Department of the Navy SBIR/STTR Transition Program

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NAVAIR SPR Number: 2022-847

Topic # N192-062
Autonomous Unmanned Aerial Vehicle (UAV) Flight Without Supervisory Control
ANDRO Computational Solutions, LLC

WHO

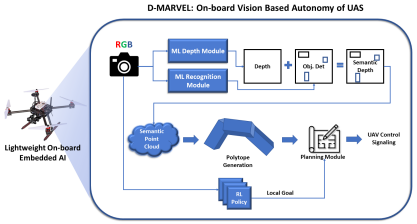
SYSCOM: NAVAIR

Sponsoring Program: PMA268 Navy Unmanned Combat Air System Demonstration

Transition Target: Small multi-rotor UAS e.g. Indago 3

TPOC: (301) 342-3728

Other Transition Opportunities: Other Group 1 & 2 UAS, such as fixed-wing (RQ-23 TigerShark, Boeing MQ-25 Stingray, MQ-4C Triton), multi-rotor (R80D SkyRaider, MQ-8 Fire Scout) and hybrid (Stalker VXE, V-BAT 128) models



Notes: In the Diagram:
-Semantic point clouds are constructed from depth and object recognitions and used to create 3D semantic occupancy grids generating a common operating picture.

-The RL engine and planning algorithm jointly compute actions to be executed in the environment

-The characteristic efficient (low SWaP) sensor configuration and modular design of D-MARVEL allows for application to a variety of hardware platforms

About the Company: ANDRO Computational Solutions, LLC was the recipient of the prestigious Tibbetts Award in 2015 for excellence in conduct of the federal SBIR/STTR program. ANDRO has several successful Phase III, developed SBIR-based commercial products, and have licensed software to larger defense contractors.

WHEN

Contract Number: N68335-20-C-0964 **Ending on:** Oct 14, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Final ANDRO Demonstration	Low	Demonstration of Collision Avoidance & Navigation, NUI	6	4th QTR FY22
NAVAIR Test Facility or Representative Location Demonstration.	Medium	Demonstration of the technology in a military relevant environment	7	2nd QTR FY23

WHAT

Operational Need and Improvement:
Lightweight autonomy framework for GPS-denied UAS which adapts to dynamic mission scenarios while enabling robust collision avoidance and seamless interoperability with human warfighters.

Specifications Required:
Provide unmanned aerial systems (UASs) with the capability to autonomously conduct flight from takeoff to landing, modifiable in real time by a human-in-the-loop or an Operations Center Supervisor (OCS) in real time without assuming a constant data link.

Technology Developed:
D-MARVEL offers a novel modular approach to autonomy for UAS, leveraging the best of both traditional autonomy approaches and machine learning based approaches. The developed framework provides robust autonomy from machine vision and perception avoiding the need for costly ranging sensors and long hover times.

Warfighter Value:
-The technology will provide autonomous resupply and exploration support in GPS-denied and broken data-link environments.

-The Natural User Interface will provide human-warfighter interactive control via physical body signals and will allow the warfighter to direct the UAS in a more natural way without the need for a dedicated data-link.

-D-MARVEL enables GPS-denied navigation via sensor fusion and machine vision, leading to increased mission survivability and efficiency.

-Machine vision used to perceive the environment onboard the UAS, producing depth maps and object detections, providing operational awareness.

HOW

Projected Business Model:
Two-fold commercialization opportunity:
(i) D-MARVEL's modular software design allows for portability to a multitude of UAS platforms and
(ii) (ii) The sub-components of D-MARVEL, such as collision avoidance algorithms for standalone UGV or UAS, may be licensed for DoD or commercial unmanned systems.

Company Objectives: Transition the technology into a program of record and eventually offer as a standalone product.

Potential Commercial Applications:
Infrastructure:
Investment monitoring, maintenance, asset monitoring
Insurance:
Risk monitoring, risk assessment, and claims management and fraud protection
Other:
Transportation, media and entertainment, telecommunications, agriculture, security, and mining industries.

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