

# Chuta Sano

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## Education

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- **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**, B.Sc. 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

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- [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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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 International 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](https://doi.org/10.1007/978-3-319-60033-8_61).

## Research

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- **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 advised 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 different 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 publications) and metaprogramming [1].
- **Carnegie Mellon University** August 2018 – October 2021
  - I extended the CC0 compiler, a C-like language extended with session-typed concurrency, 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 conjunction 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 designing 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

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- **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

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- 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

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- Organizer of Conference of McGill's Epic Programming Language Systems (COMEPLS), 2023 – 2025
- External Reviewer for FSCD, 2024
- External Reviewer for LFMTTP, 2024
- Mentor for McGill CSGS Bridge Mentorship Program, 2023 – 2024

## Awards & Honors

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- **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

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- [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](https://doi.org/10.5281/zenodo.15643008).
- [2] Daniel Zackon, **Chuta Sano**, Alberto Momigliano, and Brigitte Pientka. *Split Decisions: Explicit Contexts for Substructural Languages (artifact)*. Software artifact. Dec. 2024. DOI: [10.5281/zenodo.14271731](https://doi.org/10.5281/zenodo.14271731).
- [3] **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](https://doi.org/10.5281/zenodo.8329645).