Dartmouth College

Trustworthy Information Systems for Healthcare (TISH)

Overview

Technology infrastructure in the healthcare realm requires secure and effective systems to meet two of its most significant challenges of the 21st century: improving the quality of care and controlling costs. Yet developing, deploying and using information technology that is both secure and genuinely effective in the complex clinical, organizational, and economic environment of healthcare is a significant challenge. This project’s multidisciplinary approach will develop and analyze information-sharing technology that ensures security and privacy while meeting the pragmatic needs of patients, clinical staff, and healthcare organizations to deliver efficient, high-quality care.

Dartmouth’s TISH Program addresses fundamental challenges in current and emerging areas of information security in healthcare:

- protecting the security of clinical information, while ensuring that clinicians can access information they need, when and where they need it, and
- securing the collection of sensor data through personal sensor devices (including both physiological and activity data) to enable monitoring of patient outcomes while giving patients usable control over their privacy.

To be effective, such technologies must consider the economic, organizational and sociological dynamics that are critical to creating and implementing IT that is secure as well as usable and effective. Thus, the researchers will consider:

- usability, and its implications for secure information sharing throughout the organizational environment of medical care,
- security challenges related to collection, processing, and medical use of data from sensors worn by outpatients,
- economic risks, identifying the economically motivated threats to security and privacy in healthcare information systems and the incentives for adopting security technology, and
- privacy concerns, examining how key stakeholders (patients, clinicians, and other providers) understand and evaluate the trade-offs between information sharing, usability, security, and privacy.

This research will result in scientific advances in several fields. For example, the team will: develop new secure and efficient protocols that allow remote health monitoring through a mobile phone and wearable wireless medical sensors; design new machine-learning methods, especially active-learning and relational-learning techniques for analyzing and summarizing sensor data in a user-friendly manner; seek a deeper understanding of the economics of information security in healthcare; and explore how patients and clinicians trade off usability, security, and privacy.

Publications

As of August 2010, TISH research has resulted in the following publications:

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- Shrirang Mare and David Kotz, “Is Bluetooth the right technology for mHealth?”, In USENIX Workshop on Health Security (HealthSec), August, 2010. Position paper.

Events

In its first year of research, the TISH team sponsored three health IT security experts to speak at Dartmouth, ran multiple seminars on HIT security, met with numerous members of industry, government and academia, and, on May 17, 2010, hosted a one-day workshop on “Securing Information Technology in Healthcare”. The purpose of the workshop was to address three related challenges for IT in healthcare: 1) security and usability of mobile, sensor and implantable technologies that monitor patient health; 2) security and usability of electronic health records (EHR); and 3) understanding of, and communication of, the privacy and security risks from #1 and #2 to various stakeholders.

Team

TISH is a collaborative project of the Institute for Security, Technology, and Society at Dartmouth College. It involves a team from Computer Science, Sociology, the Dartmouth Medical School, and the Tuck School of Business, thus far bringing together seven faculty members, 10 students, and four postdoctoral researchers and staff members. The TISH team will work in collaboration with local hospitals and health systems in the Upper Valley region of Vermont and New Hampshire.

- **Principal Investigator:** David Kotz, Professor of Computer Science
- **Co-PI:** Denise Anthony, Associate Professor and Chair of Sociology and Research Director of ISTS
- **Co-PI:** Sean Smith, Associate Professor of Computer Science
- **Co-PI:** Eric Johnson, Professor of the Science of Administration, Tuck School of Business and Director, Glassmeyer/McNamee Center for Digital Strategies
- **Co-PI:** Andrew Gettinger, Associate Professor of Anesthesiology at Dartmouth Medical School
- **Key Personnel:** Tanzeem Choudhury, Assistant Professor of Computer Science
- **Key Personnel:** Ann Flood, Professor of Community and Family Medicine, DMS

For more information on the TISH project, please email contact.tish@dartmouth.edu or call 603.646.0700.