Motorized Solar Scarecrow Birds Animal Repellent: A Review

Joydip Ray, Suhail Haider, Saptarshi Samanta, Trinath Barik, Soumyankar Sambhav

Abstract

Birds, which play a major role in pollination, can leave nuisance insects and rodents, causing their normal decline by eliminating crop yields, according to the report, called Agricultural Problems. Ants have rarely proven to be effective in keeping birds away from the fields, because birds may feel that they are not real humans because they do not move. To solve this problem, a manual solar powered carabiner is designed that automatically detects the sound of birds and uses a motor to scream to scare birds and animals. The system uses a controller, DC motors, batteries, solar panels, gears and connecting links along with poles and frame models for sound sensing microphones. Garak is installed in the field with the help of iron poles, which increases its versatility in terms of its installation location. Solar panels continue to charge the system during the day. The built-in microphone continuously monitors the sound level in the environment. As soon as there is an increase in the level of noise in the environment, this signal is monitored by the controller and begins to act. The DC motor rotates and is driven by the entire hand mechanism. It brings out modern solar guards to protect the garden from non-violent birds.

Keywords: Solar power and energy; Energy conservation; Economic losses

1. Introduction

All over the world, poultry is a major threat to agricultural crops, barns, and human life. Bird species damage crops at the planting, seed and maturity stages, causing economic losses for the farming community and causing losses in agriculture, says a report by the Committee for Doubling Farmers' Income (DFI). Birds cause extensive economic damage to crops during lean periods in various agro-natural areas of the country. "The damage caused by birds to any plant depends on several factors, including the proximity of the bird population to the area under the plant, the design of the area, the season and the physiological state of the bird," he said[1]. The most common domestic birds arecrows (Corvuscorone), magpie, sparrows (Passer domestics), starlings (Sturnus vulgaris) and blackbirds (Turdusmerula) in many countries in the world. A scarecrow is a decoy or mannequin, often in the shape of a human. Humanoid scarecrows are usually dressed in[5] old clothes and placed in open fields to discourage birds from disturbing and feeding on recently cast seed and growing crops. But these days' birds and animals are smart enough to notice that it is not an actual human as it doesn't move[2]. An automatic and motorized scarecrow or smart scarecrow is more efficient than a normal scarecrow. The smart crow

[5] ✉ Saptarshi Samanta
saptarshi27samanta@gmail.com

Department of Mechanical Engineering, Institute of Engineering and Management, Kolkata, West Bengal 700091, India

automatically provides constant security for plants from birds and animals. This affects day and night. It works automatically. Smart crows are automatically equipped with sensors, moving arms and scare devices that protect birds and animals in danger. It doesn't kill or eradicate birds from nature for the sake of crop protection, thereby maintaining the balance in the ecosystem[3]. We are implementing a sound box to emit a sound of frequency ranges between 1kHz – 8kHz which can deter the birds from roaming around the farmland. Addition of a manual water sprinkler may be incorporated with it, which gets activated with a sense of touch[4,5]. This will keep off the birds and also be beneficial for the crops which flourish in sprinkler irrigation.

2. Working Principle

The system uses microcircuits for sound sensing, DC motors, batteries, solar panels, gears and joints along with poles and frame models to develop the system (**Fig. 1**). Look, an iron pole is set in the field. It can be installed anywhere outside because it does not require an external power supply. Solar panels continue to charge the system during the day[6]. Built-in microphone continuously monitors the sound level in the environment. As soon as there is an increase in the level of noise in the environment, this signal is monitored by the controller and begins to act. The DC motor rotates and is driven by the entire hand mechanism. The rotation of the motor plug rotates the gear that drives the Linkage arm mechanism[7]. This mechanism allows humans to move in a standing-like

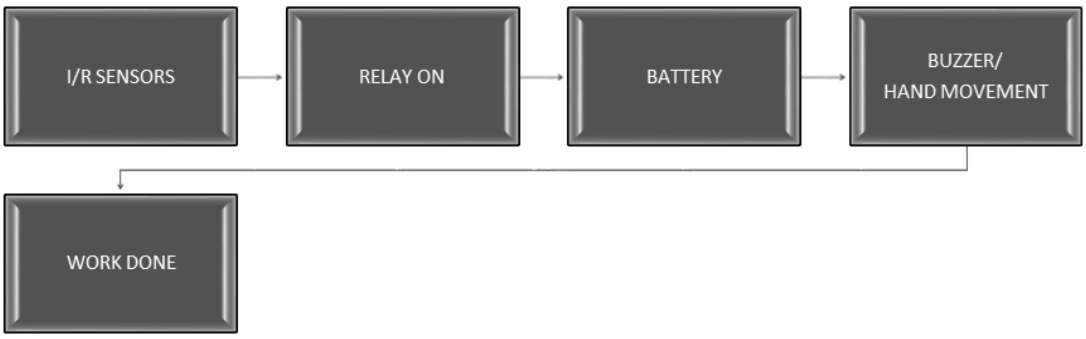

Fig. 1 Working principal of buzzer/ hand movement.

manner imitating human existence. In addition, the controller activates the speaker module to emit sound, so the hat near the field scares off the birds and animals as well. Therefore, the system produces a modern solar-powered crow to protect the farm from birds and animals[8].

Fig. 2a shows front view of proposed model which depicts the arm length, height of scarecrow and its approximate size. Dimensions of head and mounting board can also be visualized from the diagram. **Fig. 2b** shows side view of the same model, which shows details of the linkages and joints present in the proposed model.

a. Front view

b. Side view

Fig. 2 Pictorial view of the proposed model

3. Approach and Components Used

Experimental work was divided into two parts, one is working with mechanisms and the other is working with circuits. In the working mechanism, the spring mechanism is used to move the Karakov arm up and down. The crank rotates and is connected to the drive link by a connecting rod, which is connected by two arms to the drive link, which moves up and down. A T-shaped joint is used to support the mechanism. The system uses a controller, DC motors, batteries, solar panels, gears and connecting links along with poles and frame models for sound sensing microphones. Look, an iron pole is set in the field. It can be installed anywhere outside because it does not require an external power supply[9]. Solar panels continue to charge the system during the day. The built-in microphone continuously monitors the sound level in the environment. As soon as there is an increase in the level of noise in the environment, this signal is monitored by the controller and begins to act. The DC motor rotates and is driven by the entire hand mechanism. The rotation of the motor shaft rotates the gear connected to it, which drives the linked Arm Mechanism. This mechanism allows humans to move in a standing-like manner imitating human existence. The controller also activates the speaker module to make sounds, so birds and animals near the field are scared away[10,11]. Therefore, the system produces a modern solar-powered crow to protect the farm from birds and animals. We have divided our project into two parts, one is working with mechanisms and the other is working with circuits. In the working mechanism, the spring mechanism is used to move the prototype arm up and down. The crank rotates and is connected to the drive link by a connecting rod, which is connected by two arms to the drive link, which moves up and down[12,13]. A T-shaped joint is used to support the mechanism. In the operation of the circuit, the PIR

sensor detects the movement of birds and animals, sends a signal to the microcontroller (Arduino UNO), where the motor driver and battery are connected to the Arduino. The Arduino also sends a signal to the motor driver and the buzzer from the signal transmitter[14-16].

4. Conclusions

In this paper, the concept of a birdrepeller system such as a device and its design is introduced which applies astimulus to the wild birds as a control function. A motorized solar scarecrow is more efficient than normal scarecrow system which does the job of keeping the birds at bay by human like hand motions and emitting noise intolerable for the birds. Depending on the severity of the amount of damage done by the aves and other animals, farmers are free to choose a camera which can be mounted on the body of scarecrow. This gives the live images of the surroundings, captured by the feed and the same can be seen on the smartphones of the farmers. This may enhance the security of the hard-grown cultivated crops. Since, proposed model is driven by solar power, no external supply is needed, thus making it a net zero waste model.

References

1. C Saglam, F Onemli. J Tekirdag Agr. Facul. 2005; 2(1): 50-57.
2. W Abdelhakim. Int. J Heritage Tour. Hospit. 2020; 14(2): 42-51.
3. ML Avery, SJ Werner, JL Cummings, JS Humphrey, MP Milleson, CJ Carlson et al. Crop Protec. 2005; 24(7): 651-657.
4. M Bomford, PH O'Brien. Wild. Soc. Bull. 1990; 18: 411-422.
5. RW Summers. Crop Protec. 1985; 4(4): 520-528.
6. VR Suryawanshi. IJSR. 2015; 4(10): 1709-1711.
7. JW Thomas. J Acoust. Soc. Amer. 2002; 112.
8. A Nollkaemper. European J Inter. Law. 2015; 26(4): 957-964.
9. S Davies. Ear. Year. Edu. 2018; 20(4).
10. PS Dhake, SS Borde. IJATES. 2014; 02(03): 31-36.
11. R Scholten. ReNew: Technol. Sustain. Future. 2001; 75: 80.
12. S Nahatkar, A Gaur, TM Pattewa. IJARECE. 2012; 1(3): 187-191.
13. M Sathishkumar, S Rajini. IJARCET. 2015; 4(1): 70-74.
14. S Sivagamasundari, S Janani. Inter. J Comm. Eng. 2014; 06(6).
15. G Delanty. Irish Rev. 1991; 10.
16. E Hone. Sch. Sci. Math. 2010; 70: 322 - 326.