AUTOMATIC RAIN SENSING AND PROTECTION COVER FOR CROP GRAINS AND SEEDS

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Keywords:

Crop grain Protection, Rain Sensing, IoT, Solar Energy.
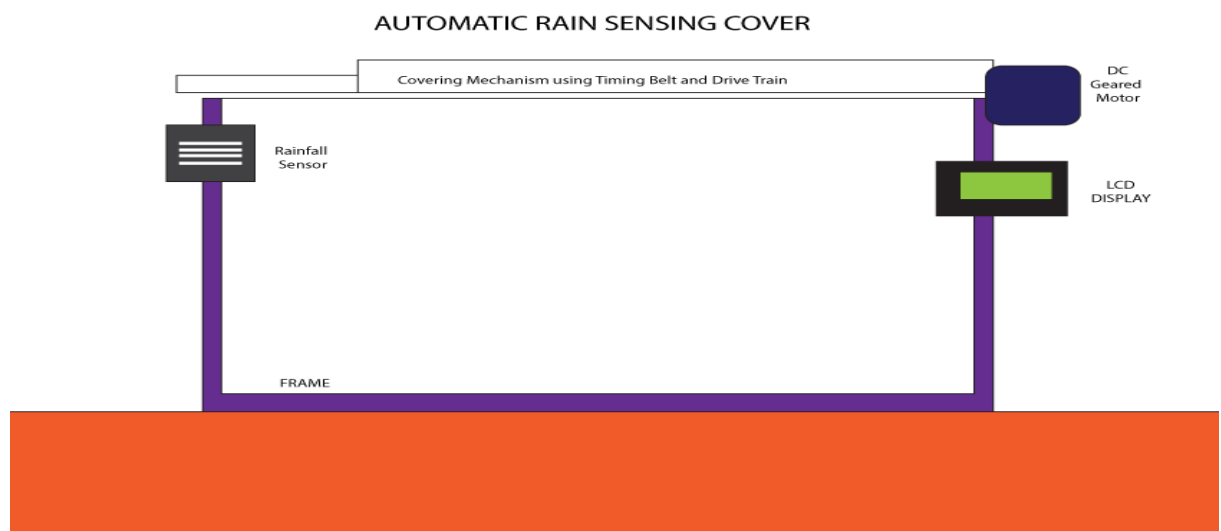
Introduction:

Agriculture plays a vital role in sustaining human life and supporting economies worldwide. However, it is heavily influenced by environmental conditions, which can be unpredictable and often harsh. Among these conditions, rain stands out as a critical factor. Traditional methods of protecting crop grains from rain, such as manual coverings, are labour-intensive and inefficient. There is a pressing need for an automated solution that can effectively protect crop grains from rainfall without requiring constant human intervention. The primary objective of this project is to design and develop an automated roof system to protect crop grains from rainfall. The system aims to provide effective protection by automatically covering crop grains when rain is detected, thereby preventing damage.

Objectives:

- The main objective of this project is to design and develop a mechanism to automatically sense rain and cover crop grains, helping farmers protect their crops from sudden rain.

- Developing a reliable sensor system capable of accurately detecting rainfall intensity.

- Prior anticipation of rain using a weather forecasting unit.

- Harnessing renewable solar energy through solar panels, reducing the reliability on electricity.

- Integration of IOT for easy handling.

Methodology:

AUTOMATIC RAIN SENSING COVER

Covering Mechanism using Timing Belt and Drive Train

DC Geared Motor

Rainfall Sensor

LCD DISPLAY

FRAME

- The required material is to be selected.
- The fabrication of the frame, covering mechanisms, and drive system is to be carried out.
- The Solar panel is to be installed and connected to the battery.
- The sensors for sensing the rain, temperature, and humidity will be installed.
- The display unit is to be installed to display the condition of the cover (open/closed).
- The system is to be connected with an application using IOT for monitoring the weather and provide control to the closing mechanism.
- The mechanism is to be tested for its operation and functionality.

Result and Conclusion:

The automatic rain sensing cover system represents a significant advancement in agricultural technology, providing an efficient and reliable solution to protect crop grains from rainfall. By integrating key components such as the Arduino microcontroller, proximity switches, an LCD display, a DC geared motor, a battery, a timing belt, and a rainfall sensor, the system offers a robust and automated method to shield crop grains from damage. The system's ability to automatically deploy and retract the cover based on real-time rain detection minimizes the risk of crop grain damage due to rain, it enhances agricultural productivity and reduces the need for manual labour.

Working Model vs. Simulation/Study:

This project work is a working model rather than a simulation, the primary components include an Arduino microcontroller, a rainfall sensor, limit switches, an LCD display, a DC geared motor, guide rails, a battery power supply, solar panel, and a solar charge converter. The rain sensor detects the rain and Arduino microcontroller stimulates the covering mechanism to protect the crop grains.

Future Scope:

- Advanced machine learning algorithms could be employed to analyze historical weather and environmental data for better decision-making and predictive maintenance.
- Expanding IoT capabilities to include mobile app control and alerts via SMS or email can increase accessibility for farmers in remote locations.
- Incorporating renewable energy storage, such as advanced battery systems, and optimizing solar panel efficiency could make the system more robust.