

**FIU**

Applied Research  
Center



**DOE-FIU Cooperative Agreement Annual Research Review – FIU Year 1**

# **Robotic Application of Coatings in the SRNL H-CAEX**

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*Worlds  
Ahead*

*Advancing the research and academic mission of Florida International University*

# Robotic Application of Coatings in the SRNL H-CAEX

## Overall Needs:

- Corrosion mitigation within H-Canyon Exhaust Tunnel
- Application system that can withstand environmental conditions:
  - 30 MPH or higher winds
  - Concrete debris
  - High humidity and moisture levels
  - Presence of radiation and nitric acid vapor

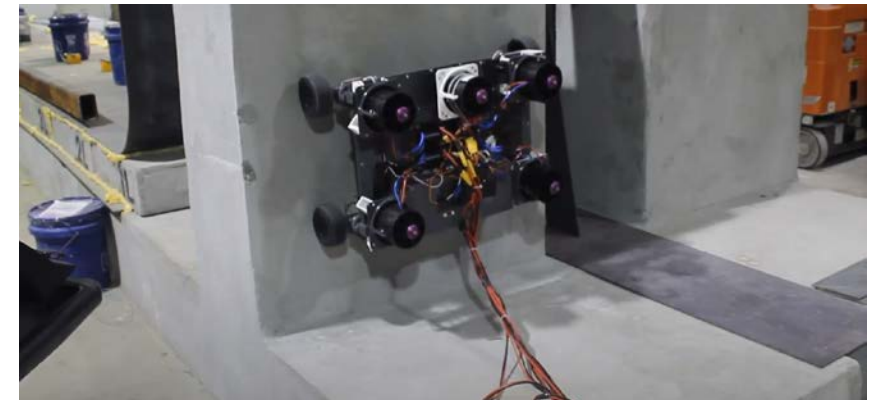
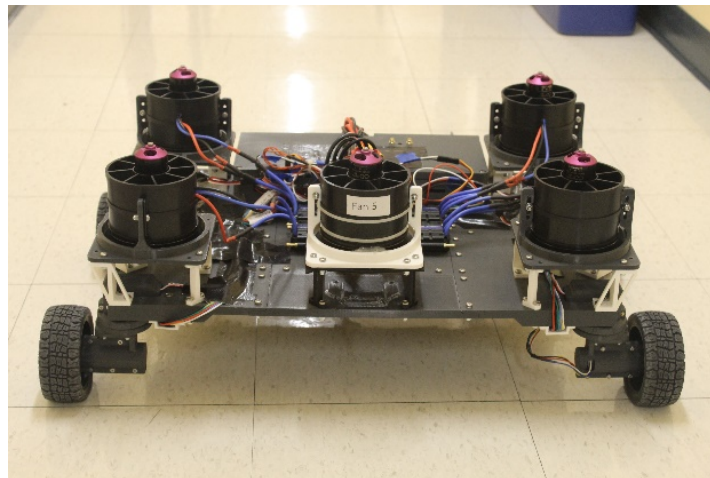
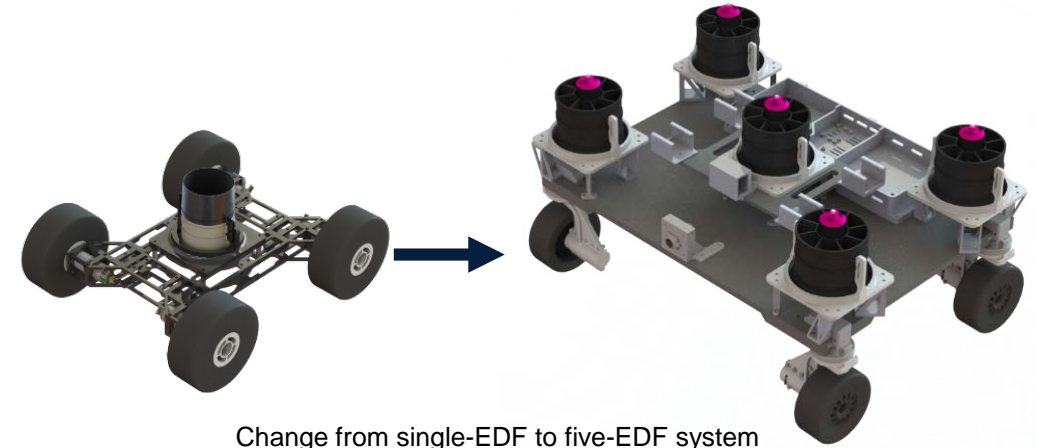
## Objectives:

- Develop a robust robotic system with vertical wall traversal capability
  - Transition capabilities between horizontal and vertical surfaces
  - Robust surface adhesion mechanism via EDF thrust
  - Payload capacity for application mechanism



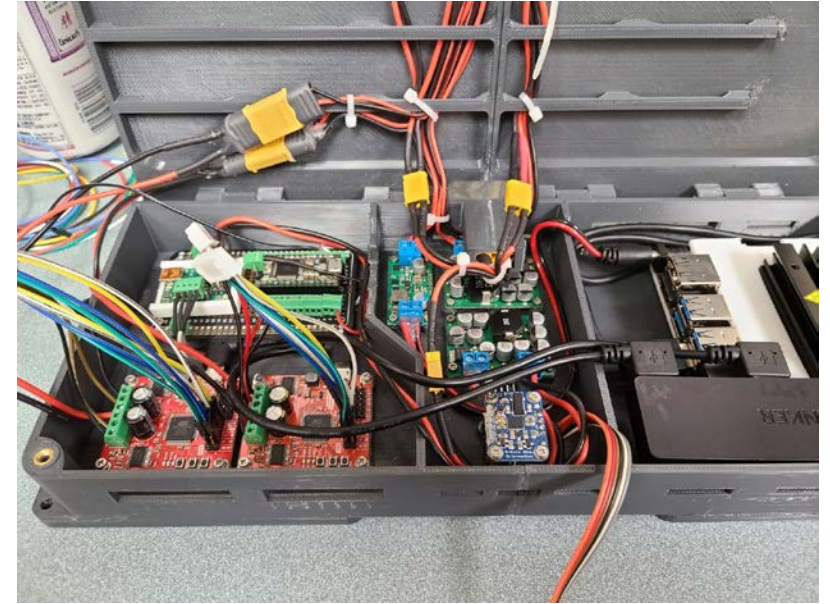
## FIU Year 1 Highlights:

- Platform expansion to five-EDF unit
  - Larger platform size for improved potential applicator surface area
  - Omnidirectional drive allows for forward/backward and strafing motions
  - Slide-in drive units for ease of maintenance
  - Initial interlocking 3D-printed chassis design

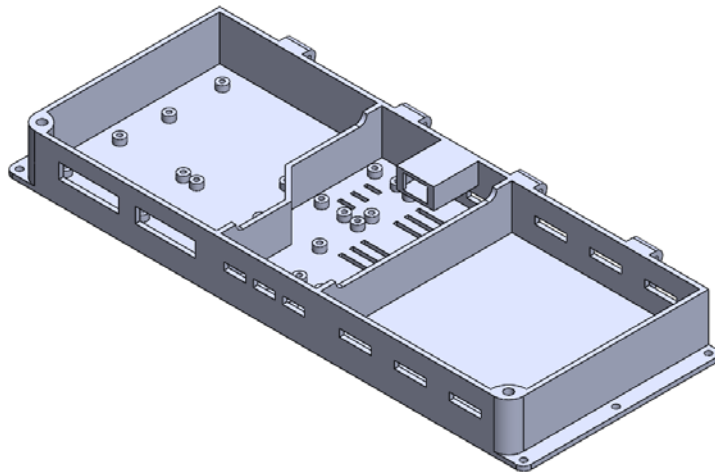


## FIU Year 1 Highlights:

- Control box prototype developed
  - Housing designed and printed to accommodate majority of electronic components
  - Contains system-on-a-chip, microcontroller, motor controllers, and power distribution
  - Designed to operate different iterative platform configurations via ROS



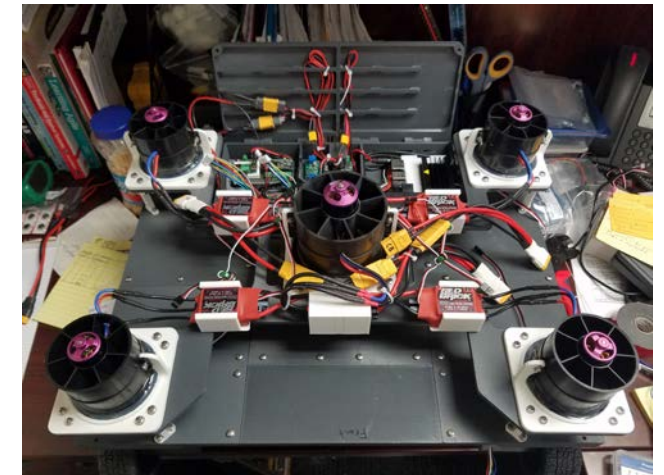
Populated control box



Control box housing model



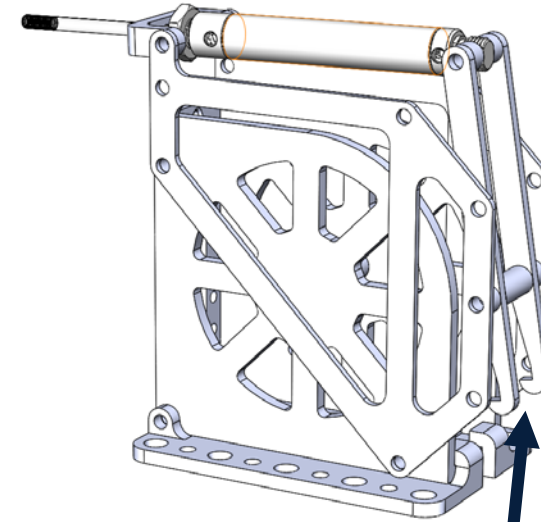
Printed control box housing



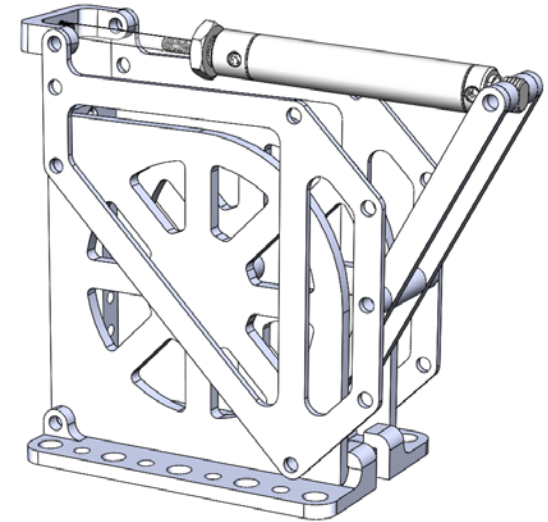
Control box installed on platform

## FIU Year 1 Highlights:

- Testing safety harness for platform developed
  - Manually operated safety harness to catch platform in case of failure during testing
  - Pneumatic system with mechanical catch for reliable operation
  - Two units constructed to work in conjunction with each other



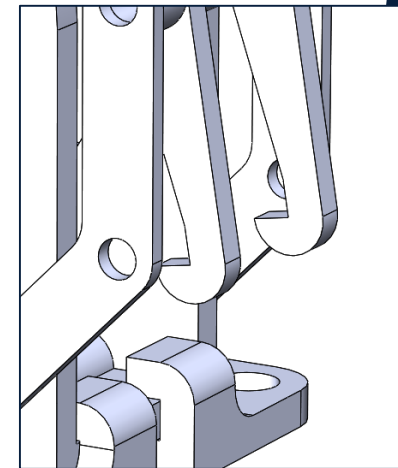
Piston retracted



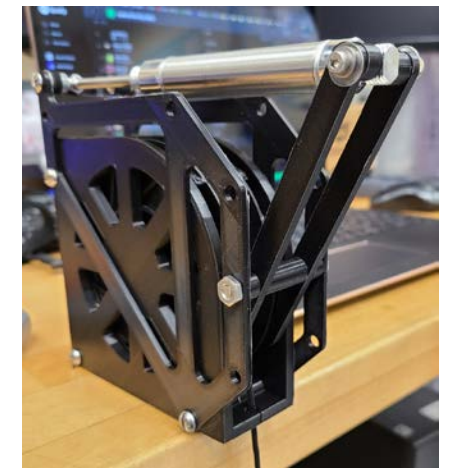
Piston extended



Safety harness in use



Closer view of catches



Constructed unit

## Future work

- Continue iterative development of climbing platform
- Complete manufacturing of carbon fiber chassis
- Blade degradation literature review
- Debris ingestion study on EDF performance



Debris ingestion test setup

## Acknowledgments

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Thank You. Questions?