

Lorenzo De Carli

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Status: US Permanent Resident

Positions held

Assistant Professor. July 2018–present

Department of Computer Science, Worcester Polytechnic Institute
Worcester, MA, USA

Assistant Professor. January 2017–June 2018

Computer Science Department, Colorado State University
Fort Collins, CO, USA

Education

University of Wisconsin-Madison, Madison, WI, USA

Ph.D. in Computer Science, December 2016

Advisor: Professor Somesh Jha

M.Sc. in Computer Science, May 2010

Politecnico di Torino, Torino, Italy

M.Sc. (2007) and B.Sc. (2005) in Computer Engineering

Research Interests

Web security, IoT security, malware detection and understanding, usable security.

Publications

CONFERENCES

- [C1] L. De Carli, A. Mignano. Network Security for Home IoT Devices Must Involve the User: a Position Paper. *FPS 2020*.
- [C2] M. Taylor, R. Vaidya, D. Davidson, L. De Carli, V. Rastogi. Defending Against Package Typosquatting. *NSS 2020*.
- [C3] F. De Gaspari, D. Hitaj, G. Pagnotta, L. De Carli, L. V. Mancini. EnCoD: Distinguishing Compressed and Encrypted File Fragments. *NSS 2020*.
- [C4] N. Hansen, L. De Carli, D. Davidson. Assessing Adaptive Attacks Against Trained JavaScript Classifiers. *SecureComm 2020*.
Acceptance rate: 36%
- [C5] F. De Gaspari, D. Hitaj, G. Pagnotta, L. De Carli, L.V. Mancini. The Naked Sun: Malicious Cooperation Between Benign-Looking Processes. *ACNS 2020*.
Acceptance rate: 21%

- [C6] L. De Carli, R. Torres, G. Modelo-Howard, A. Tongaonkar, S. Jha. KALI: Scalable Encryption Fingerprinting in Dynamic Malware Traces. *MALCON 2017*.
Acceptance rate: 33%
- [C7] V. Rastogi, D. Davidson, L. De Carli, S. Jha, P. McDaniel. Cimplifier: Automatically Debloating Containers. *FSE 2017*, September 2017.
Acceptance rate: 24.4% (75 of 295)
- [C8] L. De Carli, R. Torres, G. Modelo-Howard, A. Tongaonkar, S. Jha. Botnet Protocol Inference in the Presence of Encrypted Traffic. *IEEE INFOCOM*, May 2017.
Acceptance rate: 20.9% (292 of 1395)
- [C9] R. Sommer, M. Vallentin, L. De Carli, V. Paxson. HILTI: An Abstract Execution Environment for Deep, Stateful Network Traffic Analysis. *ACM IMC*, November 2014.
Acceptance rate: 22.9% (43 of 188)
- [C10] L. De Carli, R. Sommer, S. Jha. Beyond Pattern Matching: A Concurrency Model for Stateful Deep Packet Inspection. *ACM CCS*, November 2014.
Acceptance rate: 19.5% (114 of 585)
- [C11] D. Luchaup, L. De Carli, S. Jha, E. Bach. Deep Packet Inspection with DFA-trees and Parametrized Language Overapproximation. *IEEE INFOCOM*, May 2014.
Acceptance rate: 19.3% (319 of 1650)
- [C12] S. J. Kim, L. De Carli, K. Sankaralingam, C. Estan. SWSL: SoftWare Synthesis for Network Lookup. *ACM/IEEE ANCS*, October 2013.
Acceptance rate: N/A
- [C13] T. Nowatzki, M. Sartin-Tarm, L. De Carli, K. Sankaralingam, C. Estan, B. Robotmili. A General Constraint-centric Scheduling Framework for Spatial Architectures. *ACM PLDI*, June 2013
(distinguished paper award).
Acceptance rate: 17.2% (46 of 267)
- [C14] E. Harris, S. Wasmundt, L. De Carli, K. Sankaralingam, C. Estan. LEAP: Latency- Energy- and Area-optimized Lookup Pipeline. *ACM/IEEE ANCS*, October 2012.
Acceptance rate: 28.1% (18 of 64)
- [C15] B. Aggarwal, R. Bhagwan, L. De Carli, V. N. Padmanabhan, K. P. N. Puttaswamy. Deja Vu: Fingerprinting Network Problems. *ACM CoNEXT*, December 2011.
Acceptance rate: 18.9% (30 of 159)
- [C16] N. Vaish, T. Kooburat, L. De Carli, K. Sankaralingam, C. Estan. Experiences in Co-designing a Packet Classification Algorithm and a Flexible Hardware Platform. *ACM/IEEE ANCS*, October 2011.
Acceptance rate: 32.3% (20 of 62)
- [C17] A. Kumar, L. De Carli, S. J. Kim, M. de Kruijf, K. Sankaralingam, C. Estan, S. Jha. Design and Implementation of the PLUG Architecture for Programmable and Efficient Network Lookups. *International Conference on Parallel Architectures and Compilation Techniques (PACT)*, September 2010.
Acceptance rate: 17.3% (46 of 266)

- [C18] L. De Carli, Y. Pan, A. Kumar, C. Estan, K. Sankaralingam. PLUG: Flexible Lookup Modules for Rapid Deployment of New Protocols in High-speed Routers. *ACM SIGCOMM*, August 2009.
Acceptance rate: 10.0% (27 of 270)
- [C19] A. Baldini, L. De Carli, F. Risso. Increasing Performance of TCP Data Transfers Through Multiple Parallel Connections. *IEEE ISCC*, July 2009.
Acceptance rate: N/A

JOURNALS

- [J1] T. Nowatzki, M. Sartin-Tarm, L. De Carli, K. Sankaralingam, C. Estan, B. Robotmili. A Scheduling Framework for Spatial Architectures Across Multiple Constraint-Solving Theories. *ACM Trans. Program. Lang. Syst. (TOPLAS)* 37, 1, November 2014.
- [J2] M. Sartin-Tarm, T. Nowatzki, L. De Carli, K. Sankaralingam, C. Estan. Constraint centric scheduling guide. *ACM SIGARCH Computer Architecture News, Volume 41 Issue 2*, May 2013.

WORKSHOP PAPERS

- [W1] L. De Carli, I. Ray, E. Solovey. Enabling IoT Residential Security Stewardship for the Aging Population. *CHI 2020 workshop "Designing Interactions for the Ageing Populations"*, May 2020.

Grants

- [G1] Renewal of the Scholarship for Service (SFS) Program at the Worcester Polytechnic Institute (2021.1-2025.12), PI: Craig Shue (WPI); co-PIs: Lorenzo De Carli (WPI), Robert Walls (WPI), Craig Wills (WPI). *Sponsor: NSF*. Amount: \$4,8M.
- [G2] 2020 Worcester Polytechnic Institute DoD Cyber Scholarship grant (2020.9-2021.12), PI: Craig Shue (WPI); co-PIs: Lorenzo De Carli (WPI), Robert Walls (WPI). *Sponsor: DoD*. Amount: \$94K
- [G3] Automated Protocol Specialization and Diversification for Individualized Defense (2018.8–2023.8), PI: Long Lu (Northeastern); co-PIs: Lorenzo De Carli (WPI), Somesh Jha (UW-Madison), Vinod Yegneswaran (SRI). *Sponsor: Office of Naval Research*. Amount (including 2 option years): \$1,2M (WPI's portion) / \$3M (total including all subcontracts).

Patents

- [P1] K. Sankaralingam, J. Menon, L. De Carli. Memory Processing Core Architecture. *US Patent US10289604B2*, Granted May 2019.
- [P2] R. Torres Guerra, G. Modelo-Howard, A. Tongaonkar, L. De Carli, S. Jha. Systems and methods for reverse-engineering malware protocols. *US Patent US10050982B1*, Granted Aug 2018.
- [P3] R. Bhagwan, V. N. Padmanabhan, B. Aggarwal, L. De Carli. Learning signatures for application problems using trace data. *US Patent US8880933B2*, Granted Nov 2014.

Talks & Presentations

- The Computer Science graduate program at WPI. Providence College, 10/30/2019.
- Securing Your Network. WPI A&S Lightning Talk, 9/16/2019.
- Adversarial Program Synthesis: Malicious JavaScript and Cross-site Scripting. Università di Roma “La Sapienza”, 7/8/2019.
- Automatic Inference of Malware Protocol Specifications (and Other Adventures in Network Traffic Analysis). Università di Roma “La Sapienza”, 6/13/2018.
- Program analysis for networking problems: parallelization and de-bloating. Politecnico di Torino, 5/15/2018.
- Automatic Inference of Malware Protocol Specifications. Northeastern University, 11/13/2017.
- How I learned to stop worrying and love the job search (advice to graduate students who plan to seek academic jobs). Colorado State University, 10/9/2017.
- Automatic Inference of Malware Protocol Specifications. Politecnico di Torino, 9/5/2017.
- Increasing Flexibility in Network Traffic Analysis. Colorado State University, 2/6/2017.
- Efficient and Flexible Traffic Analysis. Brown University, 1/31/2017.

Teaching Experience

WPI CS 513, Fall 2020

Taught CS 513 - Graduate-level Computer Networks at Worcester Polytechnic Institute.

WPI CS 4536, 2020 Term D

Taught CS 4536 - Undergraduate-level Programming Languages at Worcester Polytechnic Institute.

WPI CS 3516, 2019 Term B, 2020 Term B

Taught CS 3516 - Undergraduate-level Computer Networks at Worcester Polytechnic Institute.

WPI CS 558, Fall 2019

Taught CS 558 - Graduate-level Computer Network Security at Worcester Polytechnic Institute.

WPI CS 4516, 2019 Term D

Taught CS 4516 - Undergraduate-level Advanced Computer Networks at Worcester Polytechnic Institute.

CSU CS 557, Fall 2017 and Spring 2018

Taught CS 557 - Graduate-level Advanced Networking at Colorado State University.

Mentoring Experience

ADVISING/MENTORING AT WPI (2018-PRESENT)

- Research advisor for WPI PhD student Tongwei Ren (2019-present), MS student Ryan LaPointe (2020-present), and MS student Heshan Perera (2018-present, co-advised with Robert Walls).

Research co-advisor for Colorado State University MS student Vishwajeet Bhosale (2018-present, co-advised with Indrakshi Ray.)

- Research advisor for visiting student Antonio Mignano (MS in Computer Engineering from Politecnico di Torino, Italy - graduated Fall 2019).
- Undergraduate MQP advisor for Dillon Bordeleau, Jared Grimm, and Roger Wirkala (2019/20 A-B terms, co-advised with Craig Shue); Eda Zhou and Joseph Turcotte (2019/20 A-B-C terms); Samantha Woodland (2020 A-term, co-advised with Robert Walls).

ADVISING/MENTORING AT CSU (2017-2018)

Research advisor for Colorado State University undergraduate students Louis Narmour, Devin Dennis and Andy Dolan, and master students Prashant Thakur and Vishwajeet Bhosale.

RESEARCH MENTORING AT UW-MADISON (2009-2013)

Mentor for undergraduate and graduate student research in collaboration with Professor Karthikeyan Sankaralingam, University of Wisconsin-Madison. Mentored students Sung-Jin Kim (Ph.D., 2015) and Michael Sartin-Tarm (B.Sc., 2013).

MENTORING AT POLITECNICO DI TORINO (2008)

Undergraduate thesis mentor in collaboration with Professor Fulvio Risso, Politecnico di Torino. Mentored student Stefano Cancedda (B.Sc., 2008).

Professional Activities

PROGRAM COMMITTEE MEMBER

International Conference on Information Systems Security and Privacy (ICISSP) 2021; Workshop on Forming an Ecosystem Around Software Transformation (FEAST) 2020; Research in Attacks, Intrusions and Defenses (RAID) 2020; Hot Topics in the Science of Security Symposium (HotSoS) 2020; International Conference on Cyber-Technologies and Cyber-Systems (CYBER) 2020; Communication Technologies and Cloud Computing Conference (CTCCC 2020); ACM Conference on Computer and Communications Security (CCS) 2019; Conference on Detection of Intrusions and Malware & Vulnerability Assessment (DIMVA) 2019; International Conference on Information Systems Security (ICISS) 2019; International Conference on Internet Monitoring and Protection (ICIMP) 2019; International Conference on Sensor Networks (SENSORNETS) 2019; International Conference on Information Systems Security (ICISS) 2018; International Workshop on Energy-aware Simulation (ENERGY-SIM) 2018; International Conference on Sensor Networks (SENSORNETS) 2018; Asian Internet Engineering Conference (AINTEC) 2017; IEEE International Conference on Trust, Security and Privacy in Computing and Communications (TrustCom) 2016.

EXTERNAL REVIEWER

International Conference on Software Engineering (ICSE) 2017; Conference on Detection of Intrusions and Malware & Vulnerability Assessment (DIMVA) 2016; Network and Distributed System Security Symposium (NDSS) 2016; ACM Symposium on Principles of Programming Languages (POPL) 2016; IEEE Symposium on Security and Privacy (Oakland) 2015; Conference on Principles of Security and Trust (POST) 2014-2015; Symposium on Engineering Secure Software and Systems (ESSOS) 2015; ACM Conference on Computer and Communications Security (CCS) 2014; Conference on Computer Aided Verification (CAV) 2013-2014; IEEE Computer Security Foundations Symposium (CSF) 2014; Symposium and Bootcamp on the Science of Security (HotSoS) 2014.

JOURNAL REVIEWER

IEEE/ACM Transactions on Networking (TNET); IEEE Transactions on Industrial Informatics (TII); Elsevier Computers & Security (COSE); IEEE Journal on Selected Areas in Communications (JSAC); IEEE Transactions on Mobile Computing (TMC); PLOS ONE; ACM Computing Surveys (CSUR); IEEE Access; Elsevier Journal of Information Security and Applications (JISA); MDPI Sensors; Member of MDPI Electronics' Reviewer Board.

GRANT REVIEWER

NSF Panel Member (2018)

THESIS COMMITTEE MEMBER

- MS Thesis co-advisor for Vishwajeet Bhosale, Colorado State University (exp. graduation 2021).
- PhD Thesis Referee for Jalolliddin Yusupov, Politecnico di Torino, Italy (May 2020)
- PhD Thesis Referee for Roberto Bonafiglia, Politecnico di Torino, Italy (May 2018).

Honors & Awards

- WARF (Wisconsin Alumni Research Foundation) innovation award finalist for “Memory Processing Unit Boosts Performance, Conserves Energy” (patent application with Karthikeyan Sankaralingam and Jai Menon), 2015
- Distinguished Paper Award, ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI), 2013

Language Skills

- **English:** near-native
- **Italian:** native