YUDAI URABE

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https://yudaiurabe.github.io/

EDUCATION

Institute of Science Tokyo
(renamed from Tokyo Institute of Technology on October 1, 2024) Tokyo, Japan
Graduate Research Student in the Department of Mathematical and Computing Science May 2024 -

Waseda University Tokyo, Japan
Bachelor of Human Sciences April 2020 - March 2024
Major in History and Philosophy of Science, Minor in Computer Science
GPA: *3.9/4.0 (Valedictorian)*

RESEARCH EXPERIENCE

Research Project Hybrid
Academic advisor: Guannan Wei(INRIA/Tufts University), Youyou Cong(Science Tokyo)November 2024- present

- Aiming to build a sound and computable static analyzer for programs with effect handlers. I first implemented several abstract machines (such as the CE(S)K machine and Krivine's machine) in OCaml. Based on previous work, I also designed an abstract machine semantics for the object language. After implementing this, using a systematic approach called Abstract Abstract Machines (AAM), I will derive an abstract interpreter for the static analysis of the object language. By using the interpreter, I will gain control-flow information that will enable optimizations for effect handlers (planned).

History and Philosophy of Science Lab,
Waseda University,*Thesis Student* Saitama, Japan
Academic advisor: Shigeo Kato April 2021- March 2024

- Research on the history of computer science (mainly in the 1960s), focusing on how programs came to be regarded as mathematical objects. Specifically, I examined the introduction of types as mathematical objects into programming languages. Focused on how C.A.R. Hoare's 1960s research, such as Quicksort and Axiomatic Semantics, was conceived. Read papers and unpublished notes by influential figures such as Hoare, Dijkstra, and Naur as primary sources, and over 400 papers and books as secondary sources. Wrote a 60-page paper (first author) and presented the results at a conference.
- Thesis: *"C.A.R. Hoare's Research in the 1960s and the Emergence of Computer Science as a Discipline"*

Research Project (Applications of Derivatives of Regular Expressions),
University of California, Davis Online
Academic advisor: Caleb Stanford September 2023-November 2023

- Aiming to bridge the gap between the theory and practice of regular expressions. Based on paperas on derivatives of regular expressions, such as Brzozowski's "Derivatives of Regular Expressions" (1964) and Antimirov's "Partial derivatives of regular expressions and finite automata construction" (1996), I implemented a pattern matching program using the Brzozowski derivatives in OCaml (https://github.com/YudaiUrabe/Brzozowski-derivative-and-Pattern-Matching-in-OCaml). Also, studied various languages classes like Visibly Pushdown Languages.

Uno Takeaki Lab,
National Institute of Information (NII), Principles of Informatics Research Division Tokyo, Japan
Academic advisor: Kazuki Maeyama, Towa Suda November 2022-April 2023

- Created a network in Python (using tools like NetworkX and NLTK) based on words appearing in a philosophy book, calculated various centralities, and visualized semantic connections between words in natural language. Presented the results at the National Convention of IPSJ, 2023

PRESENTATION

[1] **Yudai Urabe**, Kazuki Maeyama, Towa Suda."Analysis of the Vocabulary Distribution of Chapters and the Relationship between Chapters in Russell's *The History of Western Philosophy*" March 2023, Tokyo, Japan.
- The 85th National Convention of Information Processing Society of Japan.
[2] **Yudai Urabe**."C.A.R. Hoare's Research in the 1960s and the Emergence of Computer Science as a Discipline: Exploring the Application of Historical Studies to Theoretical Computer Science" April 2024, Tokyo, Japan.
- Workshop on the History of Science, History of Technology, and Science, Technology, and Society(STS).
[3] **Yudai Urabe**, Guannan Wei, Youyou Cong. "Toward Static Analysis for Programs with Effect Handlers by Abstracting Abstract Machines" March 2025, Gamagori, Japan.
- JSSST Workshop on Programming and Programming Languages (PPL'25).

SCHOLARSHIP

Okuma Memorial Scholarship
Awarded to the top 2 students in a grade (out of 560 students) 2020-2021, 2021-2022, 2023-2024

Azusa Ono Memorial Scholarship
Awarded to students with academic excellence 2021-2022

SKILLS, SERVICE, AND INTERESTS

Student Volunteer

ICFP Student Volunteer	September 2023
The History of Science Society of Japan, 70th Annual General Meeting	May 2023
Functional Programming Festival Volunteer Staff	June 2025
PLDI Student Volunteer	June 2025

Natural Language

Japanese (native), English (fluent, C1), Chinese (reading knowledge, B2)

Programming

Python, OCaml, Isabelle/HOL, Scala, C, Java

Activities and Interests

Mathematics club, Programming club, Philosophy club, Reading, Hiking, Othello (2nd kyu)