

Midflight Re- configuring Drone

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Motivation for the project

- Main limitation of a drone is its flight time
- Time taken for the battery to reduce from its full capacity to the minimum required to land the drone safely
- The drone which we propose has a way to improve the flight time of the drone

Capability of our drone

- It can reconfigure its structure and firmware midflight according to the requirement
- (i.e.) it can switch between any of these 3 multicopter configuration, namely quadrotor, hexrotor and octarotor

Problems in transition

- The pitch of the propellers and direction of rotation of rotors should be reversed in order to balance the torque
- Variable pitch requires swashplate mechanism which is complex and heavy
- Reversal of direction of motor rotation results in 1.)loss of thrust, 2.)huge amount of residual torque which will lead to instability, 3.)ESC calibration (which can be done only when the drone is connected for firmware uploadation).

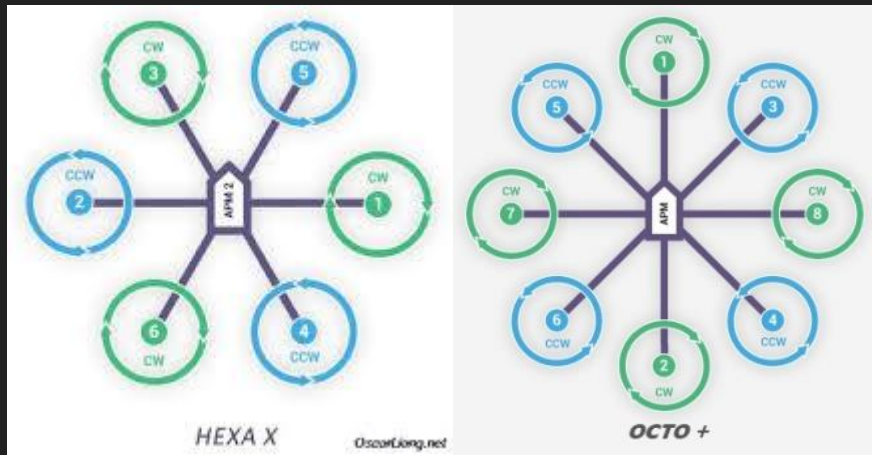
Innovation incubated

- Introduction of zero torque groups
- Development of firmware to this drone (which is completely different from a normal hex or oct config which is not available in market till date)

Comparison of hex and octa configs

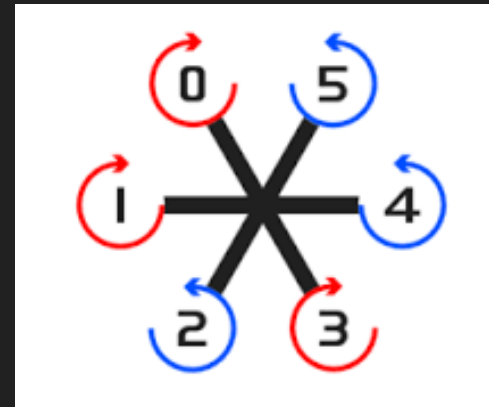
Coventional

- They have alternate CW & CCW rotors to balance the torque



MRD's

- It has a rigidly fixed quad X config with one set of zero torque group for hexa and 2 sets for octa



Transition between 3 configurations



Currently we are working on ...

- Control algorithm for stable transition
- Procurement of parts required
- Test flight and trouble shooting with custom made Arduino based flight control unit
- Modifying CAD model to optimize the performance

An example for a problem addressed by this drone

- Lets say the drone should carry 3 packages each 1 kg and drop them at three different locations

How does the drone perform this task with improvement in flight time??!!

○ THINK!!!

Solution

- Take off with octacopter configuration
- Reaches 1st destination
- OCTA – 1 package → OCTA + 2 packages
- OCTA → HEXA
- Reaches 2nd destination
- HEXA – 1 package → HEXA + 1 package
- HEXA → QUAD
- Reaches 3rd destination
- Drops the 3rd package
- Flies back to the base in QUAD configuration

Thank you 😊😊😊