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FROM ROUTINE TO RANDOM

by Lakshmi Sandhana
 Friday, 01 February 2008
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What if it were possible to implement a secure system that could foil potential terrorists at their very earliest stage of planning?

Security officials at the Los Angeles International Airport (LAX) are experimenting with what they hope might be a solution. Developed by Viterbi School of Engineering computer scientists at the University of Southern California in Los Angeles (USC), Calif., ARMOR aims to enhance security measures by making them totally unpredictable. The software works by taking all the available resources of an entire security system to create a completely randomized schedule for officials to follow. The system has been designed not only to provide as much cover as a conventional schedule but it will also make it impossible for any observer to find patterns or regularities in LAX security routines that could be exploited as part of his or her plan.

Created by a team of artificial intelligence experts led by Milind Tambe, a USC professor, the software is based on game theory and will allow officials to improve security significantly by using existing resources without incurring any additional costs.

"The idea is to use game theory to randomize how patrols are done, checkpoints are placed, etcetera, making the 'routine' actions of LAX police unpredictable," said Tambe. "ARMOR casts the problem of such patrols, checkpoints as a game and creates a randomized strategy as a solution."

The routine enemy

Security planners face the extremely challenging task of having to design security measures that will provide total coverage with the existing resources at reasonable costs. While "routine" is generally considered to be the enemy of good security, it becomes almost impossible to avoid given the magnitude of the job at hand, the difficulty of finding reliable people and the pressure to keep costs low. Officials find themselves in the unenviable position of inevitably having to commit to a routine that may contain vulnerabilities potential terrorists can exploit simply by patient observation.

In a keynote address to the US-Europe Aviation Security Policy Conference delivered earlier this year, Kip Hawley, assistant secretary of homeland security for the Transportation Security Administration (TSA), said, "For terrorists, it is easy to plot against a system so predictable they know exactly what to expect each time they approach it. Unpredictability is a crucial tool in thwarting terrorists' attack plans. If an element of unpredictability is introduced—such as changing or adding inspection routines on a variable basis or using canine teams at different places each day—this randomness increases the complexity for would-be terrorists. It is one of our best tools to defeat them." (The entire speech can be read [here](#).)

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That's exactly what the ARMOR system aims to do. The software delivers a randomized schedule for security forces that produces the same level of overall coverage as a conventional schedule and can be deployed on a large scale. The strategy also considers different types of adversaries, numerous threats and aims while coordinating the activities of a number of individual agents in the field who face an unknown number of hostile forces. Officials believe that the randomization technique will make their security measures less vulnerable and maximize the impact of their deployment.

"To interrupt or deter a terrorist plot in the surveillance phase is the safest and most efficient manner to protect the airport," said James Butts, director of law enforcement for Los Angeles' airports, which include LAX, Van Nuys, Palmdale and Ontario. "The significance of the program is found in basic game theory wherein you attempt to learn from the past behaviors of your opponent to anticipate future behavior and pre-emptively counter the opponent's strategy, while simultaneously randomizing your own behavior to lessen or eliminate the predictability of your deployments and operations. Because this artificial intelligence program allows for the construction of tables of assumptions to be factored into deployment decisions, it allows intelligent randomization of our deployments."

Interest

The software has generated a lot of interest among different security agencies and airport officials, who believe that it will make the checkpoint situation at airports less vulnerable.

Erroll Southers, a former FBI special agent who serves as an associate director for the Department of Homeland Security-funded Center for Risk and Economic Analysis of Terrorism Events (CREATE), told *HSToday*, "ARMOR is designed to reduce the risk of predictability regarding protective systems—checkpoints, patrols, individual screening, et cetera. I believe that for every target environment where surveillance is critical to an attacker's success (which would be most, if not all, of them), ARMOR may be a viable deterrent. The cornerstone of terrorist attack methodology rests in knowing what, when and how possible targets are being protected. If those factors become unpredictable, why would an attacker risk failure? There are probably few targets in the world that are 'musts' on a terrorists' menu."

The system is being used to randomize the deployment of officers at checkpoint locations at LAX. Security officials now plan to use the program to deploy their bomb detection K9 squad.



About the author:
HSToday Science Correspondent, has covered science-related subjects for BBC News Online, *Wired News Online* and the *Christian Science Monitor*. She has a bachelor's degree in computer science and a master of arts in mass communication.

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