



## Designing and Developing A Software to Control Drone

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### ABSTRACT

The objective of the proposed work is to design and develop the flight control software to operate the fixed wing drone. Drone is designed to have an on board computer (i.e., Raspberry Pi) which configured to have a web server can be allowed to accept requests from any client (i.e., Desktop computer, tablet, smart phone) through internet. The web server of Drone's on board computer is deployed with flight control software that manages the Drone's hardware, intern helps the user to have a great degree of freedom in operating the drone.

**Key Words:** Drone, Raspberry Pi, flight control, Motor controllers

### 1. INTRODUCTION

We have probably seen them buzzing around above you on Sky, drones. They've become a common sight over the past few years and people are using them for all sorts of purposes like kids to play, adults to take aerial vacation selfies, companies are training their personnel in drone use and multinationals are investing in drone equipment and software development. The use of reconnaissance drones in the Vietnam War highlighted the main purpose of drones, then and now like to gather information. All drones have a common denominator like they accomplish a task that would prove difficult or even impossible for a human. It's essential to choose the right type of drone for the task. When people talk about drones, they're usually referring to flying remotely piloted vehicle (RPV) systems. In addition to aerial drones, industries also make use of ground, naval and space systems. As these systems are starting to communicate and collaborate, a new constellation of unmanned service devices (USDs) is growing[1][2][3]

The goal of the proposed work is to design and develop a software for control the Drone with mobile. Here Drone work totally implemented with Raspberry Pi and control anywhere with the help of internet. This work involves core branches as

well. Implemented code will control the drone motors to rotate. These number of rotations with particular speed represents angle to move the Drone in the air. And code will also control the threshold to generate. This threshold will help the drone fly in air. Raspberry Pi is connected with internet and this PI is acted as server to accept the requests from the mobile clients anywhere throughout the world. So, here PI should be connected with 4G network with fast access to get efficient requests and respond accordingly. Mobile client also connects to internet to send request. During the last years, there has been a rapid and successful Development in the Drone models. A drone is powered by batteries and distance to cover, which are the major drawback. Because it is exhausted after 15 minutes of flight and at large distance there will loss of signal, causing a decrease drone on the ground. Then there were compared the military and civilian drones on selected examples. Military drones differ from civil of size and drive. They are bigger and powered by internal combustion engines and cover large distance without signal loss. Civil drones are driven by signal which are highly encrypted. Next there were shown the possibilities of using the drones. They can be used by the public services (like police, fire brigades, border guards), by army, in industry, for taking photos and filming, in delivering shipments[4] There are Many drone models Developed with raspberry pi. There are models like controlling the drones with help of the wires and remotes requests. There are also Drone model which can be controlled by the remote with signals. There all model has limitation like they can get requests within a certain range only large area models are in the development stage.

#### 1.1 Drawbacks of Existing System

The existing system results in the following drawbacks:

- Models are controlled with wire or signal remote which is near by it.
- User should be nearby drone model.

## 2. PROPOSED SYSTEM

Mobile devices which are connected to internet will send the requests through an application. Raspberry Pi will accept the requests from the internet which are sent by the application those are large area of range. Raspberry Pi is connected with internet and this PI is acted as server to accept the requests from the mobile clients anywhere throughout the world. So, here PI should be connected with 4G network with fast access to get efficient requests and respond accordingly. Mobile client also connects to internet to send request. The following Figure 1. Shows the Fixed Wing Drone[4],[5],[6],[7],[8],[9].

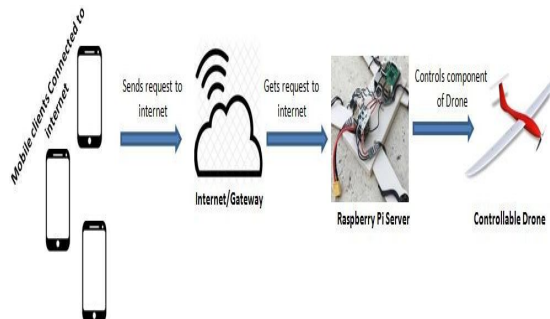


Figure 1: Block Diagram for Fixed Wing Drone

### 2.1 Advantages of Proposed System

The proposed system results in the following advantages: Used for military purposes. Used as Spy agents in solving criminal issues. Used for special care deliveries. Used for information gathering.

## 3. SYSTEM IMPLEMENTATION

### Flask Framework

Flask is a web system. This implies flask furnishes you with instruments, libraries and advancements that permit you to fabricate a web application. This web application can be some site pages, a blog, a wiki or go as large as an online schedule application or a business site. Flask is a piece of the classifications of the small scale structure. Smaller scale system is regularly structure with almost no conditions to outer libraries. This has advantages and disadvantages. Stars would be that the system is light, there is little reliance to refresh and look for security bugs, cons is that some time you should accomplish more work without anyone else or increment yourself the rundown of conditions by including modules. On account of Flask, its conditions are:

- Werkzeug a WSGI utility library
- Jinja which is its template engine.

### 3.1 Servo Motor Controllers

Servo engines have been around for quite a while and are used in numerous applications. The below figure 2 shows the Servo Motor. They are little in size however sneak up all of a sudden and are very vitality effective. These highlights permit them to be utilized to work distant controlled or radio-controlled toy vehicles and planes. Servo engines are additionally utilized in modern applications, mechanical technology, in-line assembling, pharmaceuticals and food administrations. Be that as it may, how do the little folks work. The servo hardware is fabricated right inside the engine unit and has a positionable shaft, which generally is fitted with (as demonstrated as follows). The engine is controlled with an electric sign which decides the measure of development of the pole[7],[8],[9].

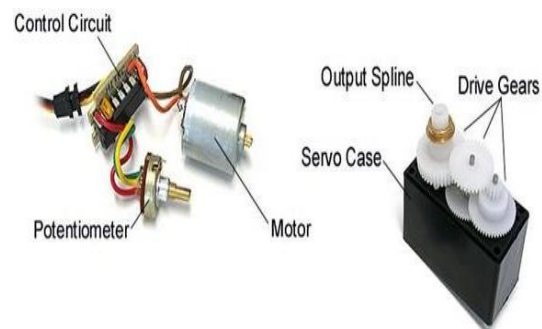


Figure 2: Servo motor

### 3.2 Brushless Motor Work

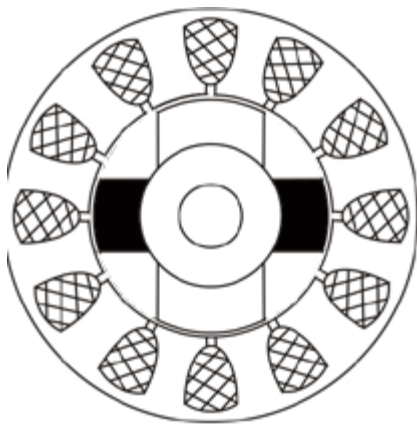
Before clarifying the working of a brushless DC engine, it is smarter to comprehend the capacity of a brushed engine. In brushes engines, there are perpetual magnets outwardly and a turning armature which contains electromagnet is inside. These electromagnets make an attractive field in the armature when the force is turned on and help to pivot the armature. The brushes change the extremity of the post to keep the turn on of the armature. The fundamental working standard for the brushed DC engine and for brushless DC engine are same for example inside shaft position criticism. Brushless DC engine has just two fundamental parts: rotor and the stator. The rotor is the turning part and has rotor magnets while stator is the fixed part and contains stator windings. In BLDC perpetual magnets are joined in the rotor and move the electromagnets to the stator. The powerful semiconductors are utilized to actuate electromagnets for the pole turns. The regulator performs power appropriation by utilizing a strong state circuit. The following Figure 3 shows the Brushless Motor.



**Figure 3:** Brushless Motor

### 3.3 Inner Rotor Design

In an internal rotor plan, the rotor is situated in the focal point of the engine and the stator winding encompass the rotor. As the rotor is situated in the centre, rotor magnets don't protect heat inside and heat get dispersed without any problem. Because of this explanation, internal rotor structured engine creates a lot of force and truly utilized. The following Figure4 shows the Inner Motor of Brushless Motor.



**Figure 4:** Inner motor

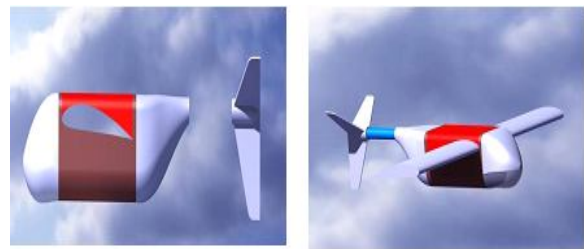
### 3.4 Outer Rotor Design:

In external rotor structure, the rotor encompasses the winding which is situated in the center of the engine. The magnets in the rotor trap the warmth of the engine inside and don't permit to scatter from the engine. Such sort of structured engine works at lower evaluated current and has low cogging force.

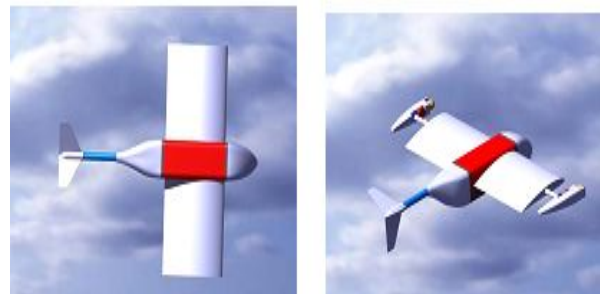


**Figure 5:** Testing whether brushless motor is rotating or not

## 4. RESULTS



**Figure 6:** Parts in CAD model and Connected parts in CAD



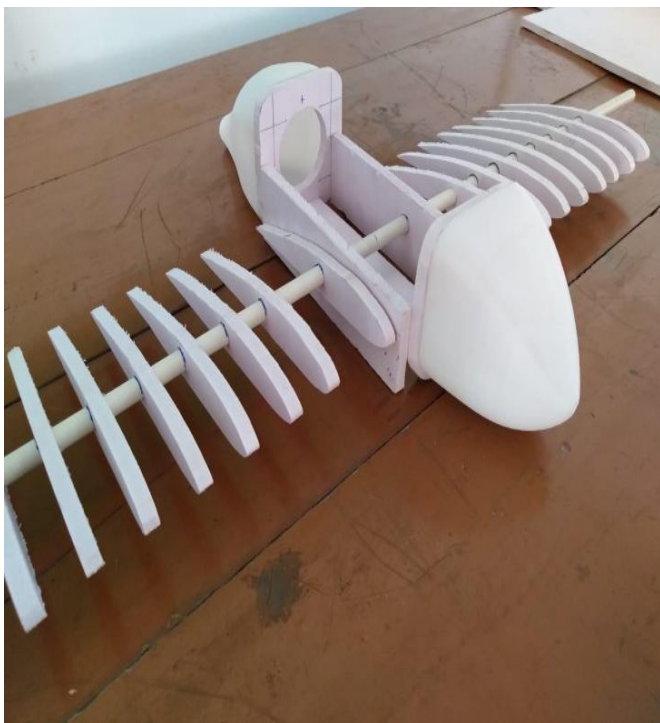
**Figure 7:** Top view in CAD model and Forward flying plane in CAD



**Figure 8:** Upward flying plane in CAD and Front view in CAD model



**Figure 9:** Front end page for flight control



**Figure 10:** Prototype of Flight

## 5. SCOPE FOR FUTURE DEVELOPMENT

The proposed drone with public IP system is used for UAVs offers a great market opportunity for equipment

manufacturers, investors and business service providers The market for commercial/civilian drones is expected to grow at a compound annual growth rate (CAGR) of 19% between 2015 and 2020. ... Construction – By attaching the camera to the drone we can to spy work and Drone driven IoT can be used to survey build sites, monitor operations and progress, provide 3D mapping, inspect construction materials and check security.

## 6.CONCLUSION

The goal of the proposed work is to Design and Develop a software to control the Drone with mobile. Here Drone work totally implemented with Raspberry Pi and control anywhere with the help software developed. This work involves core branches as well. Implemented code will control the drone motors to rotate. These number of rotations with particular speed represents angle to move the Drone in the air. And code will also control the threshold to generate. This threshold will help the drone fly in air.

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