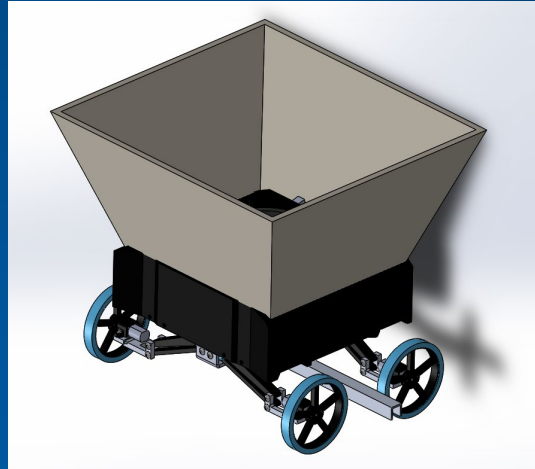# Safe Fall I
*George Carson, Tate Cervera, Thomas Hendrix, Ryan Nelli*

## Project Summary

- Lockheed Martin seeks to improve aircraft inspections by implementing Crawler Drone Technology. However, unexpected events occasionally cause the drone to fall, resulting in FOD and potentially becoming a safety issue. A Safe Fall System is thus needed for the drone in order to reduce/eliminate damage and FOD caused by falls.

## Design Concepts

- ABS frame

- TPU shell

- Aerodynamic feature

- Machined motor mounts

- Aluminum side impact protection arms



*Isometric view of final design*
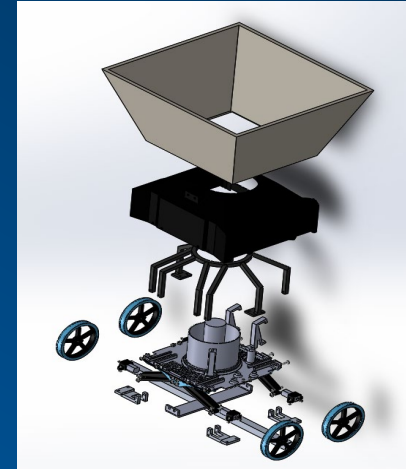


*Exploded view of final design*

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<u>Results</u>

- Two drop tests were done at a height of 10 feet

- Initial tilt orientations of 90° and 180° (upside down)

- Drone reoriented within 8 feet of fall distance

- The drone remained largely intact after first drop, but the wheels did detach from axles

- The only observed failure point after the second drop test was in the plastic suspension arm
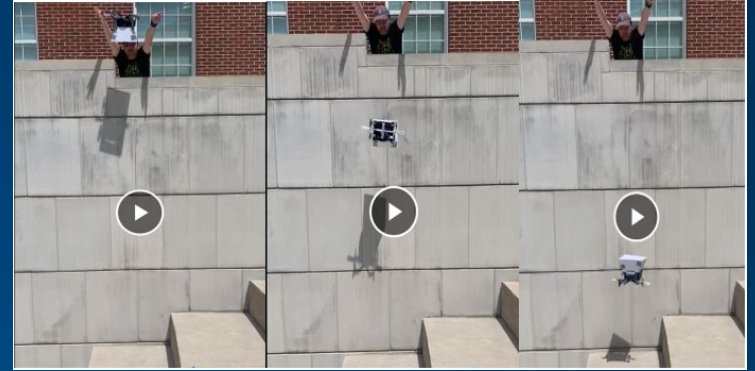


*10-foot drop test with 180° initial tilt orientation*

<u>Recommendations for Future Development</u>

- Implement Lidar sensors to shut off fan

- Machine suspension arms out of aluminum, similar to the modified motor mounts

- Fix wheels more securely to axles using adhesive

- Add TPU bumpers to the ends of the aluminum side impact arm

- Test different positions for the aerodynamic feature to optimize the impact orientation