Department of the Navy SBIR/STTR Transition Program

Topic # N193-145
Defensive Coordinator for Autonomous Countermeasure Systems
Aptima, Inc.

WHO

SYSCOM: NAVAIR

Sponsoring Program: NAVAIR

Transition Target: PMA-281 Strike Planning & Execution Systems

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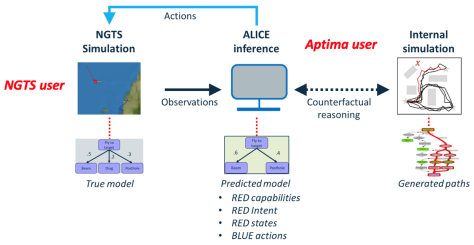
Other Transition Opportunities:

Notes: ALICE II - Adversarially Learned Inference for Countermeasure Exploitation



Aptima 2023

WHAT

Operational Need and Improvement: In the world of autonomous vehicles, agents make intelligent decisions not only when acting to achieve their own goals, but when interpreting the goals of others to inform their own actions. In the case of unmanned air systems (UAS), the goals of others can often be nefarious.

Specifications Required: Develop novel Artificial Intelligence (AI) methods that predict future actions of an adversary using their assets, the arrangement of those assets, and the recent behaviors of those assets. In the case where adversarial action can result in a “mission kill”, “hard kill”, or “soft kill” of U.S. assets, develop additional AI methods to automate a countermeasure response coupled with maneuver and pattern egress from potentially lethal encounters. Additionally, ensure that precautions are in place to avoid leading an encounter into an unintended escalation. Knowledge gained from this effort could further allow the DON to counter known vulnerabilities in autonomous capability design efforts.

Technology Developed: Aptima and our partner ASEC are proposing to develop the Adversarially Learned Inference for Countermeasure Exploitation (ALICE) solution. ALICE uses a generative model to find courses of action (COAs) that maximize information gain while minimizing risk to BLUE assets. ALICE will also design and develop a human-machine interface that ensures that the decisions made by the automation are understandable to human operators. ALICE will not only select the best actions for our own UAS, but will also seek to prompt the enemy into action in order to uncover some information about the enemy’s goals or capabilities. Finally, ALICE will leverage the team’s multi-domain expertise in order to better understand how a UAS needs to work in the larger operational system.

Warfighter Value: The end result for the Warfighters, especially those utilizing UAS assets in operational environments, is that ALICE will maintain situational awareness of known threats and real-time threat activity in order to optimize the countermeasure response and successfully maneuver through the threat environment.

WHEN

Contract Number: N68335-21-C-0450 **Ending on:** Jun 01, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
ALICE model developed	Low	ALICE model developed and tested in originally proposed environment of NGTS	4	1st QTR FY24
ALICE model integrated in relevant environment	Medium	ALICE model integrated in new environment that aligns with transition target	5	1st QTR FY24
Improve ALICE model to hide Blue force actions	Low	Enhanced model capabilities	5	2nd QTR FY24
Demonstration of ALICE	Medium	Demonstrate ALICE to customers	5	2nd QTR FY24

HOW

Projected Business Model: Software-as-a-Service (SaaS) model

Company Objectives: Since 1995, Aptima’s mission has been to optimize and improve human performance in mission-critical, technology-intensive settings. We apply deep expertise in how humans think, learn, and perform to today’s challenges.

Potential Commercial Applications:

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