IPSI

Identity, Privacy and Security Initiative

UNIVERSITY OF TORONTO

ANNUAL REPORT 2007-2008

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ABOUT IPSI

In Spring 2007, Professor Dimitrios Hatzinakos, (The Edward S. Rogers Sr. Department of Electrical and Computer Engineering, Faculty of Applied Science and Engineering) joined by colleagues from the Faculty of Information Studies and University of Toronto Mississauga, created a new initiative at the University of Toronto focusing on identity, privacy and security.

The Identity, Privacy and Security Initiative (IPSI) was established to carry out a pioneering, interdisciplinary program of research, education, outreach, industry collaboration and technology transfer with emphasis on technology, policy and security. The overall goal of IPSI is to develop new approaches to privacy that maintain the security, freedom and safety of the user and the broader community.

IPSI has received generous financial support from University of Toronto's Academic Initiatives Fund.

OBJECTIVES OF IPSI

To advance the integration of the basic, social and engineering science research required to generate sustainable solutions to identity integrity, privacy and security.

To assemble a cross-disciplinary community of researchers and community partners to create excellence in interdisciplinary research and education in the field of identity, privacy and security technologies, policies and sciences.

To provide interdisciplinary high level training in identity, privacy and security applications through state of the art educational programs and specializations that will bring together faculty and students from different disciplines to study and think about identity, privacy and security and related technologies, policies and sciences.

To facilitate the commercialization of technologies through effective technology transfer mechanisms and industrial partnerships.

To work with policymakers and regulatory agencies to inform their judgment of identity, privacy and security realities with evidence based considerations of the scientific, ethical, legal and social issues involved.

MESSAGE FROM THE CHAIR OF THE ADVISORY COMMITTEE

I would like to extend my congratulations to all the staff and researchers at IPSI upon completion of a very successful first year. When I was asked to serve as the Chair of the Advisory Committee, I immediately accepted, knowing this would be an excellent opportunity to participate in a forward-thinking interdisciplinary program that would take the relationship between privacy and technology into the 21st century.

For more than a decade now, I have been advocating the idea that technology has the ability to not only provide security and serve business interests, but also the ability to protect our privacy. Since 1995, I have been advancing the notion that technology can liberate us from the "zero-sum" trap of sacrificing privacy for the sake of security, and allow us to move forward toward a "positive-sum" paradigm. In this new positive "win-win" scenario, privacy and business, or privacy and security, can both co-exist because technology can be enlisted to protect privacy and safeguard personal information through the use of privacy-enhancing technologies (PETs). When applied to technologies of surveillance, PETs serve to transform a privacy-invasive technology into one that is protective of privacy, hence my new term of "transformative technologies." I say transformative technologies because I believe that technology has evolved to the point where it now has the ability to protect our privacy while performing whatever function it was designed for, but only if privacy is built directly into the architecture of that technology at the developmental stage – I call this "privacy by design."

And that is exactly what IPSI is delivering, with real-world results. There are already many exciting projects and developments under way such as privacy-protective object based coding encryption for video surveillance cameras and the adoption of privacy-protective radio frequency identification in health care services. I cannot express how excited I am that such groundbreaking technologies are being developed right here in Ontario – with the potential to become world-class commercial applications.

However, I want to add that what I find most promising about IPSI is its potential to foster a new privacy-aware generation – a new class of professionals who will understand the inherent and fundamental value of protecting privacy. I have no doubt that, in years to come, IPSI will not only produce advancements in the field of privacy-enhancing technologies, it will also give rise to an entire new "culture of privacy." I look forward to the day when building privacy into technology is seen as second-nature and not as a matter of debate. And this would not be possible without such initiatives as IPSI and the talented members of the Advisory Committee. I am proud to serve as the Chair of such an exceptional program, and an outstanding team of professionals.

Ann Cavoukian
Information and Privacy Commissioner of Ontario

MESSAGE FROM THE ACADEMIC DIRECTOR

This has truly been an exciting and productive year ! Our vision for the Identity, Privacy and Security Initiative became a reality in Spring 2007, thanks to time and commitment of our management team and Advisory Committee, and the generous support University of Toronto's Academic Initiatives Fund.

In Fall 2007, we launched a new Masters of Engineering in Communications with a focus in Integrated Security Technologies. Two new courses were created to support this: 1) A common seminar course entitled *Seminar in Identity, Privacy and Security*, and 2) A new engineering graduate course entitled *Biometric Systems*. Graduate students enrolled in the M.Eng Program in Engineering, as well as the MISt program in the Faculty of Information Studies were eligible to take the common seminar course as a credit towards their masters degree. Key features of our first offering of the common seminar course were excellent, distinguished, guest speakers and an innovative format that allowed the public to attend a portion of the program. Students enrolled in the seminar developed and presented projects at the end of term in diverse topics such as Patient & Medication Tracking with Radio Frequency Identification (RFID) and Biometric e-Passports in Germany.

This year we conducted a cross-campus audit of expertise related to IPSI's goals and were impressed by the breadth and scope of the research activities underway at U of T. We held the first annual IPSI research symposium in May 2008, to showcase a subset of this research underway at U of T. This truly interdisciplinary event spanned the fields of engineering, computer science, law, management and information studies and included excellent participation from industry, government and community groups.

For IPSI, this has been a year of beginnings. Our goal for next year is to strengthen relationships and build rich collaborations across the campus, the country and the international community. To this end, new affiliated researcher and graduate fellowship programs will be offered to researchers working in related areas. We will establish a number of honorary *'Expert in Residence'* positions to attract external visionaries and enrich our program. New laboratory equipment will be made available to graduate students and researchers associated with the common seminar. Theme-specific round-tables will pursue research and policy issues related to IPSI. Finally, expert podcasts and public seminars will increase our outreach activities and involve the broader community.

Information and communication technologies are indeed making this a connected world, and our ability to respect and protect the privacy and identity of our citizens will determine the quality of our connected lives. We look forward to contributing to the dialogue, exploring alternatives, creating solutions, and providing leadership to an area charged with some of the most challenging issues of our time.

Dimitrios Hatzinakos
Academic Director and Chair of the IPSI Management Committee
University of Toronto

EDUCATIONAL INITIATIVES

We have recently witnessed the rapid growth of internet and information technologies into many aspects of everyday life. At the same time, there has been a growing preoccupation with 'security' post-9/11. These developments raise a host of complex social, technical, scientific, legal and ethical issues: What are the threats to personal safety, national security, vital infrastructures, civil liberties, democratic processes? What protections are appropriate? What values and techniques should guide our efforts to promote identity integrity, privacy and security?

One key question therefore, is how do we secure the networked infrastructures on which personal and national economy, safety and security and other critical operations depend? This need has spurred unprecedented interest and activity in safety and security technologies over the last few years. Secure electronic transactions, biometric passports, smart access cards, and electronic surveillance are some examples of growing security trends. Simultaneously, linked to this movement, the societal implications of security technologies on ethics and human rights have radically expanded.

The successful development of meaningful and viable security technologies touches upon a number of diverse disciplines ranging from Communications and Computer Networks to Law and Information Policies. Also, the widespread implementation of security technologies and systems will depend upon a new breed of professionals who are able to design, develop and implement effective but also fair and transparent security products and services.

IPSI is spearheading a number of exciting educational initiatives aimed at helping to address the need for informed professionals. The MISt Concentration in Security Policy, and the MEng Concentration in Security Technology, are jointly offered by the Faculty of Information Studies and the Faculty of Applied Sciences and Engineering (ECE, MEng program). A newly developed seminar course is shared between the two Concentrations. Below is a list of speakers and topics from the 2007 offering:

Privacy by Design
Ann Cavoukian
Information and Privacy Commissioner of Ontario

Technology, the Justice System and the Future of Crime
Susheel Gupta
Special Advisor, Canadian Air Transport Security Authority

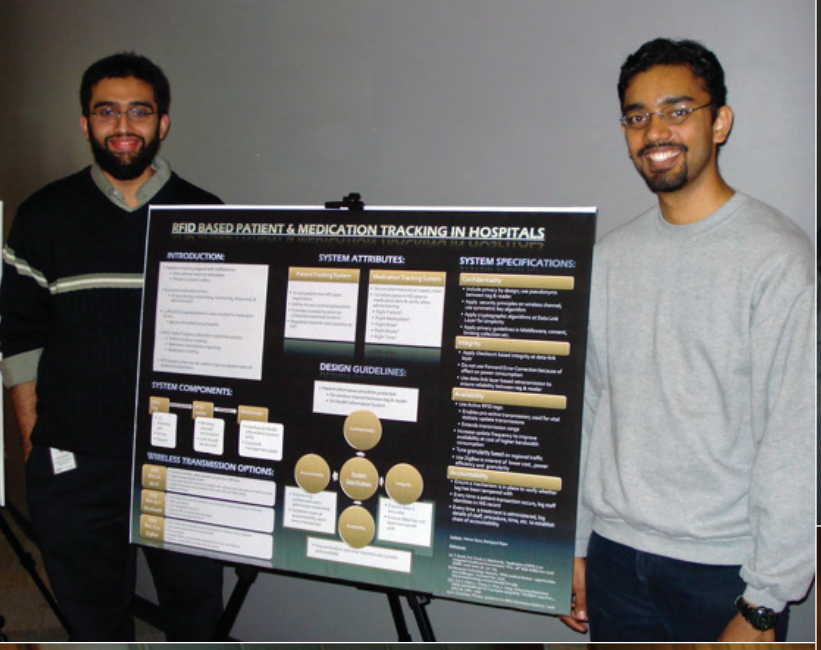
Identity and Computer Crime
Robert Beggs
President Digital Defence

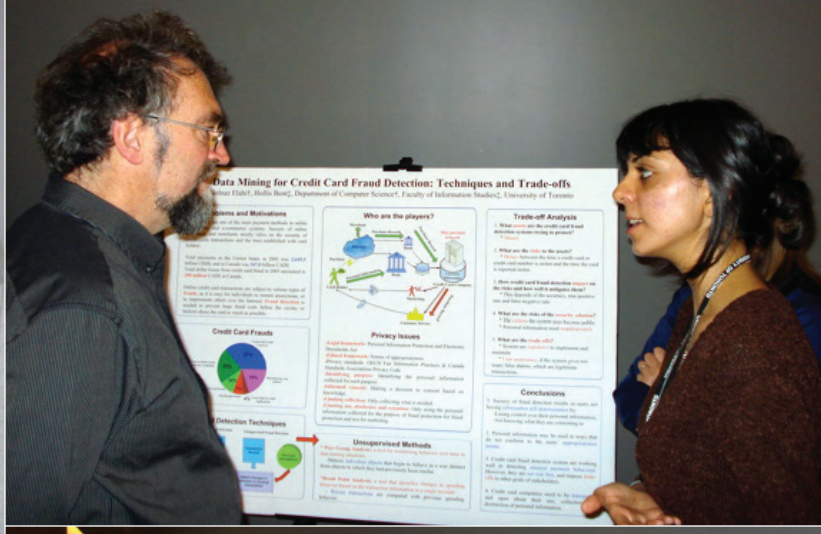
Policy and New Security Technologies: Roles, Responsibilities, Influences and Outcomes
Dean Barry
Senior Policy Advisor / International Affairs
Directorate, Public Safety Canada

Privacy, Security and Customer Service
Peter Hope-Tindall
Privacy Lead, Strategic Planning Branch, Service Ontario

Biometric Encryption: The Privacy-Enhancing Biometric of Choice
Alex Stoianov
Biometrics Specialist, Office of the Information and Privacy Commissioner, Ontario

Biometric-Based Assistance for Situational Awareness and Risk Management Support
Svetlana Yanushkevich
Associate Professor, Dept of Electrical and Computer Engineering, University of Calgary





The 2007/08 IPSI graduate seminar course culminated in student presentations and poster displays on topics as varied as tracking medical records to biometric passports. Here are some images from the day.

RESEARCH INITIATIVES

Across the University, research related to identity, security and privacy is being carried out by faculty and students in areas as diverse as law, computer science, engineering, information studies, management and education. The 2008 IPSI Research Symposium provided an excellent introduction to the multidisciplinary work underway at University of Toronto. Below is a short list of research projects involving the IPSI founders. Please see our website for an expanded list of projects.

Biometric User-Centric User Networks (BUSNET)

Researchers: Dimitrios Hatzinakos and Kostas Plataniotis (NSERC Strategic Research Project)
Industrial Partners: DRDC Toronto, Bell Canada

The aim of the project is to develop integrated security architecture to effectively and efficiently secure and protect sensitive information and data within the domain of a care enterprise such as wireless health care and home care applications and services. Specifically, this research initiative will be examining issues and developing solutions for processing of biometrics signals, biometrics registration and authentication, biometrics key generation and management as well as biometrics-based data authentication. Implementations of the proposed architecture using specific realizations of suitable wireless Body Area Network (BAN) configurations will be also developed, examined and analyzed in collaboration with our industrial partners.

Access Control based on Content Encryption and Secret Sharing (ACCESS)

Researchers: Dimitrios Hatzinakos and Kostas Plataniotis (NSERC Collaborative Research and Development Grant, BUL)
Industrial Partner: Bell Canada

The target of the proposed ACCESS architecture is to provide enhanced multilevel security and access control, either to multimedia content or to services and applications while at the same time providing privacy and confidentiality. The overall objective is to propose efficient security solutions and frameworks where data-hiding methodologies such as watermarking and fingerprinting, encryption technologies and biometric signal processing are used in an integrated symbiotic way to provide secure access control to facilities, electronic services and digital record content in terms of increased confidentiality, authentication and integrity.

Participation in "MUSES_SECRET: Multimodal-SurvEillance System for SECurity-RElaTed Applications"

Researchers: Dimitrios Hatzinakos and Kostas Plataniotis (ORF Research Excellence Project)
Industry Partners: IBM Canada, Visual Cortek

The proposed MUSES-SECRET project aims at the development and commercialization of new multimodal (video and infrared, voice and sound, RFID and perimeter intrusion) intelligent sensor technologies for location and socio-cultural context-aware security risk assessment and decision support in human-crowd surveillance applications in environments such as school campuses, hospitals, shopping centers, subways or railway stations, airports, sports and artistic arenas etc. The resulting system should provide efficient multi granularity-level function-specific feedback for human users who are the final assessors and decision-makers in the specific security monitoring situation.

The New Transparency: Surveillance and Social Sorting

Researcher: Andrew Clement (SSHRC)

The goal of the New Transparency is to create a benchmark for surveillance studies that is comparative and critical, informed by multi-disciplinary approaches and has cutting-edge policy relevance. It will move beyond the limitations of existing local- and present-oriented studies to comparative and cross-disciplinary studies, and will take into account rapid information technology changes and pivotal political-economic and cultural shifts, not least the developments since 9/11. No previous collaborative research project worldwide has undertaken the examination of surveillance in the way proposed.

Performing IDentities

Researchers: Andrew Clement, David J. Phillips and Colin J Bennett (SSHRC funding)

The Performing Identities project seeks to fill academic and practical gaps in our understanding of how people perform and experience their individual identities in their everyday encounters with identification based services and technologies. It will contribute to the articulation of 'identity rights,' as human rights distinct from other informational rights such as privacy. This will also provide the basis for the development of sound 'human-centred' identification devices, systems, policies, legislation, agencies and practices.

PIPWatch: The COllaborative Privacy Enhancing Toolbar

Researcher: Andrew Clement (SSHRC and BUL)

PIPWatch is a software tool designed to help Canadian Internet users quickly determine if a website they visit is compliant with Canadian legislation, in particular the Personal Information Protection and Electronic Documents Act (PIPEDA), *before* they submit their personal information. PIPWatch uses social navigation and web annotation techniques to allow privacy concerned Canadians to compare websites based on how well they protect personal data.

In the report "Privacy and Video Surveillance in Mass Transit System: A Special Investigation Report" (Published March 3, 2008) Dr. Ann Cavoukian, Ontario's Information and Privacy Commissioner has recommended that the Toronto Transit Commission (TTC) use a surveillance technique designed by University of Toronto researchers ***Karl Martin*** *and* ***Kostas Plataniotis****. Visit the IPSI homepage to read the Commissioner's report and the research technical report.*

IPSI 1ST ANNUAL RESEARCH SYMPOSIUM

On May 2nd 2008, IPSI held its first annual research symposium. The goal of the symposium was to facilitate knowledge transfer and interdisciplinary collaboration between research, industry, government and community participants. Over seventy attendees from academia, government, health, law and business were in attendance. Dr. Ann Cavoukian (Privacy Commissioner Ontario and Chair, IPSI Advisory Committee) provided the welcome address while Dr. Mark Vale (Chief Information and Privacy Officer, Government of Ontario) delivered the keynote address.

This event, which promises to be the first of many, included research presentations from the Faculties of Arts and Science, Information Studies, Engineering and Law, as well as the Citizen Lab- Munk Centre for International Studies, and the Rotman School of Management.

Identity, Privacy and Security Policies (and Technologies)
Chair: Andrew Clement, Professor, Faculty of Information Studies, University of Toronto.

Project Sandbox
Ronald Deibert, Professor, Citizen Lab Munk Centre, University of Toronto.

Ubiquitous Computing, Spatiality, and the Construction of Identity: Directions for Technical Research and Policy Response
David Phillips, Associate Professor, Faculty of Information Studies, University of Toronto.

Making the Decision to Monitor in the Workplace: Cybernetic Models and the Illusion of Control
David Zweig, Associate Professor, Department of Management, University of Toronto, Scarborough.

Facing Digitization: How Biometrics Change the Face
Joseph Ferenbok, PhD candidate, Faculty of Information Studies, University of Toronto.

Transparency and Surveillance
Andrew Clement, Professor, Faculty of Information Studies, University of Toronto.

Identity, Privacy and Security Technologies (and Policy)
Chair: Kostantinos Plataniotis, Associate Professor, Faculty of Applied Science and Engineering, University of Toronto.

Towards Eradicating Phishing Attacks
Stefan Saroiu, Assistant Professor, Department of Computer Science, University of Toronto.

Structuring Knowledge for a Security Trade-offs Knowledge Base
Golnaz Elahi, PhD candidate, Department of Computer Science, Eric Yu, Associate Professor, Faculty of Information Studies, University of Toronto.

Sousveillance, Inverse Surveillance, and Cyber-GLOGGING
Steve Mann, Professor, Department of Electrical and Computer Engineering, University of Toronto.

Biometric Encryption and Self-Exclusion in Face Recognition: The OLG case –
Professors: Kostantinos Plataniotis and Dimitrios Hatzinakos
PhD Candidates: Karl Martin, Francis Bui, Faculty of Applied Science and Engineering, University of Toronto.
Partners: Klaus Peltsch, Ontario Lottery and Gaming and Michelle Chibba, IPC

Security in a Quantum World
Hoi-Kwong Lo, Associate Professor, Faculty of Applied Science and Engineering, University of Toronto.

Mark Vale - Chief Information and Privacy Officer, Government of Ontario

Ronald Deibert – Professor, Citizen Lab, Munk Centre, U of T

Lisa Austin – Assistant Professor, Centre for Innovation and Policy, Faculty of Law, U of T

Andrew Clement – Professor, Faculty of Information Studies, U of T

David Zweig – Associate Professor, Department of Management, UTSC

Golnaz Elahi – PhD student, Department of Computer Science, U of T

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