# Improving Multirotor Efficiency and Flight Times

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Multirotor UAVs are quickly becoming popular with everyone from photographers to backyard hobbyists alike. A major drawback of current multirotors is their short flight times caused by inefficiency. The purpose of this project is to increase efficiency and flight times by determining the most efficient propellors for use in the static air conditions encountered in multirotor flight. I collected a set of six of the most popular off-the-shelf propellor choices used for multirotors today and determined the most efficient using two experiments. The propellors were carefully selected as to have the same diameter and pitch, only the designs were different. My research suggested that propellors engineered with lightweight materials and wider chords would perform better than other propellor designs. In the first experiment I built and used a custom test stand to measure the thrust(g) to power used(watts) ratio of each propellor type. The second experiment measured flight times of a specially constructed quadcopter using each propellor type. The results of both experiments confirmed what my research suggested in that the propellors made of lightweight carbon fiber coupled with a wide chord were the most efficient. Since the propellor was constructed using carbon fiber, it achieved the necessary stiffness with a significantly thinner airfoil resulting in less drag and increased efficiency. The wide chord of the propellor prevents the propellor blade from stalling towards the hub. The results of my experiment can be used to design more efficient propellors specifically designed for multirotor use.