"Design & Development of Automated Bird Rid-off Mechanism for Household & commercial Purposes"

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Abstract - *Automated Bird Rid-off mechanism will find to be very useful in major metro cities in dealing with one of the major problems of Pigeon entering the people's Households and ruining all their furniture, crockeries in the Kitchen, and plants in the balcony area. This problem is very huge in big cities as we open the doors or windows of our balconies nearly in 5 to 10 minutes one or two pigeons will enter and ruin the balconies by their dropping which will be increasing the daily frequency of cleaning the balconies. To Tackle this problem, we have built the Model which prevents the entering of birds in the household. In this research we used (Arduino Uno Microcontroller, PIR Sensor) for proper sensing of the bodies near model. The model will be kept hanging in balcony or the window of where we want to use it and the model makes use of its sensors to Identify the body nearest to its range and try to flew it through the flapping mechanism of the bird and tries to make the sounds to scare the bird. Which is helpful in solving the overall problem. Its Environment Friendly and Non-Hazardous to both Birds and humans as well.*

Key Words: **Pigeon, Mechanism, Microcontroller, Sensor, Flapping, Model.**

1. INTRODUCTION

Scarecrow is normally used by farmers to save the crops from the birds and animals in the field. We have used the similar Idea of Scarecrow to be used in flats for scaring the birds specifically pigeon. In this research we are going to modify the scarecrow that when the birds come in the balcony or windows, it will sense the coming of pigeon with the help of PIR sensor and move its wings up and down with the help of Flapping mechanism and it will start ringing with the help of Buzzer, the aim of the flapping mechanism is to convert the Rotary motion of the motor into the linear motion of flapping wings. When the gear rotates the connecting rods push the wings up and down it will help to scare the birds and the birds will be run away from the balcony space and it will remain neat and tidy.

The model will be kept hanging in the area where we need to solve the problem. The main components we will be using are PIR sensor for sensing the bodies in the surrounding of the model, Arduino Uno Board Microcontroller to control the functioning of the overall model i.e., controlling PIR sensor, Dc motor which will be causing flapping mechanism to scare the Bird and controlling the supply from battery. Moreover, we are using the buzzer which will make the high intensity sound to flew the bird away. Entering the birds especially the pigeon into the households can cause the destruction of our furniture, crockeries and the malfunctioning of our electronic machines such as Air conditioners and Refrigerator as they will bring the waste and will try to build the nest over them. The everyday contact of birds with humans are not good for the human health, pigeons may carry and spread diseases to people and livestock through their droppings. They are known to carry or transmit pigeon ornithosis, encephalitis, Newcastle disease, cryptococcosis, toxoplasmosis, salmonella food poisoning and several other diseases. The breed of pigeons that are mostly found in the urban areas are blue Rock dove.

We are using the Forex sheets to build the model which will give it the necessary weight and can flap the wings of the model freely. The model is completely safe and will not provide any harm to the birds according to the laws of National wildlife act. The model will be having the range of up to 5 to 8 meters.

The aim of this research is to provide ease to the people facing such issues from the birds and to reduce the frequency of everyday cleaning of the balconies. People can make the full use of the balconies and enjoy the view as we have seen some people apply cages to the balconies in the fear of birds ruining their plants. Now with the help of this model they can use it as a decorative purpose and save the cost of applying cages or nets to the balconies.

Objectives

The main Objective behind the research in this area is to make a system which works automatically to get rid of the birds specifically pigeons without harming them from the balconies and windows. As the droppings reduces the cleaning maintenance of balcony also reduces. The automatic system reduces the human efforts and need of checking the balconies over and over again. It reduces the

cost expenditure of applying nets and cages over the balcony.

Material Used

Material for preparing sample test setup, are Forex sheet alternate board, also known as percentage foam board, is a plastic movie crafted from foamed polyvinyl chloride (p.c). it's far alightweight, durable and versatile material used in many programs including advertising and marketing, signage, artwork and indoors design. Forex sheet has a clean, even pleasant for printing photos and text. They can be without problems reduce, drilled and formed using woodworking equipment, making them a popular desire for creating custom symptoms and instructions. It is available in variousforms ranging Thickness from 1mm to 30 mm and in a ramification of colours and finishes along with sleek, matteand textured. They can be laminated with extraordinary materials which includes aluminum or acrylic to enhance their look and sturdiness. This sheet had given our model asturdiness with having very light weight.

Components

Sensor

For developing model we have used Passive Infrared i.e., PIR Sensor which reacts with the body heat in its surrounding. Itssensing range is around 5 to 8 meters.

Fig. 1 – PIR Sensor

Microcontroller

It is one of the Important components needed for the development of setup, Arduino UNO is the microcontroller used in the model had 14 digital I/O pins with 6 analogue inputs, with the operatingvoltage of 5 volts.

Fig 2 – Arduino Uno

Servomotor

Servomotor sg90 was been used in the research, which provides power to lift the wings of the model for the purpose of flapping mechanism, motor having torque 2.5 kg-cm and operated at the voltage of about 5V.

Fig. 3 – Servomotor

Buzzer

To provide alternate sounds from the model to scare the bird's Piezoelectric buzzer is being used.

DC Power Supply

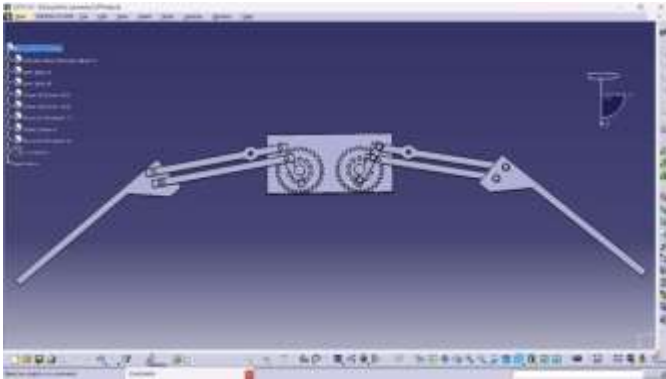The model works either on Battery or the Direct Current Supply,12 V Adapter is being Used.
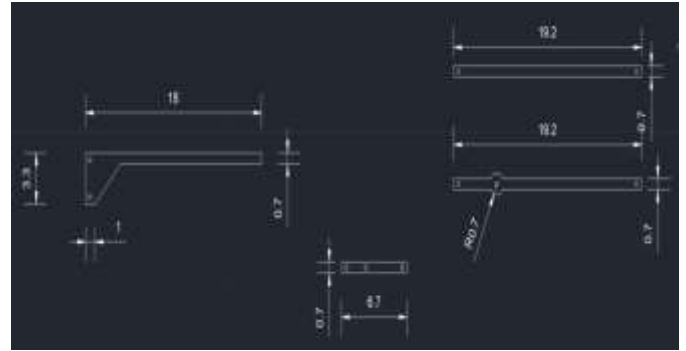
Design

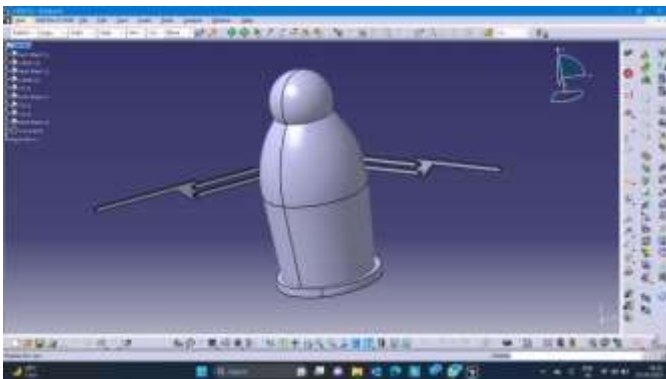**Fig. 4 –** Mechanism

Fig. 7 – Wings Dimension

Fig. 5 - Model

DIMENSION

Fig. 6 – Body Dimension

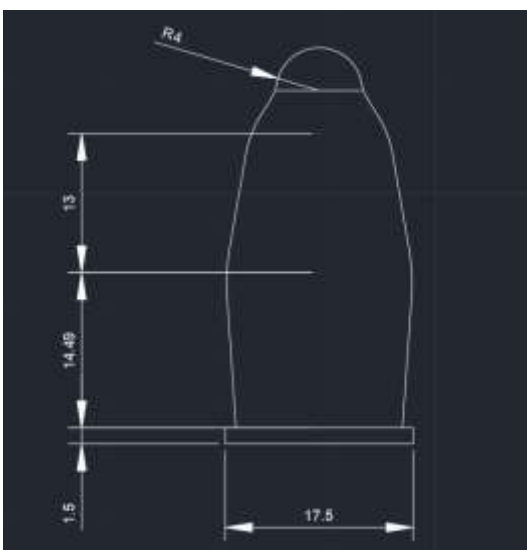**Fig. 8** - Model

2. METHODOLOGY

1. Arranged and obtained materials: Calculate the mechanism's size and weight, then choose materials that will give it the required strength and durability.

2. Construct the frame: PVC Forex sheet was used to build the mechanism's frame or body. Cutting, sanding, and gluing are required for this.

3. Construct the flapping mechanism: Using gears, servos, and linkage systems the flapping mechanism required for the driving wings was constructed. Components had to be handcraftedfor this.

4. Installation of the motor: To power the flapping mechanism and wings, the proper motor, a servomotor SG90 was chosen for installation, along with a 12-volt adaptor while considering the mechanism's weight and balance

5. Installation of the control system: To regulate the flight of the mechanism, a control system—such as a microcontroller— was connected to the motor and flapping mechanism.

6. Check and adjust: The mechanism was checked to make sure it was operating properly. Programming and mechanics were adjusted as necessary to get the desired flight characteristics.

WORKING

The research work while developing the setup was divided into parts:
- Mechanism Working
- Circuit Working

Mechanism operating:
In mechanism working, flapping mechanism is used to transport the scarecrow in upward and downward path. A crank rotates and is attached to the connecting rod with movable joint and the connecting rod is in addition connected to the 2 hands by way of the movable joint which movements in upward and downward course. A T shaped joint is used to offer support to the mechanism.
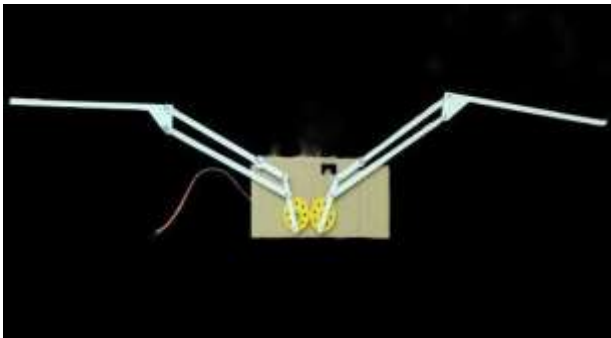

Fig. 9 - Mechanism

Circuit Mechanism:
Circuit Consist of Following Components
Arduino Uno Atmega 328
PIR sensor
Servomotor
Gear
Buzzer

A PIR sensor in a working circuit monitors the movement of and birds and provides a signal to the microcontroller (Arduino UNO), to which a battery is linked. Additionally, Arduino transmits a signal to the connected pin, from whence it transmits a signal to the motor and buzzer.
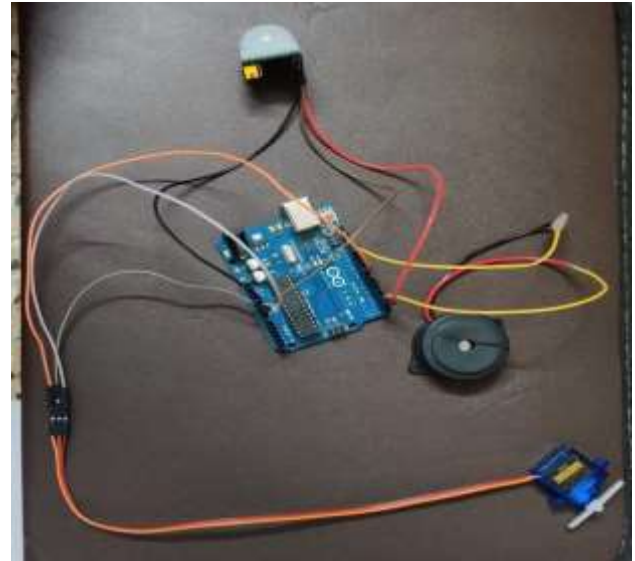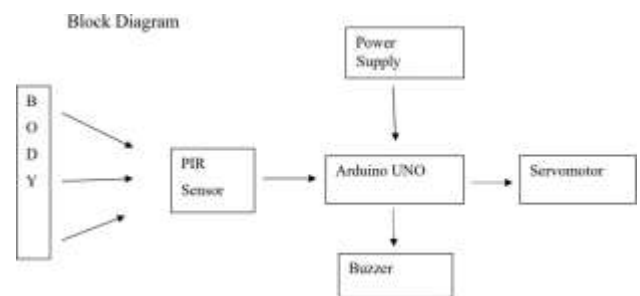

Fig. 10 – Circuit

Fig. 11 – Block Diagram

PROGRAMMING

```
#include <Servo.h>
int pirPin = 2;
int buzzerPin = 3;
int servoPin = 9;
Servo myservo;

Void setup () {
pinMode (pirPin, INPUT);
pinMode (buzzerPin, OUTPUT);
myservo. attach(servoPin);
myservo. write (0);
}

void loop ()
{int pirValue = digitalRead(pirPin);
if (pirValue == HIGH)
```

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```
{for (int i = 1; i <= 30; i++) {
for (int pos = 0; pos <= 180; pos += 1) {
myservo. write(pos);
delay (2);
}

digitalWrite (buzzerPin, HIGH);
delay (50);
digitalWrite (buzzerPin, LOW);
for (int pos = 180; pos >= 0; pos -= 1) {myservo. write(pos);
delay (2);
}

digitalWrite (buzzerPin, HIGH);
delay (50);
digitalWrite (buzzerPin, LOW);
}
delay (5000);
myservo. write (0);
}
}
```

CALCULATION

Power Equations

Output of Adapter = Input of Arduino

$P = I * V$

$\quad = 1 * 12$

$P = 12$ Watt

Power output from Servomotor

$P = (2 * \pi * N * T)/ 60$

$\mu = RPM$

Flapping Mechanism run for total 25 Seconds

25 SEC = 60 Flaps = 30 Rotations of Gears

So, for a Minute

25 SEC = 30 Rotations

60 SEC = X Rotation

$X = (30 * 60)/ 25$

X = 72 Rotation N = 72 RPM

Power Output of Gear $= (2 * \pi * N * T)/ 60$

Torque = 1.8 Kg cm = 0.18 Nm

Output $= (2 * \pi * N * T)/ 60$

$= (2 * \pi * 72 * 0.18)/ 60$

$= 1.357$ Watt

3. CONCLUSION

From this research it is concluded that the use of PIR sensor and flapping mechanism is very effective method for scaring birds trying to enter inside homes unnecessarily. The design and construction of flapping mechanism must be properly done and executed properly to generate needed power to lift the wings of model and to make use of Arduino Microcontroller was great choice for controlling the system and was able to handle the required program. Overall, the making of modern scare crow with flapping mechanism was challenging. The model developed required various skills and technologies and it can be effective in scaring birds without doing any harm to them.

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