Matthew Lentz

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ACADEMIC APPOINTMENT

Duke University, Durham, NC USA

Assistant Professor

I work broadly at the intersection of systems, networking, and security. My current research focuses on two directions: 1) introducing new abstractions and tools for building (and reasoning about) secure, trustworthy software systems, 2) building systems that improve performance for modern networking and machine learning applications.

EDUCATION

University of Maryland, College Park, MD USA

Ph.D. in Computer Science, August 2020
Dissertation: Assurance and Control over Sensitive Data on Personal Devices
Advisor: Bobby Bhattacharjee
B.S. in Computer Engineering, May 2010

Refereed Publications

- 1. MCCS: A Service-based Approach to Collective Communication for Multi-Tenant Cloud Yongji Wu, Yechen Xu, Jingrong Chen, Zhaodong Wang, Ying Zhang, *Matthew Lentz*, Danyang Zhuo SIGCOMM 2024 (ACM Special Interest Group on Data Communication)
- 2. DrSec: Flexible Distributed Representations for Efficient Endpoint Security Mahmood Sharif, Pubali Datta, Andy Riddle, Kim Westfall, Adam Bates, Vijay Ganti, *Matthew Lentz*, David Ott IEEE S&P 2024 (IEEE Symposium on Security and Privacy)
- 3. Dissecting Overheads of Service Mesh Sidecars Xiangfeng Zhu, Guozhen She, Bowen Xue, Yu Zhang, Yongsu Zhang, Xuan Kelvin Zou, XiongChun Duan, Peng He, Arvind Krishnamurthy, *Matthew Lentz*, Danyang Zhuo, Ratul Mahajan SOCC 2023 (ACM Symposium on Cloud Computing)
- 4. Remote Procedure Call as an OS-Managed Service Jingrong Chen, Yongji Wu, Shihan Lin, Yechen Xu, Xinhao Kong, Thomas Anderson, Matthew Lentz, Xiaowei Yang, Danyang Zhuo NSDI 2023 (USENIX Symposium on Networked Systems Design and Implementation)
- 5. Serving and Optimizing Machine Learning Workflows on Heterogeneous Infrastructures Yongji Wu, *Matthew Lentz*, Danyang Zhuo, Yao Lu VLDB 2023 (Very Large Data Bases)

6. Listening to Bluetooth Beacons for Epidemic Risk Mitigation

Gilles Barthe, Roberta De Viti, Peter Druschel, Deepak Garg, Manuel Gomez Rodriguez, Pierfrancesco Ingo, Heiner Kremer, *Matthew Lentz*, Lars Lorch, Aastha Mehta, Bernhard Schölkopf Nature Scientific Reports 2022

Fall 2021 – Present

7. Poirot: Private Contact Summary Aggregation

Chenghong Wang, David Pujol, Yanping Zhang, Johes Bater, *Matthew Lentz*, Ashwin Machanavajjhala, Kartik Nayak, Lavanya Vasudevan, Jun Yang NeurIPS PPML 2020 (NeurIPS Workshop on Privacy-Preserving Machine Learning)

8. enClosure: Group Communication via Encounter Closures Lillian Tsai, Roberta De Viti, *Matthew Lentz*, Stefan Saroiu, Peter Druschel, Bobby Bhattacharjee MobiSys 2019 (International Conference on Mobile Systems, Applications, and Services)

- SeCloak: ARM TrustZone-based Mobile Peripheral Control Matthew Lentz, Rijurekha Sen, Peter Druschel, Bobby Bhattacharjee MobiSys 2018 (International Conference on Mobile Systems, Applications, and Services)
- 10. Dynamic Frequency Resource Allocation in Heterogeneous Cellular Networks Vaibhav Singh, *Matthew Lentz*, Bobby Bhattacharjee, Richard La, Mark Shayman IEEE TMC 2016 (Transactions on Mobile Computing)

11. Drowsy Power Management

Matthew Lentz, James Litton, Bobby Bhattacharjee SOSP 2015 (ACM Symposium on Operating System Principles)

- 12. Brave New Word: Privacy Risks for Mobile Users Paarijaat Aditya, Bobby Bhattacharjee, Peter Druschel, Viktor Erdelyi, Matthew Lentz *(Alphabetical)* SPME 2014 (Workshop on Security and Privacy Aspects of Mobile Environments)
- SDDR: Light-weight, Secure Mobile Encounters Matthew Lentz, Viktor Erdelyi, Paarijaat Aditya, Elaine Shi, Peter Druschel, Bobby Bhattacharjee USENIX Security Symposium 2014
- EnCore: Private, Context-based Communication for Mobile Social Apps Paarijaat Aditya, Viktor Erdelyi, *Matthew Lentz*, Elaine Shi, Bobby Bhattacharjee, Peter Druschel MobiSys 2014 (International Conference on Mobile Systems, Applications, and Services)

15. **D-Mystifying the D-Root Address Change** Matthew Lentz, Dave Levin, Jason Castonguay, Neil Spring, and Bobby Bhattacharjee IMC 2013 (Internet Measurement Conference) Short Paper

Posters

16. Poirot: Private Contact Summary Aggregation Yanping Zhang, Chenghong Wang, David Pujol, Johes Bater, Matthew Lentz, Ashwin Machanavajjhala, Kartik Nayak, Lavanya Vasudevan, Jun Yang SenSys 2020 (Conference on Embedded Networked Sensor Systems)

FUNDING

 Optimizing ML Workloads via Placement and Collective Communication Co-Primary Investigator. Joint with Danyang Zhuo (Duke)
 \$50,000 (Total) / \$25,000 (Personal)

Advising

Current Students

 \blacksquare Avery Blanchard (Ph.D. CS)

- Luka Duranovic (Ph.D. CS)
- Yongji Wu (Ph.D. CS) with Danyang Zhuo
- Undergraduates: Hadi Chaudhri, Arnav Jindal

Past Students

- Nathan Ostrowski (B.S. CS)
 On Leave at Startup: Octane Security
- Yalu Cai (M.S. CS 2022) Project: "Towards Verification of a Translator from EVM to eWASM" First Job: CertiK
- Andres Montoya-Aristizabal (B.S. CS 2022) First Job: TwoSigma

PhD Committees

Prelim (Proposal): Jingrong Chen (2023), Christopher Kjellqvist (2023), Shujun Qi (2023), Shihan Lin (2022)

Courses Taught

Spring 2024
Fall 2023
Spring 2023
Fall 2022
Fall 2021

SERVICE

Program Committee Member

- MobiSys 2024 (International Conference on Mobile Systems, Applications, and Services)
- MobiCom 2024 (International Conference on Mobile Computing and Networking)
- IEEE S&P 2024 (IEEE Symposium on Security and Privacy)
- MobiSys 2023 (International Conference on Mobile Systems, Applications, and Services)
- MobiCom 2023 (International Conference on Mobile Computing and Networking)
- CCS 2022 (ACM Conference on Computer and Communications Security)
- EuroSys 2021 (European Conference on Computer Systems)
- HotMobile 2021 (Workshop on Mobile Computing Systems and Applications)

Conference Organizer

■ Proceedings Chair for SOSP 2023 (ACM Symposium on Operating Systems Principles)

External Reviewer

■ CCS 2021 (ACM Conference on Computer and Communications Security)

DEPARTMENTAL SERVICE

Communications Committee	09/2023 - Present
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■ Graduate Affairs Committee	09/2021 - Present
■ Visit Day Committee	03/2022 - 04/2022

INVITED TALKS

Efficiency, Manageability, (and Security) for Distributed Applications VMware Research - Palo Alto, California	Aug 2023
■ Invited Panelist: "Why do a Ph.D. in Computer Science?" CMMRS Pre-Doctoral Research School - Online	Aug 2021
 (Em)powering Users and Their Devices Microsoft Research - Redmond, WA USA Northeastern University - Boston, MA USA VMware Research - Palo Alto, CA USA University at Buffalo - Buffalo, NY USA Duke University - Durham, NC USA George Mason University - Fairfax, VA USA 	Feb-Mar 2020
SeCloak: ARM TrustZone-based Mobile Peripheral Control MobiSys Conference - Munich, Germany	Jun 2018
Drowsy Power Management SOSP Conference - Monterey, CA USA	Oct 2015
■ SDDR: Light-Weight, Secure Mobile Encounters USENIX Security Symposium - San Diego, CA USA	Aug 2014
■ D-Mystifying the D-Root Address Change IMC Conference - Barcelona, Spain	Oct 2013
Professional Experience	
 Broadcom, Palo Alto, CA USA Affiliated Researcher Ongoing collaboration with Broadcom, after their acquisition of VMware Research my faculty appointment at Duke University. My focus for collaborations revolves a 	11/2023 – Present , in conjunction with round trusted

execution environments, software system verification, and security threat analytics.

■ VMware Research	, Palo Alto,	CA	USA	
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Affiliated Researcher Collaboration with VMware Research in conjunction with my faculty appointment at Duke University. My focus for collaborations revolves around trusted execution environments, which is a continuation of my postdoctoral work, as well as threat analytics with VMware's Carbon Black team.

8/2021 - 11/2023

Investigating the utility of applying formal verification techniques to enabling new trusted execution environment (TEE) features (or enhancing existing features). I focused primarily on features that helped enable TEEs in virtualized environments (e.g., live migration). 3/2017 - 5/2017■ Microsoft Research, Redmond, WA USA Research Intern (Mentors: Anirudh Badam, Ranveer Chandra) Continuation of my work during the previous internship. ■ Microsoft Research, Redmond, WA USA 5/2016 - 8/2016Research Intern (Mentors: Anirudh Badam, Ranveer Chandra) Performed research on algorithms and optimization for multi-battery systems, with a focus on "2-in-1" laptop/tablet systems. Worked towards informing the low-level control logic with relevant user behavior predictions (e.g., time until next charge) based on telemetry data. Built a simulator for the design and evaluation of multi-battery systems, with support for various hardware interconnects, battery models, workloads, and control algorithms. 2/2012 - 6/2020■ University of Maryland, College Park, MD USA Graduate Research Assistant (Advisor: Bobby Bhattacharjee) Performed research in a variety of areas, including: - Operating system support for enforcing policies over I/O data - Censorship-resistant communication over video chats - Operating system power management - Cellular network spectrum allocation and sharing - Privacy-preserving mobile social applications - DNS root server measurement and analysis **NSA - Laboratory for Telecommunication Sciences**, College Park, MD USA 5/2011 - 8/2011Intern - Computer Science Internship Program Added support for the LLVM compiler infrastructure to Cray's Chapel parallel programming language compiler, allowing for faster compilation and better control over optimizations. ■ NSA - Laboratory for Telecommunication Sciences, College Park, MD USA 9/2010 - 5/2011Graduate Research Assistant Continuation of my work during the previous internship. 6/2010 - 8/2010■ NSA - Laboratory for Telecommunication Sciences, College Park, MD USA Intern - Computer Science Internship Program Developed highly-optimized real-time signal processing software using NVIDIA's CUDA libraries to look for signals in the environment, as well as compute their range and direction of arrival. 6/2009 - 8/2009■ DRS Signal Solutions, Gaithersburg, MD USA Intern - Embedded Software Engineering Developed a complete signal collection product prototype, implementing features in software running on an embedded radio platform. ■ **DRS Signal Solutions**, Gaithersburg, MD USA 6/2008 - 8/2008Intern - Application Software Engineering Programmed helper applications for common engineering tasks, and expanded the feature set of GUI applications which interface with the hardware radio platforms.

■ VMware Research, Palo Alto, CA USA

Postdoctoral Researcher

6/2020 - 6/2021