

# Michael B. James, Ph.D.

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## Research Mission

Building the next generation of Human-AI programming environments requires a deep understanding both of how AI-assistants operate and of how programmers use them. My work spans both, through my experience with *AI-agents*, *Programming Languages* techniques, and *Human-Computer Interactions* methodologies. I identify developer-centric challenges and overcome them with a novel combination of stochastic and formal techniques.

## Education

### University of California, San Diego

· Ph.D., Computer Science 2018-2024

· M.S. Computer Science 2021

Advisor: Nadia Polikarpova

### Tufts University

· B.S. Computer Science 2015

## Publications

- [THESIS]: **Exploratory Phenomena in Program Synthesis.** *Michael B. James.* 2024.
- [LEAP]: **Validating AI-Generated Code with Live Programming.** Kasra Ferdowsi\*, Ruanqianqian (Lisa) Huang\*, *Michael B. James, Nadia Polikarpova, Sorin Lerner.* *CHI.* May 2024.
- [GCP]: **Grounded Copilot: How Programmers Interact with Code-Generating Models.** Shraddha Barke\*, *Michael B. James\**, Nadia Polikarpova. *OOPSLA.* October 2023. *Distinguished Paper Award*
- [PRS]: **Program Recognition in Synthesis.** *Michael B. James, Nadia Polikarpova.* *PLATEAU.* November 2021.
- [H+]: **Digging for Fold: Synthesis-aided API Discovery for Haskell.** *Michael B. James, Zheng Guo, Ziteng Wang, Shivani Dosh, Hila Peleg, Ranjit Jhala, Nadia Polikarpova.* *OOPSLA.* November 2020.
- [TYGAR]: **Program Synthesis by Type-Guided Abstraction Refinement.** Zheng Guo, *Michael B. James, David Justo, Jiaxiao Zhou, Ziteng Wang, Ranjit Jhala, Nadia Polikarpova* *47th ACM SIGPLAN Symposium on Principles of Programming Languages (POPL 2020).* January 2020.

## Work Experience

### Founding AI Research Scientist.

 Sailplane PBC. New York City. Jul 2024 - *current*

- Second hire at venture-backed AI startup empowering developers with human-AI collaborative programming
- Designed and built several AI agents, testing various product ideas with user-collaboration as a core principle
- Zero-to-One evaluation and analysis framework for model comparisons in our agent with AWS data lake
- Evaluated our agent against different public agents, following the latest research methods (e.g., LLM-as-Judge)
- Stepped in where needed: delivered cross-cutting features needed to secure \$5M in seed round funding

### Research Intern.

 Microsoft. Remote. Summer 2022

Mentors: Arjun Radhakrishna, Gustavo Soares

- Worked with the PROSE team on novel interactive program synthesis tool for API migrations.
- Gathered changing product goals from several internal customers in concrete action plan

### Software Engineer II.

 Jana Mobile. Boston, Massachusetts. Feb 2017 - Jun 2018

- Redesigned revenue reporting pipeline for live business metrics
- Designed & implemented user profile data collection, from Cassandra DB to Android+Chromium frontend
- Productionized data scientist analyses for metrics and alert generation on business status
- Managed data scientists' APIs for product metrics, including Kafka pipelines

### Software Engineer I.

 Uber Technologies. San Francisco. Jul 2015 - Dec 2016

- Owned `business.uber.com`. Led service migration to React.
- Lead team migration to golang, with a new anti-fraud microservice.
- Managed and contributed to 12 microservices.

## Research Projects

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### Human-AI Collaborative Programming 2021-2024

Our groundbreaking study identified how programmers use Copilot: they either *accelerate* through a task, or use the tool to *explore* their problem space<sup>[GCP]</sup>. Our findings identified difficulty in validating AI-generated code, but our technique with live programming eases this difficulty<sup>[LEAP]</sup>. Current work-in-progress highlights the “wisdom of the crowds” of an LLM to assist in design space exploration.

### Type Directed Synthesis in Haskell 2018-2021

Our novel synthesis technique generates Haskell programs that are guaranteed to satisfy the user’s intent quickly by using abstract refinements<sup>[TYGAR]</sup>. A user-study proves that our multi-modal search with examples and tests aids program comprehension, allowing a user to complete more tasks<sup>[H+]</sup>. A followup study reinforces the need for tool-assisted code validation<sup>[PRS]</sup>.

## Talks

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**Grounded Copilot: How Programmers Interact with Code-Generating Models.** 2023 - OOPSLA (Cascais, Portugal)

**Program Recognition in Synthesis.** 2021 - PLATEAU (Carnegie Mellon University)

**Digging for Fold: Synthesis-aided API Discovery for Haskell.** 2021 - OOPSLA (Chicago), 2020 - OOPSLA 2020 (virtual)

**Component-based Type Driven Synthesis.** 2019 - University of California, San Diego

## Teaching

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### Graduate Teaching Assistant (UC San Diego)

Courses: undergraduate and graduate programming languages.

Fall 2023, Spring 2022, Spring 2021, Fall 2019.

Supervisor: Nadia Polikarpova

### Undergraduate Teaching Assistant (Tufts University)

Course: undergraduate programming languages  
Fall 2014.

Supervisor: Kathleen Fisher

## Service

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Reviewer: CHI 2024, PLATEAU 2024

Student Volunteer Co-Chair: PLDI 2023, 2024

Artifact Evaluation: ICFP 2020, ICFP 2021

## Skills

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Python, Typescript, Haskell, Elixir, Program Synthesis, Artificial Intelligence, AI Agents, Distributed Systems, User Research, Quantitative Research, Qualitative Research, Evaluation, Data Science, Compilers, Type Systems, Web development, git, jira, react