

Aerodynamic Structure for Multi-Rotor Flights

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Abstract—The Prototype developed has a Aerodynamic design for Multi-Rotor flights. The designs which are being used presently have zero Aerodynamics, based on a frame structure. In the Frame structure, When one of the Motors of the Multi-Rotor system stops working, the Centre of Gravity shifts due to uneven thrust distribution and it stalls off the sky. The only source of Aerodynamics in the frame structure is the Four or Six rotating propellers.

The new Prototype developed for Multi-Rotor flights is completely Aerodynamic and will not Stall off the sky in case of a Multi-Rotor Malfunction. The Prototype has a total of Five Brushless Motors, Four of which generate 2200 RPM and are the part the Multi-Rotor System in the Prototype. The Fifth Motor generates 2800 RPM and is a part of the Flight operation fixed on the Nose of the Prototype. The Prototype is developed using an Airplane like structure, it has a Wing and a Fuselage.

The Multi-Rotor motors on the Prototype is mounted on both the edges go the wing, Two each on both edges. Mounting the Multi-Rotor motors on the wing is critical and has increased the Angle of attack for normal flight operations landings.

The fifth motor is mounted on the Nose (Fuselage) of the Prototype but is not connected to the Multi-Rotor System. The fifth Motor with 2800 RPM is meant for normal Airplane operations using the Rudder, Elevator and Ailerons. The servos and the Motor is connected to a second tx/Rx module and has no relation with the Multi-Rotor system on the same prototype.

The prototype uses two sets of Transmitting and Receiving Tx/Rx Module ,one for Multi-Rotor Flights and the second one for the Normal Flight operations.

The main motive and theory behind designing this prototype is to prevent a Multi-Rotor from stalling from the sky and increase is safety standards for being Airborne. If in this Prototype the multi-Rotor fails then the Prototype will not stall off the sky instead the Aerofall section of the Prototype will help to glide and stay Airborne as long as possible, Secondly the other system meant for normal flight operations will activate and the pilot flying the prototype will have enough time to Manoeuvre it using the Rudder ,Ailerons, Elevator and the fifth Motor in an Emergency and Land it to safety without causing any harm or damage to the prototype and the surroundings .

The Prototype as tested is capable of gliding with all motors stop for more than four Minutes depending on wind speed .The Prototype is also capable of travelling at speeds as high as 80Km/ hr as tested and cover a larger distance within a radius of 10kms using the Auto Pilot system.