

Manned Octocopter Drone

Jaspal Singh Chawla

LITERATURE SURVEY

With the increasing application of wheeled mobile robots on soft terrains, the challenge of lateral and longitudinal slippage existing in the contact surface between the wheels and the terrain has attracted more attention. To address the difficulties caused by the lateral and longitudinal slippage, this paper proposes an improved linear active disturbance rejection control (LADRC) method for path tracking control of a six-wheeled corner steering rover.

Based on the LADRC, the tracking differentiator and nonlinear state error feedback are introduced into the improved LADRC. By using the improved LADRC, the influence of disturbances in inputs can be attenuated and a higher regulating efficiency than LADRC can be achieved. The simulations validate the effectiveness of the proposed approach with a good tracking performance.

The Unmanned Aerial Vehicle (UAV) market is to grow dramatically by 2020, as military, civil and commercial applications continue to develop. Potential changes in air traffic management include the creation of an information It defines a UAV to be "An aircraft which is management system to exchange information among Air Traffic Management users and providers, the introduction of navigation, and the development of alternative separation procedures. The impact of each scenario on the future air traffic and surveillance is summarized, and associated issues identified. The paper concludes by describing the need for a UAV roadmap to the future. This paper aims to provide a simple and low-cost solution of an autonomous aerial surveyor which can do aerial surveillance, recognize and track various objects, able in making simple 3d map.

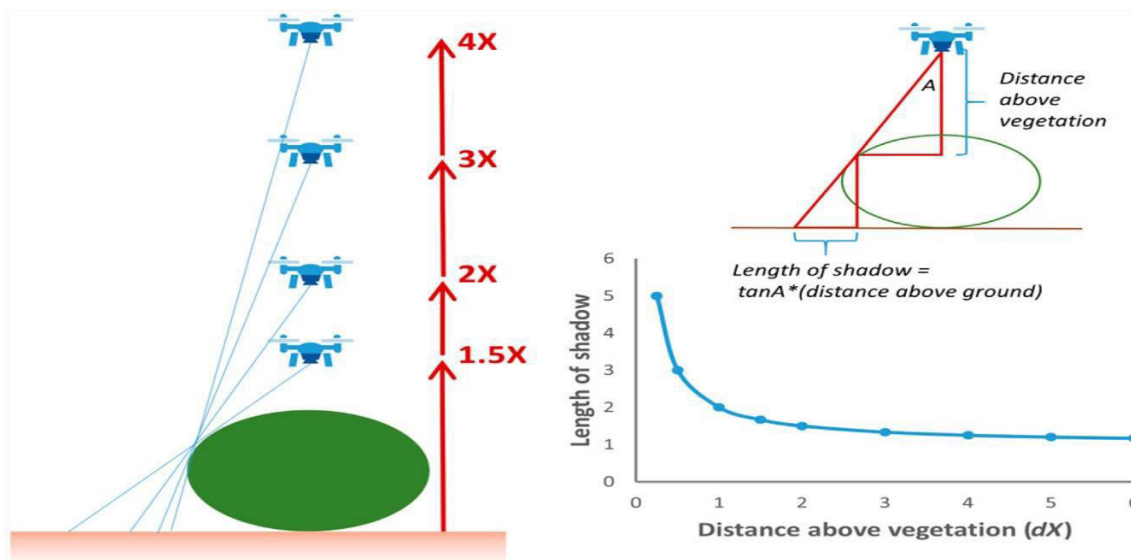


Fig 1: Distance of the Octocopter above vegetation

INTRODUCTION

Research and development of unmanned aerial vehicle (UAV) and micro aerial vehicle (MAV) are getting high encouragement nowadays, since the application of UAV and MAV can apply to variety of area such as rescue mission, military, film making, agriculture and others. Octocopter or octo rotor aircraft is one of the UAV that are major focuses of active researches in recent years.

Compare to terrestrial mobile robot that often possible to limit the model to kinematics, Octocopter required dynamics in order to account for gravity effect and aerodynamic forces. Octocopter operated by thrust that produce by eight motors that attached to it body. Octocopter has advantages over the conventional helicopter where the mechanical design is simpler.

Besides that, Octocopter changes direction by manipulating the individual propellers speed and does not require cyclic and collective pitch control.

The design is made in such a manner that during each mode of transport the design gets changed. As in, if you take for land transport, all the rings of the Octocopter get rotated to 90 degrees and by the rotation of the propeller the Octocopter moves front and back. If you take for water transport the movement of rings would be same as for land, but a float comes into picture. And finally, for movement in air, the rings get back into its normal position and by the rotation of the propeller the Octocopter goes up and down.

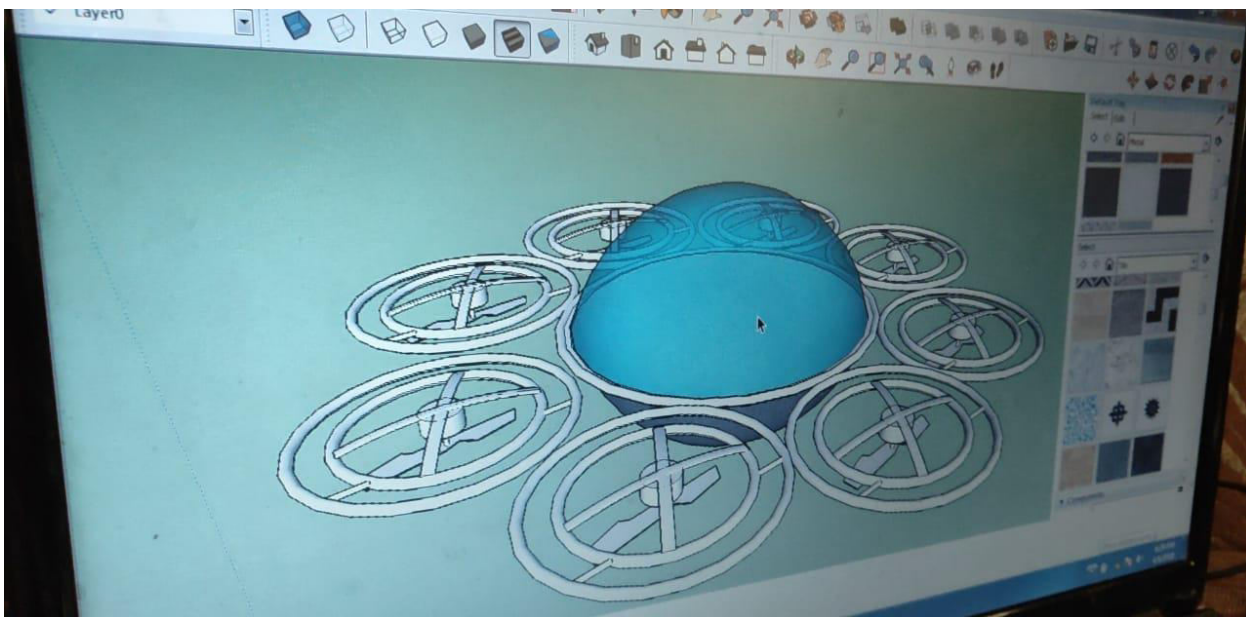


Fig 2: Design

OPERATION AND METHODOLOGY

The radio signals from the radio transmitter are sent to the receiver. The frequency of the waves is 2.4GHz, from the receiver the signals are passed onto the flight control board. The board acts as a controller circuit with feedback. The signal is then passed onto the electronic speed controller.

This Electronic speed controller (ESC) helps to control the speed of the motor and acts as a drive circuit. Power supply is given to the ESC and motors and 11.1 V of voltage is applied to the circuit. The Propellers are attached to the motors and rotate with the given speed. 4 propellers rotate in clockwise direction and rest 4 in anticlockwise direction.

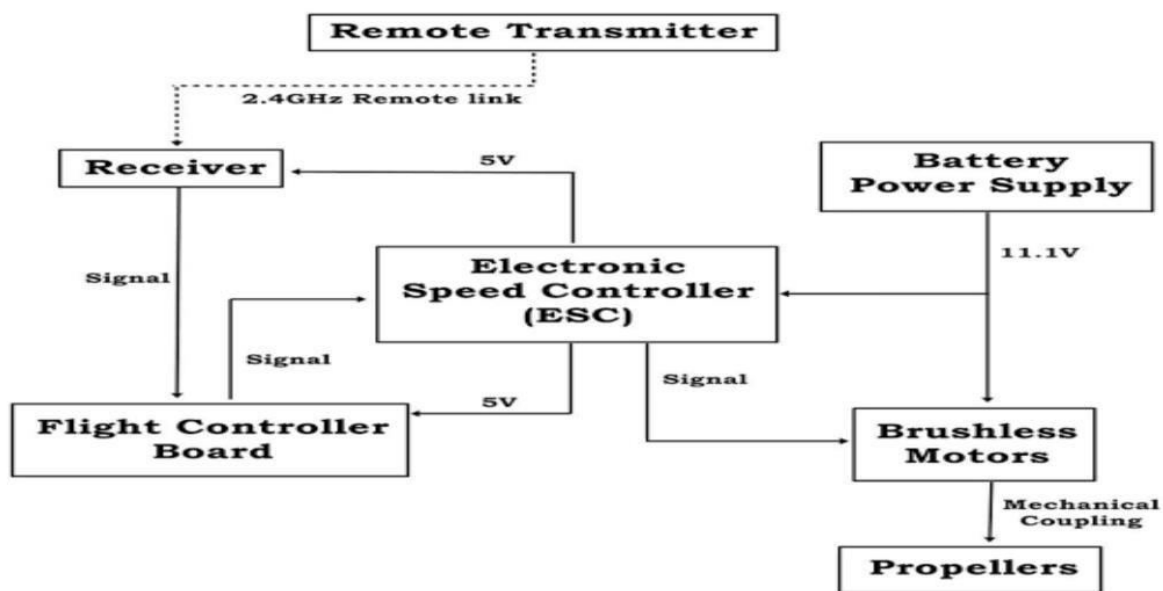


Fig 3: Block diagram of operation of Octocopter

Remote transmitter: Transmits the give band of frequency or given signal to the receiver in the given interval of time.

Remote receiver: Receives the given signal approximately 2.4GHz from the transmitting end and send it to the Flight Controller Board.

Flight Controller Board: It's basically a circuit board with sensors that detects orientation changes of your drone. It also receives user commands and controls the motors in order to keep the octocopter in the air.

Electronic speed controller: ESC offers high power, high frequency and high resolution 3-phase AC power to the motors in an extremely compact miniature package.

Battery supply: This is the place from where you get the power to the entire circuit and all the motors are connected to the ESC which indeed connected to the battery.

Brushless Motors: Since high torque is required for the octocopter, we use Brushless DC Motors and as torque increases faster you can change the speed of your propellers.

Propellers: As you get power from the battery the propellers start to rotate according to the speed given from the ESC and as their start rotating, the Octocopter starts going to their required location.

RESULTS

Development of unmanned aerial vehicle (UAV) and micro aerial vehicle (MAV) are getting high encouragement. Since the application of UAV and MAV can apply to variety of area such as rescue mission, military, film making, agriculture and others. Thus, air transportation is made easier to the society.

With the design of octocopters, the 8 propellers attached to it can exceptionally reach vey great heights or elevations. The speed of octocopter is much faster when compared to other drones. Its ability is not only restricted to air, but also extend to other two modes of transportation like water and terrain.

It is supported by multiple suspensions and shock absorber to stabilize the overall copter ride and prevents an excess of body lean roll in one direction. Provides much more resistance to winds and heavy rains, thus improving the stability of the copter.

Safety matters a lot, where we can still fly the octocopter even when two motors are damaged. Improves repair time by eliminating the use of copter survey. Since the size of the octocopter is much bigger when compared to other drones, we can incorporate multifeatured into the copter like stereo cameras, IR cameras, 360-degree cameras, LIDAR. Also helps to capture the best aerial footages using the add ones.

At times of emergencies, these can aid by airlifting people from one place to other, helps to survey faster, aids in reaching out to people faster by delivering foods. Fire department can also use this to map the spread of wildfire. This can also act as an air ambulance which can save time to help in transplantation of organs to faraway places, thus by helping to extend its features in medical fields. Bio metric or fingerprint sensor is installed to provide greater security for the copter. This copter may be driven from inside or can be operated from outside through radio remote controllers.

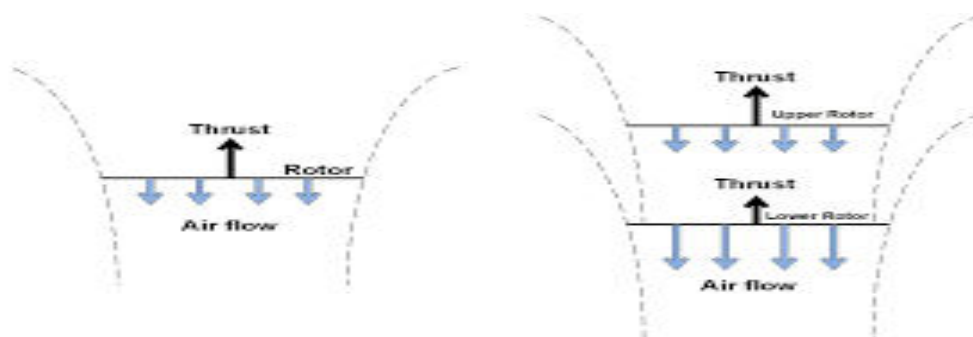


Fig 4: Motion of Air across the Octocopter

Conclusion and Future Objectives

In the present situation, the future of transport will make more use of the airspace. So, we are trying to shape this idea into reality. So, from a developing point of view, we are trying to create a door-to-door connectivity through the octocopter which delivers food, postal letters, medicines etc. from one click through the phone.

For this the technology incorporated would be Vertical Take Off & Landing. It can also be incorporated with still more advanced and heavier motors to lift and carry even more greater loads. Adding another concept to this which is commonly known to all of us is rental vehicles.

Upon future work, we can also incorporate this as an air taxi or a rental copter by which people can enter an onetime password sent to their smart phone by the copter rental company and the customers can travel to their destination place easily. This avoids traffics on road and the customer can easily save much more time than the other modes of transport.

At times like COVID-19, where people are afraid to deliver food hand to hand, we can make the best usage of octocopters in delivering more food to people at the same time and ensuring them a zero-contact delivery of foods. And, at times of lockdown where transportation of materials e.g., Agricultural yields, pharmaceutical medicines, where they need to be transported from one corner of the country to another, octocopters can play a wide role in helping them.