UAV Workshop

Quadrotor Design

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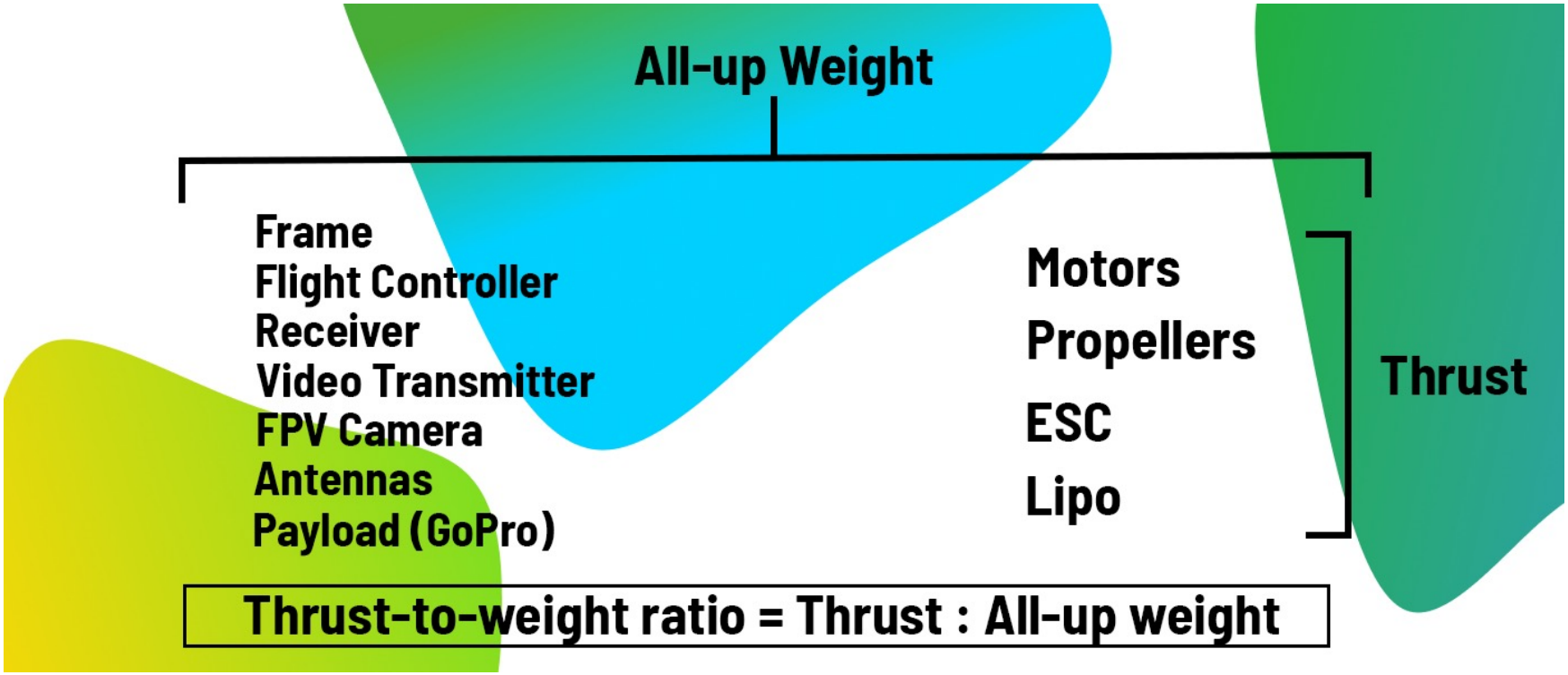
General Principle

- Determining the motor and battery capacity for a quadrotor involves considering factors such as the total weight (including payload), desired flight time, and the specific frame and propellers being used.



- Calculate Total Weight:
  - Determine the weight of the quadrotor frame, motors, electronics, propellers, and the payload you intend to carry. Add them together to get the total weight (mass) in kilograms.
- Estimate Thrust Requirements:
  - The total thrust required is influenced by the total weight of the quadrotor. A commonly used rule of thumb is to have a thrust-to-weight ratio (TWR) of 2:1 for agile flight. Multiply the total weight by 2 to estimate the required total thrust.
- Choose Motors:
  - Select motors that can provide the required thrust. Motor specifications, such as thrust per motor and RPM, are crucial. Consider the Kv rating (rotations per minute per volt) when choosing motors, as it influences the motor's performance with different propellers and voltage.
- Propeller Selection:
  - Choose propellers that are compatible with the selected motors. Propeller size and pitch affect the thrust and efficiency.
- Battery Selection:
  - Choose a battery with an appropriate voltage (S) and capacity (mAh) to meet the power requirements of the motors. The voltage should match the motors' specifications, and the capacity determines the flight time.

Example

- Total weight (including frame, electronics, motors, etc.): 2 kg
- Desired TWR: 2:1
- Calculation:
  - Thrust Required: 2 kg×2 TWR=4 kg2kg×2TWR=4kg
  - Thrust per Motor:
    4 kg÷4 motors=1 kg/motor4kg÷4motors=1kg/motor
  - Motor and Propeller Selection: Choose motors with a thrust rating of at least 1 kg each and select propellers that match the chosen motors.
  - Battery Selection: Choose a battery with an appropriate voltage (e.g., 3S or 4S) and capacity to provide sufficient power for the motors and achieve the desired flight time.

How to select the motor?

- https://www.omnicalculator.com/other/drone-motor
- https://oscarliang.com/quadcopter-motor-propeller/