MILIJANA SURBATOVICH

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RESEARCH INTERESTS

My research is in developing formal models, analysis tools, and runtime systems for intermittent computing devices, spanning different abstraction layers from systems to programming languages and applications. I am excited to enable provably correct and secure computation in emerging domains.

EDUCATION

PhD Candidate, Electrical & Computer Engineering **08/17 – 05/23 (expected)**

Carnegie Mellon University (Pittsburgh, PA)

MS, Electrical & Computer Engineering **05/20**

Carnegie Mellon University (Pittsburgh, PA)

GPA 3.77

BS, Computer Science **09/13 – 05/17**

University of Rochester (Rochester, NY)

Minor in Russian

Summa Cum Laude

RESEARCH EXPERIENCE

Doctoral Student, ECE Department, Carnegie Mellon University. **08/17 – Present**

Researching compilers, programming languages and formal methods for intermittent computing.

- Designing execution models and formalisms to reason about general concurrency for intermittent systems
- Designing information flow type-systems for intermittent computing correctness
- Developed formalisms and compiler tools to enable correct-by-construction timeliness for intermittent systems. Published in PLDI 2021.
- Defined a formal framework to reason about memory consistency of intermittent systems. Published in OOPSLA 2020.

- Identified and characterized a new bug type caused by inputs on an emerging platform. Designed static and dynamic program analyses to detect the bug. Published in OOPSLA 2019.
- Advisors: Brandon Lucia, Limin Jia

Visiting Researcher, Max Planck Institute for Software Systems **03/22 – 05/22**

- Worked on defining semantics and correctness criteria for interrupt-driven intermittent execution. Gave seminar talk on designing formally correct intermittent systems.
- Mentor: Derek Dreyer

Research Assistant, Cylab, Carnegie Mellon University **05/17 – 08/17**

- Designed and developed a user study to analyze security perceptions and user behavior on IFTTT, an end-user programmable IoT service. Published in SOUPS 2020.

REU Intern, Institute for Software Research, Carnegie Mellon University **05/16 – 08/16**

- Used information flow theory to analyze security & privacy violations in Internet of Things devices. Built an analytical model in Datalog to track secrecy and integrity violations on a popular IoT service. Published in WWW 2017. Also presented at the FTC's PrivacyCon 2018

PUBLICATIONS

1. **Milijana Surbatovich,** Naomi Spargo, Limin Jia, and Brandon Lucia. 2023. A Type System for Safe Intermittent Computing. In Submission.
2. Farzaneh Derakhshan, Myra Dotzel, **Milijana Surbatovich**, and Limin Jia. 2023. Modal Crash Types for Intermittent Computing. In Submission
3. Emily Ruppel, **Milijana Surbatovich**, Harsh Desai, Kiwan Maeng and Brandon Lucia. 2022. An Architectural Charge Management Interface for Energy-Harvesting Systems. 55th IEEE/ACM International Symposium on Microarchitecture (MICRO), 2022, pp. 318-335, doi: 10.1109/MICRO56248.2022.00034.
4. **Milijana Surbatovich**, Limin Jia, and Brandon Lucia. 2021. Automatically enforcing fresh and consistent inputs in intermittent systems. Proc. 42nd ACM SIGPLAN International Conference on Programming Language Design and Implementation (PLDI 2021). DOI: https://doi.org/10.1145/3453483.3454081
5. **Milijana Surbatovich**, Brandon Lucia, and Limin Jia. 2020. Towards a formal foundation of intermittent computing. Proc. ACM Program. Lang. 4, OOPSLA, Article 163 (November 2020) DOI: https://doi.org/10.1145/3428231
6. Camille Cobb, **Milijana Surbatovich**, Anna Kawakami, Mahmood Sharif, Lujo Bauer, Anupam Das, Limin Jia. 2020. How Risky Are Real Users' IFTTT Applets? USENIX Symposium on Usable Privacy and Security (SOUPS 2020)
7. **Milijana Surbatovich**, Limin Jia, and Brandon Lucia. 2019. I/O dependent idempotence bugs in intermittent systems. Proc. ACM Program. Lang. 3, OOPSLA, Article 183 (October 2019) DOI: https://doi.org/10.1145/3360609

8. **Milijana Surbatovich**, Jassim Aljuraidan, Lujo Bauer, Anupam Das, and Limin Jia. 2017. Some Recipes Can Do More Than Spoil Your Appetite: Analyzing the Security and Privacy Risks of IFTTT Recipes. In Proceedings of the 26th International Conference on World Wide Web (WWW 17). DOI: https://doi.org/10.1145/3038912.3052709

MENTORING AND TEACHING EXPERIENCE

Mentoring

- Mentored a high-school intern in learning Rust programming **Fall 2021**
- Mentored an undergraduate summer research intern in a project on information flow types for intermittent computing. **Summer 2021**
- Mentored an undergraduate research intern who developed a Coq formalization of the theorem for basic intermittent system correctness **Summer 2020**
- Mentored three undergraduate interns in developing a custom reader for the JavaCard environment, and one REU program intern in a project on analyzing end-user security and privacy harms in IoT services. **Summer 2019**

Graduate Teaching Assistantships & Training

- **Formal Foundations of Security**. (CMU course 15-316). Responsibilities included weekly office hours, and grading of homeworks, labs, and exams.
- **Secure Software Systems.** (CMU course 18-732). Responsibilities included weekly office hours, running some recitations, project rollout and infrastructure maintenance, and grading.
- **Eberly Center Future Faculty Program.** (in progress) Pedagogical training program given by the education center. Attended seminars on teaching skills and centering DEI in course design. Worked with teaching fellows to incorporate active learning in lectures.

Undergraduate Teaching Assistantships

Lab and Project Teaching Assistant **2016 - 2017**

- For **Computer Organization** and **Front-end Web Development**. Responsibilities included weekly lab sessions and office hours, grading labs and projects.

Workshop Leader **2015 - 2016**

- **Science of Programming** and **Science of Data Structures**. Responsibilities included leading mandatory weekly workshops, grading weekly quizzes and the exams.
- The position required taking a weekly class on leadership and pedagogy skills.

HONORS

Selected for the Rising Stars in EECS workshop **2022**

Won 1st place at the PLDI 2022 SRC **2022**

Received CyLab Presidential Fellowship	**2021**
Inducted to Phi Beta Kappa	**2017**

TALKS, POSTERS, AND TUTORIALS

A Type System for Safe Intermittent Computing (**1st place** winning poster/talk)	**PLDI 2022 SRC**
Automatically Enforcing Fresh and Consistent Inputs in Intermittent Systems	**SPLASH 2021**
Automatically Enforcing Fresh and Consistent Inputs in Intermittent Systems	**PLDI 2021**
Towards a Formal Foundation of Intermittent Computing	**OOPSLA 2020**
I/O Dependent Idempotence Bugs in Intermittent Systems	**OOPSLA 2019**
Tutorial: Getting Started with Intermittent Computing	**MICRO 2018**
Security & Privacy Flaws in End-User IoT Programming	**PrivacyCon 2018**
Security & Privacy Flaws in End-User IoT Programming	**WWW 2017**

REFERENCES

Brandon Lucia | blucia@andrew.cmu.edu

Limin Jia | liminjia@cmu.edu

Derek Dreyer | dreyer@mpi-sws.org

Lujo Bauer | lbauer@cmu.edu