TEXAS STATE UNIVERSITY

The rising STAR *of Texas*

Group M2.02 - Airogistic

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airogistic

Project Description

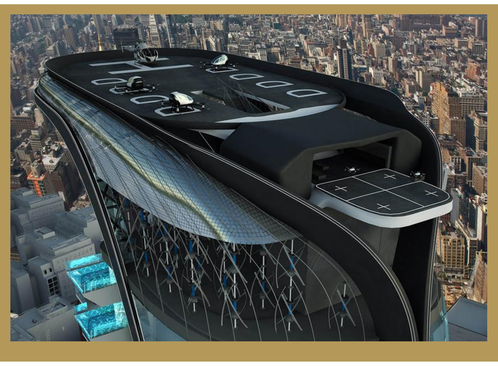
We are developing the supporting infrastructure that any autonomous drone must use to operate in the real world. By creating a diagnostic suite aboard every landing pad that regularly evaluates a drone's health before take-off, we can ensure a fleet's safe flight.

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 each time.

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

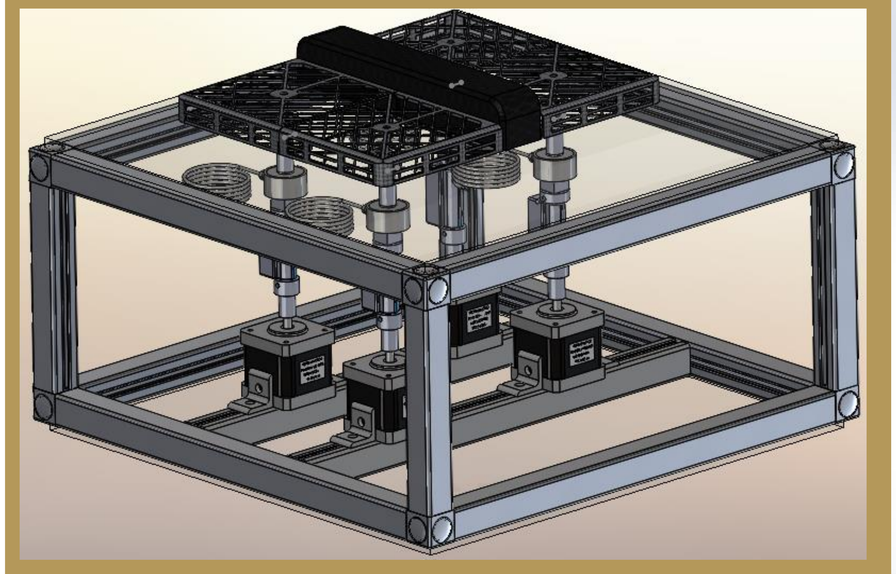


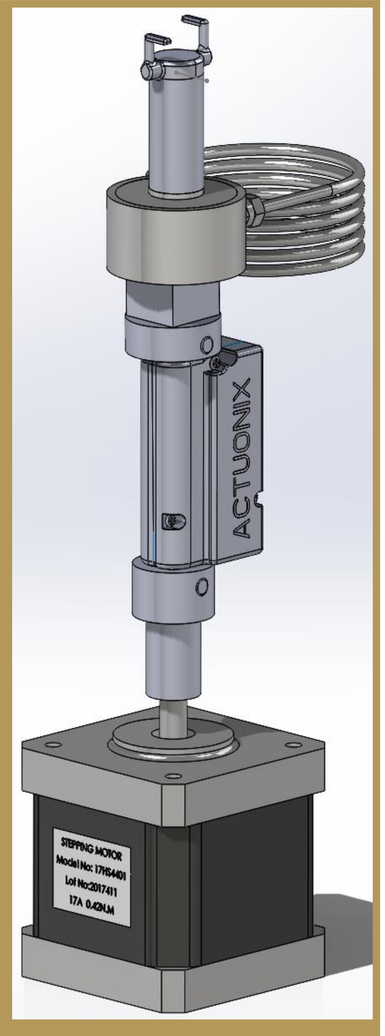
Design

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 load cell to test the lift force.

This design:

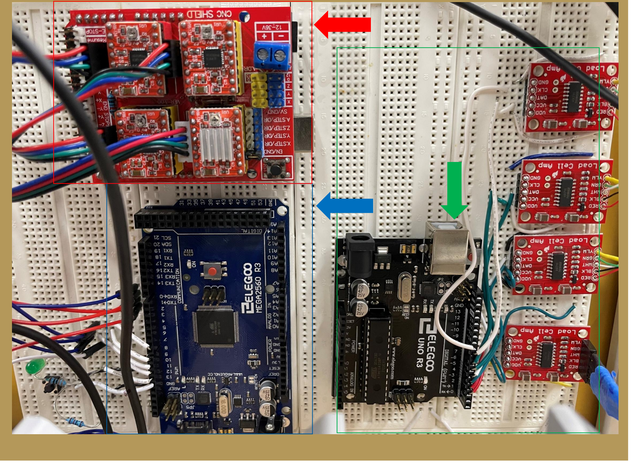
- Minimizes footprint and mass added to the drone
- Reduces arm parts and complexity
- Is fully scalable for customer's drones





Designed and programmed a control system for coupling and decoupling:

- Linear actuators (blue)
- Stepper motors (red)
- Load cells (green)
- Data collection (green)



Process

Customer needs:

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

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 recommendations

- Make the adapters out of aluminum
- Mold the adapters into the drone body
- Create unified controller system
- Optimize code to integrate sensor system for drone coupling and decoupling

Photo Courtesy - https://dronelife.com/2018/11/08/new-hover-2-drone-will-launch-next-week/