Kimberly Ruth

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Education

Stanford University, Stanford, CA 2020 - Present
Ph.D. Student, Computer Science Department

University of Washington, Seattle, WA 2015 - 2020
B.S. in Computer Engineering, B.A. in Mathematics
College Honors; *summa cum laude* GPA 3.99
Thesis: *Understanding and Designing for Security and Privacy in Multi-User AR Interactions*

Research Experience

Research Assistant, Stanford University 9/2020 - Present
Advised by Professor Zakir Durumeric

Research Assistant, University of Washington Security and Privacy Lab 1/2016 - 6/2020
Co-advised by Professors Franziska Roesner and Tadayoshi Kohno
Projects:

Secure Sharing for Multi-User AR 6/2017 - 6/2020

- Formulated and led a project addressing user-to-user security and privacy challenges in AR
- Designed, built, and evaluated a module for secure and private AR content sharing (patent pending), released my code as a developer toolkit (available at arsharingtoolkit.com), and mentored two undergraduates to build apps using the toolkit (summer 2019)
- Published work as sole student author on top-tier conference paper [2], and presented work both at the conference [T-5] and at local venues [T-1] [T-2] [T-3] [T-6] [T-7] [T-8]
- Presented as invited speaker at Industry-Academia Summit on Mixed Reality Security, Privacy, and Safety [T-4] and contributed to Summit report [6]

Augmented Reality User Study 9/2016-5/2017

- Assisted with the design, execution, and interpretation of a study about user expectations and concerns around immersive multi-user AR
- Co-authored resulting top-tier conference paper [3], and presented as invited speaker in UW ACM's Student Tech Talk series [T-9]

Augmented Reality Output Security 1/2016 - 5/2016

- Built components for the evaluation of an AR system prototype that constrains application output according to security policies
- Co-authored resulting top-tier conference paper [4] and invited journal article [5], and presented on this project at UW's Undergraduate Research Symposium [T-10]

Industry Experience

Engineering Practicum Intern, Google, Mountain View, CA 6/2016 - 9/2016

- Worked on Security and Privacy engineering team to facilitate secure practices across Google products
- Contributed to Google-wide transition to strict autoescaping in Closure templates as protection against cross-site scripting vulnerabilities
- Collaborated with Google Analytics team to migrate >1300 of their templates and with Google Search Appliance team to migrate >120 of their templates
- Refactored data pipelines as needed using JavaScript and Closure template system
- Co-presented work at team meeting and at intern project showcase
- Earned Peer Bonus recognition from a Google Analytics team member for quality of work

Publications and Talks

Peer-Reviewed

Conference

[1] M. Ziv, L. Izhikevich, **K. Ruth**, K. Izhikevich, and Z. Durumeric, "ASdb: A system for classifying owners of Autonomous Systems," in *ACM Internet Measurement Conference (IMC'21)*, ACM, November 2021

[2] **K. Ruth**, T. Kohno, and F. Roesner, "Secure multi-user content sharing for augmented reality applications," in *Proceedings of the 28th USENIX Security Symposium*, USENIX Association, August 2019

[3] K. Lebeck, **K. Ruth**, T. Kohno, and F. Roesner, "Towards security and privacy for multi-user augmented reality: Foundations with end users," in *Proceedings of the 39th IEEE Symposium on Security and Privacy (Oakland)*, IEEE, May 2018

[4] K. Lebeck, **K. Ruth**, T. Kohno, and F. Roesner, "Securing augmented reality output," in *Proceedings of the 38th IEEE Symposium on Security and Privacy (Oakland)*, IEEE, May 2017

Invited Article

[5] K. Lebeck, **K. Ruth**, T. Kohno, and F. Roesner, "Arya: Operating system support for securely augmenting reality," *IEEE Security and Privacy Magazine*, vol. 16, pp. 44–53, February 2018

Non-Refereed

[6] *Contributed to:* University of Washington Security and Privacy Research Lab and UW Reality Lab, "2019 industry-academia summit on mixed reality security, privacy, and safety: Summit report," April 2020. Ed. Franziska Roesner and Tadayoshi Kohno.

Talks

[T-1] **Understanding and Designing for Security and Privacy in Multi-User AR Interactions**
Stanford Security Lunch, Stanford, CA Sept 2020

[T-2] **Understanding and Designing for Security and Privacy in Multi-User AR Interactions**
Undergraduate Research Symposium, Seattle, WA May 2020

[T-3] **Understanding and Designing for Security and Privacy in Multi-User AR Interactions**
Microsoft HoloLens Team Brown Bag Lunch Seminar, Seattle, WA March 2020

[T-4] **Understanding and Designing for Security and Privacy in Multi-User AR Interactions**
Industry-Academia Summit on Mixed Reality Security, Privacy, and Safety, Seattle, WA Sept 2019

[T-5] **Secure Multi-User Content Sharing for Augmented Reality Applications**
USENIX Security 2019, Santa Clara, CA Aug 2019

[T-6] **Secure Multi-User Content Sharing for Augmented Reality Applications**
Microsoft Research Crypto Day, Redmond, WA June 2019

[T-7] **Secure Multi-User Content Sharing for Augmented Reality Applications**
Undergraduate Research Symposium, Seattle, WA May 2019

[T-8] **Designing for Security and Privacy in Multi-User Augmented Reality Interactions**
Undergraduate Research Symposium, Seattle, WA May 2018

[T-9] **Emerging Security and Privacy Challenges in Augmented Reality**
UW ACM Student Tech Talk, Seattle, WA April 2018

[T-10] **Securing Application Output of Augmented Reality Systems**
Undergraduate Research Symposium, Seattle, WA May 2017

Posters

[P-1] **Secure Multi-User Content Sharing for Augmented Reality Applications**
UW Allen School Women's Research Day 2020, Seattle, WA April 2020

[P-2] **Secure Multi-User Content Sharing for Augmented Reality Applications**
UW Allen School Affiliates Research Day 2019, Seattle, WA Nov 2019

[P-3] **Secure Multi-User Content Sharing for Augmented Reality Applications**
UW Allen School Women's Research Day, Seattle, WA April 2019

Awards and Honors

NSF Graduate Research Fellowship (GRFP) 2020
Stanford EDGE Fellowship 2020
UW Allen School Best Senior Thesis Award 2020
UW Allen School Outstanding Senior 2020
CRA Outstanding Undergraduate Researcher Award Winner 2020
UW College of Engineering Dean's Medalist (based on academic and extracurricular achievement) 2020
CRA Outstanding Undergraduate Researcher Award Finalist 2018, 2019
Lisa Simonyi Prize (based on excellence, leadership, and diversity in Allen School) 2019
Phi Beta Kappa Honor Society 2019
Barbara Sando Scholarship in Mathematics (awarded by UW math department) 2019
Barry Goldwater Scholar 2018
Husky 100 Award (based on contribution to UW community) 2018
Washington Research Foundation Fellowship 2017, 2018, 2019

William Lowell Putnam Competition Top 15%	2017
Tau Beta Pi Engineering Honor Society (early induction; top 1/8 of junior class)	2017
University of Washington Honors Undergraduate Scholar Award	2017, 2018
Scholarship for Women Studying Information Security (sponsored by ACSA)	2017, 2018
Rebecca Gurley Bace Scholarship (sponsored by ACSA)	2017
Everett R. Dillman Endowed Scholarship	2017
University of Washington Mary Gates Research Scholar	2017
William Lowell Putnam Competition Top 20%	2016
Patricia G. Lynch and Theodora & Eugene Russell Memorial Scholarship	2016
National Merit Scholar	2015
University of Washington Mary Gates Honors Scholar	2015

Teaching Experience

TA/Grader, Art of Problem Solving, San Diego, CA 4/2015 - 12/2019

- Guided 50+ highly motivated middle and high school students as teacher assistant in fast-paced online introductory and intermediate-level Python programming classes
- Assisted online math classes as substitute TA as needed (from pre-algebra through pre-calculus)
- Wrote detailed feedback and suggestions for Intermediate Python course content based on observations as TA
- Named AoPS Python All-Star for consistently high quality of Python grader written feedback

Peer Tutor, University of Washington Allen School, Seattle, WA 10/2017 - 6/2018

- Served as volunteer tutor for CSE 311 (Foundations of Computing), an introduction to mathematics and proofs for computer science and engineering majors
- Ran weekly tutoring meetings for 3 students; prepared original practice materials beforehand
- Communicated status to tutoring program organizers for further development of undergraduate tutoring program

Computer Science Tutor, Independent Consultant, Bellevue, WA 9/2015 - 1/2016

- Worked with student on introductory-level Python programming
- Taught code design, development, debugging, and documentation

Volunteer Experience

Mentorship

Mentor, Stanford CS Mentor Program, 10/2020-6/2022
Panelist, CURIS Graduate School Panel, 8/2021, 9/2021
Panelist, Student Advisory Council Research Panel, 5/2020
Speaker and Panelist, ACM Research Night, 2/2020
Mentor, UW SWEsters, 11/2016-6/2019

Panelist, Admitted Student Preview Day Research Panel, 4/2019
Mentor, ACM New Student Welcome, 9/2016, 3/2017, 9/2017
Panelist, Direct Admit "CSE Startup" course, 8/2017
Mentor, Direct Admit "CSE Startup" course, 8/2017
Panelist, SWE Undergraduate Research Panel, 11/2016
Panelist, Direct Admit Freshman Seminar, 10/2016, 11/2017, 10/2018

Outreach Volunteering

Poster judge, Stanford Undergraduate Research Conference, 4/2021
Panelist and mentor, Stanford/Berkeley Graduate Pathways to STEM, 2/2021-5/2021
Volunteer, UW Math Circle, 10/2019
Volunteer, UW Engineering Discovery Days, 4/2018
Lightning talk speaker, Undergraduate Research Lightning Talks at UW Libraries, 5/2019
Lightning talk speaker, Kobe University Scholars visit, 8/2019
Lightning talk speaker, CSE Undergraduate Research Lunch, 8/2018
Mentor, Math Prize for Girls alumni mixer, 10/2020

Stanford Security Lunch organizer, 7/2020 - Present

- Run weekly lunch seminar attracting 25-40 attendees in hybrid meeting format
- Invite and coordinate with both internal and external presenters

Women's Research Day undergraduate liaison, 12/2017 - 4/2018, 1/2019 - 4/2019, 1/2020 - 4/2020

- Represented undergraduate perspective on organizing committee for UW Allen School Women's Research Day event
- Recruited 5 female undergraduate researchers each year as poster presenters and lightning talk presenters
- Presented on current research via lightning talk in 2018 and via poster in 2019 and 2020

Go Figure founder/web developer, 6/2013 - Present

- Create and run initiative to showcase elegance of math and inspire middle school students
- Develop and maintain website www.gofiguremath.org
- Write web pages clearly explaining topics in mathematics; create worksheets and other resources for students and teachers; conduct presentations and activity sessions in local area
- Selected as Davidson Institute for Talent Development Young Scholar Ambassador

Davidson Institute Pacific Northwest Regional Events organizer, 6/2013 - 3/2020

- Assisted in organizing and running local community events of academically minded families (30-50 people attending each event)
- Engaged children ages 5-12 in creative tactile and intellectual activities

Related Coursework

Computer Security, Security Research seminar, Cryptography seminar, Distributed Systems, Operating Systems, Design of Domain-Specific Languages, Cryptography, Programming Languages, Computational Logic, Digital Design, Systems Programming, Statistical Learning

Course Projects

CSE M 501 (Design of Domain-Specific Languages) group project 4/2019 - 6/2019

- Collaborated with 1 other teammate to design and build KnitScript, a domain-specific language for designing knitting patterns
- Drove discussions of functionality requirements based on domain knowledge
- Contributed to language implementation and standard library (total of over 1300 lines of code)
- Described language in design docs, language tutorial, demo video, and final report
- Code available at https://github.com/logicologist/knitscript

MATH 381 (Discrete Mathematical Modeling) group project 6/2018 - 8/2018

- Collaborated with 3 other teammates to build Monte Carlo model of the spread of influenza in a university setting
- Wrote initial Python code for basic model; wrote code for model evaluation, including parameter sensitivity analysis (total of over 1400 lines of code)
- Articulated work in written report
- Drove coordination and communication efforts among teammates and with course staff
- Code available at https://github.com/logicologist/project-381