

Fabrication of automatic solar powered bird repellent in maize field

¹Mohana Priya. V, ²Mubeena. M, ³Mugil arasan. M, ⁴Vishwa. K, ⁵Ms. K. Tharini

^{1,2,3} Student, ⁵Assistant Professor,

¹Faculty of Agricultural Engineering,

¹ SRM Valliammai College of Engineering, Chengalpattu, India.

ABSTRACT

The most crucial factor that highly affecting crops growth are domestic birds which may cause injuries to the crops during ripening period. To prevent this factor, farmers has used some domestic methods such as scarecrow toys, flash lights etc. however these methods not very effective. This paper has been based on the installation and testing process of automatic solar powered bird repellent in maize field. This device is specially made for maize field, because it has a specific time duration. Unlike other device, it is developed device can rotate the sound emitter by 360 degrees with the help of motor. So, we can cover all the corner of field. This bird repellent device works with the help of solar panel. This resulting is a lower operational cost for a higher efficiency of repellence.

Key words: solar power, automation, maize land, scarer sound, birds' frequency.

I. INTRODUCTION

Agriculture has always been the most desired factor in India. In this case, most of the growing crops has been damaged by violence of birds. Birds attack is considered as a one of the major factors that highly affect the growth of crop and yield. Majorly, pulses, cereals, millets, fruits and vegetables have highly been affected by birds. primarily birds have started to attack on crops while ripening stage which refers to the period of development of fruit when the fruit turn into gentler, acceptable, sweeter and attractive colour. As well as bird's droppings may distribute many harm diseases to humans and livestock. To solve this issue, we were installed automatic solar powered bird repellent device that may capable of threatening the birds through generating scarer sounds which may not heed by human ears.

On the other hand, this machine was developed with the aim of provide eco-friendly and low-cost investment. Also, it may rotate 360 degrees to cover the overall land with the help of motor. As well, this machine is especially made for maize land since, the domestic birds attack is more common in maize land.

II. MATERIALS AND METHOD

This project requires following materials: solar panel, battery cell, battery cell holder, Arduino UNO programming board, motor, L293 motor driver, mp3 player, speaker, jumper wires, wheel.

COST REQUIRED

The prototype we made was inexpensive. due to the fact that it was created for small-scale formers who faced financial difficulties. Additionally, after installation, it requires very little upkeep.

SUMMARY

The solar panel is checked whether it can able to absorbe the uv rays from the sun and the panel capacity was to be 180W, 6V. as well verified all electronics are functioning properly. assembling all electronic parts in appropriate place on the rectangular board that 31cm long and 21cm wide, then fitting properly all together. completed installation by connecting all wires in appropriate circuit and make sure it is working properly. At last, experimentation was occurred at the field after checked through the working of instrument to ensure it is working correctly.

III. WORKING

We used 6V solar panel as a power generation source which may absorb sun rays (photovoltaic cell) and convert it into electricity or heat energy. the generated energy was stored into 2 cells lithium-ion batteries. so, we can use this stored energy whenever we want. The stored energy is transferred through the Power Supplier unit to MP3 player, Arduino UNO board and Motor driver.

Programming board used for controlling the process and it may help to control motor, mp3 player and speaker by embedded c programming code. The energy is transferred to the motor, which powers the wheel and produces mechanical work out of electric energy. As well it helps to rotate speaker clock wise as well as anti-clock wise. Speaker is connected with mp3 player which serves as an audio source and it can easily connect with speaker for amplification and playback. The primary function of mp3 player is store and provide audio files as well it may transmit audio signal to speaker for playback.

FREQUENCY OF AUDIO:

The range of human repetition is approximately 20 t0 20,000Hz. However, birds can hear sounds between 600 and 10,000 Hz in frequency. Therefore, human ears are unable to hear the audio produced by the machine.

Additionally, insects, pests, and animals can all hear this frightening sound. We can swap out the audio whenever we'd want because it's stored on a detachable memory card.

IV. DESIGN OF PROTOTYPE

We must design the electric circuit and block diagram based on the available materials and methods of operation.



Fig 1: Block diagram of machine

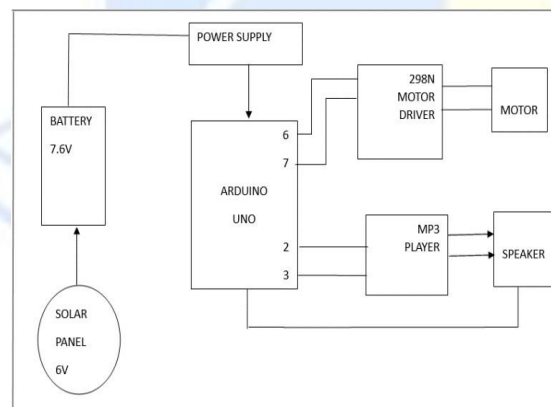


Fig 2: Circuit diagram of machine

A 6V solar panel is used to convert star beam radiation into energy. The stored energy is stored or collected from 7.4V capacity battery and it release the energy to other components. The stored energy is transferred through the Power Supplier unit to MP3 player, Arduino UNO board and Motor driver. The energy is supplied to the Arduino uno boards to work. This programming board are control other elements such as MP3 player, Speaker and Motor. Motor is connected in 6th and 7th block of Arduino UNO board. And MP3 player is connected in the 2nd and 3rd block of Arduino UNO board.

V. RESULT AND DISCUSSION

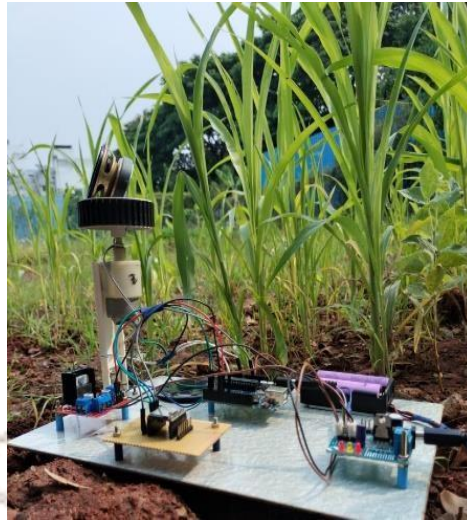


Fig 3: final setup of machine

After the production process was complete, we tested the solar-powered bird repellent device on land.

CROP SELECTION

For the machine testing procedure, we chose the maize crop. Since one of the crops most severely impacted by bird attacks is maize especially during ripening stage. Bird damage to maize crops is an important cause of economic loss for maize growers in Italy.

some domestic birds such as corvids, house sparrows was discovered that the primary cause of damage to maize.

LAND SELECTION

We have chosen to conduct our tests at the SRM Valliammai Engineering College's Crop Husbandry Laboratory.



Fig 4: maize field (crop husbandry laboratory)

FIELD TESTING

After all connections are made correctly and the model is positioned in the center of the chosen field. The testing was done between 10 a.m. and 12 p.m. Since early morning and late afternoon are when birds are most likely to be spotted, we selected this particular time period for our test.

MACHINE IMPACT ON BIRDS

During the test the black crows, pigeons were scared and leaved the field. But this prototype may not capture long distance birds. However, it's possible that this prototype will miss distant birds. Several insects, including wasps and dragon flies, fled the area as the machine made that terrifying noise.

DISCUSSION

- The machine's testing was completed satisfactorily. The machine operated efficiently and completed its task.
- Additionally, the machine rotates in both clockwise and counterclockwise directions every 30 seconds.
- Furthermore, the efficiency is comparable to traditional procedures.
- All outside impediments, including wind and bird attacks, were totally avoided during the testing process. Yet water damage could occur.
- However, the prototype's coverage of large agricultural fields is a little bit limited.

VI. CONCLUSION

In general, automatic bird repellents may offer a practical and efficient way to shield crops against bird damage. The testing of machine was successfully carried out on the field. The field test produced a favourable outcome. The machine performed the specified task at prescribed time.

FUTURE SCOPE

1. It is economical, inexpensive to install and run, and requires little maintenance.
2. Even while farmers aren't in the field, automatic bird repellents can offer ongoing protection from bird damage.
3. It cannot harm the environment in any way.
4. By using this automatic seed dispersal machine, farmers can reduce labour costs, increase yields, and promote sustainable agriculture practices.
5. Due to its 360-degree clockwise and counterclockwise rotation, it can cover all corner of the agriculture land.
6. At a reasonable cost, ideal for small-scale and terrace gardening.

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