Exceptional service in the national interest

SAND2019-9165PE

Tethered Multi-Rotor System Development:

Technology Overview & Status

August 1, 2019

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.
R&A Tracking No. 877732

TMRS Ground Taker Summary

Funding agency/POC: DTRA/JIDO, Michael Dillard
End user POC: James Harvey, Naval Special Warfare Command

Project Summary

Project began in April 2018

Objective: Develop, test, and deliver a Tethered Multi-Rotor System to supply command & control, power, and data feeds to a hexacopter UAS for use as an aerial platform for communications, intelligence collection, and CUAS purposes.

Accomplishments

Complete

- Demonstrated prototype system, flights to 300+ ft under software control, power and comm over tether

In process

- Integration of remaining payloads
- Engineering fix for two issues (required for functionality)
  - Thermal management in UAS body
  - Tether fatigue/early life failure
- Further design upgrades desired, TBD based on funding

Deliverables and/or Milestones

Milestone	Original	Actual (*Planned*)
Project kick-off upon receipt of funding	4/2018	4/2018
Preliminary Design Review	8/2018	10/2018
Critical Design Review	12/2018	1/2019
Initial Prototype complete	2/2019	*5/2019*
Prototype demonstration at SNL	4/2019	*7/2019*
Final delivery	5/2019	*12/2019*

Top Risks & Issues

- Inability to build off previous TMRS system significantly increased development cost & schedule
  - Original proposal plan included using a previously developed reel system and control software; however they did not support current requirements

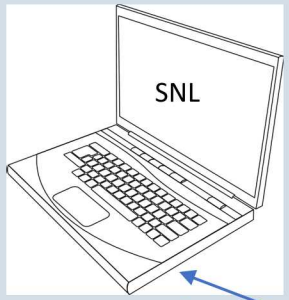
Current system shown with simulated payload

HIGH LEVEL SYSTEM OVERVIEW

SNL UAS (unmanned aerial system)

MITLL Wide-Area Imager (WAMI)

SNL tether for power, C2 and fiber optic comm



Ethernet connection (SNL)

WAMI server (MITLL)

Ethernet connection (SNL)

fiber optic connection (MITLL)

fiber optic connection (SNL)

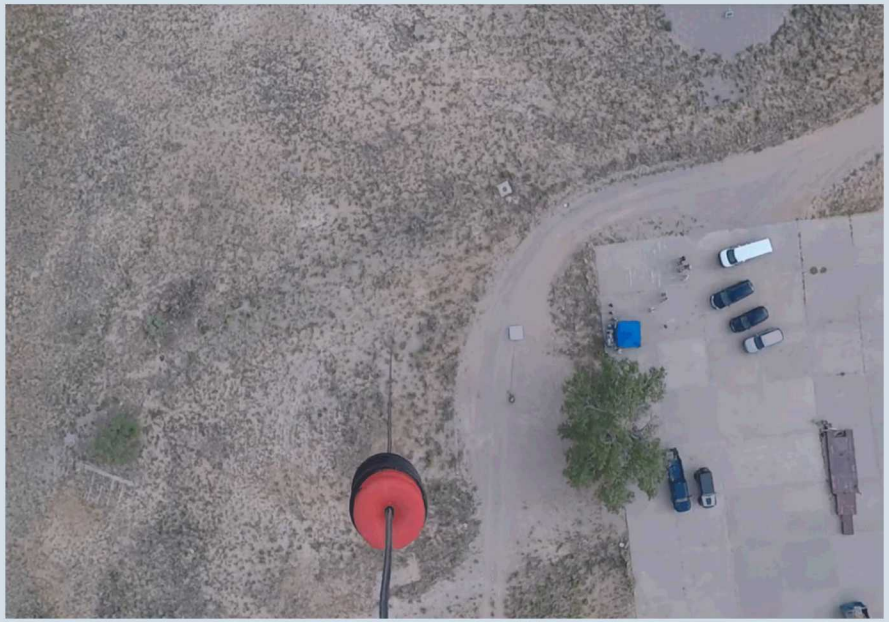
Active control tether reel (SNL)

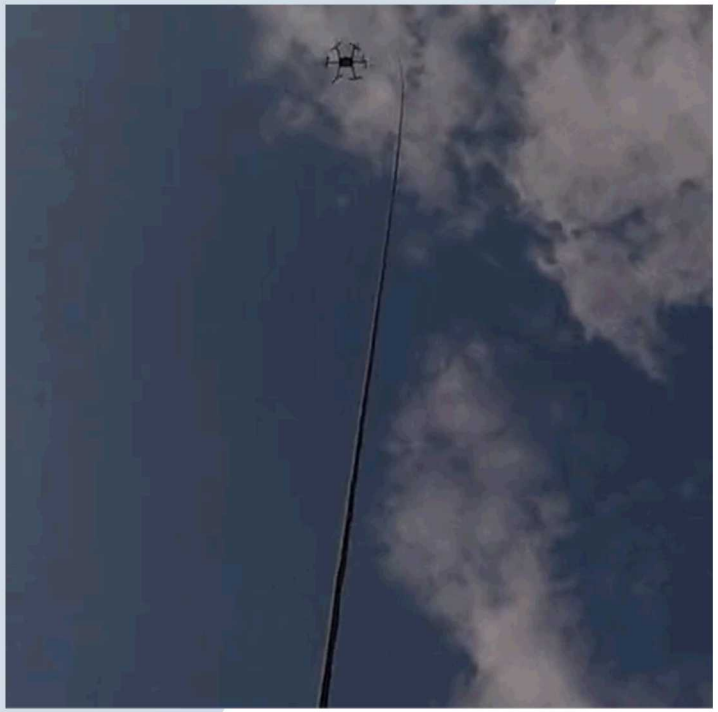
Comm breakout box (SNL)

SYSTEM DEMONSTRATION – 07/23/2019

System Launch

View from Onboard GoPro at 300’ AGL





Reel Mounted GoPro: 100’ AGL, ~10 mph cross-wind