Adam Petz

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Education:

University of Kansas: (Jan. 2017-Present)

- PhD in Computer Science (Defending Fall 2021)
  - 3.97 GPA

University of Kansas: (Aug. 2014-Aug. 2016)

- Master's in Computer Science
  - 4.0 GPA

Emporia State University: (Aug. 2010-May 2014)

- Bachelor of Science in Computer Science (May 2014)
  - 4.0 GPA
- Bachelor of Science in Mathematics (May 2014)
  - 3.94 GPA

Employment:

- ***Rockwell Collins Inc. (Now Collins Aerospace, Cedar Rapids, IA):***
  Research Engineer Intern on the Cyber Systems team (Fall 2016, Spring 2017(remote))
  - Extended a Model-Based Fuzzing framework
    - Generated high-quality test inputs to explore edge cases in Software-Defined-Radios
    - Integrated formal back-end tools (JKind model checker and Lustre dataflow language) with a more traditional software environment (Java-based wrapper to heatmap visuals of test coverage)

- ***The Information and Telecommunication Technology Center (KU-Lawrence campus):***
  Graduate Research Assistant (Summer 2014-Present)
  - DoD-sponsored "Cyber-Assured-Systems-Engineering (C.A.S.E.)" project
    - Integrated remote attestation components into a high-assurance U.A.V. demo platform
    - Implemented custom integrity measurers in CakeML and C to monitor legacy software
    - Configured components within the seL4 microkernel and CAmkES build system
    - Formally verified detection of feasible corruption by an adversary
  - NSA-sponsored Science of Security Lablet
    - Designed (with collaborators) Copland DSL and reference semantics for attestation protocols
    - Defined a concrete Copland-based execution environment in Coq
    - Proved in Coq that attestation events and evidence emitted refine reference semantics
    - Implemented prototype Copland interpreters in CakeML and Haskell
  - Honeywell (National Security Campus) Additive Manufacturing
    - Applied remote attestation technologies towards assuring trust in a 3D printer
    - Integrated Trusted Platform Module (TPM) functionality into demonstration platforms
    - Implemented attestation manager prototypes and provided tutorials for sponsor

- ***ARRIS Group Inc. (Lawrence, KS office):*** Software Engineer Intern (Summer 2013)
  - Designed, implemented, tested, and debugged software as a part of an Agile development team
  - Worked closely with team members to implement components of an Android app for the 4Home home automation product and a Java web app for the EDGE network health product

- ***Emporia State University****:* Tutor in mathematics and CS labs (Fall-Spring 2012, Fall 2013)
  - Worked with students in computer science and mathematics courses to communicate technical concepts and provide guidance on programming projects/homework assignments

REFERENCES AVAILABLE UPON REQUEST

Research Interests

- Trusted Computing and Attestation:
  - trusted boot, attestation protocols, applied cryptography, system integrity, system-level security, trusted hardware
- Formal Methods:
  - interactive theorem proving, formal specification, formal logics, correct-by-construction components, verified synthesis, protocol analysis, end-to-end security
- Functional Programming
  - static types, embedded DSLs, monadic abstraction, type-driven design, rapid prototyping
- Programming Language Semantics
  - operational and denotational semantics, type systems, domain-specific languages, program logics, protocols-as-a-language, certified compilers

Publications

- Petz, A., G. Jurgensen, and P. Alexander, "Design and Formal Verification of a Copland-based Attestation Protocol", **ACM-IEEE International Conference on Formal Methods and Models for System Design (MEMOCODE'21)**, Nov 20-22, 2021. [link to pdf]
- Petz, A. and P. Alexander, "An Infrastructure for Faithful Execution of Remote Attestation Protocols", **NASA Formal Methods (NFM'21)**, May 2021. [link to pdf]
- Petz, A. and P. Alexander, "A Copland Attestation Manager," **Hot Topics in Science of Security (HoTSoS'19**), Nashville, TN, April 2019. [link to pdf]
- Ramsdell, J., P. D. Rowe, P. Alexander, S. Helble, P. Loscocco, J. A. Pendergrass, and A. Petz, "Orchestrating Layered Attestations," **Principles of Security and Trust (POST'19**), Prague, Czech Republic, April 8-11, 2019. [link to pdf]

Software

- Copland AVM - The Copland Attestation Virtual Machine (AVM) repository includes an implementation in Coq of a formally verified attestation manager. It includes a formal execution environment for attestation protocols specified in Copland along with a proof of refinement from the Copland reference semantics.
  Visit on GitHub: https://github.com/ku-sldg/copland-avm
- Haskell AM – A prototype implementation of an attestation manager in Haskell. It is intended more as an experimental platform for rapid prototyping of new features/Copland language extensions (thus is typically ahead of the formal model in the Copland AVM repo).
  Visit on GitHub: https://github.com/ku-sldg/haskell-am
- CakeML AM - A (yet-to-be) formally verified implementation of an attestation manager in CakeML. Includes a set of core attestation services as well as custom measurers written in C and invoked through the CakeML FFI.
  Visit on GitHub: https://github.com/ku-sldg/am-cakeml

Technical Competencies:

- Languages(incomplete list) (P=Proficient, E=Prior Experience): C(P), C++(P), Java(P), Haskell(P), Coq(P), CakeML(P), Python(P), JSON(P), LaTeX(P), Z3(E), JKind(E), SAL(E), Lustre(E), OCaml(E), ML(E), JavaScript(E), SQL(E), XML(E), Android(E), ExtJS(E), HTML/CSS(E)
- Tools: GitHub, Eclipse IDE, Microsoft Visual Studio, Make, Cmake, Docker, Proof General, Haskell Stack, Cabal, OmniGraffle, Oracle SQL developer, Git and CVS/SVN version control, Xen Hypervisor, ANT, J-Unit, Kali Linux, Metasploit

REFERENCES AVAILABLE UPON REQUEST

- Methodologies: Scrum development, regression testing, code reviews, internal demos, coding conventions

Conferences/Workshops Attended

- Fifth Summer School on Formal Techniques (SSFT)--Summer 2015 Menlo College, Atherton, CA
- Sixth Summer School on Formal Techniques (SSFT)--Summer 2016 Menlo College, Atherton, CA
- DeepSpec-The Science of Deep Specification--Summer 2017, UPenn Campus, Philadelphia, PA
- DeepSpec-The Science of Deep Specification--Summer 2018, Princeton Campus, Princeton, NJ
- Hot Topics in the Science of Security (HotSoS)--Spring 2019, Nashville, TN
- Hot Topics in the Science of Security (HotSoS)--Fall 2020, Virtual
- Midwest Verification Day (MVD)--Fall 2016, Iowa State Campus, Ames, IA
- High Confidence Software and Systems (HCSS)—Spring 2019, Annapolis, MD
- High Confidence Software and Systems (HCSS)—Fall 2020, Virtual
- International Conference on Functional Programming (ICFP)--Summer 2020, Virtual
- Hot Topics in the Science of Security (HotSoS)--Spring 2021, Virtual
- NASA Formal Methods (NFM)—Spring 2021, Virtual
- High Confidence Software and Systems (HCSS)—Spring 2021, Virtual

Presentations

- **NASA Formal Methods 2021 Conference (May 2021, Virtual)**
  (Presentation title: An Infrastructure for Faithful Execution of Remote Attestation Protocols)
- **HotSoS 2020 Conference (September 2020, Virtual)**
  (Presentation title: An Infrastructure for Faithful Execution of Remote Attestation Protocols)
- **HotSoS 2019 Conference (April 2019, Nashville, TN)**
  (Presentation title: A Copland Attestation Manager)
- **KU Engineering Research Showcase (March 2019, KU Campus)**
  (Presentation title: Copland: A Semantics for Trust in Cyber Infrastructure)
- **Capitol Graduate Research Summit (February 2019, Kansas State Capitol Building)**
  (Presentation title: Copland: A Semantics for Trust in Cyber Infrastructure)
- **DeepSpec Summer School 2017**
  (Presentation title: Trusted Boot-Components and Challenges)
- **Midwest Verification Day 2016**
  (Presentation title: A Semantics for Attestation Protocols using Session Types in Coq)

Activities/Awards:

- Capitol Graduate Research Summit (Spring 2019):
  - Competitive application, selected as 1 of 8 graduate students to represent KU
  - Presented my research to state legislators at the capitol building in Topeka, KS
- KU Engineering Showcase: Poster and speech (Spring 2019)
- Graduate Engineering Prospective Student Day Representative (Spring 2019, Spring 2020)
- Travelled to Data61 in Sydney, Australia in November 2019 for C.A.S.E. project PI meeting
- Graduate Engineering Association (GEA) Fundraiser Work Day at Worlds of Fun (Winter 2018)
- Selected to attend Fifth/Sixth “Summer School on Formal Techniques” at SRI in Atherton, California--select group of students from around the country--workshops/lectures given by experts in FM (May 2015/16)
- Elected as Officer (Treasurer) of ITTC Student Organization (2015-2016)
- Vice President of KU Club Baseball team (2016-2018)

REFERENCES AVAILABLE UPON REQUEST

- Member of KU Chamber Choir-top auditioned group at KU (2015-2019)
- Member of Kappa Mu Epsilon (mathematics honor society, 2011-2014)
- ACM International Collegiate Programming Competition (Oct. 2012)
- MCM: Mathematical Contest in Modeling – Team Captain (Feb. 2012)
- Valedictorian – Lawrence Free State High School: 1st in class of 400 students (2010)
- Accomplished pianist - Lessons and Performance – 15+ years

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