Chuta Sano

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Education

- **McGill University**, PhD in Computer Science
  August 2022 – Present (Expected graduation: Summer 2026)
  Advisor: Prof. Brigitte Pientka

- **Carnegie Mellon University**, MS in Computer Science
  August 2018 – December 2019
  Advisor: Prof. Frank Pfenning
  Thesis: On Session-Typed Contracts for Imperative Languages

- **University of Massachusetts Lowell**, BSc in Computer Science, Data Science Concentration, Math Minor
  August 2015 – May 2018
  Advisor: Prof. Xinwen Fu
  Thesis: Turning Legacy IR Devices into Smart IoT Devices

Publications

[1]   Chuta Sano, Deepak Garg, Ryan Kavanagh, Brigitte Pientka, and Bernardo Toninho. "Fusing Session-Typed Concurrent Programming into Functional Programming". In: *Proc. ACM Program. Lang.* 9.ICFP (Aug. 2025). DOI: 10.1145/3747519.

[2]   Daniel Zackon, Chuta Sano, Alberto Momigliano, and Brigitte Pientka. "Split Decisions: Explicit Contexts for Substructural Languages". In: *Proceedings of the 14th ACM SIGPLAN International Conference on Certified Programs and Proofs.* CPP '25. New York, NY: Association for Computing Machinery, 2025, pp. 257–271. ISBN: 9798400713477. DOI: 10.1145/3703595.3705888.

[3]   Chuta Sano, Ryan Kavanagh, and Brigitte Pientka. "Mechanizing Session-Types using a Structural View: Enforcing Linearity without Linearity". In: *Proc. ACM Program. Lang.* 7.OOPSLA2 (2023), pp. 374–399. DOI: 10.1145/3622810.

[4]   Chuta Sano, Stephanie Balzer, and Frank Pfenning. "Manifestly Phased Communication via Shared Session Types". In: *23rd International Conference on Coordination Models and Languages (COORDINATION 2021).* Ed. by F. Damiani and O. Dardha. Valletta, Malta: Springer LNCS 12717, June 2021, pp. 23–40. DOI: 10.1007/978-3-030-78142-2_2.

[5]   Chuta Sano. "On Session Typed Contracts for Imperative Languages". Technical Report. Masters Thesis. Carnegie Mellon University, Dec. 2019. URL: http://reports-archive.adm.cs.cmu.edu/anon/2019/CMU-CS-19-133.pdf.

[6]   Chuta Sano, Chao Gao, Zupei Li, Zhen Ling, and Xinwen Fu. "Turning Legacy IR Devices into Smart IoT Devices". In: *Wireless Algorithms, Systems, and Applications - 13th International Conference, WASA 2018, Tianjin, China, June 20-22, 2018, Proceedings.* Ed. by Sriram Chellappan, Wei Cheng, and Wei Li. Vol. 10874. Lecture Notes in Computer Science. Springer, 2018, pp. 412–424. DOI: 10.1007/978-3-319-94268-1_34.

[7]   Zupei Li, Qinggang Yue, Chuta Sano, Wei Yu, and Xinwen Fu. "3D vision attack against authentication". In: *IEEE International Conference on Communications, ICC 2017, Paris, France, May 21-25, 2017.* IEEE, 2017, pp. 1–6. DOI: 10.1109/ICC.2017.7996462.

[8]   Zhen Ling, Melanie Borgeest, Chuta Sano, Jazmyn Fuller, Anthony Cuomo, Sirong Lin, Wei
      Yu, Xinwen Fu, and Wei Zhao. "Privacy Enhancing Keyboard: Design, Implementation,
      and Usability Testing". In: *Wirel. Commun. Mob. Comput.* 2017 (2017). DOI: 10.1155/
      2017/3928261.

[9]   Zhen Ling, Melanie Borgeest, Chuta Sano, Sirong Lin, Mogahid Fadl, Wei Yu, Xinwen Fu,
      and Wei Zhao. "A Case Study of Usable Security: Usability Testing of Android Privacy
      Enhancing Keyboard". In: *Wireless Algorithms, Systems, and Applications - 12th Inter-
      national Conference, WASA 2017, Guilin, China, June 19-21, 2017, Proceedings.* Ed. by
      Liran Ma, Abdallah Khreishah, Yan Zhang, and Mingyuan Yan. Vol. 10251. Lecture Notes
      in Computer Science. Springer, 2017, pp. 716–728. DOI: 10.1007/978-3-319-60033-8_61.

Research

- **McGill University**, August 2022 – Present

    - I investigated techniques to mechanize substructural languages via higher-order abstract
      syntax in the proof assistant Beluga. One approach [3] led to a mechanization of session
      types, which have a linear type system. I also adviced many student projects that used
      this technique. I also worked on an alternate approach that later led to a general
      framework for mechanizing a whole suite of substructural languages [2].

    - I am investigating language interoperability between languages with substantially differ-
      ent semantics, e.g., functional programming and session-typed process calculi. I develop
      a notion of first-class code that enables a functional language to generate, analyze, and
      run process calculus code [1]. I am generalizing this approach to capture interactions
      between functional languages and a broader set of languages, including an assembly-like
      language and a quantum programming language.

- **Max Planck Institute for Software Systems**, September 2023 – October 2023

    - As a visiting researcher, I worked on extending session types with probability (no pub-
      lications) and metaprogramming [1].

- **Carnegie Mellon University** August 2018 – October 2021

    - I extended the CC0 compiler, a C-like language extended with session-typed concur-
      rency, with monitors. I extended the theory of monitors to support shared session types
      and formalized it in my thesis [5]

    - I extended shared session types with subtyping [4], enabling the static encoding of
      shared protocols with "phases," i.e., protocols that can be encoded in a (finite) state
      machine.

- **University of Massachusetts Lowell**, *Robotics Research Group* September 2016 – May
  2017

    - I developed a ROS-based service that receives a top-down image of a robot and its
      surroundings to simulate laser scan outputs done by the robot. This was used in con-
      junction with TinyRobo, a swarm robot project.

    - I implemented a real time FaceDetector for GoogleGlass using OpenCV and Android
      NDK, and then optimized it by devising a handoff mechanism between generic Android
      devices through first class continuations.

- **University of Massachusetts Lowell**, *Center for Internet Safety and Forensic Education
  and Research* August 2015 – May 2018

- I surveyed various consumer phones with stereocameras and conducted experiments to determine their attack capabilities [7].
- I researched common IR-based products and their protocols. This led to a proposing of a few attack models and the desigining of low-cost devices that bridge IR and IoT devices [6].
- I maintained and enhanced the Privacy Enhancing Keyboard application for Android based on usability experiments [9, 8].

Conference/Invited Talks

- **Fusing Session-Typed Concurrent Programming into Functional Programming**

  - International Conference on Functional Programming (ICFP), October 2025
  - McGill University (COMEPLS), September 2024
  - Languages and Logic Montreal (LLM), March 2025
  - Eastern Canada Logic and Programming Seminar (ECLaPS), December 2024

- **Mechanizing Session-Types using a Structural View: Enforcing Linearity without Linearity**

  - Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), October 2023
  - University of Tokyo, May 2023
  - Kyoto University, May 2023
  - Eastern Canada Logic and Programming Seminar (ECLaPS), March 2023

- **Manifestly Phased Communication via Shared Session Types**

  - International Conference on Coordination Models and Languages (COORDINATION), June 2021
  - McGill University (COMEPLS), October 2024
  - University of Edinburgh, October 2021

Teaching

- McGill University

  - Winter 2025: COMP527 – Logic and Computation, Teaching Assistant
  - Winter 2023: COMP527 – Logic and Computation, Teaching Assistant
  - Fall 2022: COMP302 – Programming Languages and Paradigms, Teaching Assistant

- Oregon Programming Languages Summer School, 2021

  - Course assistant: *Session-Typed Concurrent Programming.*

- University of Massachusetts Lowell

  - Mathematics Tutor: Taught Calculus, Discrete Math, Linear Algebra, Probability, and Number Theory

Services

- Organizer of Conference of McGill's Epic Programming Language Systems (COMEPLS), 2023 – 2025

- External Reviewer for FSCD, 2024

- External Reviewer for LFMTP, 2024

- Mentor for McGill CSGS Bridge Mentorship Program, 2023 – 2024

Awards & Honors

- **Tomlinson Graduate Fellowship**, McGill University, 2022 – 2025

- **Best Teaching Assistant Award**, McGill University, Winter 2023
  Recognized for my TA-ship of COMP527 based on student nominations

- **Latorre Family Scholarship**, University of Massachusetts Lowell, 2017

- **Co-op Scholar**, University of Massachusetts Lowell, 2016

- **Dean's Scholarship**, University of Massachusetts Lowell, 2015 – 2018

- **Professor George Grinstein Scholarship**, University of Massachusetts Lowell, 2015

Software Artifacts

[1] Chuta Sano, Deepak Garg, Ryan Kavanagh, Brigitte Pientka, and Bernardo Toninho. *Fusing Session-typed Concurrent Programming into Functional Programming - Implementation.* Version 1. Software artifact. June 2025. DOI: `10.5281/zenodo.15643008`.

[2] Chuta Sano, Ryan Kavanagh, and Brigitte Pientka. *Mechanizing Session-Types using a Structural View.* Version 1.0. Software artifact. Sept. 2023. DOI: `10.5281/zenodo.8329645`.