

# A Review on Auto- Mechanized Scarecrow for Agricultural Purpose

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*Abstract- The automatic scarecrow is a viable and consistent alternative for protecting agricultural produce from bird and animal infestations. By safely repelling the pests, it efficiently eliminates any form of destruction on the crop. The objective of the project was to create and construct a mechanical bird repellent that produces a distress sound to ward off birds. RF modules were employed to create two wireless devices under the control of an ATmega328P microcontroller. The prototype includes a sound system, a motorized mechanism, and a motion detector. Once motion is detected, the system will activate both the servomotors and the buzzer to make the device move and emit the sound. The contemporary scarecrow is an adaptable solution to be used for various purposes ranging from minimizing monetary losses due to bird infestations to humanely repelling birds from farmlands.*

*Keyword: Flapping mechanism, Linear Motion, Buzzer. Bird Repellent.*

## I. INTRODUCTION

Automatic scarecrow technology provides a practical and dependable solution for managing avian threats to crops, including birds and other animals. By dispersing them in a safe and humane manner, it significantly reduces agricultural crop damage. Drawing inspiration from nature, the system employs bio-acoustic techniques to safeguard farmland and surrounding agricultural areas. Its applications are wide-ranging, encompassing the r Automated scarecrow technology serves as an ideal and effective approach to handling bird menace on farms or crops in general, which includes not only birds but any other kind of animals that may prove a danger to crops. Through the humane dispersal of the pests, the extent of damage is minimized. In essence, the automated scarecrow technology mimics natural elements using bio-acoustics to protect farmland and other agricultural lands. Among other applications, it can be used for minimizing loss of

revenue as a result of crop destruction by birds.eduction of financial losses caused by bird-related crop damage, humane and reliable bird dispersal, and its establishment as a preferred bird control method within the farming industry.

## II. PROBLEM STATEMENT

Birds have been a longstanding obstacle for farmers seeking to maximize their output. In past times, when birds would attack crops, they would eat all the corn or wheat harvest, depriving the farmer's family of enough food until the next season, leading to the creation of scarecrows some 3,000 years ago. In modern times, the menace still remains, as birds will raid paddy fields and inflict heavy damage on the crop, causing substantial losses in both quality and yield. Static scarecrows have been effective only on small farms but fail to address problems on larger farmlands.Large commercial rice farmers face additional challenges, including the high cost and limited availability of manual bird-scaring labor. Chemical alternatives, such as Avicide treatments — substances specifically lethal to certain bird species — present serious environmental and public health concerns, as their toxicity extends beyond birds and poses risks to human beings as well.

## III. WORKING METHODOLOGY

1. These main elements include the controller, DC motor, battery, solar cells, gear mechanisms, linkage systems, joint connections, sound sensor microphone, and pole with model frame that work collectively to make up a complete system.
2. The device is fitted on the ground through its metallic pole and can be placed anywhere in an open space without having any external power source. The solar panels keep charging the device's battery

throughout the day to maintain its continuous operation.

3. The microphone detects the sound level in the surroundings. Whenever there is an increase in sound levels, it processes the signal through the controller that activates the device through switching the power to the DC motor to start rotating the whole arm system.

4. The rotating shaft of the motor turns the gears connected with it, which further actuates the arm system through the linkages to move up and down like the movement of a human arm. motion required for the flapping arms. As the crank rotates, it drives the connecting rod, which in turn pushes the arms in an upward and downward direction. The system consists of a number of important parts, including the crank, the connecting rod, the flapping rod, the support system, and the fasteners like nuts and bolts. The one end of the connecting rod is joined with the crank, whereas the other end is fixed to the flapping rod. When the crank finishes its complete cycle, it applies pressure on the connecting rod, which then passes the pressure to the flapping rod.

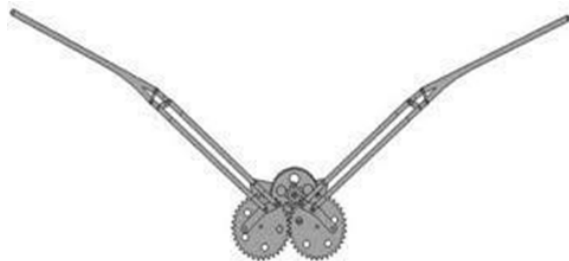


Fig: 3.1-Flapping Wing Mechanism

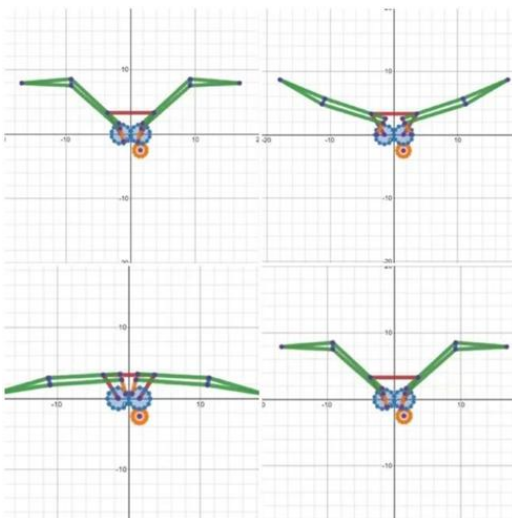


Fig: 3.2- Motion of Mechanized Arm

#### IV. COMPONENTS USED

##### 4.1 Mechanical Components

a) Metal pipe: Round hollow section mild steel pipes were selected for constructing the structural framework of the scarecrow. This material was chosen due to its ability to provide the necessary strength and rigidity required to support the overall structure effectively.



Fig: 3.3- Metal Pipe

b) ACP (Aluminium Composite Panel): Sheet of Aluminium Composite Panel (ACP) material was used in making the mechanism for the project. This is because the material is capable of performing two roles – acting as structural support for the mechanism and also making critical parts like the flapping arms, crank, and connecting rod.

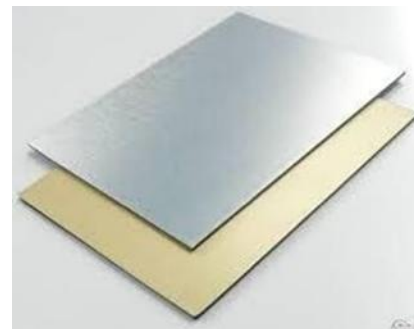


Fig 3.4: ACP sheet

c) Nut and Bolts, Screws: The nuts, bolts, and screws are used as the main fastening materials used to hold together and connect the different parts of the structure and mechanism. The nuts and bolts are used for the creation of temporary joints in the flapping mechanism

that enables the arms of the scarecrow to flap up and down. However, the screws are used for the creation of permanent joints that hold the structure and mechanism together.



Fig 3.5: Nut and Bolts

d) Plastic Gears : The flapping system has a gear ratio system that ensures a certain frequency for flapping movements; through this gear system, it is possible to slow down the speed of rotation from the motor. During the downward flapping cycle when both thrust and lift are produced, the wings move in such a manner that the maximum thrust is created.



Fig 3.6: Plastic Gear

#### 4.2 Electrical and Electronic components:

a) Arduino UNO: Arduino UNO acts as the main microcontroller that receives the input signals from the sensors and regulates the functioning of the motor driver as well as the buzzer.



Fig 3.7: Arduino UNO

b) Motor and Motor Driver: Directional control regulation for the motor is performed by the motor driver whereas the DC gear motor working on 12V constitutes the major driving element of the wing-flapping action..



Fig 3.8: Motor and Motor driver

c) PIR Sensor, Buzzer: The PIR (Passive Infrared) sensor is used to sense movement by birds and animals around the field. When movement is detected, the alarm triggers a loud noise that acts as a scare tactic for both birds and animals, thereby preventing them from the protected area.



Fig 3.9: PIR Sensor and Buzzer

d) Battery, Connecting Wires: The power supply in this case is a 12-volt battery that provides the electrical energy to the microcontroller as well as the motor driver. Connecting wires are used to create all the necessary electrical connections among the components of the system..



Fig 3.10: Bttery and Connecting Wires

## V. WORKING

**Working Mechanically:** The fluttering mechanism is what ensures that the arms of the scarecrow move in a repeated up-and-down motion. A crank that rotates is connected to the connecting rod using a joint that can move, which in turn is connected to the two arms using another joint that moves, allowing them to move vertically. The assembly also includes a T-shaped joint.

**Circuit Working:** Regarding the electrical circuit, the PIR sensor keeps an eye on the area around the device and detects any kind of movement in the environment, which is due to the presence of birds and animals. As soon as the sensor detects the motion, it sends a signal to the Arduino UNO microcontroller, which acts as the brain of the whole system. Both the motor driver and the battery are connected to the Arduino, where the signal sent by the PIR sensor is processed and sent to the motor driver.

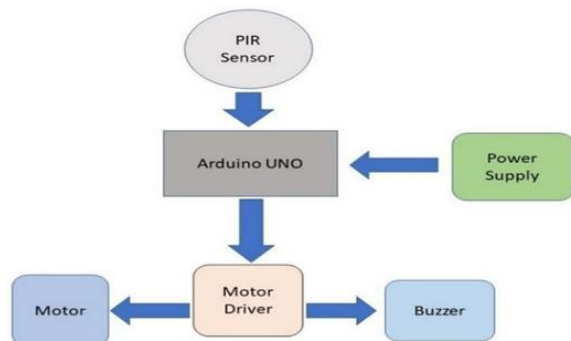


Fig 3.11: Circuit Block diagram

## VI. CONCLUSION

An automatic scarecrow is a very active and efficient tool with much scope in protecting crops and gardens from birds and animals. The equipment is designed to function on its own without any external input and can work continuously throughout the day. Apart from farming operations, it can also be used in several other areas such as airports, roofs of houses and buildings, schools, and offices where flocks of birds may produce noise pollution and contaminate the environment with their feces.

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