MICHAEL S. KIRKPATRICK

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RESEARCH INTERESTS

Computing Ethics, Privacy & Security Policy, Computing & Society, Systems & Concurrency, Computing Education Research

TEACHING INTERESTS

Society, Ethics, & Professionalism in Computing, Systems Programming, Operating Systems, Computer Organization, Embedded Systems, Information Security, Applied Cryptography

PROFESSIONAL EXPERIENCE

James Madison University, Department of Computer Science

Associate Professor   August 2017 – present
Assistant Professor   August 2011 – July 2017

- Taught courses in Computer Systems, Society, Ethics, & Professionalism, Web-based Application Development, Operating Systems, Computer Organization, Embedded Systems, Data Structures, and Formal Methods for Information Security; courses include both graduate and undergraduate level, as well as online and on-campus.
- Led effort to revise and restructure systems-track curriculum. The old curriculum had three required courses, while the new curriculum has two required courses on fundamental computer systems concepts and five courses in different types of systems that students can choose from.
- Designed and taught new courses on Societal & Professional Issues, Web-based Application Development, and Embedded Systems.
- Conducted scholarly research leading to publication in the areas of computing & professional ethics, privacy, computing education research, access control, applied cryptography, operating systems, and embedded systems. Collaborated with colleagues in other departments, at other institutions, and in industry.
- Contributed to the department, university, and profession in a variety of service roles, including curriculum committees, peer teaching evaluations, professional ethics committees, hiring committees, security task force, and advising.
- Served as reviewer and program committee member for multiple international journals, conferences, and workshops.

James Madison University, Center for Faculty Innovation

Faculty Associate   August 2017 – June 2020

- Served as co-lead facilitator for jmUDESIGN, an annual week-long course design institute for faculty that is the signature program for the CFI teaching team.
- Conducted Teaching Analysis Polls (TAPs), small-group discussions with students focused on effective teaching practices, in several departments and colleges across campus.
- Conducted research on effective teaching practices to inform programming.

- Led workshops on effective teaching practices based on the Scholarship of Teaching and Learning (SoTL) literature.
- Participated in planning discussions for other activities led by other members of the teaching area team.
- Wrote multiple Teaching Toolboxes, short articles on evidence-based teaching practices and reflections on teaching in general.

PROFESSIONAL LEADERSHIP

Association for Computing Machinery (ACM)
- Member of Publications Board — July 2022 – present
- Chair of Ethics & Plagiarism Committee — July 2022 – present
- Vice Chair of Ethics & Plagiarism Committee — March 2022 – July 2022
- Member of ACM-IEEE Joint Investigative Committee — February 2020 – February 2021
- Officer of Committee on Professional Ethics — August 2017 – present
- Executive Committee Member of Code 2018 Project — August 2017 – June 2018

AWARDS

James Madison University, College of Integrated Science and Engineering
- Oliver Endowed Professorship — 2023 – 2024
- Distinguished Service Award — 2021
- Outstanding Junior Faculty Award — 2014

PUBLICATIONS

Books and Booklets
1. *Michael S. Kirkpatrick*, *Computer Systems Fundamentals: Principles of Concurrent Systems*. In publication.
2. Don Gotterbarn, Marty J. Wolf, and *Michael S. Kirkpatrick*, *ACM Code of Ethics and Professional Conduct*. Booklet containing the revised ACM Code along with supporting material. ISBN 978-1-4503-6626-7, DOI 10.1145/3274591, August 2018.

Journal Articles
3. Aditi Gupta, Javid Habibi, *Michael S. Kirkpatrick*, and Elisa Bertino, "Marlin: Mitigating Code Reuse Attacks Using Code Randomization." *IEEE Transactions on Dependable and Secure Computing (TDSC)*, May/June 2015 (vol. 12, no. 3), 12 pages.
4. Aditi Gupta, *Michael S. Kirkpatrick*, and Elisa Bertino, "A Formal Proximity Model for RBAC Systems." *Computers & Security*, March 2014 (vol. 41), 16 pages.
5. *Michael S. Kirkpatrick*, Gabriel Ghinita, and Elisa Bertino, "Privacy-preserving Enforcement of Spatially Aware RBAC." *IEEE Transactions on Dependable and Secure Computing (TDSC)*, September/October 2012 (vol. 9, no. 5), 14 pages.
6. *Michael S. Kirkpatrick*, Gabriel Ghinita, and Elisa Bertino, "Resilient Authenticated Execution of Critical Applications in Untrusted Environments." *IEEE Transactions on Dependable and Secure Computing (TDSC)*, July/August 2012 (vol. 9, no. 4), 13 pages.

Conference & Workshop Papers
7. *Michael S. Kirkpatrick*, "Access Control Meets Genetics: The Challenges of Information Leakage and Non-users (Extended Abstract)." Ethicomp 2022, Turku, Finland, July 2022.
8. *Michael S. Kirkpatrick*, Emmanuelle Burton, and Marty J. Wolf, "Free Speech and Computing

Professionals: Moral Considerations and Tensions (Extended Abstract)." Ethicomp 2022, Turku, Finland, July 2022.

9. Don Gotterbarn, *Michael S. Kirkpatrick*, and Marty J. Wolf, "From the Page to Practice: Support for Computing Professionals Using a Code of Ethics." Ethicomp 2022, 15 pages, Turku, Finland, July 2022.

10. Dee A. B. Weikle, Michael O. Lam, and *Michael S. Kirkpatrick*, "Automating Systems Course Unit and Integration Testing: An Experience Report." 50th SIGCSE Technical Symposium, 6 pages, Minneapolis, MN, February 2019.

11. *Michael S. Kirkpatrick*, "Student Perspectives of Team-Based Learning in a CS Course: Summary of Qualitative Findings." 48th SIGCSE Technical Symposium, 6 pages, Seattle, WA, March 2017. (Exemplary Paper award)

12. *Michael S. Kirkpatrick* and Chris Mayfield, "Evaluating an Alternative CS1 for Students with Prior Programming Experience." 48th SIGCSE Technical Symposium, 6 pages, Seattle, WA, March 2017.

13. *Michael S. Kirkpatrick* and Samantha Prins, "Using the Readiness Assurance Process and Metacognition in an Operating Systems Course." *ACM Annual Conference on Innovation and Technology in Computer Science Education (ITiCSE)*, 6 pages, Vilnius, Lithuania, July 2015.

14. *Michael S. Kirkpatrick*, Mohamed Aboutabl, David Bernstein, and Sharon Simmons, "Backward Design: An Integrated Approach to a Systems Curriculum." *ACM Technical Symposium on Computer Science Education (SIGCSE)*, 6 pages, Kansas City, MO, March 2015.

15. Aditi Gupta, *Michael S. Kirkpatrick*, and Elisa Bertino, "A Secure Architecture Design Based on Application Isolation, Code Minimization, and Randomization." *IEEE Conference on Communications and Network Security (CNS)*, 7 pages, Washington, DC, October 2013.

16. Aditi Gupta, Sam Kerr, *Michael S. Kirkpatrick*, and Elisa Bertino, "Marlin: A Fine-grained Randomization Approach to Defend Against ROP Attacks." *7th International Conference on Network and Systems Security (NSS)*, 14 pages, Madrid, Spain, June 2013.

17. Aditi Gupta, *Michael S. Kirkpatrick*, and Elisa Bertino, "A Formal Proximity Model for RBAC Systems." *8th IEEE International Conference on Collaborative Computing: Networking, Applications, and Worksharing (CollaborateCom)*, 10 pages, Pittsburgh, PA, October 2012. **Best Student Paper Award.**

18. *Michael S. Kirkpatrick*, Maria Luisa Damiani, and Elisa Bertino, "Prox-RBAC: A Proximity-based Spatially Aware RBAC." *19th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS)*, 10 pages, Chicago, IL, November 2011.

19. *Michael S. Kirkpatrick*, Sam Kerr, and Elisa Bertino, "PUF ROKs : A Hardware Approach to Read-Once Keys." *6th ACM Symposium on Information, Computer and Communications Security (ASIACCS)*, 10 pages, Hong Kong, March 2011.

20. *Michael S. Kirkpatrick* and Sam Kerr, "Enforcing Physically Restricted Access Control for Remote Data." *1st ACM Conference on Data and Application Security and Privacy (CODASPY)*, 11 pages, San Antonio, TX, February 2011. **Best Paper Award, First Runner-Up.**

21. Sam Kerr, *Michael S. Kirkpatrick*, and Elisa Bertino, "PEAR: A Hardware-based Authentication System." *3rd ACM SIGSPATIAL International Workshop on Security and Privacy in GIS and LBS (SPRINGL)*, 10 pages, San Jose, California, November 2010.

22. *Michael S. Kirkpatrick* and Elisa Bertino, "Enforcing Spatial Constraints for Mobile RBAC Systems." *15th ACM Symposium on Access Control Models and Technologies (SACMAT)*, 10

pages, Pittsburgh, PA, June 2010.

23. ***Michael S. Kirkpatrick*** and Elisa Bertino, "Software Techniques to Combat Drift in PUF-based Authentication Systems." *Secure Component and System Identification (SECSI)*, 9 pages, Cologne, Germany, April 2010.

24. ***Michael S. Kirkpatrick***, Sam Kerr, and Elisa Bertino, "PUF ROKs: Generating Read-Once Keys with Physically Unclonable Functions." Extended abstract, *6th Cyber Security and Information Intelligence Research Workshop (CSIIRW)*, 4 pages, Oak Ridge, TN, April 2010.

25. ***Michael S. Kirkpatrick*** and Elisa Bertino, "Physically Restricted Authentication with Trusted Hardware." *Fourth Annual Workshop on Scalable Trusted Computing*, 6 pages, Chicago, IL, November 2009.

26. ***Michael S. Kirkpatrick*** and Elisa Bertino, "Context-Dependent Authentication and Access Control." *Open Research Problems in Network Security (iNetSec)*, 13 pages, Zurich, Switzerland, April 2009.

Encyclopedia Articles & Book Chapters

27. ***Michael S. Kirkpatrick***, "Access Control Models." *McGraw-Hill Yearbook of Science & Technology*, edited by David Blumel, 2013.

28. Elisa Bertino, Stephen J. Elliott, ***Michael S. Kirkpatrick***, and Shimon K. Modi, "Digital Identity Management." *Security in Computing and Networking Systems: The State-of-the-Art*, edited by W. McQuay and W. W. Smari, 2012.

Invited Papers

29. Elisa Bertino and ***Michael S. Kirkpatrick***, "Location-Based Access Control Systems for Mobile Users – Concepts and Research Directions." 4th SIGSPATIAL ACM GIS International Workshop on Security and Privacy in GIS and LBS (SPRINGL), 4 pages, Chicago, IL, November, 2011.

30. Aditi Gupta, Salmin Sultana, ***Michael S. Kirkpatrick***, and Elisa Bertino, "A Selective Encryption Approach to Fine-Grained Access Control for P2P File Sharing." *6th IEEE International Conference on Collaborative Computing: Networking, Applications and Worksharing (Collaborate-Com)*, 10 pages, Chicago, IL, October 2010.

31. Elisa Bertino and ***Michael S. Kirkpatrick***, "Location-Aware Authentication and Access Control – Concepts and Issues." *IEEE 23rd International Conference on Advanced Information Networking and Applications (AINA)*, 6 pages, Bradford, UK, May 2009.

Position Papers, Posters, & Technical Reports

32. Aditi Gupta, ***Michael S. Kirkpatrick***, and Elisa Bertino, "A Secure Architecture Design Based on Code Minimization and Application Isolation." *Purdue University, CERIAS TR 2013-4*, 7 pages, July 2013.

33. Aditi Gupta, Sam Kerr, ***Michael S. Kirkpatrick***, and Elisa Bertino, "Marlin – Making it Harder to Fish for Gadgets." Poster, *19th ACM Conference on Computer and Communications Security (CCS)*, Raleigh, NC, October 2012.

34. Carmen R. Vicente, ***Michael S. Kirkpatrick***, Gabriel Ghinita, Elisa Bertino, and Christian S. Jensen, "Requirements and Challenges of Location-Based Access Control in Healthcare Emergency Response." Position Paper, *2nd SIGSPATIAL ACM GIS International Workshop on Security and Privacy in GIS and LBS (SPRINGL)*, 6 pages, Seattle, WA, November 2009.

35. ***Michael S. Kirkpatrick***, Elisa Bertino, and Frederick T. Sheldon, "Restricted Authentication and Access Control for Cyber-physical Systems." *DHS Workshop on Future Directions in Cyber-physical Systems Security*, 5 pages, Newark, NJ, July 2009.

1. *Michael S. Kirkpatrick*, Samuel Kerr, and Elisa Bertino, "System on Chip and Method for Cryptography using a Physically Unclonable Function." U.S. Patent No. 8,750,502 B2, issued June 10, 2014.

Funding Experience

Virtual Library of Virginia (VIVA)   April 2019 – June 2021

- Received VIVA Course Redesign Grant of $6,200 to develop and share freely available open access textbook. Material available at `https://opencsf.org`.

Purdue University   October 2013

- Acquired a sub-award to study the security implications of smart meters. Sub-award of $10,000 was used to purchase a smart meter and to provide a stipend for a graduate student, and was part of a multi-site Department of Energy grant that included researchers from Sypris Electronics, Purdue University, and Oak Ridge National Laboratory.

Sypris Electronics   January 2010

- Co-authored a successful partnership proposal for studying techniques to protect remote, unattended devices. Award of $114,820 supported three graduate students for one year.

Professional Membership and Service

Member of ACM and IEEE Computer Society

- Member of Special Interest Group on Security, Audit and Control (SIGSAC)
- Member of Special Interest Group on Computer Science Education (SIGCSE)
- Member of Special Interest Group on Operating Systems (SIGOPS)
- Member of Special Interest Group on Embedded Systems (SIGBED)
- Member of ACM Women in Computing (ACM-W)

Member of NCWIT Academic Alliance

Conference Program Committee

- 8th Cyber Security and Information Intelligence Research Workshop (CSIIRW), 2012
- 7th Cyber Security and Information Intelligence Research Workshop (CSIIRW), 2011
- 6th Cyber Security and Information Intelligence Research Workshop (CSIIRW), 2010

Conference & Journal Reviewer

- ACM Conference on Data and Application Security and Privacy (CODASPY)
- ACM Innovations and Technology in Computer Science Education (ITiCSE)
- ACM Symposium on Access Control Models and Technologies (SACMAT)
- ACM Technical Symposium on Computer Science Education (SIGCSE)
- ACM Transactions on Computing Education (TOCE)
- ACM Transactions on Information Systems Security (TISSEC)
- Annual Computer Security Applications Conference (ACSAC)
- Annual Cyber Security and Information Intelligence Research Workshop (CSIIRW)
- Computers & Security
- Hawai'i International Conference on System Sciences
- IEEE International Conference on Data Mining
- IEEE International Conference on Mobile Data Management

- IEEE International Symposium on Policies for Distributed Systems and Networks (POLICY)
- IEEE Security & Privacy
- IEEE Transactions on Dependable and Secure Computing (TDSC)
- IEEE Transactions on Education (TE)
- IEEE Transactions on Information Forensics & Security (TIFS)
- IEEE Transactions on Knowledge and Data Engineering (TKDE)
- IEEE Transactions on Very Large Scale Integration Systems (TVLSI)
- IEEE Transactions on Wireless Communication (TWireless)
- IFCA International Conference on Financial Cryptography and Data Security
- International Journal of Information Security
- Journal of Information Security and Applications
- Transactions on Computational Science

Miscellaneous Talks & Panels

1. Talk: "Women in Computing: Past, Present, and Future," JMU ISAT 485 Guest Lecture, April 2020
2. Talk: " 'Avoid harm' considered harmful: Does the ACM Code of Ethics advocate harm?" Computing Ethics and Philosophical Enquiry (CEPE), May 2019
3. Workshop: "Getting Started with Specifications Grading," JMU CFI May Symposium 2019
4. Talk: "Women in Computing: Past, Present, and Future," JMU ISAT 485 Guest Lecture, April 2019
5. Invited Talk: "Teaching, Fast and Slow: Using Cognitive Science to Increase Student Engagement," Bridgewater College, January 2019
6. Panel: "Ethical Considerations for New Technologies: The Impact of AI and Technology on Human Operators," Jones Day/ACM Washington, D.C., January 2019
7. Panel: "Integrating Ethical Security Practices into the Code," Ethicomp, September 2018
8. Workshop: "Toward Successful Cooperative Learning: Enhancing Small-group Work," JMU CFI Workshop Fall 2018
9. Workshop: "Active Learning 101: Why and How to Get Started," JMU CFI New Faculty Orientation 2018
10. Birds-of-a-feather Session: "Active Learning Strategies for Integrating the ACM Code of Ethics into CS Courses," ACM SIGCSE Symposium, March 2018
11. Workshop: "Strategies for Integrating the Updated ACM Code of Ethics into the Computing Curriculum," ACM SIGCSE Symposium, March 2018
12. Invited Talk: "Meltdown and Spectre: Complexity and the Death of Security," College and University Auditors of Virginia
13. Workshop: "Active Learning 101: Why and How to Get Started," JMU CFI New Faculty Orientation 2017
14. Workshop: "When is Too Much Not Enough? Using Cognitive Theories of Learning to Shape Instructional Choices," JMU CFI May Symposium 2017
15. Invited Talk: "Where We've Been and Where We Are: Implications for Diversity in Computing," CAPWIC 2017
16. Workshop: "Strategies for Integrating Driverless Cars into the Computing Curricula," ACM SIGCSE Symposium, March 2017
17. Workshop: "Teaching Fast and Slow: Using Peer Instruction for Active Learning," James

Madison University, Center for Faculty Innovation May Symposium, May 2016

18. Talk: "Women in Computing: Good News, Bad News, and What Can Be Done (And Is!)," James Madison University ISAT 485 Guest Lecture, March 2016
19. Talk: "Using Technology for Content Delivery, Formative Assessment, and Reflection," Bridgewater College Annual Pedagogy Project, May 2015
20. Workshop: "Wading Through the Pedagogy Alphabet Soup," James Madison University, Center for Faculty Innovation May Symposium, May 2015
21. Talk: "Addressing the Diversity Crisis in Computing," James Madison University Annual Diversity Conference, March 2015
22. Panel (moderator): "Best Practices for IRB Approval: Four Perspectives," ACM SIGCSE Symposium, March 2015
23. Talk: "Women in Computing: Good News, Bad News, and What Can Be Done (And Is!)," James Madison University ISAT 485 Guest Lecture, September 2014
24. Workshop: "Sparking Active Engagement with Interactive Lecturing," James Madison University, Center for Faculty Innovation Workshop, September 2014
25. Birds-of-a-feather Session: "Integrating Active Learning Techniques into Systems Courses," ACM SIGCSE Symposium, March 2014
26. Host: Codebreaker – A film about Alan Turing, James Madison University, November 2013
27. Panel: CS Content Teaching Academy, James Madison University, June 2013
28. Panel: "Cyber Security – How to Avoid Being the Next Headline," Commonwealth of Virginia Innovative Technology Symposium (CoVITS), August 2012
29. Talk: "Contextual Access Control," James Madison University, February 2011
30. Talk: "Myths of Computer Security," Butler University, October 2010
31. Panel: "What is Graduate School?" Purdue University, September 2010

EDUCATION

Purdue University, West Lafayette, IN
- Ph.D., Computer Science   August 2011
  - Dissertation: "Trusted Enforcement of Contextual Access Control"
  - Committee: Elisa Bertion (adviser), Mikhail Atallah, Ninghui Li, and Dongyan Xu

Michigan State University, East Lansing, MI
- M.S., Computer Science & Engineering   August 2007
  - Thesis: "Canary Bit: Extending Secure Bit for Data Pointer Protection from Buffer Overflow Attacks"
  - Adviser: Richard Enbody

Indiana Univserity, Bloomington, IN
- B.A., Mathematics & Computer Science   May 2001
  - Minor: Religious Studies

OTHER WORK EXPERIENCE

Purdue University, Department of Computer Science   *Graduate Student*
- Taught courses in Foundations of Computer Science and College Algebra as the instructor of record. Led recitation and discussion sections to reinforce lecture material in Precalculus, Foundations of Computer Science, and Data Structures. Supervised undergraduate research

projects in the areas of hardware design and mobile application development. Served as technical supervisor and managerial support for Engineering Projects in Community Service. (EPICS), an interdisciplinary service learning program.

- Conducted scholarly research on contextual access control systems and trusted platform technologies, utilizing microkernel OS, cell phones enabled with Bluetooth and near-field communication (NFC) technologies, physically unclonable functions (PUFs), field-programmable gate arrays (FPGAs), virtualization. Published several peer-reviewed works in these areas, and co-authored multiple patent applications.
- Served as chair of the Graduate Student Board for the 2009–2010 academic year, overseeing student representation to the department.

Sypris Electronics *Summer Intern*
Supervised by Hal Aldridge, Ph.D. May – August 2010
- Conducted research on architectural and OS approaches for trustworthy computing. Contributed to the design of a novel hardware architecture for secure computing, performed the patent search, and co-authored a patent disclosure for the system. Initiated research on customized execution environments for application isolation.

Oak Ridge National Laboratory *Summer Intern*
Supervised by Frederick Sheldon, Ph.D. May – August 2009.
- Conducted research on use of PUFs for cyber-physical systems, such as smart grid systems. Developed prototype for contextual insider threat detection for Linux kernel.

IBM Server & Technology Group *Software Engineer*
Essex Junction, VT June 2002 – December 2006
- Developed and implemented Optical Proximity Correction (OPC) algorithms for manufacturing 130nm, 90nm, 65nm, and 45nm semiconductor lithography technologies. Products using these technologies include cell phones, servers, video game consoles, and application-specific integrated circuits (ASICs). Maintained chip design processing infrastructure and performed failure analysis. Developed and implemented access control systems leveraging LDAP and AFS. Trained developers to program in Perl, led training sessions for remote system users, and developed training materials for new employees.

IBM Global Services *IT Professional*
Chicago, IL June 2001 – May 2002
- Provided web consulting services in a professional, client-driven environment. Client sectors included retail, banking, and education.

CourseShare.com *Programmer*
Bloomington, IN October 2000 – May 2001
- Led implementation of a PHP web application for online survey creation.

Indiana University *Programmer*
Bloomington, IN July 2000 – May 2001
- Implemented a ColdFusion web application for tracking personnel information.