



Portable UAV Launcher

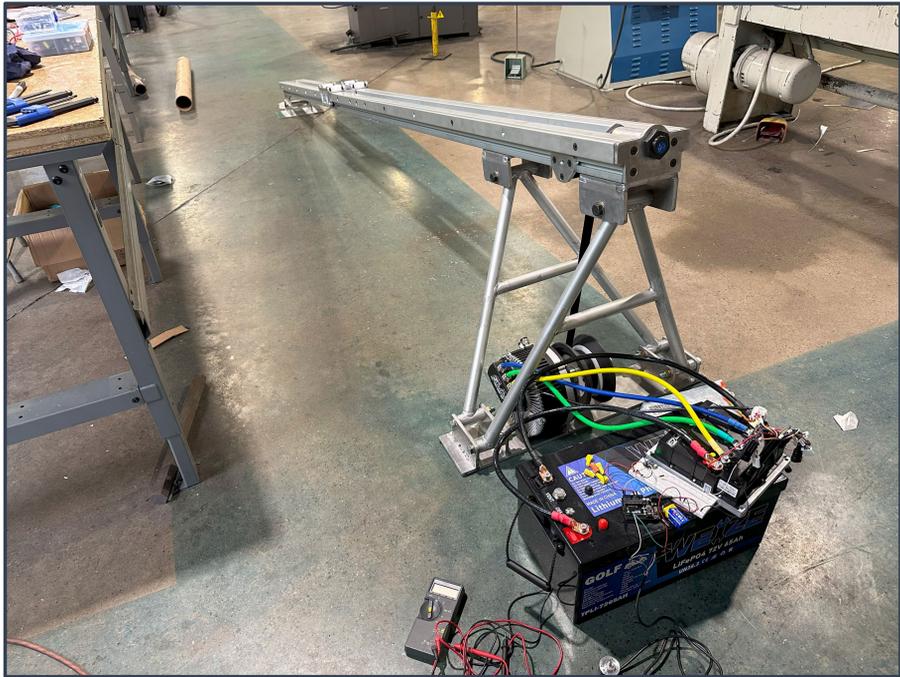
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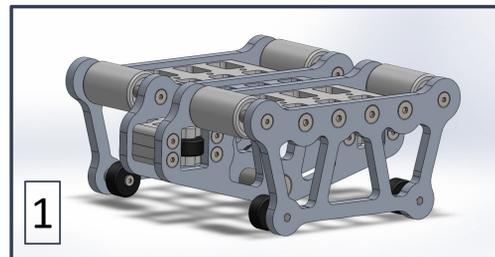
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Project Description

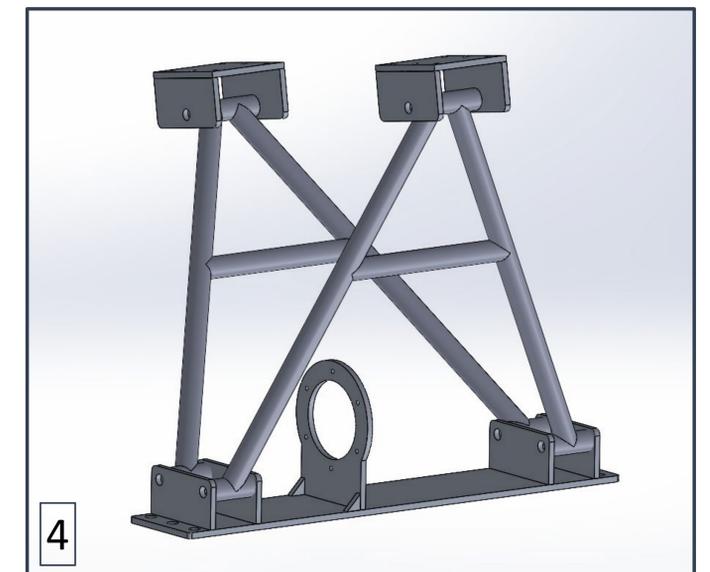
KIHOMAC's current methods for test launching their fixed-wing drones are often damaging, hazardous, inefficient, or inconsistent. Our goal is to design and implement a launch system that offers enhanced control over launch speeds, improves consistency, and ensures the drones remain undamaged. These improvements are crucial for KIHOMAC, as they save both time and money during the testing process.



Design Description



- 1.) Sled – The sled is what will be propelled down the track and houses the drone.
- 2.) Motor – The brushless DC motor rotates the spool which in turn winds up a cable propelling the sled forwards.
- 3.) Damper – The damper is situated at the end of the track and serves as the braking system which stops the sled allowing the drone to launch off.
- 4.) Front Leg Assembly – The front leg assembly holds up the end of the track and is where the motor is mounted.



Performance Review

Requirement/Constraint	Target	Threshold	Predicted Value	Actual Value
Payload	N/A	6.8 kg	6.8 kg	6.8 kg
Launch Velocity	N/A	> 20m/s	26.18 m/s	Not tested
Maximum Acceleration	N/A	< 88 m/s	75 m/s	Not tested
Launch Reload Time	< 1 min	< 5 min	< 3 min	Not tested
Launch Angle	N/A	10 degrees	10 degrees	10 degrees
Attachment to Drone	N/A	Cannot require changes to UAV body	Mounting holes for UAV fixture	Mounting holes for UAV fixture
Size of Launch Rail Sections	< 1.67 m in length	< 2.43 m in length	1.83 m	1.83 m

Conclusion

We were able to deliver a UAV launcher prototype that meets the requirements of correct launch angle, sled with mounting holes for UAV attachment, and modular rail sections for easy assembly. The UAV Launcher can accelerate the sled at tremendous rates. However, due to major design changes late in the year, we ran out of time to be able to test the exact launch velocity, acceleration, and reload time.

Originally, the design was supposed to use linear induction to launch the drone. Most of the year was dedicated to a design we didn't feel confident in implementing safely. We learned that often the simplest solution is the best. We recommend testing the launch velocity, acceleration, and weight of the payload with the drone. Additionally, the Arduino needs to be programmed to utilize feedback from the rotary encoder to get to the correct sled velocity. We also recommend implementing safety features like an emergency shutoff, fail-safe safety pins, and safety procedures for handling the battery.

Special thanks to KIHOMAC for the opportunity to work on this awesome project which gave us real-world experience working on a complex engineering problem. Specific thanks to Adam Grimm for being the point of contact within KIHOMAC and helping us throughout the project.

