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Working and Construction of the Propeller Driven Remote Controlled Flying in Air Hoverboard

Rahul Kumar

University Student, Dept. of CSE, Chandigarh University, Gharuan, Punjab, India

ABSTRACT: In this modern era, people still think that flying in air and traveling by it is impossible. The great inventors and scientist had invented aero plane for traveling through air and it can carry many persons at a one time. But in this world there is big craze for the hover boards and remote controlled things. People get more attracted towards the thing which they can control and can get work out of it. My idea is about propeller based hover board which will fly in air in a safe able height so that person who is traveling by it could enjoy the surrounding and even feel safe because he is the one who is controlling the machine. It will marvelous ride and will be first time when someone will fly in air by not making any harm to environment and he only need is electricity.

KEYWORDS: propeller, hover board, motors, battery, esc, Arduino.

I.INTRODUCTION

• It a propeller based hoverbed driven by brushless dc battery Powered by lithium polymer batteries. It is modified design and it is more likely looks like spider and it has parachute cloth cut into required shape attached to its side ways for the more lift.

• Through this we would be able to travel in air for shorter distance. An environment friendly innovation for the future growth and it will take the future of RC's planes or drones to the new era

II.MODEL REQUIREMENTS

There are some materials which are required for this construction are as follows:-
1. Fully carbon fiber made design with less weight.
A. MOTOR SPECIFICATION-see fig. 1
->12 brushless dc motors (bldc).
-> Motors of 400 kilovolt.
-> 6-28 ampere high efficiency and torque.
-> Continuous current rate will be 80 ampere.
-> Power output will be 1375 watt.'
-> Reactive current will be 1.6 ampere.
-> Motor length is 55 mm
-> Motor diameter is 50 mm.
-> 6 clockwise motors and 6 counter clock wise motors.

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1.

This wil be the motor which is needed according to requirements.

B.PROPELLER ACCORDING TO THE MOTORS SPECIFICATION-seefig.2

-> Size will be 30x2x1 i.e.; 14”x8”. [14 “is diameter. 8” is pitch.]
-> 12 pieces.
-> 6 CW and 6 CCW.
-> Shaft diameter = 8mm

2.

This wil be the propeller which is needed according to requirements.

C.BATTERY SPECIFICATIONS-seefig.3

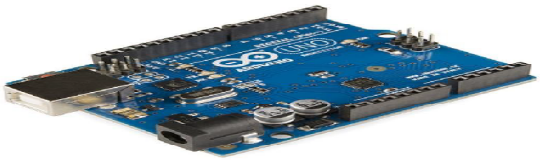
-> 24 pieces of lipo batteries.
-> Lithium polymer battery 6S.
-> 2900 mah each of 30C.
-> will have 87 ampere of discharge rate.
-> Voltage will be 22.2 volt.
-> Weight of one battery will be 346 grams.
-> ESC of 90 ampere.

This wi lbe the battery which is needed according to requirements.

3.

5. Connecting wires, a cloth made up of parachute material cut into the required shape.

6.**ARDUINO**-:seefig.4



4.

This wil be the arduino which is needed according to requirements.

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V.EXPLANATION

A.LIPO BATTERIES IN PARALLEL

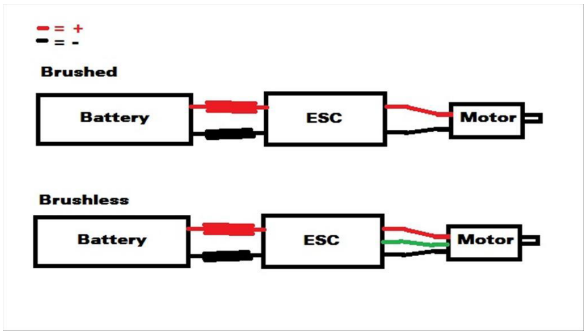
• Line the Lipo batteries next to each other so you can easily connect them. Each battery has a clearly marked positive (+) and negative (-) terminal. Connect a wire to the negative terminal of the first Lipo battery, then connect the other end to the negative terminal of the second Lipo battery.
• Connect a wire to the positive terminal of the first Lipo battery, then connect the other end to the positive terminal of the second Lipo battery.
• Connect a second wire to the negative terminal of the second Lipo battery. This will connect to the unit you which you want to power. Connect a second wire to the positive terminal of your second Lipo battery. This will also connect to the unit you want to power.
• Check that you have wired the Lipo batteries in parallel correctly and the wires are secure or not.
• Connect the remaining loose wires attached to the second Lipo battery to the negative and positive terminals of the unit you want to power. Hence you have connected two Lipo batteries in parallel and doubled its endurance.
Same as all the batteries to be connected in parallel with each other in pair of two and their loose wire will then connected to the esc(electronic speed controller) which further will be connected to motors.

There are 2 types of ESCs, this is because there are 2 types of electric motors.
The difference is that brushless motors last longer and provide greater speed. Brushless motors also have 3 wires to control it, this means that there is a special type of ESC for it. A brushless motor has 3 wires because it has 3 coils inside. They are also known as a three-phase induction motor (they are brushless because they generate a rotating magnetic field which makes the Anker, the thingy that is attached to the axle of your motor rotate).
With brushless motors you will have 5 wires, 2 for battery and 3 for the motor and of course a on/off switch.
So... Connect the red wire to the + pole of the motor and the same for the black wire. Same for the battery. As usually one side of the ESC is for the battery and one side is for the motor and if not it will be written on it.
Hence connect all the esc with the pair of battery and with each motor.

B.ESCANDITSCONNECTIONS.-:

see fig 5 and 6

5. 

6. 

This is basically the connection of esc and the battery. How it is connected with two is explained by pictures.

C. ARDUINO

• Arduino is an open source computer hardware and software company and user community that designs and manufactures single board microcontrollers and kits for building digital devices and interactive objects that can sense and control objects in the physical world.
• After connecting esc with motors and battery. Now it's time to Connect esc with Arduino so that we can control the speed of our Motors firmly and can run it as we want with the help of regulator also called potentiometer. To do this we have to connect Arduino with esc and for implementing we have to make a code for the Arduino to work with the help of the Arduino software. A single Arduino can run 7 dc motors but we will connect it with single motors for cleanliness

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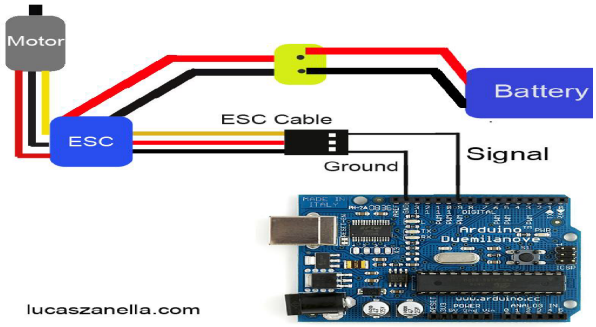
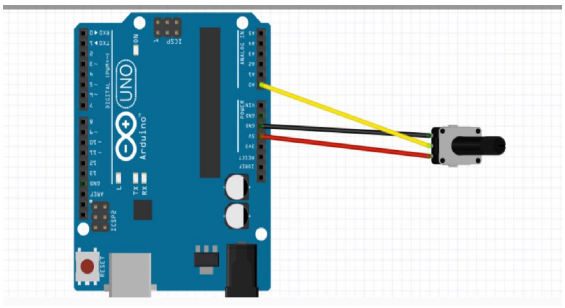
but it can be connected up to 7 as already said. After Making code and all the connections. Connect all the Arduino Remaining wires with the single regulator so that we can control the Speed of all the motors at once only.

D.ARDUINO CONNECTIONS-

see fig 7 and 8



7.



8.

This is basically the connection of arduino with the esc and the battery. How it is connected with two is explained by pictures.

IV.EXPERIMENTAL RESULTS

• Low kV battery means we require large propeller which will eventually produce large torque and less acceleration. Large torque will help us to lift up high in the air and acceleration will help to move forward.
• As we know,
Mah*volt=watthour
So, 2900*22.2 = 64.38 WH
->Watthour\hour = watts
64.38\hour=1375
Hour = 64.38\1375
=> 0.0468218182 hours.
So, in minutes it will be minutes
= hour*60
= 2.809 minutes.
In this case the run time for the fly board will be 2.809 minutes but we have calculated it for only one battery means if one battery will provide power to on motor but as per design we are going to power one motor with 2 batteries to get more run time in less power consumption.
Therefore we can conclude it that it would be double of the previous.
* The total thrust generated in this design would be equal to 48 kilogram because in motor test the motor has produced the thrust of 4 kilogram so 12 motors will produce thrust of 48 kilogram.
* The total weight of the whole fly board should be <=35. because for proper flying normal thrust to weight ratio is 1:1 but for more precautions we could also take it as 1.5:1 or 2:1 but we can't afford to take it as 0.5:1 or less than the total weight of the object because it would may not work or some accident could happen.

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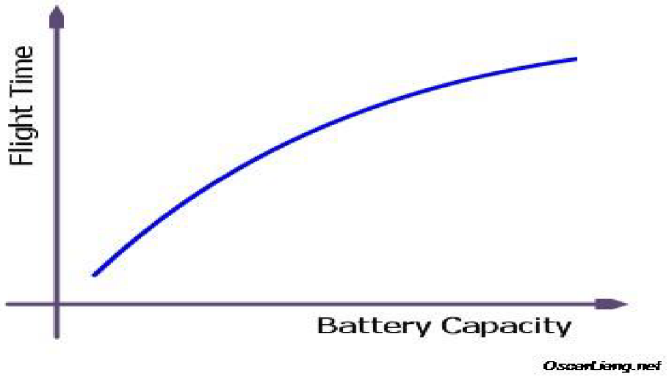
For lipo batteries the capacity graph is:- see fig 9



9.

This graph shows that how the flight time is affected by the capacity of the battery.
From this we can see that more battery capacity equals to more flight time but after certain limit it becomes independent of it. So, that's why we should choose the battery up to proper range.
* we didn't had use high kv motor because high kv motors wok efficiently with small size propeller which did not produce enough thrust to lift a heavy plane or drone. It only focus on more acceleration and therefore ha less torque and less torque means less equal and opposite force and hence less flight.
* All the values have been calculated practically by many experimenters. They calculated it by showing proper test but for the security purposes 5-10% loss in power could be taken for the sake of simplicity.
* CW and CCW concept would be used in propeller so that it would balance the whole fly board. Otherwise if all CW or all CCW will be use it would spin fly board or may unbalance it. So, CW and CCW would be used alternatively to counter back thrust and to produce equal and opposite force to lift up.

A.ESC:-
• An electronic speed control, it follows a speed reference signal (derived from a throttle lever, joystick, or any other manual input) and varies with the switching rate of a network of field effect transistors (FETs).
• By adjusting the duty cycle or by switching frequency of the transistors, the speed of the motor could be changed. The rapid switching of the transistors is what causes the motor itself to emit its characteristic high-pitched whine, especially noticeable at lower speeds.
• Brushless ESC systems basically create three-phase AC power, same as like in a variable frequency drive, to run brushless motors. Brushless motors are more popular in radio controlled airplane hobbyists because of their efficiency, power, longevity and light weight in comparison to old brushed motors. Brushless AC motor controllers are complicated in comparison of brushed motor controllers.
The correct phase varies with the rotation of the motor, which is to be taken into account by the ESC. Usually, back EMF of the motor is used to detect this rotation, but variations exist that use magnetic (Hall effect) or optical detectors.
There is also another type of controllers known as computer programmable speed controllers.
Computer-programmable speed controls generally have user-specified options which allow setting low voltage cut-off limits, timing, acceleration, braking and direction of rotation. Reversing the motor's direction may also be done by only switching any two of the three leads from the ESC to the motor.

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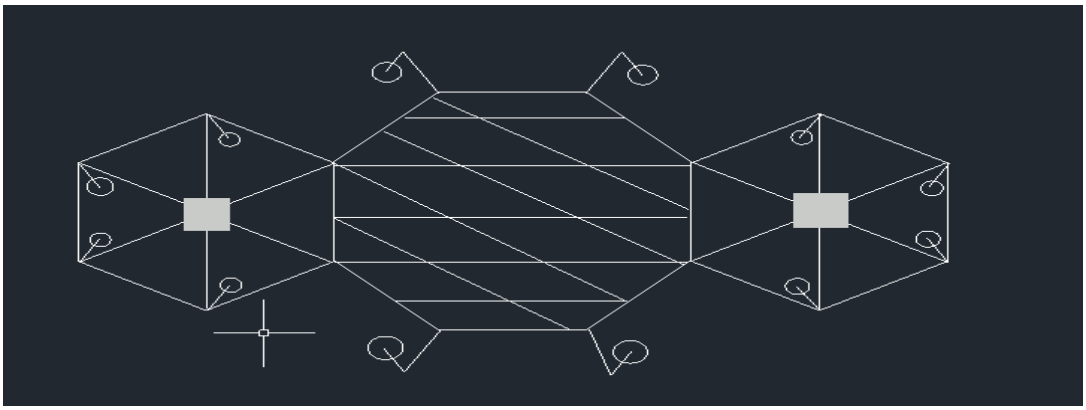
E.ROUGH DIAGRAM OF THE MODEL:-See fig-10



10.

It is rough diagram for the model that would be made after all the procedure.

VI. CONCLUSION

At the end it all concludes that by applying this method and by applying this to theory we could make the flying machine which will be driven by remote controlled motors and propellers and we would experience a new future world of flying cars or flying hover boards.

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