Peter F. Klemperer
50 College St
South Hadley, MA 01075
email: pklemper@mtholyoke.edu
telephone: (217) 898-4637

PROFESSIONAL OBJECTIVE
My research interests include computer security, robotics, and CS education.

EDUCATION
December 2014
PhD in Electrical and Computer Engineering, Carnegie Mellon University. *Thesis Title: Efficient Hypervisor Introspection,* Supervisor: Professor James C. Hoe

July 2008
M.S. in Electrical and Computer Engineering, University of Illinois at Urbana-Champaign. Master's Thesis: *Field-Programmable Gate Array Implementation of the Trusted Computing Base Augmented with the Reliability and Security Engine,* Supervisor: Professor Ravi K. Iyer

December 2005
Bachelor of Science in Computer Engineering,
University of Illinois at Urbana-Champaign.

ACADEMIC EXPERIENCES
August 2017 to Present
Assistant Professor of Computer Science and Innovation Hire in Engineering, Mount Holyoke College, South Hadley, Massachusetts

July 2015 to August 2017
Visiting Lecturer, Mount Holyoke College, South Hadley, Massachusetts

Sept. 2014 to June 2015
Lecturer, University of California San Diego

Aug. 2010 to Aug. 2014
IGERT Trainee, Cylab Usable Privacy and Security Laboratory, Carnegie Mellon University

Spring 2010, Spring 2011
Head Teaching Assistant, 18-447, Introduction to Computer Architecture, Carnegie Mellon University

Jan. 2006 to Dec. 2008
Research Assistant, The Center for Reliable and High-Performance Computing, Coordinated Science Laboratory, University of Illinois at Urbana-Champaign

ACADEMIC HONORS
Bertucci Graduate Fellowship, 2013-2014
IGERT Usable Privacy and Security Fellowship, 2010-2011
Winner - Advanced Micro Devices, Inc. Digital Systems Testing and Testable Design Course Final Project Design Contest

RESEARCH INTERESTS
I am interested in all aspects of computer security, with an emphasis on virtualized systems and usability. I want to study how virtualization can provide an isolated high ground position for malware detection in operating systems and processes. In general, I enjoy developing solutions to engineering problems in computer systems.

PERSONAL
US Citizen

RESEARCH
2008 to Present
Virtualization Supported Security [1]:
My research improves computer security by detecting kernel based rootkits and other malware from the high ground of a hypervisor. The high ground position provides isolation and increased privileges to observe the guest operating system and processes. Increased privilege removes the possibility for spoofing and tainting found in conventional antivirus techniques where the antivirus and malware operate at the same privilege.

To support this project, I developed a KVM virtual machine manager add-on that maps the entire guest memory into the host file system. With the KVM add-on, pre-existing forensic memory analysis tools – originally designed to examine memory dump files offline – can now examine guest state in real-time with native memory performance. These memory mapping techniques will also be extended to enable new virus detection software without compromising guest performance. The KVM add-on has been released as the *shm-snapshot* element of the open-source LibVMI virtual machine introspection project (http://libvmi.com).

PAST PROJECTS
2015-2016
Benchmarking Introductory Programming Exams [2,3]:
I assisted in the testing of a new benchmark of computer science understanding. The benchmark is intended to measure student understanding of core computer science concepts. To support this study I administered the benchmark to the introductory computer science course I was teaching at the University of California San Diego Computer Science Department and score the results.

2011
Photo Tagging for Access Control [4]:
I assisted in the development of an 18 participant in-lab user study of whether access control policies could be inferred from photo tags. To support this study I developed custom web-based interfaces for displaying access policy rules inferred from photo tags and for capturing users policy preferences.

2010
Reactive Access Control [5]:
I assisted in the development of a 24 participant in and out of lab experience-sampling study of whether users could create accurate access control policies dynamically in response to requests (i.e. reactive policy). To support this study I developed a software platform for automatically sending simulated file requests to each participant at random intervals over a period of a week as well as conducting subject interviews.

2006 to 2008
FPGA Implementation of Reliability and Security Engine [6,7,8]:
I adapted a previously simulation-only MIPS-like processor core to Xilinx field-programmable gate array (FPGA) implementation and integrated reliability and security hardware-checking modules into the pipeline. I then interfaced the Nallatech PCI-based FPGA carrier card to the x86 host to demonstrate the performance of the Reliability and Security Engine core. I presented the FPGA implementation of the Reliability and Security Engine at the 2007 Workshop on Dependable and Secure Nano-computing and prepared a demonstration for the Trusted Cyber Infrastructure for Power center annual NSF review in 2007.

PAPERS & PRESENTATIONS

[1]

Peter F. Klemperer, Bryan D. Payne, and James C. Hoe, "Efficient Hypervisor Based Malware Detection," In submission to *IEEE Transactions on Dependable and Secure Computing (TDSC)*.

[2]

Simon, Judy Sheard, Daryl D'Souza, **Peter Klemperer**, Leo Porter, Juha Sorva, Martijn Stegeman and Daniel Zingaro. Benchmarking Introductory Programming Exams: Some Preliminary Results. The twelfth annual ACM International Computing Education Research (ICER) Conference, September 2016.

[3]

Simon, Judy Sheard, Daryl D'Souza, **Peter Klemperer**, Leo Porter, Juha Sorva, Martijn Stegeman, Daniel Zingaro. Benchmarking Introductory Programming Exams: How and Why. In Proceedings of the 21st Annual Conference on Innovation and Technology in Computer Science Education (ITiCSE), July 2016.

[4]

Peter Klemperer, Yuan Liang, Michelle Mazurek, Manya Sleeper, Blase Ur, Lujo Bauer, Lorrie Faith Cranor, Nitin Gupta, and Michael Reiter. 2012. Tag, you can see it!: using tags for access control in photo sharing. In Proceedings of the 2012 ACM annual conference on Human Factors in Computing Systems (CHI '12), 2012.

[5]

Michelle L. Mazurek, **Peter F. Klemperer**, Richard Shay, Hassan Takabi, Lujo Bauer, Lorrie Faith Cranor, Exploring reactive access control, Proceedings of the 2011 Annual Conference on Human Factors in Computing Systems (CHI), 2011.

[6]

Karthik Pattabiraman, **Peter F. Klemperer**, Shelley Chen, Zbigniew Kalbarczyk and Ravi Iyer, An automated end-to-end approach for deriving application-aware error detectors and their hardware implementation, Technical Report, University of Illinois (Urbana-Champaign), June 2007.

[8]

J. C. Hoe, *Network Interface for Message Passing Parallel Computation on a Workstation Cluster*. In Proceedings of Hot Interconnects II, Stanford, California, August 1994. (Presenter)

[7]

Ravishankar Iyer, Zbigniew Kalbarczyk, Karthik Pattabiraman, Wen- Mei Hwu, William Healey, **Peter Klemperer** and Reza Farivar, Towards Application-aware Security and Reliability, IEEE Security and Privacy Magazine, Jan 2007.

[8]

Peter Klemperer, Shelley Chen, Karthik Pattabiraman, Zbigniew Kalbarczyk and Ravishankar Iyer, FPGA Hardware Implementation of Statically Derived Application-aware Error Detectors, Workshop on Dependable and Secure Nano-computing (WDSN), Held in conjunction with the International Conference on Dependable Systems and Networks, 2007. (Presenter)

INDUSTRY EXPERIENCES

Jan. to Aug. 2008
Internship at Intel, Hillsboro, OR, Corporate Technology Group, Systems Technology Lab, Trust and Identity Group: Demonstrated techniques for subverting antivirus from kernel memory.

Summer 2005
Internship at Intel, Hillsboro, OR, Corporate Technology Group, Systems Technology Lab, Trust and Identity Group: Developed security vulnerability demonstration suite.

SERVICE & OUTREACH

October 9, 2016
Judge, University of Massachusetts Amherst Hackathon

Summer 2016 - Present
Member, Mount Holyoke College Makerspace space search committee.

April 2015
Reviewer, Program Committee of the 2015 Annual IEEE/IFIP International Conference on Dependable
Systems and Networks Student Forum

Spring 2015
Mentor, Techbridge technology program for young women at Oakland Tech High School