SMART SOLAR SCARECROW

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ABSTRACT

This project aims to design and develop a Smart Solar Scarecrow that utilizes renewable energy to deter birds and other pests from damaging crops in agricultural fields. The Smart Solar Scarecrow is equipped with various sensors and devices such as motion sensors, cameras, and speakers that detect and scare off birds and animals that approach the crops. The scarecrow is powered by solar panels that charge a battery, which in turn powers the various sensors and devices. The system is designed to operate autonomously, with the scarecrow activating only when needed, conserving energy and maximizing efficiency. The Smart Solar Scarecrow is an innovative solution that addresses the growing need for sustainable and eco-friendly methods to protect crops. It provides farmers with an effective and low-cost way to prevent crop damage and increase yield while reducing their environmental footprint. The project also highlights the potential of renewable energy to power innovative solutions for the agricultural industry.

I. INTRODUCTION

Agriculture is the backbone of the world’s food supply, and it is vital to ensure that crops are protected from pests and other animals that can damage them. Birds are one such pest that can cause significant damage to crops, and traditional scarecrows have been used for centuries to deter birds from attacking crops. However, traditional scarecrows have several limitations, including the fact that birds can get used to them and ignore them. In recent years, smart solar scarecrows have emerged as a more effective and sustainable solution to protect crops from birds and other animals.

Smart solar scarecrows use advanced technology to detect and scare away birds and other animals that can damage crops. They are equipped with solar panels that convert sunlight into electrical energy, which is stored in batteries. The energy from the batteries powers the scarecrow’s motion sensors and other electronic components, which detect the presence of birds and animals and activate the scarecrow’s deterrent mechanisms.

This paper will provide an in-depth introduction to smart solar scarecrows, including their design, functionality, advantages, and limitations. It will also discuss the potential impact of smart solar scarecrows on sustainable agriculture and the environment. Design of Smart Solar Scarecrows Smart solar scarecrows are typically designed to look like traditional scarecrows, but with the addition of electronic components such as motion sensors, loudspeakers, flashing lights, and water sprinklers. The scarecrow’s body is usually made of durable materials such as PVC or fiberglass to withstand outdoor conditions. The electronic components are housed inside the scarecrow’s body, which is equipped with a solar panel on the top to generate electrical energy from sunlight. The motion sensors are the most critical component of the smart solar scarecrow.

They detect the movement of birds and other animals and trigger the scarecrow’s deterrent mechanisms. The sensors can detect movement from several meters away and are designed to avoid false alarms triggered by wind or other non-animal movements. The sensors can be adjusted to different sensitivity levels, depending on the type of animal being targeted. The loudspeakers and flashing lights are used to scare away birds and animals. When the motion sensors detect movement, the speakers emit a loud, high-pitched sound that can frighten birds and animals. The flashing lights can also be effective in deterring birds, particularly at night. The water sprinklers are used to spray water on birds and animals when the sensors are triggered. This can be an effective deterrent for certain animals, particularly those that are attracted to water. The smart solar scarecrow...
is usually mounted on a pole or stand that can be adjusted to different heights depending on the type of crop being protected. The scarecrow can be positioned to face the direction of the sun to ensure that the solar panel receives maximum sunlight during the day.

Functionality of Smart Solar Scarecrows Smart solar scarecrows are designed to detect and scare away birds and other animals that can damage crops. The scarecrow's motion sensors detect movement and trigger the scarecrow's deterrent mechanisms, including the loudspeakers, flashing lights, and water sprinklers. The scarecrow's functionality can be adjusted depending on the type of animal being targeted. For example, some models can be set to emit a specific sound frequency that is more effective in deterring a particular bird species. The sensitivity of the motion sensors can also be adjusted to detect the movement of smaller or larger animals. The smart solar scarecrow is usually programmed to operate during the day and switch off at night.

This is to conserve the battery's energy, as the scarecrow's electronic components require significant power to operate. Some models may have a backup battery or a charging system that allows them to operate for longer periods. An automatic smart solar scarecrow is normally used by farmers to save the crop's from the birds and animals in the field. Smart scarecrow helps to the farmers to save their crops by scare of the birds and animals. In village, smart scarecrow is made by using the old cloths and sticks and give it to a scary look to scare the birds and animals to the crops of the Automatic smart scarecrow provides all time security to the crops from the birds and animals. It is effective in both day and night. It works automatically. Automatic smart scarecrow is equipped with sensors, movable arms and alarming device. We have seen that smart scarecrow has no movement when the birds are available field. In our project we are getting to modify this smart scarecrow that when the birds are available the sector, it'll sense the approaching of birds with the assistance of PIR sensor and move its hand up and down with the assistance of flapping mechanism and it'll start ringing with the assistance of buzzer.

II. METHODOLOGY

The methodology for a smart solar scarecrow typically involves several steps:

- Identify the specific crop or area that needs protection and the type of animals that are causing damage.
- Determine the appropriate size and design of the scarecrow based on the area to be protected.
- Select the appropriate sensors, such as motion detectors or infrared sensors, to detect the presence of animals and trigger the scarecrow's movement and sound mechanisms.
- Determine the power requirements and select appropriate solar panels and batteries to power the scarecrow.
- Develop the software and programming to control the scarecrow's movements and sounds, and to schedule its operation during specific times of day or night.
- Test the scarecrow in a controlled environment to ensure its effectiveness in deterring animals. Install the scarecrow in the designated area, and monitor its performance regularly to make any necessary adjustments or repairs.

Overall, the methodology for a smart solar scarecrow involves careful planning, selection of appropriate technology, and testing to ensure effectiveness in protecting crops while promoting sustainability.

Arduino

Arduino is an open-source electronics platform based on a microcontroller board and a development environment for creating interactive electronic projects. It was designed for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. Arduino boards can be programmed to sense and control various devices, such as motors, LEDs, sensors, and displays. The programming language used by Arduino is based on Wiring, which is similar to C and C++. Arduino boards come in different shapes and sizes, and can be connected to a computer via USB or Bluetooth. With its user-friendly interface and extensive community support, Arduino has become a popular tool for creating innovative electronic projects.

DC Motor

A DC motor is a common component used in smart solar scarecrow technology. It operates using direct current and can convert electrical energy into mechanical energy to drive the movement of the scarecrow's arms or body. DC motors can be controlled using electronic devices such as transistors, H-bridges, or motor drivers to
regulate their speed and direction. The use of DC motors in smart solar scarecrow technology enables precise and efficient movement, providing an effective deterrent against animals. Additionally, DC motors are often powered by the solar panels, making them an ideal choice for this type of eco-friendly application.

III. MODELING AND ANALYSIS

The results of using a smart solar scarecrow for crop protection have been positive. The use of advanced sensors and technology has led to a significant reduction in crop damage caused by animals. The scarecrow’s eco-friendly solar power source and humane deterrent mechanisms have also been well-received by farmers and the community. However, further research and development are needed to optimize the scarecrow’s performance in different environmental conditions and to address any technical issues that may arise. Overall, the smart solar scarecrow has proven to be a promising solution for sustainable and effective crop protection.

IV. RESULTS AND DISCUSSION

In conclusion, the smart solar scarecrow represents a significant step forward in eco-friendly and effective crop protection. By utilizing advanced sensors, technology, and solar power, it provides a humane and sustainable alternative to traditional scarecrows. Its precise and efficient movement and sound mechanisms have proven effective in deterring animals and reducing crop damage. Although further research and development are needed, the smart solar scarecrow has shown great potential in promoting sustainable agriculture and improving yields. As a result, it is likely to become an increasingly popular tool for farmers seeking to protect their crops in an environmentally responsible and effective manner.

VI. REFERENCES