Topic: N132-134

TechFlow, Inc.

High Power Radio Frequency (HPRF) Dynamic Surface Engagement Modeling and Simulation Tool

High Power Radio Frequency (HPRF) Dynamic Surface Engagement Modeling and Simulation Tool: This product establishes the requisite modeling and simulation framework to provide battlespace decision-makers capability to preview surface engagement scenarios for naval assets employing Directed Energy weapons in their battlespace environments. It enables user to understand the impact of HPRF weapons on their adversaries during realistic wargaming situations and can be adapted to Land, Air, Sea, Space, and Cyber environments. TechFlow Inc. specializes in the physical sciences of Directed Energy and Laser Technologies and integrates those technologies with its information technology (IT) and Cyber capabilities to provide end-users with robust user interfaces from timely, accurate information. TechFlow Inc. services both government and commercial markets with leading technologies and products to preserve our national and economic security.

Technology Category Alignment:

Advanced Electronics
Autonomy
Electronic Warfare (EW)
Energy & Power Technologies
Sensors

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SYSCOM: ONR
Contract: N00014-15-C-0156

Department of the Navy SBIR/STTR Transition Program

STATEMENT A. Approved for public release; distribution is unlimited.
ONR Approval # 43-2203-16

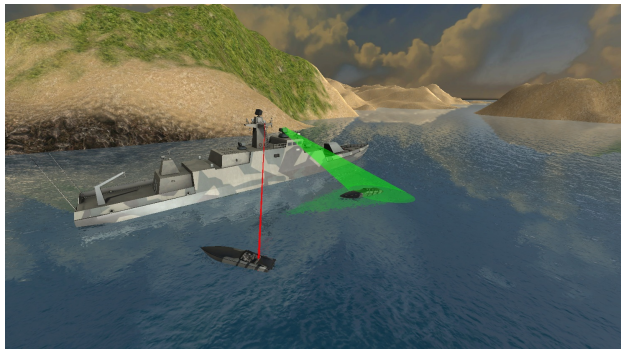
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WHO

SYSCOM: ONR

Sponsoring Program: ONR Code 35 Directed Energy Weapons

Transition Target: Athena, an autonomous agent-based littoral combat modeling and simulation tool designed to simulate combat between friendly and enemy forces. Athena endows "agents" with individual rules of motion and decision-making and can be configured to react under various situations with a multitude of high-powered microwave, laser, and kinetic weapons. Athena's GPU-based technology 3D photo-realistic renderer supports multi-scenario vantage point observation, and multi-scenario information gathering and statistical analysis.



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Other transition opportunities: Athena is extensible for Air Force, Army, Marine Corps and Coast Guard application. It simulates directed energy (DE), kinetic weapons, and electronic warfare (EW) air or land engagement strategies. Athena plans offensive and defensive strategies involving unmanned autonomous vehicle (UAV) swarms, non-lethal riot control and force protection engagement scenarios.

WHAT

Operational Need and Improvement: With the advent of non-lethal weapons alongside conventional weapons in the battlespace, the need has arisen for a tool to simulate the dynamic aspects of engagements where such weapons are employed. Such a tool will allow the effectiveness of non-lethal weapons to be assessed, and will assist in the development and analysis of optimal engagement scenarios. This tool should employ graphical views of the scenario and resulting analysis data, and should allow analysts and planners to create, observe, and analyze combat and engagement scenarios with minimal configuration. The capability should enable analysts and planners to explore "what if" scenarios to assess the effectiveness of both existing and hypothetical weapons, vehicles, and situations.

Specifications Required:
- Able to run on COTS hardware
- Accessible to non-computer experts
- Accurate HPM weapons modeling
- Fully user configurable

Technology Developed: TechFlow's initiative extends previous work carried out at the Naval Postgraduate School and other Navy organizations to develop an agent-based model of combat. It also extends work performed by the Navy and other military branches regarding the use of non-lethal weapons in combat scenarios.

Warfighter Value: This work benefits the warfighter by providing a better understanding of how non-lethal weapons can affect combat scenarios. TechFlow's Athena simulation tool will help military planners and strategists visualize different combat strategies using both non-lethal and conventional weapons and analyze the effectiveness of such strategies, including loss of life. Athena supports development of combat strategies that maximize the ability to stop the enemy with minimal risk to the warfighter.

WHEN

Contract Number: N00014-15-C-0156 **Ending on:** November 11, 2016

Milestone	Risk Level	Measure of Success	Ending TRL	Date
GUI Completion	Low	Working GUI	4	February 2016
Terrain Incorporation, 3D Rendering	Med	Acceptable Visualization	4	April 2016
Agent Rules	Med	Acceptable autonomous agent action	5	November 2016
HPM Weapons Simulation	Med	Corroboration with existing databases	5	November 2016
Monte Carlo Analysis	Low	Corroboration with known scenario results	6	November 2016

HOW

Projected Business Model: TechFlow will develop software licenses and for commercial clients licensing fees for the various modules and libraries that make up the Athena simulation tool. These modules and libraries will cater to the various US Department of Defense (DoD) and other civilian agencies. TechFlow anticipates that certain modules or libraries, particularly those relating to the operational characteristics of US DoD vehicles, aircraft, and vessels, as well as certain weapon capabilities will be classified or restricted in nature and will therefore be protected accordingly. TechFlow anticipates that more applications of Athena will continue to present themselves as ever greater functionality is incorporated into the tool. TechFlow plans to develop a licensing model, coupled with requisite maintenance and support contract structure, to provide a sustained revenue stream that will enable continued development and improvement to the Athena simulation framework.

Company Objectives: TechFlow intends to develop a sustainable licensing, maintenance, and support model for providing the Athena simulation tool and its various modules and libraries to DoD and civilian clients.

Potential Commercial Applications: Athena's agent-based modeling engine, GUI, and 3D visualization system can be modified to represent traffic and crowd flow, thus becoming a useful tool for federal and state transportation departments, urban planners, local law enforcement agencies and other organizations with a need to understand the complex motion arising from groups of individual actors.

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