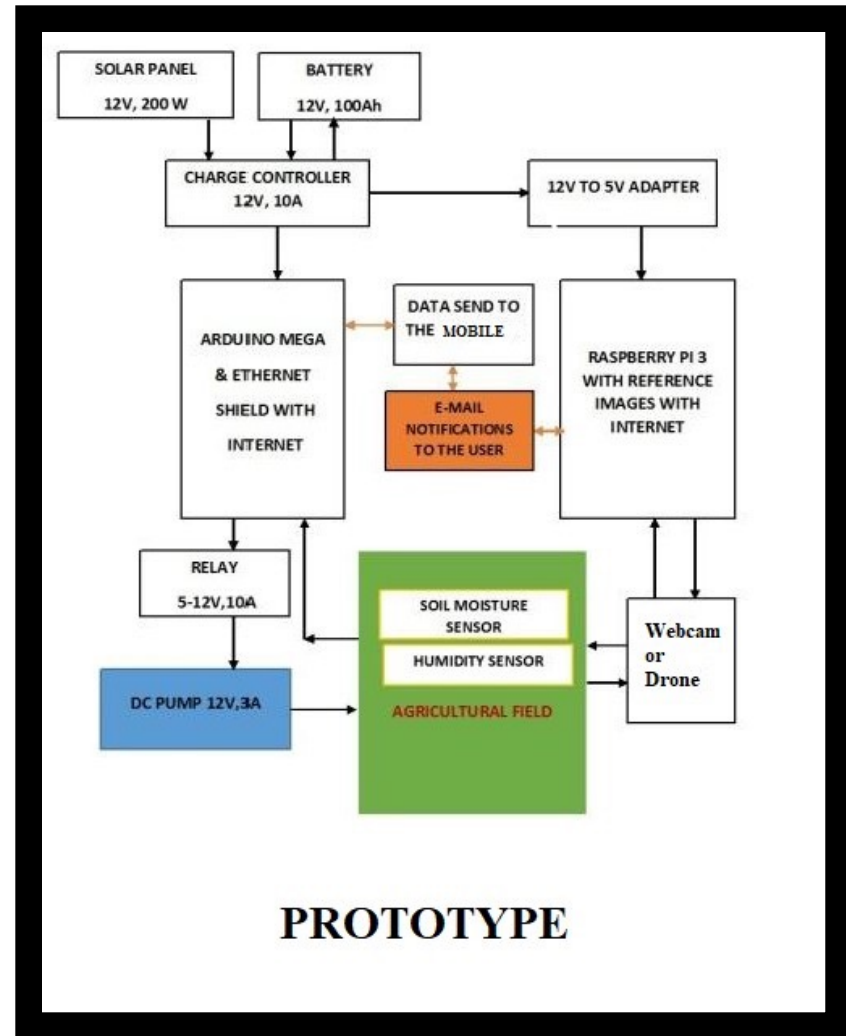


FIG 3.6 MIND MAP

# PROTOTYPE :-

## WORKING

In this system Set values are fixed for a particular crop and are programmed in the controller. Such that when the condition of the soil exceeds the set value, the Arduino automatically sends a message to the farmer and the relay is started and vice versa. This automatic irrigation system senses the moisture content of the soil through photo conversion of the captured photos and automatically switches the pump when the power is ON. When the soil condition is less than the references value then the soil is considered as dry and instantly the sensor sends the logic signal 1 to the microcontroller. The microcontroller then turns on the motor circuit and prompts the motor to pump water to the plants. When the soil condition is greater than the reference value, the soil becomes dry. Then the sensor sends the logic signal 0 to the microcontroller, this turns OFF the motor circuit and prompts motor to pump water to fields. Finally the condition of the motor and soil are displayed in the LCD display.





# FUTURE WORK

- Platform independent application.
- Solar energy can be used to generate the power.
- Various other functionality can also be added depending upon the scope of the objective.

# References

- [1] Fang Meir, D. D. Garrote, D. T. Mansion and S. H. Human, 1990, Automated irrigation system using plant and soil sensors, ASAE Publication 04-90 American Society of Agricultural Engineers St. Joseph, Michigan, pp 533-537.
- [2] Clemens A. J. 1990, Feedback control system for surface irrigation management, ASAE Publication 04-90 American Society of Agricultural Engineers St. Joseph, Michigan, pp 555-56
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