Increasing Drone Flight Times Without Sacrificing FPV Flight Capability

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The purpose of this project was to create a more efficient drone that was still stable enough to fly FPV. The design I am using is a large central propellor to generate most of the thrust and 3 smaller propellors to control the pitch and roll. To maintain control of the yaw axis, the smaller propellors needed to be mounted at an angle to generate enough torque to compensate for the large central propellor. Flight time tests were conducted to compare back-to-back flights of the project drone to a Diatone Roma F4 LR, an efficiency-focused off-the-shelf drone in the target weight category. On the slower flights with the smaller batteries, the project drone had about 30% less flight time. As the speed of the drone flying or the size of the battery increased, the percent difference in flight time went down. Although this drone is less efficient than the Roma F4, this prototype was a success. It is close in efficiency considering the 62-gram difference in weight. 62 grams is 29.67% of the weight of the project drone. I am positive I can remove at least those 62 grams. Efficiency curves are not linear so flight times will probably increase by more than 29.67%. In comparison with the Roma F4, this would lead to a few percent longer flights with slower flights and smaller batteries, and at least 20% longer faster flights with larger batteries. Additional testing was done to predict flight times with removed weight by adding weight. The results showed comparable hovering flight times at the same weight though predicted removed weight and thorough added weight to the lighter Diatone Roma F4 LR.

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