PR201-DRONE

WITH LIVE STREAMING

Department of Electrical and Communication Engineering
PDPM Indian Institute Of Information Technology,
Design and Manufacturing,
Jabalpur

Project Mentor and Guide: Atul Kumar

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Team Members

1. Saumya Mishra (2017230)
   Computer Science and Engineering
2. Siddhant Lohia (2017254)
   Electronics and Communication Engineering
3. Vikrant Sharma (2017289)
   Electronics and Communication Engineering
4. Kuhu Pyasi (2017327)
   Electronics and Communication Engineering
5. Sakshi Sharma (2017344)
   Computer Science and Engineering
6. Siddharth Charri (2017353)
   Electronics and Communication Engineering

PR201
Project Approval Certificate

Department of Electronics and Communication Engineering
PDPM IIITDM,Jabalpur

The project entitled Drone with live streaming is submitted by Ms. Saumya Mishra, Mr. Siddhant Lohia, Mr. Vikrant Sharma, Ms.Kuhu Pyasi, Ms. Sakshi Sharma and Mr Siddharth Charri is approved for PR201 , at The Department of Electronics and Communication Engineering, PDPM IIITDM Jabalpur on successful completion of their project.

Dr. Atul Kumar

Dept of ECE, IIITDMJ

Mentor Project Incharge

Place : PDPM IIITDM Jabalpur, Madhya Pradesh
Date : July 25, 2019

DECLARATION

We declare that this written submission represents our ideas in our words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will cause a disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Saumya Mishra (2017230)
Computer Science and Engineering

Siddhant Lohia (2017254)
Electronics and Communication Engineering

Vikrant Sharma (2017289)
Electronics and Communication Engineering

Kuhu Pyasi (2017327)
Electronics and Communication Engineering

Ms. Sakshi Sharma (2017344)
Computer Science and Engineering

Siddharth Chhari (2017353)
Electronics and Communication Engineering

Date: July 24, 2019

ABSTRACT

Drones are more formally known as unmanned aerial vehicles(UAVs). A drone is a flying robot that can be remotely controlled or fly autonomously through software controlled flight plans in their embedded systems. Live Streaming and drone cameras are a truly great combination. Drone live streams basically give humans ability to see what is happening far away right now and ability to see the ground from a bird's eye view. Live video can be streamed directly on PC using Raspbian Os and Raspberry Pi.It can also be used in surveillance of wild animals in college campus.

There are increasing number of wild animals in institute's campus. The campus is not safe at night. Students are not allowed to move even inside campus and out of hostel after 10:30 PM because of safety. Surveillance of wild animals is needed for the safety of students, faculties and others in campus. The Drone can find wild animals present in campus and can inform us so that necessary security actions can be taken.

ACKNOWLEDGEMENT

We would like to express our profound gratitude and deep regards to our guide Dr Atul Kumar. He made us believe in ourselves and push our limits to emerge as a better Computer Engineer.

We would also like to thank him for his exemplary guidance, valuable information and constant encouragement throughout the project. He was always there to show us the right track when needed help. With the help of his brilliant guidance and encouragement, we all were able to complete our tasks properly and were up to the mark in all the tasks assigned.

During the project, we got a chance to observe the stronger and weaker areas of our technical and non-technical profiles. This helped us in paying close attention to weaker aspects which eventually helped us in progressing and ultimately completing this project.

Contents

Chapter 1

Project Overview

The overview of this project is to make a drone which can do live streaming. In this project drone is made by assembling various components and then Raspberry Pii is used for live streaming.

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Chapter 2

Components Used

- A4 Frame
- 4 Brushless Motor (1000KB)
- 4 30A ESC (Electronic Speed Controller)
- 1 pair Clockwise and 1 pair Counter-Clockwise Propeller
- Charger
- Lipo Battery
- Flight Controller (KK2.1.0)
- Transmitter
- Receiver
- Raspberry Pi
- Camera Module

Chapter 3

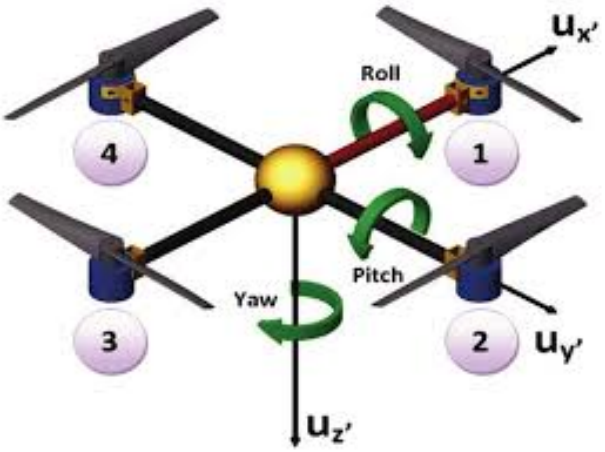
Working Principle

Vertical Motion Drones use rotors for propulsion and control.Spinning blades push air down as the rotor pushes down on the air, the air pushes up on the rotor. This is the basic idea behind lift, which comes down to controlling the upward and downward force. The faster the rotors spin, the greater the lift, and vice-versa.

Turning With the two sets of rotors rotating in opposite directions, the total angular momentum is zero.
The red counterclockwise rotors have a positive angular momentum and the green clockwise rotors have a negative angular momentum. To rotate the drone clockwise,decrease the spin of rotor 1 and 3 and increase the spin for rotors 2 and 4. The angular momentum of the rotors doesn't add up to zero, so the drone body must rotate.

Forwards and Sideways Increase the rotation rate of rotors 3 and 4 (the rear ones) and decrease the rate of rotors 1 and 2. The total thrust force will remain equal to the weight, so the drone will stay at the same vertical level. Also, since one of the rear rotors is spinning counterclockwise and the other clockwise, the increased rotation of those rotors will still produce zero angular momentum. The same holds true for the front rotors, and so the drone does not rotate. However, the greater force in the back of the drone means it will tilt forward. Now a slight increase in thrust for all rotors will produce a net thrust force that has a component to balance the weight along with a forward motion component.

Roll,Pitch and Yaw-
Drones are controlled by changing roll,pitch and yaw .



Yaw-
Yaw is the deviation/Rotating the head of the quadcopter either to right or left, Yaw can be controlled through the throttle stick, also called rudder, making it to rotate either to the left or right.
Pitch-
Pitch is the movement of quadcopter either forward and backward. Forward Pitch is achieved by pushing the aileron stick forward, which makes the quadcopter tilt and move forward, away from you.Backward pitch is achieved by moving the aileron stick backwards(towards you), making the quadcopter, come closer to you.
Roll-
Roll is making the quadcopter fly sidewards, either to left or right. Roll is controlled with the aileron stick, making it move left or right, if you move the aileron stick to the left, the quadcopter will fly left, if you move the aileron stick to right, the quadcopter will fly right.
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Chapter 4

Assembling of Drone

All the four brushless motor is connected with the respective arm of the Drone with the help of screws. Then the ESCs wires are soldered with the lower frame of the quadcopter.
Quadcopter arm is attached to the lower body with the help of screws. Then the ESCs are tightened to the arm by a tightener. Brushless motors and ESCs wires are joined by soldering. Heat strings covers this soldering so as to prevent them from short circuiting and helps to keep the soldered part untouched. Now the toplet of the quadcopter is attached with the rest of the frame. Flight controller is fixed in the middle of the toplet with the help of double sided tape.

The RC transmitter allows the drone pilot to control the drone wirelessly. It would be silly to fly a drone with a wire in the sky, so connecting the Radio Controlled (RC) transmitter is a must for a drone.

The RC transmitter sends signals and the receiver receives the signal. The RC transmitter is also known as the TX and the RC receiver is known as the RX. Before discussing about the RC receiver, let's know the transmitter first
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Basically, the transmitter is the remote controller of the drone. Before choosing a perfect transmitter, you need to consider a few things, such as the number of channels, the modes, and the frequency technology, and so on.

It is suggested to buy a good transmitter because this is the least thing that is destroyed while flying drones. The number of channels gives you the ability to control how many individual actions you can control of the drone.
How to bind transmitter with receiver?

The transmitter is basically you hold in your hands and the receiver you put inside your drone. Dramatically simplifying things here, your drone transmitter will read your stick inputs and send them through the air to your receiver in near real time. Once the receiver has this information it passes it on to your drones flight controller which makes the drone move accordingly.

Binding is really important. Without proper binding, you cannot configure the drone's actions properly. You can bind your transmitter with at least the following things-
1. A binding cable
2. An ESC
3. A servo motor
4. A battery

Firstly, connect the binding cable to the RC receiver on the BAT pin. Now, take an ESC and connect the signal, 5V, and ground pin to the CH1 pins. Connect the battery to the ESC. The ESC will make a beeping sound and the RC receiver will show an LED blinking. Now turn on the RC transmitter after installing a battery. On your receiver there will be small button hold that light will flash , turn on your transmitter , hold bind button , light will stop flashing and its successfully binded. At this time you can connect the ESCs' R/C input to the flight controller. The flight controller you chose should have a diagram showing which motors on your multirotor connect to which pins on the flight controller. The same diagram should also show the direction of rotation of each motor, but again for now, you do not need to consider the direction.

Look up the connection diagram between the motors / ESC and the flight controller in the flight controller manual Plug the R/C connectors of each ESC to the corresponding pins on the flight controller, ensuring the the ground wire (normally black) connects to the ground pin on the flight controller, and the signal pin (white or yellow) connects to the signal pin on the flight controller. Only one of the RC connectors will still have the red (power) pin connected; it does not matter which it is.

Your RC transmitter should have come with the appropriate RC receiver. The receiver should have been bound to the transmitter, so you can remove the binding jumper from the receiver (if one is included). The package may have also included a AA battery holder which is intended to power the receiver, but we will not make use of this since the BEC will be powering both the receiver and the flight controller. To know which channels of the RC receiver plug into which pins on the flight controller, you need to look at both the flight controller and the RC system's user guide. The flight controller's manual will specify the locations of the following pins which are to be matched and connected to the receiver:

Throttle
Pitch
Yaw
Roll
Auxiliary (Aux) 1, 2, 3 etc.

You can now make the following connections:
Read the flight controller's manual to see which R/C input pin is associated with which of the functions above Read the RC transmitter's manual to see which channel is associated with each of the functions.
Some RC transmitters can be reprogrammed to change the function of each pin, so if you decide to change which input (joystick or switch) does what, then be sure to know which channel on the receiver will correspond to which function. Throttle, pitch, yaw and roll should always be associated with the two joysticks, not with switches or knobs.
Connect the throttle channel on the receiver to the throttle input on the flight controller
Connect the pitch channel on the receiver to the pitch input on the flight controller
Connect the yaw channel on the receiver to the yaw input on the flight controller
Connect GND on the flight controller (normally the third row of pins) to GND on the receiver (normally the third row of pins)
If an auxiliary input is used, connect Aux 1 on the receiver to Aux 1 on the flight controller and so on.
You can use three-pin servo wires for each of the channels, but only one of the channels (can be any) needs to have voltage and ground; the rest only need the signal wire. All of the connections can have GND to GND though only one is needed. Once again, the receiver does not need a separate battery since it will be receiving power from the flight controller, which itself is receiving power from the BEC from one of the ESCs.

Chapter 5

Raspberry Pi and Raspbian Os

What is Raspberry Pi?

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

Raspbian?

Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run.

Chapter 6

Conclusions and Future Scope

Uses Drone with live streaming can be used for:

- Delivery
- News-Reporting
- Emergency Services
- Photography:Spatial positioning to capture the perfect photo from the perfect angle.

Future Scope

We can use Image Processing along with Live streaming to make our quadcopter more purposeful.

- Fully Autonomous
- Use of Image Processing to detect wild animals in college campus
- Surveillance2

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