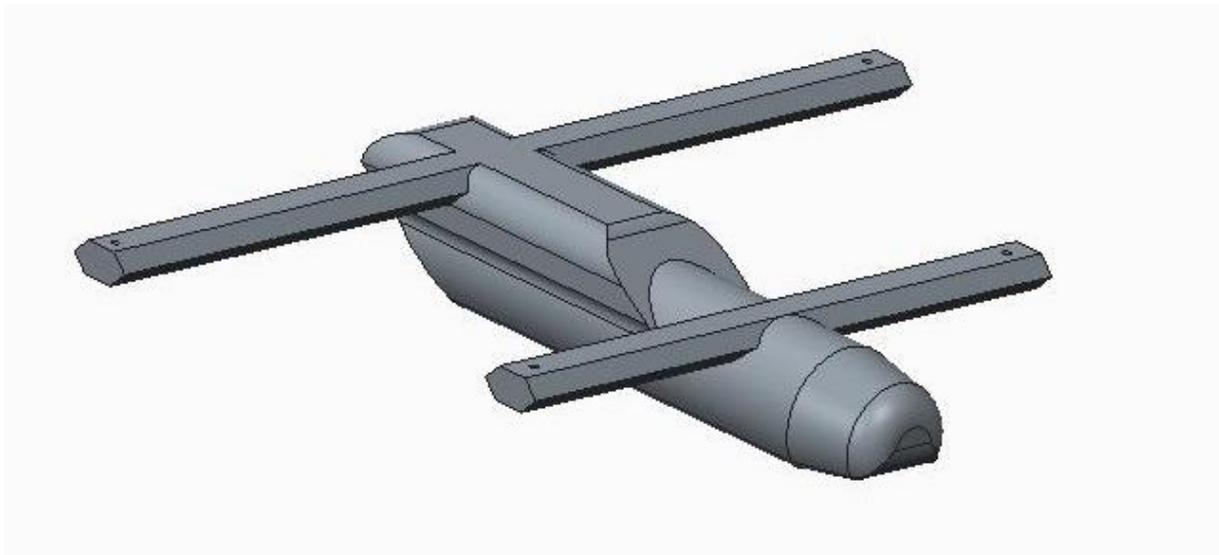


INTRODUCTION

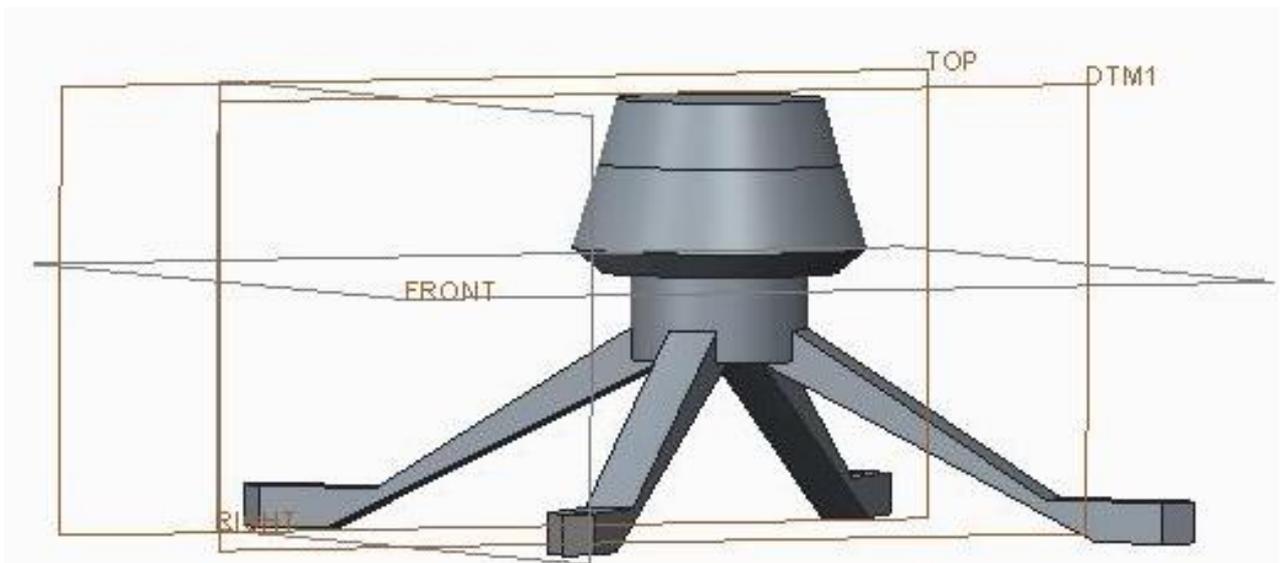
Quadcopters are very stable as far as everything is functioning properly. That means that all four spinning blades are in fact spinning, but as soon as one of them suffers a failure or an impact of some sort, the drone will go down. But as the technology advances it's getting easier for the user to control and keep the drone in the air. By giving the copter a harder and a more advanced body that protect the blades and mostly the engines, we can keep even some heavier drones to stay in the air or at least mitigate the decline.

TYPES

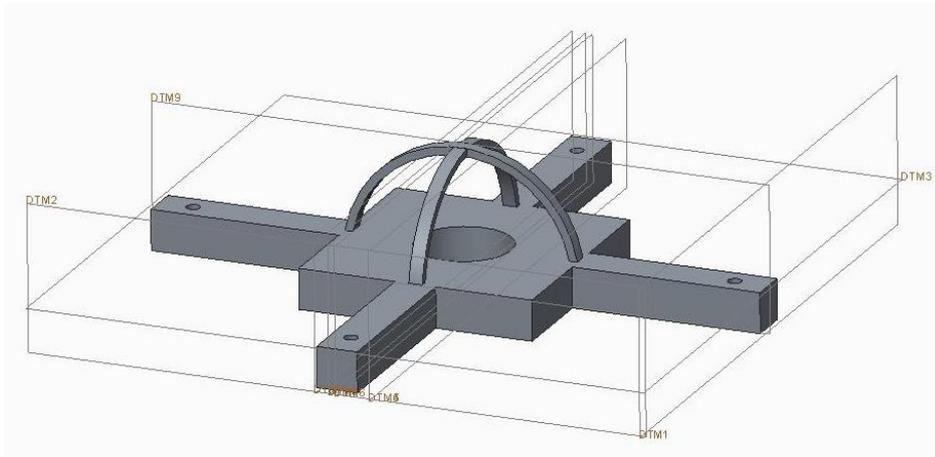
-The Bell Boeing Quad TiltRotor concept takes the fixed quadcopter concept further by combining it with the tilt rotor concept for a proposed C-130 sized military transport.



-Parrot AR.Drone 2.0 take-off, Nevada, 2012The Aermatica Spa Anteos was the first rotary wing RPA to obtain official permission to fly in the civil airspace, by the Italian Civil Aviation Authority , and will be the first able to work in non segregated airspace.



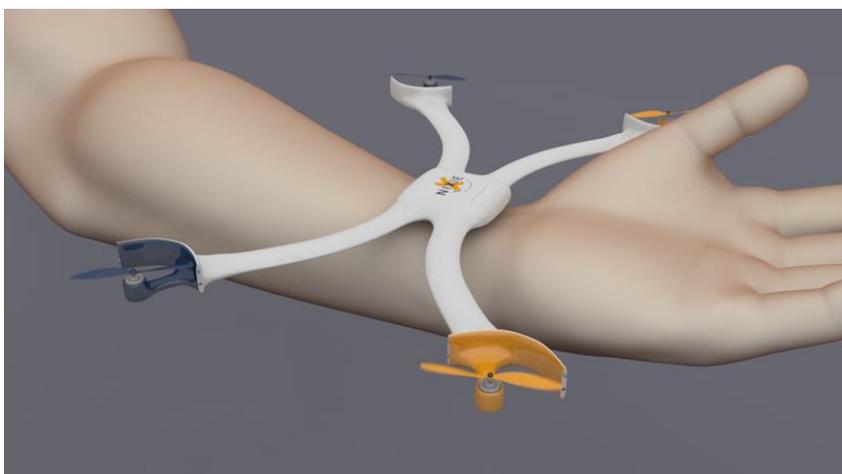
-AeroQuad and ArduCopter are open-source hardware and software projects based on Arduino for the DIY construction of quadcopters.



-Parrot AR.Drone is a small radio controlled quadcopter with cameras attached to it built by Parrot SA, designed to be controlled by smartphones or tablet devices.

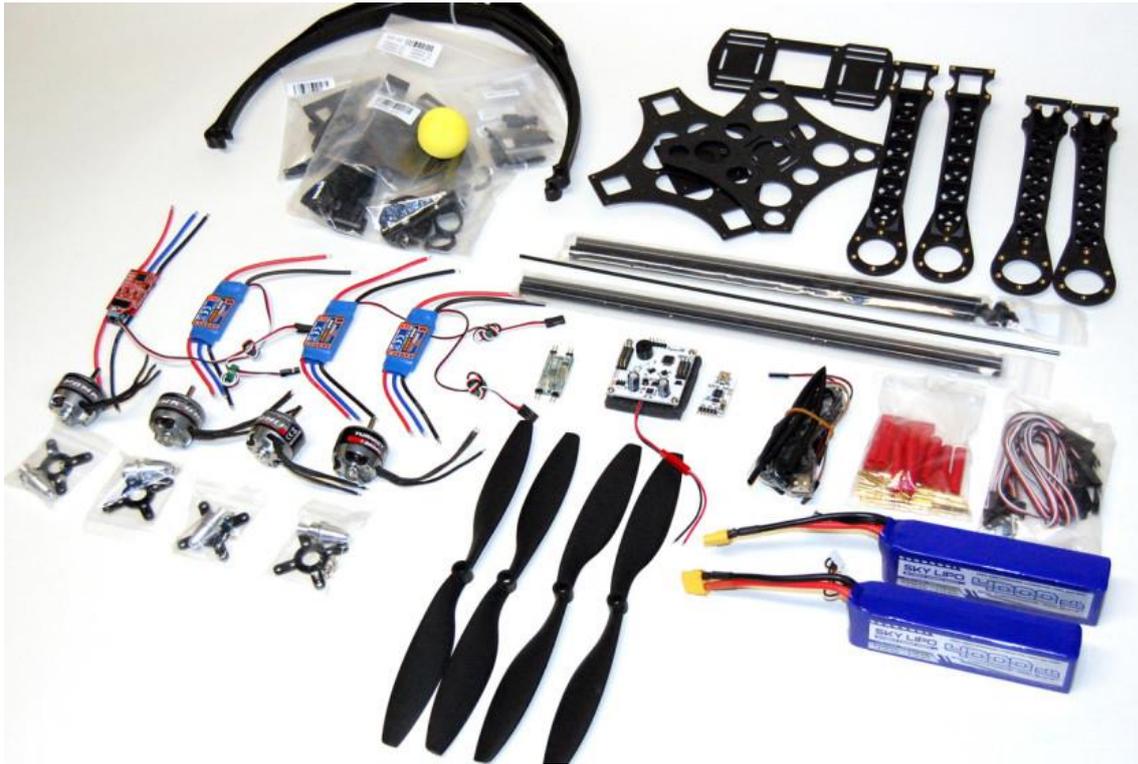


-Nixie is a small camera-equipped drone that can be worn as a wrist band



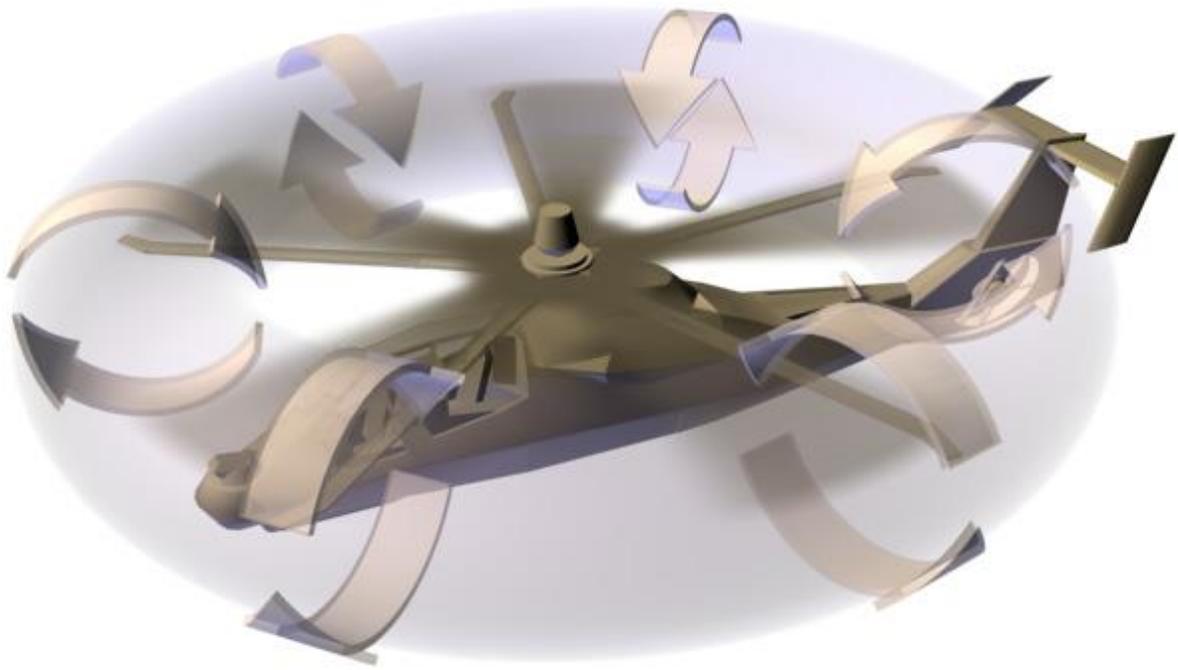
MECHANICALS

The main mechanical components needed for construction are the frame, propellers and the electric motors. For best performance and simplest control algorithms, the motors and propellers should be placed equidistant. Recently, due to their light weight and structural stiffness carbon fiber composites have become a very common solution for the body of the copters. The electrical components needed to construct a working quadcopter are similar to those needed for a modern RC (remote controlled) helicopter. They are an electronic speed control module, on-board computer or controller board, and battery.



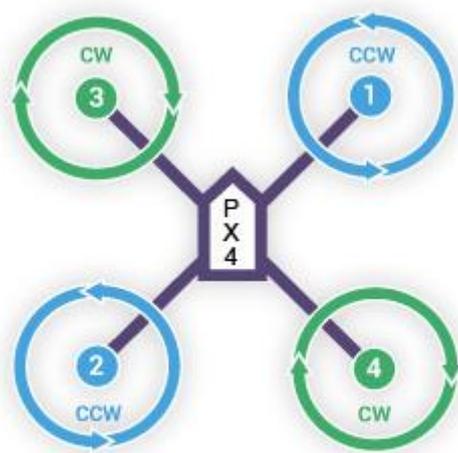
VOTRTEX RING STATE-definition

Small quadcopters such as we are making are subject to normal rotorcraft aerodynamics, including vortex ring state. In forward flight, there is no upward flow of air in the hub area. As forward airspeed decreases and vertical descent rates increase, an upflow begins because there are no airfoil surfaces in the mast and blade grip area. As volume of upflow increases, the induced flow of the inner blade sections is overcome and the blades begin to stall near the hub. As the inner blade sections stall, a second set of vortices, similar to the rotor tip vortices, form in the center of the rotor system. The inner set of vortices decreases the amount of lift being produced and causes an increase in sink rate. In an accelerated condition, the inner and outer vortices begin to feed each other to the point where any increase in rotor blade pitch angle increases the interaction between the vortices and increases the rate of descent. In this state, the helicopter is operating in its own downwash, descending through descending air. The failure of a helicopter pilot to recognize and react to the condition can lead to high descent rates and impact with terrain.

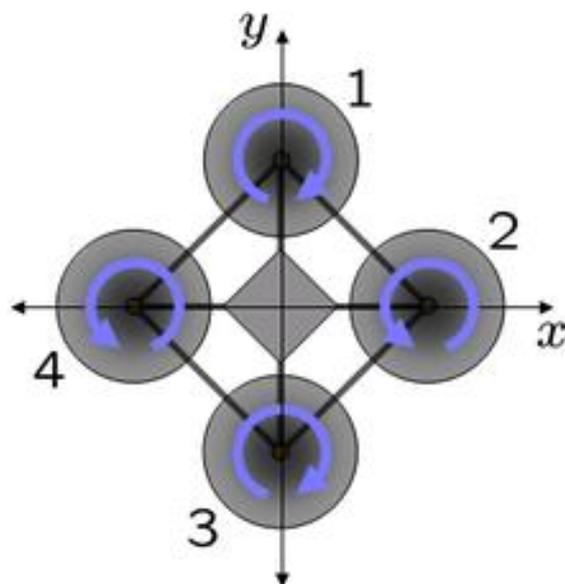


FLYING

Each rotor produces both a thrust and torque about its center of rotation, as well as a drag force opposite to the vehicle's direction of flight. If all rotors are spinning at the same angular velocity, with rotors one and three rotating clockwise and rotors two and four counterclockwise, the net aerodynamic torque, and hence the angular acceleration about the yaw axis, is exactly zero, which implies that the yaw stabilizing rotor of conventional helicopters is not needed. Yaw is induced by mismatching the balance in aerodynamic torques.



QUAD X



ASSIGNMENT

Draw a copter body, just draw a sketch of a copter body you think looks the best and the most useful due to the information you heard about the types of copters and their bodies.

Presentation made by Luka Golob and Tadej Likar

Students of secondary school Gimnazija Jurija Vege Idrija

4th of April, 2015