USC Engineering Anti-Terrorism System Begins Tests in Boston Harbor

Coast Guard testing a computer application designed for airports that makes security activity impossible for observers to predict

April 12, 2011 —

It began with Viterbi School work on randomizing airport security police patrol routines at Los Angeles International Airport while still maintaining the same level of protection. The example spread across the nation, and is now methodically and unpredictably at work in the waters off Massachusetts.

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After months of study, PROTECT (Port Resilience Operational / Tactical Enforcement to Combat Terrorism) began a two-month trial around Boston Harbor April 4, 2011.

The idea, according to a description posted on the website of TEAMCORE, the Viterbi School research group that designed it, is to make best use of limited resources that "prevent full security coverage at all times, which allows adversaries to observe and exploit patterns in selective patrolling or monitoring, e.g., they can plan actions avoiding existing patrols

PROTECT builds on three airport security patrol randomization systems previously developed by TEAMCORE, a unit in the Department of Computer Science directed by Professor Milind Tambe.

All of the three use computer applications of game theory algorithms to create schedules that fulfill the same level of law enforcement presence, but do so in such a way that even the closest observer can't predict when or where an airport patrol team or vehicle -- or in this case, a Coast Guard response vessel -- will show up.

According to Craig Baldwin, a senior analyst for the Coast Guard Research and Development Center, the initial phase of the project began in September 2010, when the USC TEAMCORE group began working with Coast Guard officials to fit the ideas in the system, originally developed for airports, to the demands of patrols by Coast Guard response boats.

"The Coast Guard interest is to improve the deterrence effects of its patrol, by implementing an optimized randomized schedule for its activity," Baldwin said.

The current testing involves a force consisting of five to ten response boats, plus one coast guard cutter, deployed in the waters around Boston."One measure of our success would be that crews were able to maintain schedules as proscribed," and do so without creating organizational problems," said Baldwin. If the test is a success, he continued, the next step will be to take the model "and further evolve it in other ports."

Baldwin said the experience of development going into testing had been highly positive. "It's a pleasure to work with Milind's group," he said. "They are not only academically astute, but able to understand the mission and fold it into their model."

Tambe was equally pleased by the relationship. "The Coast Guard has given us the opportunity to take our ideas in a new direction, solving problems that are related, but with much different parameters," he said.

The previous TEAMCORE applications for airport security include ARMOR (Assistant for Randomized Monitoring Over Routes), used at LAX since 2007; IRIS (Intelligent Randomization in Scheduling) a follow-on created for the Federal Air Marshals, in use since 2009) and GUARDS (Game-theoretic Unpredictable and Randomly Deployed Security) now being evaluated by the Transportation Security Administration.

The PROTECT team includes Ph.D. student Eric Shieh and
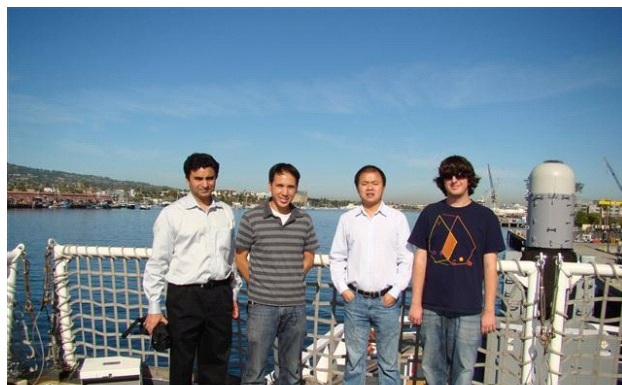
postdoctoral researcher Bo An, along with former postdoctoral researcher Chris Kiekintveld, now an assistant professor at the University of Texas El Paso.

PROTECT Team on board a US Coast Guard (USCG) cutter at USCG Station Los Angeles/Long Beach. From left, Milind Tambe, Ph.D student Eric Shieh Post-doc Bo An, and undergraduate merit scholar researcher Andrew Deeds.

All of the projects are funded through the Homeland Security Center for Risk and Economic Analysis of Terrorism Events (CREATE). On October 5, at the U.S. Capitol, Tambe received the 2010 Homeland Security Award for Border and Transportation Security from the Christopher Columbus Foundation for his role in this research.