Refining Novel Drone Design to Increase Efficiency

Perry, Caden (School: Moscow High School)

The goal of this project was to refine the previously developed propeller configuration and determine its viability in various form factors. This propeller configuration used a larger central propeller (due to increased efficiency of larger propellers) and three smaller outer propellers to increase flight time. Initial testing was done with modified hardware from last year's project to test the effect that outer motor distance and props above vs beneath had on efficiency. It was determined that a 12.3% decrease in motor distance from the center, lowered flight time by 7.4%. A test hover with propellers above resulted in burning motors and 45% increase in throttle percentage to hover. The motor mount design was refined to improve the ease of swapping motors and changing the angle of the motor mount. The inspection-targeted drone and photography-targeted drone were designed to be foldable. The photography-oriented drone is 73.2% of the weight of last year's design while adding a GPS and 4k video camera. The inspection-oriented drone is 89.9% the weight of last year's design. Initial flight testing has shown flight times comparable to the efficiency-focused off-the-shelf drone but no significant flight time gain has been realized. The small-size drone has shown to be the lower limit of current technology with the design. Potential identified issues that will continue to be investigated include central propeller efficiency, central motor efficiency, arm flexing during flight, and angle refinement of the outer motors. With continued refinement, longer drone flight times could be achieved.

Awards Won: