TIM BECKER

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EDUCATION

Fall 2018 - Present
Graduate Student in Computer Science
University of Wisconsin – Madison, Madison, WI
GPA: 4.00

Notable Courses:
- Mathematical Analysis of Algorithms (CS 801, Fall 2018)
- Algebraic Geometry I (MATH 763, Fall 2018)

May 2018
Bachelor of Science with Honors in Computer Science and Mathematics
Carnegie Mellon University, Pittsburgh, PA
QPA: 3.75 Overall — **4.00 in Math and CS**

Notable Courses:
- SCS Honors Undergraduate Research Thesis (15-599, Spring 2017 - Spring 2018)
- Graduate Applied Cryptography (18-733, Spring 2017)
- Graduate Algebra I (University of Pittsburgh) (MATH 2500, Spring 2017)
- Special Topics: Theoretical Cryptography (15-503, Spring 2016)

RESEARCH EXPERIENCE

Algebraic Automata Theory

Abelian Automaton Groups — Advised by *Klaus Sutner*

Spring 2017 - Fall 2018
- Developed useful embeddings of abelian automaton groups
- Classified which abelian transducers have rational orbit relations
- Used techniques from group theory, field theory, and linear algebra
- Research code available at https://github.com/tim-becker/thesis-code.

Security Education

Automatic Problem Generation — Advised by *David Brumley*
Summer 2014 - Spring 2015
- Developed method to automatically generate problems for CTF competitions
- Analyzed the impact of automatically generated problems on picoCTF 2014

LEADERSHIP AND TEACHING

PPP

President of the Plaid Parliament of Pwning
Fall 2015 - Fall 2018
- Computer security research group at Carnegie Mellon University that ranks among the top in the world in "Capture the Flag" competitions
- Notable accomplishments:
  - 4-time DEFCON CTF Champions
  - Grew the team from less than 20 members to more than 40
  - Organized Highest Rated CTF (according to CTFtime.org) in 2017

Teaching Assistant

15-410: Operating Systems Design and Implementation
Fall 2016 - Spring 2017
- Developed midterm and final exam questions
- Held weekly office hours
- Graded projects, homework assignments, and exams

PUBLICATIONS AND PRESENTATIONS

Paper (LATA 2019)

Orbits of Abelian Automaton Groups
Spring 2019

- Presents a useful embedding of abelian automaton groups into algebraic number fields.
- Contains a classification of orbit-rational abelian transducers.
- Algorithms implemented and are publicly available on my github.

Presentation (LATA 2019)

Orbits of Abelian Automaton Groups
Spring 2019

- 20 minute talk presenting the work in the above paper

Thesis Presentation

Representations and Complexity of Abelian Automaton Groups
Spring 2018

- Presented the results of my senior thesis as part of CMU's Meeting of the Minds.

Paper (USENIX 3GSE 15)

Automatic Problem Generation for Capture-the-Flag Competitions
Fall 2015

- Co-authored a conference paper for USENIX 3GSE 15: https://goo.gl/kEAfxW

WORK EXPERIENCE

ForAllSecure

HackCenter and Mayhem — Software Engineering Intern
Summer 2015 - Summer 2018

- Worked on infrastructure for Mayhem using Kubernetes
- Developed the backend and infrastructure for HackCenter
- Made optimizations to the Mayhem symbolic executor
- Developed CTF challenges testing skills in Cryptography and Binary Exploitation

Google

Chrome Browser Process Security — Software Engineering Intern
Summer 2017

- Produced a document outlining the attack surface of the browser process
- Audited several components and discovered critical security flaws

Google

Chrome and Android Security — Software Engineering Intern
Summer 2016

- Developed a fuzzer targeting the builtin functions in the V8 Javascript Engine
- Used LibFuzzer to create a fuzzing platform for the Android System Services
- Discovered and fixed several vulnerabilities in Google Chrome and Android

OTHER

Vulnerability Research

Noteworthy bugs found:

- Chrome Issue 740710: Chrome Sandbox Escape - discovered during internship
- CVE-2017-0546: Android Privilege Escalation
- CVE-2016-5221: Sanitization Bug in ANGLE (Chrome's Graphics Engine)