TEXAS STATE UNIVERSITY

The rising STAR *of Texas*

M1.02 - Drone Diagnostics VTOL Platform

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Project Description

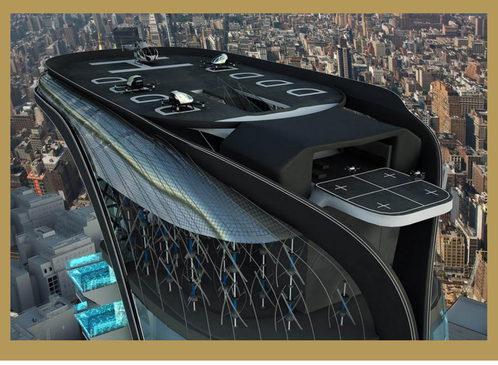
We are developing the supporting infrastructure that any drone must use to operate in the real world. By creating a diagnostic suite aboard every landing pad that regularly evaluates a drone's health before take-off, we can ensure a fleet's safe flight.

Photo courtesy - https://singularityhub.com/2020/07/08/how-drones-and-aerial-vehicles-could-change-cities/

Problem

We are developing a coupling and decoupling mechanism which will be used to test the lift force of each motor, ensuring safe flight.

Photo courtesy - https://humphreys.com/next-generation-apartment-future-concept-design/humphreys-partners-architects-aotf-drone-port/

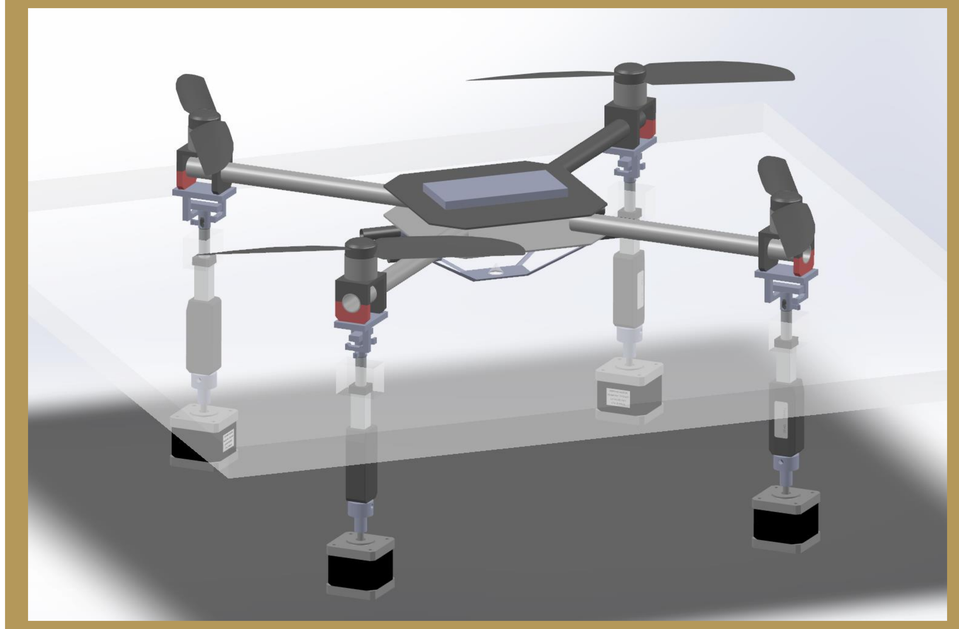


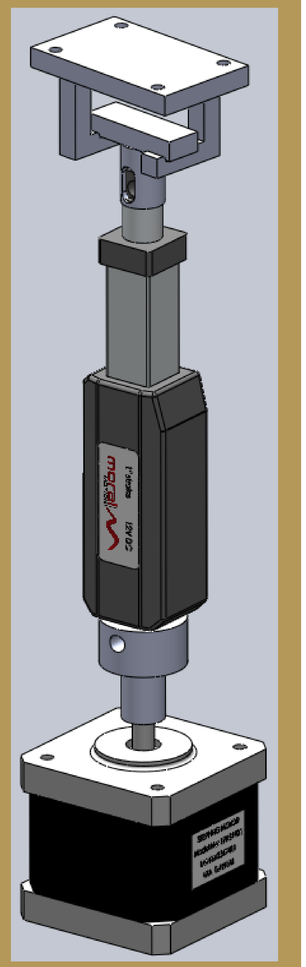
Design

We created a "lock and key" design to couple and decouple the drone using a linear actuator and a stepper motor. The "key" adapter will be connected to a force sensor using a Kevlar cable to test the lift force.

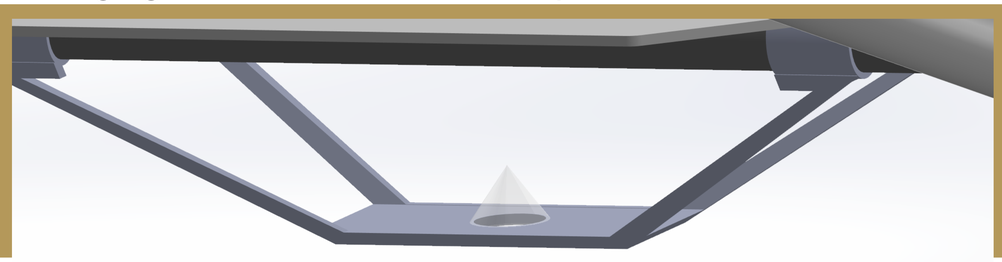
This design:

- Minimizes footprint and mass
- Increases acceptable docking variances
- Increases pad weatherability
- Reduces arm parts and complexity
- Is fully scalable for customer's drones





We have designed a passive system which aligns the drone "locks" with our "keys" as it lands. This includes a replaceable alignment geometry as a wear point prolonging the life of the rest of the platform



Process

Customer needs:

- Repeatable coupling and decoupling mechanism
- Minimize mass on drone
- Coupling must withstand test forces
- Fully scalable design
- Prioritize fabrication

Completed goals

- Statement of work
- IP Research
- Design
- Scale factor analysis
- CAD Models of adapters and assemblies
- Programming arm assembly
- 3d printing of prototypes

Future Scope

- Rapid prototyping and testing
- Geometry refinement
- App development
- Landing pad fabrication
- Final design

Photo Courtesy - https://www.hovergames.com/