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8:07 PM PDT, October 1, 2007

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USC student's computer program enlisted in security efforts at LAX

Program developed by a USC student is intended to thwart terrorists by making the frequency of searches unpredictable.

By Larry Gordon, Los Angeles Times Staff Writer
October 1, 2007

The doctoral dissertation of a 26-year-old USC computer science student is having an unusual effect on security and transportation at Los Angeles International Airport.

That's because the LAX police are giving a trial run to a new computer program that, they say, seeks to keep potential terrorists and criminals constantly uncertain about where, when and how often vehicles will be searched at airport entrances. The software is based on the thesis of Praveen Paruchuri, who earned his doctorate in May.

Paruchuri says he's surprised and delighted that his game-theory research on random timing of police patrols and its effects on crimes such as home burglaries has so quickly been utilized. High-tech assistance won't solve all the issues of terrorism, but "in the hands of the police can be very powerful tools and make the process a little more efficient," said Paruchuri, who was born and raised in India and is now working at an artificial intelligence research company in Maryland.

Use of the software at LAX began in August and expects to continue the test on car searches for about six months in all, according to James Butts, deputy executive director of law enforcement for Los Angeles World Airports, the agency that operates LAX. The program might be expanded to patrols of bomb-sniffing dogs.

Citing security concerns, Butts declined to discuss specifics of the program and its complicated algorithms other than to say it affects police deployment and the frequency of car searches in a way that "makes it virtually impossible to predict where resources might be deployed."

It not only takes away the routine behavior that terrorists might study and take advantage of, it also designs schedules more likely to catch criminal behavior, Butts said. The result so far has been "very useful" and free of glitches, although he said it was too soon to say anything about its deterrence power.

The project grew out of a federally funded think tank at USC that deploys scholars in engineering, economics, political science, psychology and computer science to evaluate and minimize the risks of terrorism.

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Paruchuri's thesis advisor, computer science professor Milind Tambe, is affiliated with that center, formally named the Homeland Security Center for Risk and Economic Analysis of Terrorism Events. In 2004, Tambe said, he suggested that Paruchuri devote his thesis to predictability in police and anti-terrorism efforts.

"That things in our society run in very predictable ways, on the dot, on time, is being used against us," said Tambe, an expert in artificial intelligence at USC's Viterbi School of Engineering.

Paruchuri tackled the topic with "a dogged determination," said Tambe, who recalled his student pulling all-nighters on research.

LAX's adoption of Paruchuri's work is "something that we, as researchers, dream of: creating research that is not only academically wonderful but something that is also very useful," Tambe said. Although engineers in artificial intelligence often are inspired by thinking about what robots will do on Mars in 50 years, Tambe said, "This is not planet Mars. This is planet Earth, and we are being useful right here and right now."

The thesis was titled "Keep the Adversary Guessing: Agent Security by Policy Randomization." Using highly refined equations and computer modeling, Paruchuri analyzed such situations as a security officer watching over a humanitarian relief camp for refugees and police officers patrolling a residential neighborhood that is prey to burglars. The formulas changed with varying numbers of players on each side, differing strategies and varying amounts of information that each side learned about adversaries.

The dilemma, Paruchuri wrote, is that police need "to commit to a security policy, while the adversaries may observe and exploit the policy committed to." He said he consulted with USC campus police on such topics as how to choose a patrol route.

Erroll Southers, a former FBI special agent, was the link between USC, where he is associate director of the homeland security center, and the airport police, where he heads the intelligence and anti-terrorism efforts. Southers brought the thesis to the attention of airport officials who, according to Butts, were receptive to new ideas to help with Los Angeles Mayor Antonio Villaraigosa's efforts to ensure LAX security.

Over the summer, Tambe led a wider team that adapted the thesis work for LAX, at no cost to the city. It included Fernando Ordonez, a USC assistant professor in industrial and systems engineering, and Sarit Kraus, a computer science professor from Bar-Ilan University in Israel. USC graduate students will continue to monitor it as a research effort.

Raised in southern India's Andhra Pradesh state, where his parents live, Paruchuri earned his undergraduate degree at the International Institute of Information Technology-Hyderabad and came to USC in 2002. Now that he is working in the robotics field on the East Coast, Paruchuri won't be around Los Angeles much to oversee the airport test, although he said he hopes to visit a few times a year.

During his five years in Los Angeles, his car trunk was searched once at LAX.

He said he was happy to cooperate with airport police. "It gave me a sense of safety,"

he said.

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