

Topic: N131-048

Charles River Analytics Inc.

Shiphandling Educator Assistant for Managing Assessments in Training Environments (SEAMATE)

Despite advances in automated instruction, virtual environment-based (VE) shiphandling training currently depends on expert trainers working one-on-one with students, which creates significant bottlenecks in the VE-based shiphandling training process. The Shiphandling Educator Assistant for Managing Assessments in Training Environments (SEAMATE) provides instructors with the capability to supervise larger student cohorts and dynamically track student performance through event-based, automated performance feedback and efficient, contextualized alerts. SEAMATE's instructor-oriented user interface (UI) supports at-a-glance awareness of multiple student performance, provides dynamic feedback to direct instructor attention, and improves instructor awareness of individual student progress and intervention needs. Charles River Analytics' goal is to transition this technology into government and prime contractor virtual training systems for surface, subsurface, air-vehicle control training, and virtual-environment based part-task training systems.

Technology Category Alignment:

Satellite Communications (SATCOM)

Robotics/Automated Material Handling Equipment

Shipyards/Shipbuilding

Supply; Storage

Satellite Communications (SATCOM)

Satellite Communications (SATCOM)

Supply; Storage

Supply; Storage

Satellite Communications (SATCOM)

Satellite Communications (SATCOM)

Shipyards/Shipbuilding

Robotics/Automated Material Handling Equipment

Robotics/Automated Material Handling Equipment

Robotics/Automated Material Handling Equipment

Robotics/Automated Material Handling Equipment

Protection, Sustainment, and Warfighter Performance

Medical Chem-Bio Defense

Military Infectious Diseases

Propulsion and Extreme Environments

Fixed Wing Vehicles (includes UAS)

Survivability

Maintainability/Sustainability

Unmanned Ground and Sea Vehicles

Corrosion

Advanced Computing/Software Development

Networks and Communications

Modular/Open/Reconfigurable Architectures

RF Components for sensing, transmission and communication

Electronics Integration

Broadband/Multispectral Components and Systems

Sensors, Electronics and Photonics

Radio Frequency (RF) (non-EW)

Survivability

Broadband/Multispectral Components and Systems

RF Components for sensing, transmission and communication

Radio Frequency (RF) (non-EW)

Networks and Communications
Guidance, Navigation & Control (GN&C) and Data Links
RF Components for sensing, transmission and communication
Networks and Communications
Cognitive/Adaptive Capabilities
Preemptive/Proactive Effects
Broadband/Multispectral Components and Systems
Advanced Computing/Software Development
Networks and Communications
Personalized Assessment, Education, and Training
System Interfaces & Cognitive Processes
Aircraft Propulsion, Power and Thermal
Modeling, Simulation & Test Infrastructure
Rotary Wing Vehicles
Fixed Wing Vehicles (includes UAS)
Fixed Wing Vehicles (includes UAS)
Acoustic, Seismic and Magnetic
Rotary Wing Vehicles
Structures and Protection
Energy storage
Unmanned Ground and Sea Vehicles
Mobility
Power and Energy
Synthesis/Analytics/Decision Tools
Information Collection/Management
Advanced Computing/Software Development
Survivability
Unmanned Ground and Sea Vehicles
Radio Frequency (RF) (non-EW)
Power Generation/Energy Conversion
Energy storage
Power and Energy
Sensors, Electronics and Photonics
Maintainability/Sustainability
Advanced Computing/Software Development
EO/IR Components for sensing, transmission and communication
Microelectronics and Nanoelectronics
Networks and Communications
Mobility
Broadband/Multispectral Components and Systems
Sensors, Electronics and Photonics
Structures and Protection
Electro-Optical/Infrared (EO/IR)
Human/Autonomous System Interaction and Collaboration
Maintainability/Sustainability
System Interfaces & Cognitive Processes
Aircraft Propulsion, Power and Thermal

Power Generation/Energy Conversion
High Energy Lasers (HEL)
Propulsion
Biomedical Informatics / Health Information Systems & Technology
Protection, Sustainment, and Warfighter Performance
Modeling, Simulation & Test Infrastructure
Maintainability/Sustainability
Mobility
Personalized Assessment, Education, and Training
RF Components for sensing, transmission and communication
Broadband/Multispectral Components and Systems
Sensors, Electronics and Photonics
Radio Frequency (RF) (non-EW)
Radio Frequency Weapons (RFW)
Energy storage
Power Generation/Energy Conversion
Thermal Transport and Control
Unmanned Ground and Sea Vehicles
Acoustic, Seismic and Magnetic
RF Components for sensing, transmission and communication
Guidance, Navigation & Control (GN&C) and Data Links
Survivability
High-Speed/Hypersonics
Power Generation/Energy Conversion
Acoustic, Seismic and Magnetic
Radio Frequency Weapons (RFW)
Electronic Materials
Electronics Integration
RF Components for sensing, transmission and communication
Electromechanical conversion
Energy storage
Power Control and Distribution
Power Generation/Energy Conversion
Thermal Transport and Control
EO/IR Components for sensing, transmission and communication
RF Components for sensing, transmission and communication
Fixed Wing Vehicles (includes UAS)
Fixed Wing Vehicles (includes UAS)
Distributed/Coordinated/Net-Enabled Systems
High-Speed/Hypersonics
Propulsion and Extreme Environments
Energy storage
Ordnance
Human Computer Interfaces (HCI) for Decision Making
Information Collection/Management
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EO/IR Components for sensing, transmission and communication

Rotary Wing Vehicles
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Modeling, Simulation & Test Infrastructure
Radio Frequency (RF) (non-EW)
Machine Perception, Reasoning and Intelligence
Assuring Effective Missions
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Fixed Wing Vehicles (includes UAS)
Machine Perception, Reasoning and Intelligence
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Power Generation/Energy Conversion
Mobility
Maintainability/Sustainability
Power Generation/Energy Conversion
Maintainability/Sustainability
Acoustic, Seismic and Magnetic
Test, Evaluation, Validation, and Verification
Maintainability/Sustainability
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Fixed Wing Vehicles (includes UAS)

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Military Infectious Diseases
Military Operational Medicine
Readiness
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Biomedical Informatics / Health Information Systems & Technology
Electro-Optical/Infrared (EO/IR)
High Energy Lasers (HEL)
EO/IR Components for sensing, transmission and communication
Networks and Communications
Sensors, Electronics and Photonics
Electro-Optical/Infrared (EO/IR)
Human Computer Interfaces (HCI) for Decision Making
Information Collection/Management
Synthesis/Analytics/Decision Tools
Human Aspects of Operations in Military Environments
System Interfaces & Cognitive Processes
Clinical & Rehabilitative Medicine
Combat Casualty Care

Military Operational Medicine
Protection, Sustainment, and Warfighter Performance
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Advanced Electronic Protection Techniques and Technology
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Personalized Assessment, Education, and Training

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Modular/Open/Reconfigurable Architectures
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Survivability
Manufacturing Technology for Affordability

Manufacturing Technology for Affordability
Propulsion
Manufacturing Technology for Affordability
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Manufacturing Technology for Affordability
Trust Foundations
Trust Foundations
Distributed/Coordinated/Net-Enabled Systems
Survivability
Agile Operations
Personalized Assessment, Education, and Training
Protection, Sustainment, and Warfighter Performance
Human/Autonomous System Interaction and Collaboration
Human Computer Interfaces (HCI) for Decision Making
Synthesis/Analytics/Decision Tools
Information Collection/Management
Human Aspects of Operations in Military Environments
Information Collection/Management
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Synthesis/Analytics/Decision Tools
Machine Perception, Reasoning and Intelligence
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Aircraft Propulsion, Power and Thermal
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Rotary Wing Vehicles
Fixed Wing Vehicles (includes UAS)
Corrosion
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Sensors, Electronics and Photonics
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Biomedical Informatics / Health Information Systems & Technology
Military Operational Medicine
Machine Perception, Reasoning and Intelligence
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Trust Foundations
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RF Components for sensing, transmission and communication
Maintainability/Sustainability
Fixed Wing Vehicles (includes UAS)
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High-Speed/Hypersonics
Propulsion
Aircraft Propulsion, Power and Thermal
Electro-Optical/Infrared (EO/IR)
RF Components for sensing, transmission and communication
Networks and Communications
Distributed/Coordinated/Net-Enabled Systems
Radio Frequency (RF) (non-EW)
EO/IR Components for sensing, transmission and communication
Networks and Communications
Sensors, Electronics and Photonics
RF Components for sensing, transmission and communication
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Fixed Wing Vehicles (includes UAS)
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Manufacturing Technology for Affordability
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Power Control and Distribution
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Radio Frequency (RF) (non-EW)
Protection, Sustainment, and Warfighter Performance
Aircraft Propulsion, Power and Thermal
Fixed Wing Vehicles (includes UAS)
Power Generation/Energy Conversion
Rotary Wing Vehicles
Protection, Sustainment, and Warfighter Performance
Energy storage
Power Control and Distribution
Power and Energy
Propulsion and Extreme Environments
Ordnance
Energy storage
Power and Energy
Test, Evaluation, Validation, and Verification

Department of the Navy SBIR/STTR Transition Program

Statement A: Approved for Release. Distribution is unlimited.

Topic # N131-048

Shiphandling Educator Assistant for Managing Assessments in Training Environments (SEAMATE)

Charles River Analytics Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: Team Ships, PMS 339

Transition Target: Conning Officer Virtual Environment (COVE) Training Simulator

TPOC:
(202) 781-4913

Other transition opportunities: Other virtual environment (VE) training simulator systems to support surface, subsurface, and air vehicle operational training

Notes: SEAMATE's dashboard-style user interface combines high-level overviews and alerts of multiple students' real-time performance and training intervention needs.



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WHAT

Operational Need and Improvement: Shiphandling instruction, currently facilitated through one-on-one interactions between expert trainers and students, is costly. Although various technologies, such as virtual environment (VE) training simulators, have been instrumental in decreasing training costs, they have not increased the student-to-instructor ratio. The Navy requires a technological solution that can increase the number of students that an instructor can effectively supervise during VE training exercises to realize the benefits of VE training systems and expand current training capacities.

Specifications Required:

- Interface with existing and emerging shiphandling training technologies, including the Navy's Conning Officer's Virtual Environment (COVE) software, Intelligent Tutoring System (ITS), and Automated Assessment Engine (AAE)

- Efficiently cue instructors to an individual student's potential knowledge or skill deficiencies as they emerge through training exercises
- Provide instructors the capability to effectively focus on and work with individual students that will benefit from direct training support, and the capability to efficiently pivot attention to other students
- Replicate the overall training efficacy of the Navy's current 1:1 student-to-instructor ratio, for larger groups of students training in parallel

Technology Developed: SEAMATE provides novel, at-a-glance situation awareness displays for rapid pivoting between class-wide supervision and 1:1 student interaction; Intelligent, contextualized alerting cues to notify and direct instructor attention; and Lightweight tools for annotating student performance and streamlining individual and class-wide after-action review processes

Warfighter Value: Increases the number of students an instructor can supervise effectively, improving training throughput; Extends instructors' training expertise to a broader number of students, improving training experience without increasing burden on limited instructor resources; Reduces effort required to identify and address student support needs, improving training outcomes.

WHEN

Contract Number: N00024-15-C-4030 **Ending on:** April 6, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Design Conceptualization and Prototyping	Med	Proper data flow, positive user feedback	6	April 2017
Extended Integration, Harden Software, and Performance Evaluation	Med	Proper data flow, IA data conformance, increased instructor capacity	7	April 2018

HOW

Projected Business Model: Charles River Analytics plans to retain SBIR data rights for SEAMATE instructor support interfaces to commercial entities. SEAMATE is targeted for transition to the SWOS' Navigation and Ship handling Training and Assessment Tools (NSTAT) program.

Company Objectives: Charles River Analytics intends to integrate SEAMATE into the SWOS' sustained Navigation and Ship Handling Training and Assessment Tools (NSTAT) VE; and to extend SEAMATE's capabilities into a flexible architecture capable of interacting with air, ground, and other marine transportation instruction environments.

Potential Commercial Applications: The technologies being researched are suitable for integration with virtual environment (VE) training systems and intelligent tutoring systems (ITS) as a means to augment training and increase instructors' ability to work effectively with large student cohorts. Such industries include commercial maritime academies, commercial freight training, driving schools, primary and secondary classrooms, and instructional tutoring environments.

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