Matthew Landen

PhD Student

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Summary

Aiming to create intrusion detection methods that are successful in detecting sophisticated, targeted cyber-attacks before they cause serious damages to the critical resources of enterprise companies.

Research Interests

Attack detection, systems and network security

Education

Ph.D. Georgia Institute of Technology — Atlanta, Georgia
Computer Science — Expected May 2023
Specialization: Information security
Minor: Security and privacy policy
Advisor: Dr. Wenke Lee
NSF Graduate Research Fellow — $34,000 / year, 3 years
Georgia Tech Presidential Fellowship — $5,500 / year, 4 years

B.S. University of Maryland, Baltimore County (UMBC) — Baltimore, Maryland
Computer Science and Mathematics, Summa Cum Laude — May 2017
Meyerhoff Scholar — $15,000 / year, 4 years
Phi Kappa Phi Honors Society Member — April 2017 – Present
GPA: 4.0 / 4.0

Research Experiences

Lawrence Livermore National Laboratory — Livermore, California (Remote)
Advisor: Dr. JP Watson — May 2020 – Present

Autonomous power grid operation with cyber attackers

- Applied deep reinforcement learning to create an autonomous agent to maintain the power grid robustly
- Experimented with actor critic and risk adverse agents

Georgia Tech, Institute for Information Security & Privacy (IISP) — Atlanta, GA
Advisor: Dr. Wenke Lee — August 2017 – Present

Leveraging provenance audit for intrusion detection

- Extract representations of attack tools to later enhance intrusion detection systems by flagging attack tool reuse

Android malware classification using machine learning

- Features capture the frequency that a sensitive API call is invoked by an android framework entrypoint
- Outcomes
    - (Allen, 2018): Improving Accuracy of Android Malware Detection with Lightweight Contextual Awareness

UMBC MAPLE Lab — Baltimore, MD
Advisor: Dr. Marie desJardins — November 2016 – August 2017

Planning with learned subtask hierarchies in reinforcement learning domains

- Designed and implemented a hierarchical reinforcement learning algorithm using BURLAP java library
- Implanted R-MAXQ as a baseline to our approach
- Outcomes
    - (Squire, 2017): R-AMDP: Model-Based Learning for Abstract Markov Decision Process Hierarchies
    - (Winder, 2017): Towards Planning With Hierarchies of Learned Markov Decision Processes

National Institute of Standards and Technology — Gaithersburg, MD
Advisors: Michaela Iorga, Ph.D. and Dmitry Cousin — May 2015 – May 2017

Hash chaining for secure and privacy-preserving digital forensics in the cloud

- Implemented a hash chain logging approach in a research cloud environment using java which has applications in information security and privacy-preserving digital forensics

NIST cloud security framework analyzer and visualizer

- Developed a tool in C# that allows agencies to analyze the NIST cloud computing security architecture and see pertinent information in a variety of situations as well as visual trends

Publications

Joey Allen, Zheng Yang, **Matthew Landen**, Raghav Bhat, Harsh Grover, Andrew Chang, Yang Ji, Roberto Perdisci, and Wenke Lee. Mnemosyne: An Effective and Efficient Postmortem Watering Hole Attack Investigation System. In *Proceedings of the 2020 ACM SIGSAC Conference on Computer and Communications Security* (*CCS '20*). Association for Computing Machinery, New York, NY, USA, 787–802. DOI:https://doi.org/10.1145/3372297.3423355

Winder, J., Milani, S., **Landen, M.**, Oh, E., Parr, S., Squire, S., & Matuszek, C. (2020, April). Planning with Abstract Learned Models While Learning Transferable Subtasks. In Proceedings of the AAAI Conference on Artificial Intelligence (Vol. 34, No. 06, pp. 9992-10000).

Joey Allen, **Matthew Landen**, Sanya Chaba, Yang Ji, Simon Chung, Wenke Lee “Improving Accuracy of Android Malware Detection with Lightweight Contextual Awareness” In Annual Computer Security Applications Conference, 2018

Shawn Squire, John Winder, **Matthew Landen**, Stephanie Milani, Marie desJardins "R-AMDP: Model-Based Learning for Abstract Markov Decision Process Hierarchies" In The Multi-disciplinary Conference on Reinforcement Learning and Decision Making 2017, 2017

John Winder, Shawn Squire, **Matthew Landen**, Stephanie Milani and Marie desJardins "Towards Planning With Hierarchies of Learned Markov Decision Processes" In ICAPS-2017 Integrated Execution of Planning and Acting Workshop, pg 50-53, 2017

Technological Skills

Programming Languages:	Java, Python, C, C++, C#, Visual Basic, intel assembly, HTML, CSS, JavaScript, PHP, SQL, Latex
Frameworks / Libraries:	Python – Keras, Sklearn, Tensorflow, NumPy, Pwntools, Mpi4Py, multiprocessing Web – Jquery, AngularJS
Tools:	Git, IDA Disassembler

Teaching Experience

Georgia Institute of Technology

Fall 2018	CS 6262 – Network Security	Teaching Assistant

University of Maryland, Baltimore County

Fall 2016	COMP 101 – Computational Thinking and Design	Head Teaching Fellow
Fall 2015	COMP 101 – Computational Thinking and Design	Teaching Fellow

Honors

NSF Graduate Research Follow ($34,000 / year, 3 years)	August 2017 - Present
Georgia Tech Presidential Fellowship ($5,500 / year, 4 years)	August 2017 - Present
Phi Kappa Phi Honors Society Member	April 2017 - Present
2nd place team in Georgia Tech's Capture the Flag Competition	November 2018
Meyerhoff Scholar ($15,000 / year, 4 years)	August 2013 - May 2017
President's List	August 2013 - May 2017
National Honor Society	August 2011- May 2013

Conferences & Workshops Attended

AAAI Conference on Artificial Intelligence	February 2020
Annual Computer Security Applications Conference	December 2018
USENIX Security and Artificial intelligence Networking Workshop	May 2018
CRA Grad Cohort Workshop for Underrepresented Minorities + Persons with Disabilities	March 2018, 2020
ACM Richard Tapia Celebration of Diversity in Computing	September 2017
The Multi-disciplinary Conference on Reinforcement Learning and Decision Making	June 2017

Relevant Employment

United States Defense Intelligence Agency — College Park, MD

Student Intern — June 2014 – August 2017

Software engineering projects

- Developed a tool to update a mailing list for updates specific to a piece of software automatically
- Engineered software to get digital certificate information from users on a website

Personal Interests

Performing in theatre productions — September 2010 – May 2017