

M2.03 – Airogistic Diagnostic Landing Pad

Katherine Ausanka, Jordan Smesny, Nate Lazaga, Sergio Sepulveda, Stephen Marines
Sponsors: Jeff Michalski

Project Purpose

UAV's (Unmanned Aerial Vehicles) are becoming more prevalent as new technology emerges and it is critical to have an autonomous diagnostic system in place to ensure safe flying. This project is in tandem with electrical and industrial engineering students to develop autonomous diagnostic systems for a drone landing pad. This includes a sensor actuator (temperature, RPM, audio, and microphone), frame stabilization, and force sensor coupling.



Problem Statement

When a drone is ready for flight, there needs to be sufficient pre-flight diagnostics in place to ensure the drone will not fail while in the air. Since drones are autonomous, there must also be an autonomous way of taking sensor readings. This is especially important if the drone landing pad is in a remote location.

Customer Requirements

Side Sensor Actuator

Must retract upon loss of power and be able to account for XY/yaw landing variability

Sensors include:

- Temperature:** measures motor heat during operation
- RPM:** determines how fast propeller blades are spinning
- Audio/Microphone:** looking for anomalies in bearings

Force Sensor Coupling

Be able to withstand 3.7 N of force and account for XY/yaw landing variability

Force Sensor: measures the lift each motor provides through tension

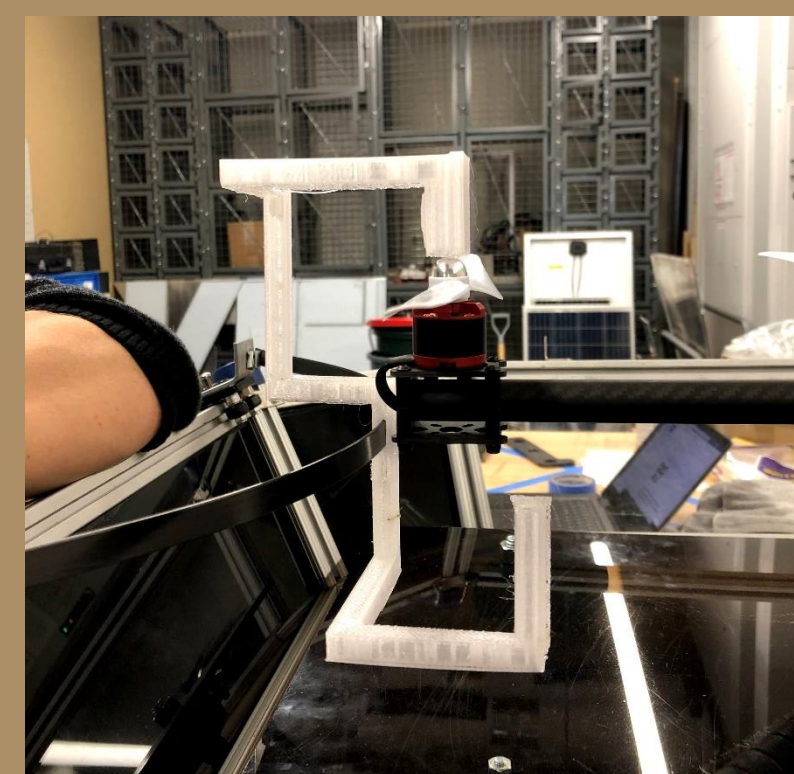
Frame Stabilization

Must allow the landing pad to be moved and maintain structural integrity

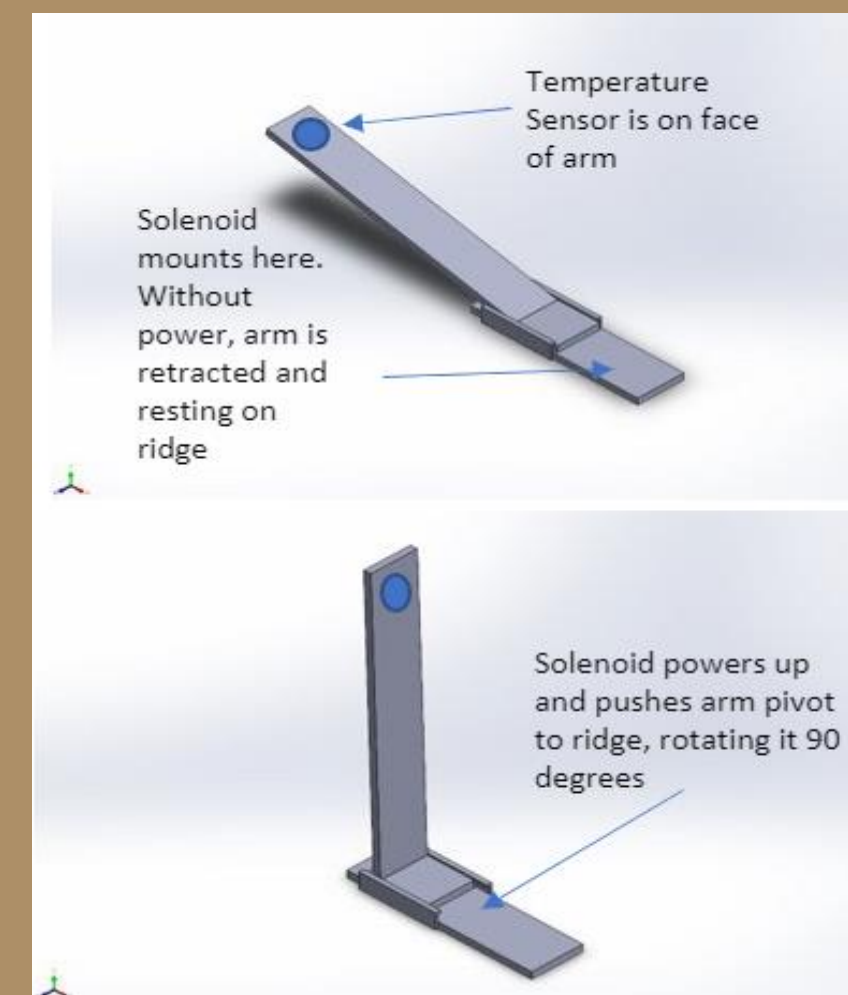
Spring 2021

Side Sensor Actuator

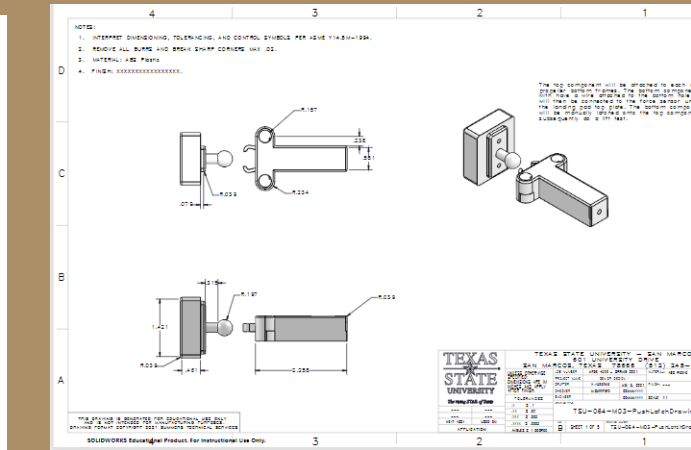
Previous Work (2020)



Spring 2021



Force Sensor Coupling

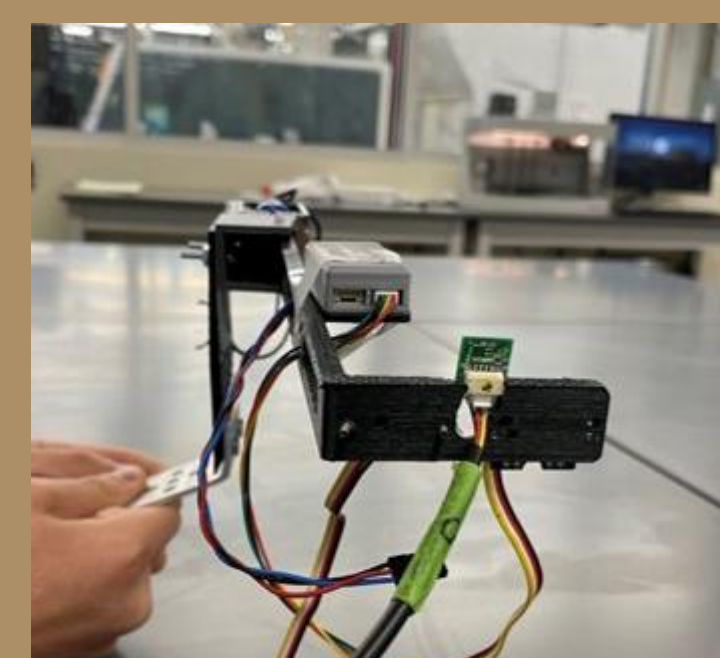


Fall 2021

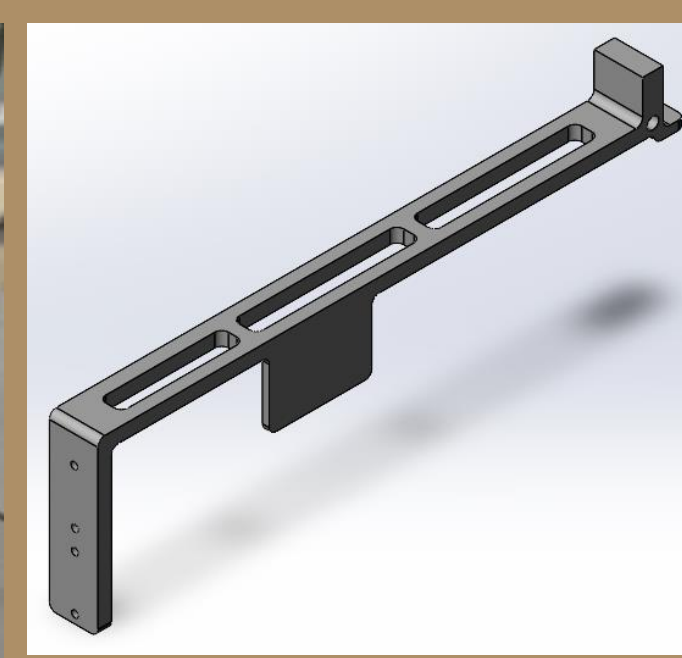
Side Sensor Actuator



End Effector Assembly



Full Assembly

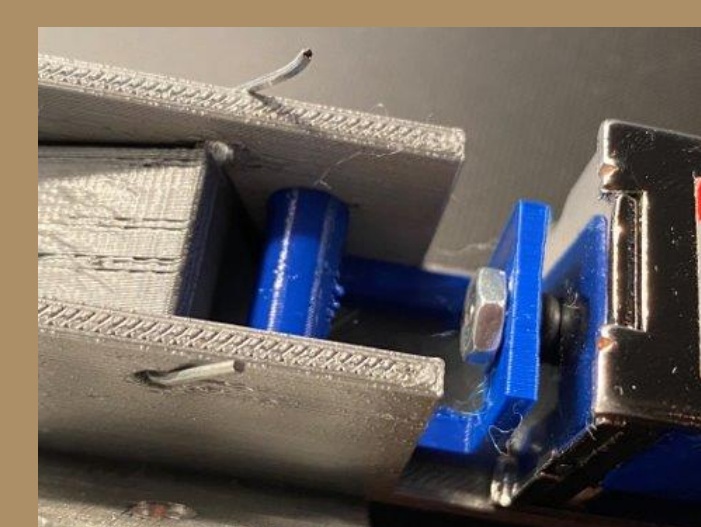


End Effector CAD Model



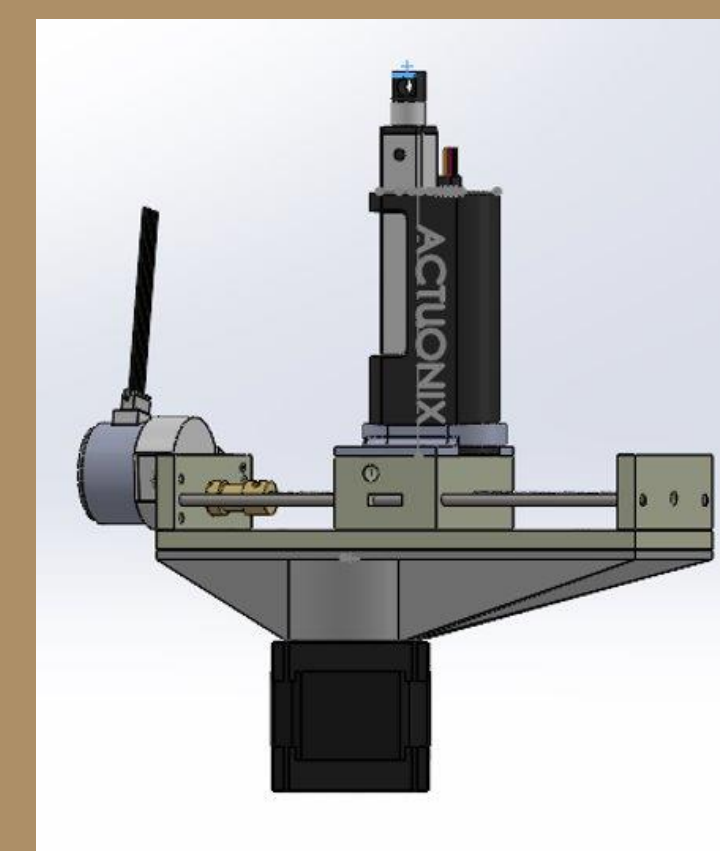
Internal Mechanism Retracted

Internal Mechanism Extended

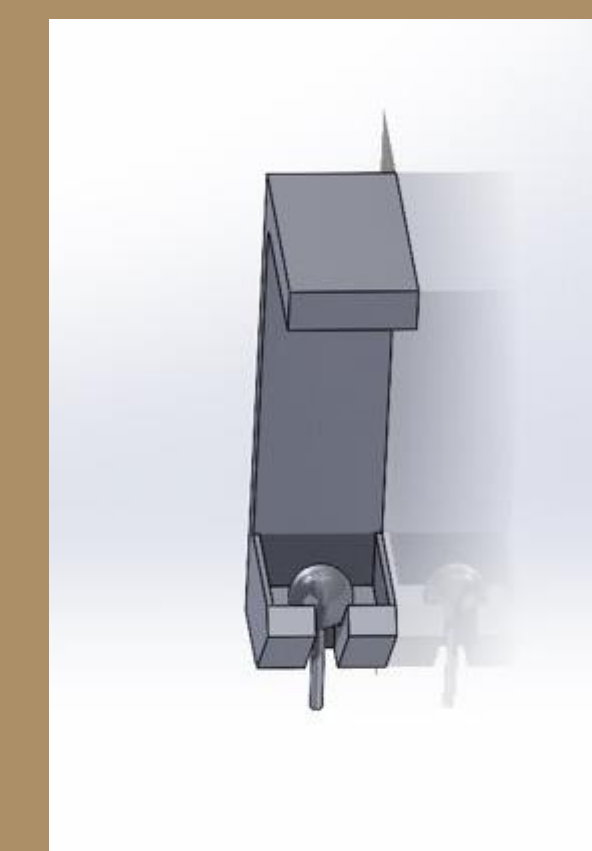


Internal Mechanism

Force Sensor Coupling



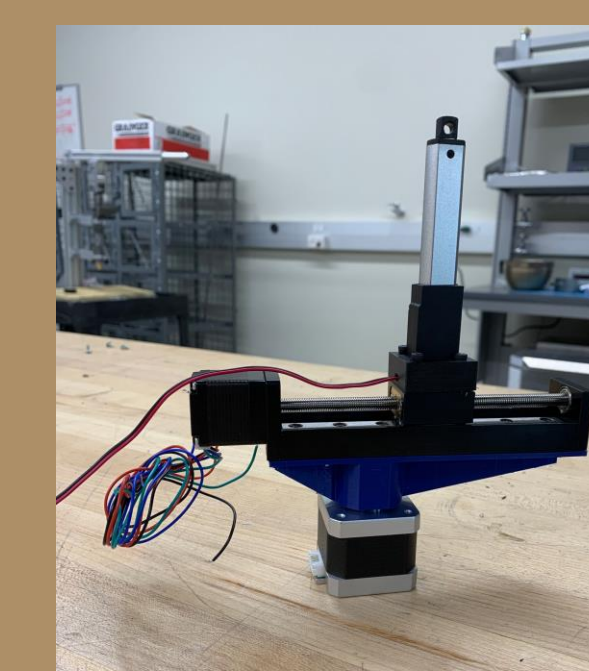
Actuator CAD Model



Hook System CAD Model

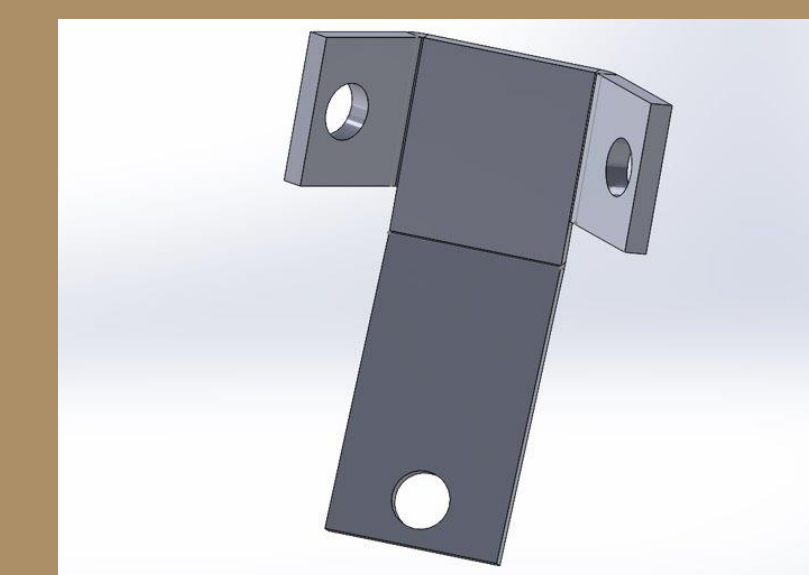


Hook System on Drone Propeller



Actuator Assembly

Structural Improvements



T-bracket CAD Model



Previous Bracket



Current Bracket

Landing Pad Assembly



Future Work

Side Sensor Actuator

- Improve cable management and stop mechanism
- Fine tune actuation motion
- Power solenoid for autonomous movement

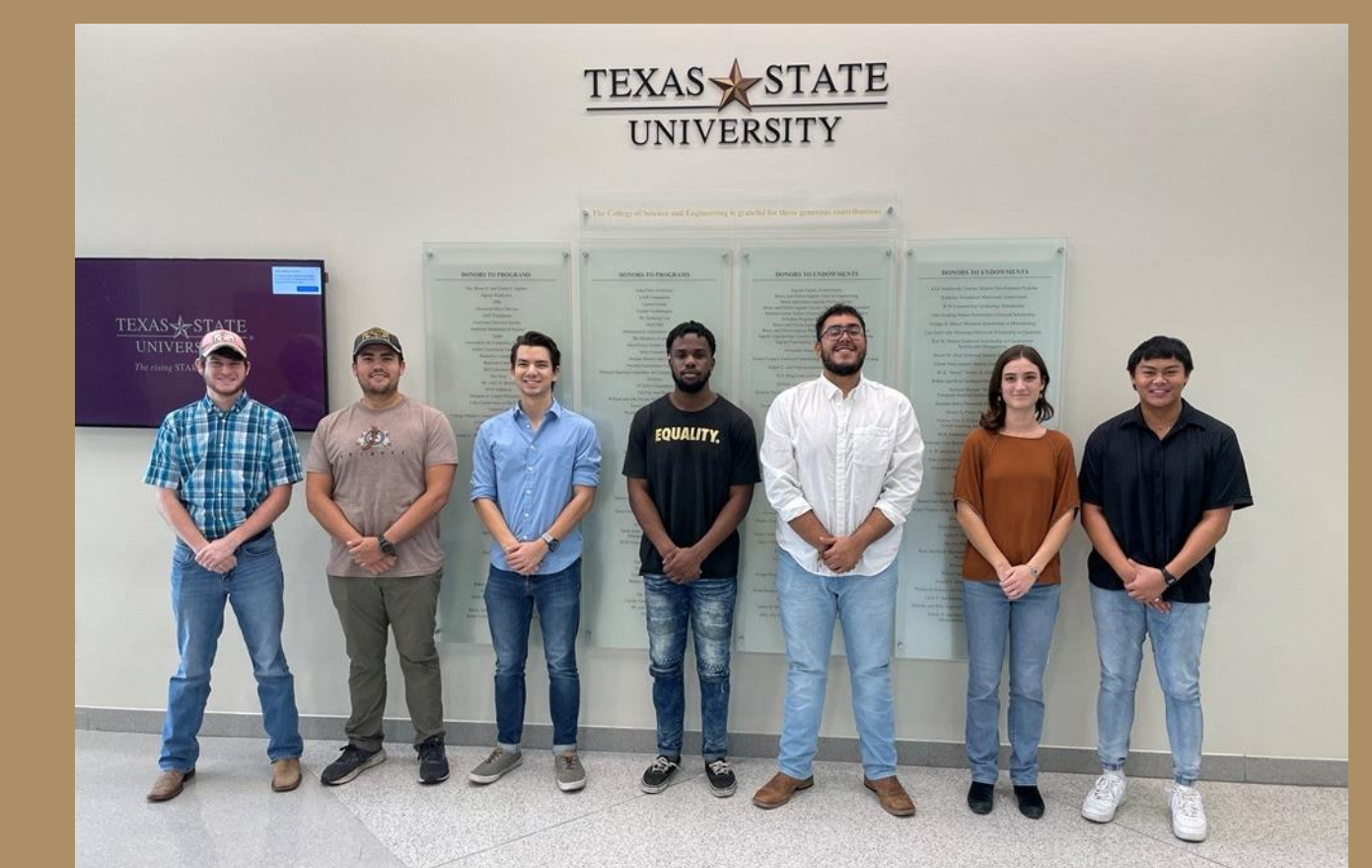
Force Sensor Coupling

- Completion of actuator and coupling fabrication
- Testing with EE team powered coupling of drone at different landing positions

Structural Improvements

- Complete fabrication and installation of t-brackets for all joints

Team Members



Left to right: James Smetzer, Stephen Marines, Jordan Smesny, Victor Ekwuribe, Sergio Sepulveda, Katherine Ausanka, Nate Lazaga

Acknowledgements

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