AFFORESTATION USING FIXED WING UAV

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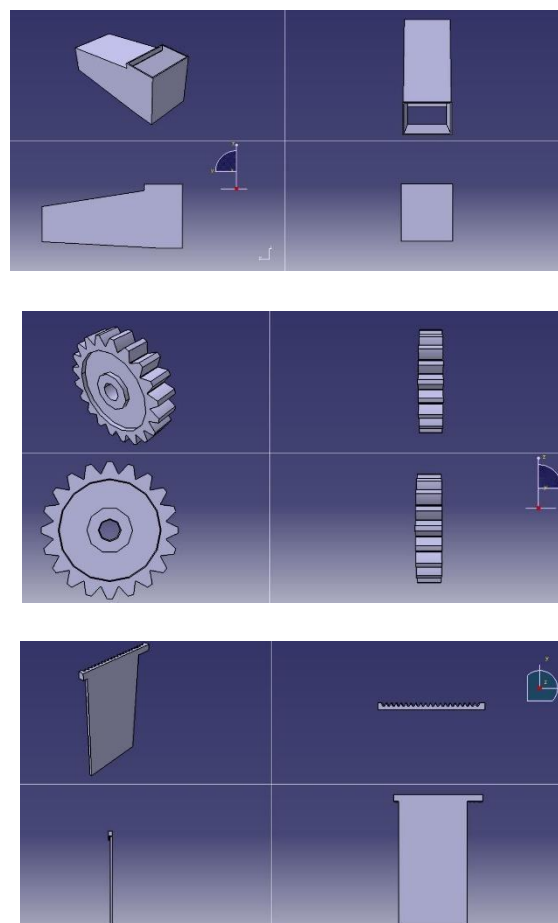
ABSTRACT:

In the modern world UAV is the most developing technology around the world. In our research, we are going to fix a seed ball sowing system inside the fuselage of the Fixed wing UAV. We are going fly the plane over the forest areas and drop the seed ball in the lower dense forest areas. We have constructed a regular fixed wing UAV with the basic calculations. The plane is initially tested manually to calculate the payload carrying capacity, durability and covering range of the plane. From the obtaining results we are going to design a seed ball sowing system with appropriate flight conditions and it will be fixed at the point of center of gravity of the fixed wing UAV. In this report we explain how the seed ball sowing system is designed and how is going to work.

1. INTRODUCTION

In the modern world, RC Planes (Fixed wing UAV) and multi rotor drones are used in lot of agricultural purposes. Nowadays many forest fires occur drastically all over the world, we could not able to control the any natural disasters, but we can able to do some action to overcame the problems. Planting trees in the large affected areas is the only solution, but practically it needs lot of human resources, huge expanses and huge time and also working in forest areas is very dangerous. We designed RC plane and a seed ball sowing system that can be fixed inside the fuselage of the plane. The seed ball sowing system is specially designed according to our RC plane dimension. The main advantages of the RC plane over the multi rotor drone is that it can capable to cover large distance within a short period of time.

2. DESIGN AND FABRICATION

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3. COMPONENTS AND SPECIFICATION

- Seed balls
- Seed ball carrying box
- Rack and pinion gear
- Servo
- Arduino
- Radio receiver

3.1 Seed balls:

Seed balls is the combination seed, cow dung and soil. The seed has to be selected is Sesbania Grandiflora.

3.1.1 Seed ball carrying box

Initially the available space inside the fuselage is noted. Seed ball carrying box is designed according to the fuselage dimension. This box is designed using the CATIA SOFTWARE. The box is having two cavities, one in the top and other in the bottom. The upper cavity is used for refilling the seed balls and the lower cavity is for dropping. The box is designed in a particular way, all the seeds are automatically move towards the cavity of the box because of the gravitational force.

3.1.2 Rack and pinion gear

Rack and pinion gear consist two parts one is that circular gear rack and an engaging gear rack. This gear is used to translate the rotational motion obtained from the servo to the linear motion. The pinion gear is designed according to the servo motor dimensions. The rack is designed according to the seed ball box dimension and the UAV dimension.

3.1.3 SERVO

A Servo Motor is a small device that has an output shaft. This shaft can be positioned to specific angular positions by sending the servo a coded signal. As long as the coded signal exists on the input line, the servo will maintain the angular position of the shaft

This SG90 360 degree Continuous Rotation Servo Motor is special among all the available servo motors because its operation is very different from that of a standard servo. As instead of going to a specified angle, this servo will be static at a 1.5ms pulse, a longer pulse gives forward rotation and a shorter pulse give backward rotation.

3.1.4 ARDUINO

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices.

LIPO Battery:

High energy storage ratio with a high discharge rate. For this project 8000mah battery with 3 cells (11.1v) is used for a power source.

Radio Receiver:

it's a 2.4 GHz with 6 independent channels to receive the signal. The signal is further sent to the microcontroller and gets processed. Current consumption is less than 40mA & works on the 5-volt power supply.

OPERATION:

After all the hands on work the plane is allowed for the test ride. Seed balls are filled in the seed ball box, approximately

2.5 kg. The test had been done in our college ground areas. We had flight our drone to the visible distance.

The Arduino servo is already connected to the 5th, 6th channels of the radio receiver. The inputs are given through the ground control unit. When the inputs are given the transmitter send the signals to the radio receiver, then the receiver send the signal to the Arduino board, it makes the servo motor to run. The servo makes the pinion gear to rotate. The rotatory motion of the pinion of the pinion gear makes the rack to move linearly. When the rack moves there is a cavity created in the bottom of the seed ball carrying box, so that the seed balls are allowed to fall. At the necessary time the seed balls are allowed to drop to the ground

4. CONCLUSION

In this project, we concluded that fixed wing drones are also used to do several type of operations. This project makes afforestation so much easier and cost effective. Afforestation is the only way to reduce global warming, only trees can observe the carbon dioxide from the atmosphere and produce oxygen and also to save the nature. We can able to do tree plantation in any type of difficult dangerous places in a very safe manner in a less period of time. These type of drones are comparatively very less cost, can able fly more faster, energy consumption is also very less. In the medical field, in emergency situations we can supply medicines to any places within a short period of time. In advancing its features, fixed wing UAV makes the instant parcel services, mini goods exchanges. In military, with the help of fixed wing UAV, we can able to

send food materials, weapons, medicinal supply for our soldiers instantly and main think is we can also able to drop granites and bombs on our enemies during the war time.

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