Topic: N162-124

Charles River Analytics Inc.

Software Tool for the Analysis of Optimal Training System Fidelity

The Navy needs a scientifically sound method for determining how much realism is needed to train a specific task, which is critical for simulator and simulation design and development. STRUDEL offers both a lightweight, tailorable tutoring system and recommendations from our skill learning models; the tutoring system and learner model provide low-cost, powerful learning tools that help optimize training in programs such as C-ARTS. It's easily tailored for new equipment and the learner models provide guidance about how much training is necessary. The tutoring system is complete and being used to support empirical studies, while the learner models have been designed and are being developed. Charles River, who conducts leading-edge AI, robotics, and human-machine interface R&D seeks training acquisition programs and training developers in the DoD/Primes.

Technology Category Alignment:

Human Systems

Modeling and Simulation Technology

None

Contact:

Ashley McDermott

amcdermott@cra.com

(617) 491-3474761

https://www.cra.com/

SYSCOM: ONR

Contract: N00014-18-C-7015

Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00014-18-C-7015

Tech Talk: https://youtu.be/g4B9D4FJnck

Department of the Navy SBIR/STTR Transition Program

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Topic # N162-124
Simulating Training Results to Understand Differing Effects of fidelity on Learning (STRUDEL)
Charles River Analytics Inc.

WHO

SYSCOM: ONR

Sponsoring Program: Live Virtual Constructive

Transition Target: Any simulations/simulators that provide training of interest to Navy and/or Marine Corps (e.g., maintenance tasks).

TPOC:
Dr. Ray Perez
ray.perez@navy.mil



http://navylive.dodlive.mil/files/2013/01/130109-NZZ999-001.jpg

Other transition opportunities: The recommendation engine can guide both training curriculums and training system acquisitions for groups such as NET-C and NAWC-TSD. Both the maintenance troubleshooting tutor and the learner models could expand the offerings in a program such as C-ARTS. The learner model is also a powerful tool to integrate into programs that guide personalized training, such as PAL3. This training software could be part of a package with new systems, such as the AN/SYM-3 Condition-Based Maintenance (CBM) system from Mikros Systems Corp., where it would provide training tools to learn how to use and troubleshoot the system.

Notes: Charles River Analytics has had recent success providing maintenance training systems, including completing a final Government Approval Test in July 2019 for MAGPIE, our TRL-9 intelligent virtual maintenance trainer (IVMT) being developed under a Phase III USAF SBIR. STRUDEL expands the maintenance training capabilities that Charles River Analytics has to offer.

WHAT

Operational Need and Improvement: The Navy needs a scientifically sound method for determining how much realism is needed to train a specific task, which is critical for simulator and simulation design and development. Currently there are no systematic empirically based methods that provide meaningful direction to training developers to determine how much realism (e.g., fidelity requirements) is needed to train for mission effective performance. Fidelity related design decisions are motivated by the belief that the more accurately the simulation stimulates the human sensory system, the higher the probability that the system will provide effective training. As budgets tighten, it is critical that these systems are optimized for training effectiveness.

Specifications Required: This effort should generate software that provides direction for training developers. The learner model should help developers to determine the level of fidelity optimal for effective training and interface design, and the software developed under this effort will provide a low-cost, adaptable tutoring system that can maximize benefits in the early stages of learning. The end result of this effort could generate clear and concise guidance that would enable subject matter experts to develop simulation-based training that is mission effective. To this end, this SBIR effort seeks an innovative software tool that can assess and validate the efficacy of simulation-based training technologies. This software tool, and any associated hardware required to run the software, will be used to evaluate current Navy simulator training and future simulation training design and development.

Technology Developed: STRUDEL offers a training recommendation engine; a lightweight, tailorable tutoring system; and guidelines for training schedules from our skill learning models. The STRUDEL toolset provide low-cost, powerful learning tools that help optimize training in programs such as C-ARTS; determining how much realism is needed.

Warfighter Value: The STRUDEL toolset will help drive optimizing training schedules for the Warfighter. This means the Warfighter won't have to waste time on training on material they have already learned and will receive the appropriate amount of training that they can feel confident carrying out their duties. This is especially true in training that requires learning how to use or maintain equipment, where STRUDEL will be able to provide lower fidelity training so the Warfighter can practice on simulations of the equipment and maximize the learning benefits when they finally access the equipment itself.

WHEN

Contract Number: N00014-18-C-7015 **Ending on:** October 30, 2020

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Troubleshooting Skill Tree	N/A	Skill Tree that serves as basis of tutor	1	4th QTR FY18
Troubleshooting Tutor	Low	Usable tutor accessible over web interface	6	4th QTR FY20
Fidelity and Learning Model	Low	Functioning model instantiated in software	5	1st QTR FY21
Human Troubleshooting Performance Data	High	Complete data collection on human fidelity experiment	3	1st QTR FY21
Maintenance System Integration	Med	Integrate actual Navy system (e.g., Aegis radar) into tutor	8	TBD
Learning Model Integration into Existing Training	High	Integrate learning model into training curriculum plans	7	TBD

HOW

Projected Business Model: Our expertise in Government technology transition includes licensing, custom development for Government primes, and joint-venture enterprises. For STRUDEL we plan to both license the recommendation engine, the tutor, and learner model, as well as team with Government primes to create custom tutors for their systems.

Company Objectives: Our objective for the FST is to connect with maintenance training providers, such as the Carrier-Advanced Reconfigurable Training System (C-ARTS) facility under PMS 378, CVN 78 Class Program and the Personal Assistant for Life Long Learning (PAL3) effort currently funded by ONR. We also seek to connect with equipment providers, such as Mikros Systems, who provide prognostic maintenance systems, to offer a light-weight training option they could tailor and bundle with delivery of their systems. Our commercialization objective is to team with equipment or training providers in areas where the machinery used can be dangerous and expensive, such as manufacturing, to provide safe and effective training about how to maintain such machinery.

Potential Commercial Applications: In addition to the military market, the technology could have broad applicability in technical training and education, consumer learner products, and developers of augmented and virtual reality systems. These tools provide the most benefit for training in situations when high fidelity training or training on the physical equipment is expensive, dangerous, or even unavailable. We provide supplementary instruction that can maximize the benefit of high fidelity training by supplementing with relevant lower fidelity training upfront.

Contact: Ashley McDermott , Scientist
amcdermott@cra.com (617) 491-3474 x761