IGERT: NSF Project

Securing Global Flows of People and Cargo: Interdisciplinary Education and Research in Policy, Science and Technology

The proposed program sets out to bridge the gap between the academic fields of security-related studies and global logistics by educating and re-educating researchers, academics and policy analysts, thereby supporting the creation and expansion of a broad international epistemic community on security in the context of international travel and global supply chains. To achieve these goals we propose to develop a PhD curriculum and research programs in the subject areas of secure people flow (especially terrorist travel), and cargo flow (especially, container security and port/border security operations). Security-relevant research and training will be established in policy development and analysis, risk analysis and assessment, stochastic modeling (analytical and simulation), optimization, data mining, security technologies and economics of security. I-GERT aims to incorporate technology into security procedures and operations as guided by policies and regulations, and to employ modeling and analysis techniques to evaluate and optimize the performance of security-related systems.

National Science Foundation

IGERT: Partners

University Participants
Rutgers University
Princeton University
George Washington University
WW Int. Center for Scholars
SUNY Maritime College
Oxford University
INSEAD
University of Genoa
Univ. Autònoma de Barcelona
Otto-von-Guericke University
McLeod Institute of Sim.Science
Bogazici (Bosphorus) University

Governmental Partners
•Department of Homeland Security
•Homeland Security Advanced Research Projects Agency (HSARPA)
•Bureau of Customs and Border Protection (CBP)
•Homeland Security Institute
•US Coast Guard Research & Development Center
•Federal Law Enforcement Training Center
•World Customs Organization

Industrial Participants
•Unisys
•David Sarnoff Research Center
•APM Terminals
•Detroit-Windsor Tunnel Company
•SAP

IGERT: Research Activity

The proposed IGERT project is a 5-year effort involving faculty from Rutgers University, regional, national and international universities, as well as government and industry participants.

Research Topic	Research Activity	Field Work
Secure People Flow	Policy analysis Security-oriented IT Traveler info systems Bioinformatics	Detroit Windsor Tunnel, NY/NJ Ports San Francisco, Seattle harbors
Secure Cargo Flow	Policy analysis Economics Sensor technology GPS tracking systems Queueing modeling and analysis of ports Simulation/optimization Risk Analysis Parallel simulation (HLA)	 NY/NJ Ports Port Singapore Port of Venice Port of Genoa Port Barcelona Istanbul (Bosphorus) Strait

IGERT: Partner Capabilities

Participant	Areas of Expertise
Rutgers University	Policy analysis, mathematical and simulation modeling of security operations, sensor technology, bioinformatics
Princeton University	Traveler information, GPS systems
George Washington University	Risk analysis and management
WW Int. Center for Scholars	Policy analysis and planning, future technologies
SUNY Maritime College	Economics of logistics and security
Oxford University	Migration policy and border control
INSEAD	Simulation optimization, risk analysis
University of Genoa	Modeling security operations, container security
Univ. Autònoma de Barcelona	Decision making, risk analysis
Otto-von-Guericke University	Large-scale parallel simulation (HLA)
Bogazici (Bosphorus) University	Risk analysis and assessment

IGERT: PhD Courses

Global and Homeland Security. This political science graduate course introduces students to the basic concepts of international security, and considers the contemporary challenges posed by the potential use of WMD by non-state actors in a globalizing world. It will provide detailed analysis of terrorism and asymmetric warfare, and cover the challenges of the proliferation of nuclear, chemical and biological weapons, as well as the post-9/11 US Government responses of establishing the Department of Homeland Security and the reforming of the intelligence agencies. Special attention is paid to the tensions between economic globalization and the imperatives of homeland security in three areas: international travel and migration vs. tighter border controls; international trade vs. augmented transportation and port security; expanding on-line economies and accelerating capital mobility vs. protection of critical infrastructure and finance.

Homeland Security Technologies. This Business School graduate course is a review of technologies that support homeland security. The course first surveys information security technologies (encryption, data mining and expert systems, EDI and its standardization, firewalls, detection of malicious activities, self-healing networks and sensor networks). It then proceeds to cover technologies that support the security of human flows (authentication techniques, including credentials, biometrics, risk identification and assessment and tamper-resistant passports) and cargo flows (sensors for cargo tampering detection, scan technologies for detecting contraband, including anomaly analysis and radiation, RFID and tamper-resistant manifests).

Modeling and Analysis of Security Systems. This Industrial and Systems Engineering graduate course presents techniques for modeling and performance analysis of security-related systems, including storage, manufacturing and transportation. It assumes basic knowledge of probability and statistics to treat work stations with stochastic input flows and random service processes with stoppages at an introductory level. Finally, it to covers queueing-theoretic and simulation models of security-related systems.

Introduction to Sensors and Sensor Systems. This Electrical and Computer Engineering graduate course overviews modern sensor technology, emphasizing sensors and sensor systems for security applications. This course presents basic principles and operational characteristics of sensors, and describes security sensor classes that respond to particular physical, chemical, and biological input signals. The course will incorporate experimental projects in Rutgers Microelectronics Research Lab (MERL).