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Design of Cultivated Crop Protection System Using Embedded System

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Abstract: Agriculture is a backbone of our country. About almost of our country's revenue comes from agriculture. But during heavy rain falls, the farmers face lot of problems because there cultivated crops get washed off or destroyed. So, in order to avoid this problem this project is designed which helps if saving the crops from heavy rainfall and protecting that rain water to use it for other purposes. In this system an automaticroof is inculcated which works by taking the signals from the rain and soil moisture sensors and covers the whole field toprotect it from heavy rains. Whenever there is rainfall the rain sensor gets activated. Then the controller indicates theDC motor to run which opens the roof automatically to close the field using a polythene sheet. Which is implemented is "Automated irrigation system with partition facility for effective irrigation of small scale farms" (AISPF). But this method has some drawbacks which can be improved and here we are with a method called "Automated irrigation systemusing weather prediction for efficient usage of water resources" (AISWP).

Keywords: Design of framework, Catia**,** sensors.

I. INTRODUCTION

Agriculture is a backbone of our country. About 70% of our country's revenue comes from agriculture. As per the recent government reports, more than 100 crores rupees is lost during and after harvesting. Due to improper cultivation methods, delay in yield distribution process, the farmers are at loss. Huge quantity is wasted, 'saving a grain is similar to producinga grain'. Hence it is quite necessity of the government and as well as private sector people to help improve the conditions in each of the phases from seeding to marketing of the value chain.This is possible by involving agriculturists, technologists and scientists in the process for quality produce, thus ensuring the food security of the country. The losses are because of lackof infrastructure during harvest and after harvest. Limited knowledge of good practices for specific crops to the farmers and market trends of demand and supply are prime concerns. Small farmers are vital for India's economy and defined as holding less than two hectare of land constitute about 80% of country's farmer community. India is currently the second largestproducer of agricultural commodities after china in the world and yet, faces the threat of food and nutrition insecurity.

Nowadays, during the rainy season the cultivated crops get affected due to heavy rainfall. So the farmers face lot of problems because there cultivated crops get washed off or destroyed. So in order to avoid this problem this project is designed which helps by protectingthe crops from heavy rainfall. This system involves protection of the crops by auto roof whichcovers the certain area. The rain sensor is activated when there is rainfall and it will give intimation to the control unit to close the roof as soon as the rain is detected. Once rain is stopped, controller automatically opens the roof. In the designed prototype frame work along with roof control mechanism, the parameters like soil moisture, system temperature and humidity are measured and displayed on display unit.

II.LITERATURE SURVEY

Naveen KB *et al.* proposed system in [2] which helps by saving the crops from heavy rainfall and protecting that rain water to use it for other purposes. The saved and storedwater can be used for feeding animals, washing, cooking etc. and can also be reused to sprinkleit back to the field when needed. In this system an automatic roof is inculcated which works by taking the signals from the rain and soil moisture sensors and covers the whole field to protect it from heavy rains. Whenever there is rainfall the rain sensor gets activated. Then the controller indicates the DC motor to run which opens the roof automatically to close the field using a polythene sheet.

Sathvik *et al.* [3] presented a system to prevent the crops from the heavy rain and also save the rain water. In presented system rain sensor is used for the working of automatic roof.An automatic roof is inculcated in [4] works by taking the signals from the rain and soil moisture sensors and covers the whole field to protect it from heavy rains. Whenever there is rainfall the rain sensor gets activated. The water level in the soil is sensed by the soil moisture sensor. Whenever there is rain, the rain sensor is ON and when the water level inthe soil is beyond the normal level then soil moisture sensor is ON. If both the sensors are ON then this information is given to the controller and the GSM. Then the controller indicates

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theDC motor to run which opens the roof automatically to close the field using a polythene sheet.If there is any problem in opening of the roof, then this is intimated to the farmers thought SMSto their mobile phone using GSM.

III.METHODOLOGY

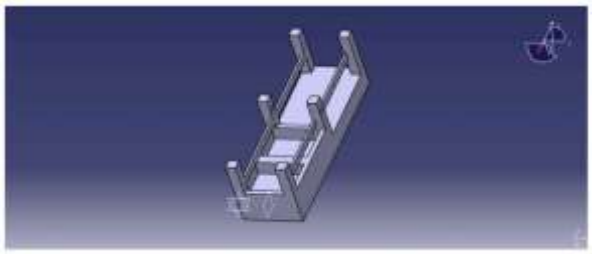
RECOGNITION OF NEED
↓
LITERATURE OF STUDY
↓
MECHANISM AND MATERIALS
↓
DESIGN AND CALCULATION FABRICATION PROCESS
↓
ASSEMBLY OF UNIT FINALIZING THE PROJECT

V.DESIGN PARAMETERS

- **PINION DIAMETER =0.05 M**
- **RACK LENGTH =0.3M**

TRAVELLING OPERATION

- **1) MASS TO BE MOVED M =20KG**
- **2) SPEED V=0.3 M/SEC**
- **3) ACCELERATION DUE TO GRAVITY G = 9.81 M/SEC**
- **4)ACCELERATION TIME TB = 1 SEC**
- **5) COEFFICIENT OF FRICTION = 0.01**
- **6) LOAD FACTOR KA = 1.5**
- **7) LIFE TIME FACTOR FN = 1.05**
- **8) SAFETY COEFFICIENT =1.2**
- **9) LINEAR LOAD DISTRIBUTION = 1.5**



a= v/tb
a= 0.3/1
a= 0.3 m/sec2

Fu= m·g·μ + m·a/1000 (For lifting axel)

Fu= 20 x 9.81x 0.1+20x0.3/1000
=0.0079KN

$$\text{Fu perm} = \frac{\text{Fu Tab}}{\text{KA X SB X fn X LKHP}}$$

$$= \frac{0.026}{1.5 \times 1.2 \times 1.05 \times 1.5}$$

Fu perm= 0.00899 KN

Condition

Fu per > Fu = > fulfilled
0.00899 > 0.00790 = Fulfilled
Tangential Force is Fu per = 0.00899 KN

Torque

T = Ft. r
Pinion Diameter = 0.05 m = 0.025 m = r
T = 0.00899 X 0.025
T =0.0002248 KN-m
Power P = T. n/6300
= 0.0002248 X 100/6300
P = 3.49 X10^-7 KW

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VI.ADVANTAGES AND DISADVANTAGES, APPLICATIONS

ADVANTAGES

- Proposed system is helpful to protect the harvested crop from rain.
- It works on Renewable Energy.
- Helpful to get update of soil moisture, Temperature and Humidity.

DISADVANTAGES

- System works on Renewable energy; alternate power supply is required in case of worst climate condition.
- Design is complicated.

APPLICATIONS

- In agriculture field
- For domestic purposes

VII.CONCLUSION

Nowadays, during the rainy season the cultivated crops get affected due to heavy rainfall. So the farmers face lot of problems because there cultivated crops get washed off or destroyed. So in order to avoid this problem this project is designed which helps by protectingthe crops from heavy rainfall. This system involves protection of the crops by auto roof whichcovers the certain area. The rain sensor is activated when there is rainfall and it will give intimation to the control unit to close the roof as soon as the rain is detected. Once rain is stopped, controller automatically opens the roof. In the designed prototype frame work along with roof control mechanism, the parameters like soil moisture, system temperature and humidity are measured and displayed on display unit.

From the results obtained from designed framework following conclusions are drawn:

1. The designed frame work can be helpful to protect the cultivated crops.
2. As it works on the renewable energy source, minimum power is required for the operation.
3. The system sensors continuously monitor the system parameters and hence the parameterslike temperature, humidity, moisture associated with crops and soil are continuously conveyed to farmer through display unit.

Following future work can be done to improve the system performance:

1. As the system is powered with solar energy, every time in day solar light is not same henceinstead relying on only solar energy the system could be powered with hybrid energy source.
2. As it is a prototype frame work the coverage area is limited
3. The system is work in offline mode, by providing the IoT support the parameters could beonline measured.

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