Cyrus Omar

Computer Science and Engineering
University of Michigan
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Employment

University of Michigan

Assistant Professor (Sep. 2019-present)

Future of Programming Lab (FP Lab)

Computer Science and Engineering (CSE) Division

Electrical Engineering and Computer Science (EECS) Department

College of Engineering (CoE)

University of Chicago

Postdoctoral Scholar (Sep. 2017-Aug. 2019)

Department of Computer Science

Supervisor: Ravi Chugh

Carnegie Mellon University

Postdoctoral Scholar (May. 2017-Aug. 2017)

Computer Science Department

Supervisor: Jonathan Aldrich

Education

Carnegie Mellon University

Ph.D. in Computer Science (Oct. 2010-May 2017)

Thesis: *Reasonably Programmable Syntax*

Advisor: Jonathan Aldrich

Center for the Neural Basis of Cognition

Graduate Training Program Certificate (Oct. 2010-May 2017)

PhD Program in Neural Computation (Aug. 2008-Oct. 2010)

University of Illinois at Urbana-Champaign

B.S. in Computer Science, *summa cum laude*, 2008

B.S. in Molecular & Cellular Biology, *summa cum laude*, 2008

Internships

Los Alamos National Lab

Synthetic Visual Cognition Group (May 2010-August 2010)
Supervisor: Garrett Kenyon

Awards and Honors

1. 1938E Award, College of Engineering, University of Michigan, 2025
2. Distinguished Paper Award, POPL 2024
3. Distinguished Paper Award, OOPSLA 2023
4. NSF CAREER Award, 2023
5. Distinguished Paper Award, ECOOP 2014
6. Alan J. Perlis SCS Graduate Teaching Award, 2013
7. DOE Computational Science Graduate Fellowship, 2008-2012
8. NSF Graduate Research Fellowship, 2008-2013
9. Inductee, University of Illinois Bronze Tablet, 2008

Professional Societies

1. Member, IFIP Working Group 2.16 (Language Design), 2024-present
2. Member, ACM SIGPLAN, 2010-present

Research Papers

Primary Research Area: programming languages
Secondary Research Areas: human-computer interaction, artificial intelligence, learning technology
underlined = primary advisor during paper preparation

Manuscripts Under Review

ArXiV DeckFlow: Iterative Specification on a Multimodal Generative Canvas
G. Croisdale, E. Huang, J. J. Y. Chung, A. Guo, X. Wang, A. Z. Henley, **C. Omar**
ArXiV preprint, arXiv:2506.15873
(Under Review)

ArXiV Hazel Deriver: A Live Editor for Constructing Rule-Based Derivations
Z. Zong, **C. Omar**
ArXiV preprint, arXiv:2506.10781
(Under Review)

- Syntactic Completions with Material Obligations
D. Moon, A. Blinn, T. J. Porter, **C. Omar**
(Under Review, manuscript available upon request)

Accepted for Publication

OOPSLA 2025 Incremental Bidirectional Typing via Order Maintenance
T. J. Porter, M. Kirisame, I. Wei, P. Panchekha, **C. Omar**
Proc. ACM Program. Lang., Issue: OOPSLA 2025 (Accepted, to appear)

Aarhus 2025 Steps towards an Ecology for the Internet
A. Madhavapeddy, S. Reynolds, A. Christie, D. Coomes, M. Dales, P. Ferris, R. Gibb, H. Haddadi, S. Jaffer, **C. Omar**, W. Sutherland, J. W, Crowcroft
Aarhus Conference (Accepted, to appear)

POPL 2025 Grove: A Bidirectionally Typed Collaborative Structure Editor Calculus
M. Adams, E. Griffis, T. J. Porter, S. Satish, E. Zhao, **C. Omar**
Proc. ACM Program. Lang., Issue: POPL 2025

OOPSLA 2024 Statically Contextualizing Large Language Models with Typed Holes
A. Blinn, X. Liang, J. Kim, **C. Omar**
Proc. ACM Program. Lang., Issue: OOPSLA 2024

HATRA 2024 Learner-Centered Design Criteria for Classroom Proof Assistants
M. Keenan, **C. Omar**
Workshop on Human Aspects of Types and Reasoning Assistants (HATRA)

HOPE 2024 Modularizing Reasoning about AI Capabilities via Abstract Dijkstra Monads
C. Omar, P. Ferris, A. Madhavapeddy
Workshop on Higher-Order Programming with Effects (HOPE)

POPL 2024 Total Type Error Localization and Recovery with Holes
E. Zhao, R. Maroof, A. Dukkipati, A. Blinn, Z. Pan, **C. Omar**
Proc. ACM Program. Lang., Issue: POPL 2024
Distinguished Paper Award

PROPL 2024 Toward a Live, Rich, Composable, and Collaborative Planetary Compute Engine
A. Bandukwala, A. Blinn, **C. Omar**
Programming for the Planet (PROPL) Workshop, colocated with POPL 2024

TFP 2024 Polymorphism with Typed Holes
A. Chen, T. J. Porter, **C. Omar**
Symposium on Trends in Functional Programming (TFP 2024)

OOPSLA 2023 Live Pattern Matching with Typed Holes
Y. Yuan, S. Guest, E. Griffis, H. Potter, D. Moon, **C. Omar**
Proc. ACM Program. Lang., Issue: OOPSLA 2023
Distinguished Paper Award

VL/HCC 2023 Gradual Structure Editing with Obligations
D. Moon, A. Blinn, **C. Omar**
IEEE Symposium on Visual Languages and Human-Centered Computing

Onward! 2022 Contextualized Programming Language Documentation

H. Potter, A. Madadi, R. Just, **C. Omar**

ACM SIGPLAN International Symposium on New Ideas, New Paradigms, and Reflections on Programming and Software (Onward!), Papers Track

VL/HCC 2022 RustViz: Interactively Visualizing Ownership and Borrowing

M. Almeida, G. Cole, K. Du, G. Luo, S. Pan, Y. Pan, K. Qiu, V. Reddy, H. Zhang, Y. Zhu, **C. Omar**

IEEE Symposium on Visual Languages and Human-Centered Computing

VL/HCC 2022 An Integrative Human-Centered Architecture for Interactive Programming Assistants

A. Blinn, D. Moon, E. Griffis, **C. Omar**

IEEE Symposium on Visual Languages and Human-Centered Computing

TyDe 2022 tylr: A Tiny Tile-Based Structure Editor

D. Moon, A. Blinn, and **C. Omar**

Workshop on Type-Driven Development

PLDI 2021 Filling Typed Holes with Live GUIs

C. Omar, D. Moon, A. Blinn, I. Voysey, N. Collins, and R. Chugh

ACM SIGPLAN International Conference on Programming Language Design and Implementation (PLDI)

HATRA 2020 Hazel Tutor: Guiding Novices Through Type-Driven Development

H. Potter and **C. Omar**

Workshop on Human Aspects of Types and Reasoning Assistants

ICFP 2020 Program Sketching with Live Bidirectional Evaluation

J. Lubin, N. Collins, **C. Omar**, and R. Chugh

Proc. ACM Program. Lang., Issue: ICFP 2020

POPL 2019 Live Functional Programming with Typed Holes

C. Omar, I. Voysey, R. Chugh and M. Hammer

Proc. ACM Program. Lang., Issue: POPL 2019

ICFP 2018 Reasonably Programmable Literal Notation

C. Omar and J. Aldrich

Proc. ACM Program. Lang., Issue: ICFP 2018

SNAPL 2018 Toward Semantic Foundations for Program Editors

C. Omar, I. Voysey, M. Hilton, J. Sunshine, C. Le Goues, J. Aldrich and M. Hammer

Symposium on Advances in Programming Languages

POPL 2017 Hazelnut: A Bidirectionally Typed Structure Editor Calculus

C. Omar, I. Voysey, M. Hilton, J. Aldrich and M. Hammer

ACM SIGPLAN Symposium on Principles of Programming Languages

GPCE 2016 Programmable Semantic Fragments: The Design and Implementation of `typy`

C. Omar and J. Aldrich.

ACM SIGPLAN International Conference on Generative Programming: Concepts & Experiences

SAC 2015 Composable and Hygienic Typed Syntax Macros
C. Omar, C. Wang and J. Aldrich
ACM Symposium on Applied Computing

ECOOP 2014 Safely Composable Type-Specific Languages
C. Omar, D. Kurilova, L. Nistor, B. Chung, A. Potanin and J. Aldrich.
European Conference on Object-Oriented Programming
Distinguished Paper Award

PSP 2014 Statically Typed String Sanitation Inside a Python
N. Fulton, **C. Omar** and J. Aldrich
International Workshop on Privacy and Security in Programming
Best Paper Award

ICSE 2014 Collaborative Infrastructure for Test-Driven Scientific Model Validation
C. Omar, J. Aldrich and R. Gerkin
International Conference on Software Engineering
New Ideas & Emerging Results Track (18% acceptance rate)

IWACO 2014 Language-Based Architectural Control
J. Aldrich, **C. Omar**, A. Potanin and D. Li
International Workshop on Aliasing, Capabilities and Ownership

GlobalDSL 2013 Type-Directed, Whitespace-Delimited Parsing for Embedded DSLs
C. Omar, B. Chung, D. Kurilova, A. Potanin and J. Aldrich
International Workshop on the Globalization of Domain-Specific Languages

ICSE 2012 Active Code Completion.
C. Omar, Y. Yoon, T. D. LaToza and B. A. Myers
International Conference on Software Engineering

J. Neuro. 2012 Neural correlation is stimulus modulated by feedforward inhibitory circuitry
J. W. Middleton, **C. Omar**, B. Doiron and D. J. Simons
Journal of Neuroscience 32(2):506–18

IJHCI 2011 A Feedback Information-Theoretic Approach to the Design of Brain-Computer Interfaces.
C. Omar, A. Akce, M. Johnson, T. Bretl, R. Ma, E. Maclin, M. McCormick and T. Coleman
International Journal of Human-Computer Interaction, 27:1, 5–23

ACC 2008 Policies for neural prosthetic control: initial experiments with a text interface
C. Omar, M. Johnson, T. Bretl and T. Coleman
American Control Conference

ICASSP 2008 Querying the user properly for high-performance brain machine interfaces: recursive estimation, control and feedback information theoretic perspectives
C. Omar, M. Johnson, T. Bretl and T. Coleman
IEEE International Conference on Acoustics, Speech, and Signal Processing

IJCNN 2008 Shedding the weights: more with less
T. Achler, **C. Omar** and E. Amir
International Joint Conference on Neural Networks

Selected Talks and Outreach Activities

1. Invited talk, PurPL Seminar, Purdue University, May 2025
2. Invited Guest, Dead Code Podcast, 2025
3. Invited Guest, Maize and AI Podcast, 2024
4. Keynote Address, *Research Methods for Designing Next-Generation Programming Systems*, HATRA 2024
5. Invited talk, Topos Institute, August 2024
6. Invited talk, IFIP Working Group 2.3 (Language Design), March 2024
7. Invited talk, University of Washington, Sep 2023
8. Invited talk, IFIP Working Group 2.3 (Language Design), Jan 2023
9. Invited talk, Ink & Switch, May 2022
10. Invited talk, University of Toledo, Feb 2022
11. Invited talk, University of Washington, December 2021
12. Invited talk, Strumenta Community, December 2021
13. Invited talk, UC Berkeley, October 2021
14. Invited talk, UC San Diego, Summer 2021
15. Invited talk, Hackworth Ltd., Summer 2021
16. Invited talk, Webflow, Summer 2021
17. Invited Talk, PPIG 2020
18. Accepted talk, Midwest PL Summit 2019
19. Accepted talk, TyDe 2019
20. Invited talk, Chicago Functional Programming Meetup + Reason Meetup (joint talk), 2018
21. Accepted talk, LIVE 2018
22. Accepted talk, META 2018
23. Invited talk, CMU Principles of Programming Seminar, 2018
24. Accepted talk, Strange Loop, 2018
25. Invited talk, Ink & Switch, 2018
26. Invited talk, Purdue University, 2017
27. Invited talk, TU Darmstadt, 2017
28. Accepted talk, LIVE 2017
29. Invited talk, HARC (Y Combinator Research), 2016

Teaching

University of Michigan

EECS 203: Discrete Mathematics

Winter 2025

EECS 490: Programming Languages

Winter 2020, Fall 2020, Winter 2021, Fall 2021, Winter 2022, Fall 2022, Winter 2023, Fall 2023, Winter 2024, Fall 2024, Fall 2025

EECS 598-015: User Interfaces for Programming Languages

Fall 2019

Carnegie Mellon University

15-312: Principles of Programming Languages

Spring 2013, Head TA, with Prof. Robert Harper

15-150: Functional Programming

Fall 2011, Head TA, with Prof. Dan Licata

Advising

University of Michigan

Postdocs and Research Scientists (advising period; subsequent placement)

1. Michael D. Adams (Fall 2019-Winter 2021; Assistant Professor at Yale-NUS)

PhD Students (advised)

1. Alexander Bandukwala (Fall 2024-present)
   NSF CSGrad4US Fellowship
2. Thomas J. Porter (Fall 2024-present)
3. Gregory Croisdale (Summer 2024-present)
4. Matthew Keenan (Fall 2023-present)
5. Andrew Blinn (Fall 2020-present)
6. Eric Griffis (Fall 2020-Summer 2022)
7. David Moon (Fall 2019-present)

PhD Committees

1. Eric Giovannini (CSE, expected 2026)
2. Hannah Potter (University of Washington, expected 2026)
3. Daniël Pelsmaeker (TU Delft, expected 2025)
4. Matthías Páll Gissurarson (Chalmers University of Technology, 2024)
5. April Wang (School of Information, 2023)
6. Xiaoying Pu (CSE, 2022)

Masters and Undergraduate Research Students
the following only lists students who went on to PhD programs

1. Johnson He (2021-2023; PhD student at Indiana University)

2. June Hyung (Jacob) Kim (2024-2025; PhD student at UC Irvine)
3. Sundara Vishnu Satish (2022-2025; PhD Student at NYU)
4. Zhiyao Zhong (2024-2025; PhD Student at National University of Singapore)
5. Yuchen Jiang (2021-2022; PhD Student at University of Michigan)
6. Eric Zhao (2021-2024; PhD student at Brown University)
   NSF Graduate Research Fellowship
7. Matthew Ruiz (2023-2024; PhD student at Purdue University)
8. Alaric Chen (2023-2024; PhD student at Purdue University)
9. Yanjun Chen (2021-2023; PhD student at UC Irvine)
10. Luoxi (Rosie) Meng (2022-2022; PhD student at UCSD)
11. Siyuan He (2020-2021; PhD student at Purdue University)
12. Yuning Wang (2020-2021; PhD student at Rutgers University)
13. Hannah Potter (2019-2021; PhD student at University of Washington)
14. Yongwei Yuan (2019-2020; PhD student at Purdue University)
15. Ke Du (2019-2020; PhD student at UIC)

... (150+ other undergraduate and masters research students as of July 1, 2025, see lab website for full listing)

Advising Prior to Faculty Position

Undergraduates (year; faculty advisor; subsequent placement)

1. Chenglong Wang (2015; Jonathan Aldrich; PhD student, University of Washington)
2. Benjamin Chung (2014; Jonathan Aldrich; PhD student, Northeastern University)
3. Nathan Fulton (2012; Jonathan Aldrich; PhD student, Carnegie Mellon University)
4. Michael Rule (2009; Nathan Urban; PhD student, Brown University)

External Service

1. Program Committee, PLDI 2026
2. Program Committee, POPL 2025
3. Program Committee, GPCE 2025
4. Program Committee, VL/HCC 2025
5. Program Committee, ML Family Workshop 2025
6. Program Committee, HATRA 2025
7. Program Committee, LIVE 2025
8. Reviewer, CHI 2025
9. Reviewer, Journal of Functional Programming (JFP), 2025
10. Reviewer, ACM Computing Surveys, 2025
11. Reviewer, ACM Transactions on Computing Education (TOCE), 2025
12. Reviewer, Journal of Functional Programming (JFP), 2024
13. Program Committee, OOPSLA 2024

14. Program Committee, VL/HCC 2024
15. Program Committee, Onward! 2024
16. Program Committee, LIVE 2024
17. Program Committee, SPLASH-E 2024
18. Publicity Chair, HATRA 2024
19. Panelist, NSF SHF Core Panel 2024
20. Steering Committee Co-chair, MWPLS 2024-2025
21. Co-founder and Steering Committee Member, Rust Edu working group, 2022-present
22. Reviewer, CHI 2024
23. Reviewer, ICFP 2024
24. Reviewer, Wiley Publishing 2023
25. Reviewer, ACM Transactions on Programming Languages and Systems (TOPLAS), 2023
26. Panelist, Programming Languages Mentoring Workshop (PLMW) at ICFP 2023
27. Program Committee, SPLASH-E 2023
28. Co-chair, Midwest PL Summit (MWPLS) 2023
29. Steering Committee Chair, TyDe (2022-2023)
30. Program Committee, PLDI 2023
31. Program Committee, ECOOP 2023
32. Program Committee, VL/HCC 2023
33. Program Committee, HATRA 2023
34. Program Committee, IFL 2023
35. Program Committee and Area Chair (Brave New Ideas and Pearls), ECOOP 2023
36. Panelist, NSF SHF Core Panel 2023
37. Panelist, European Research Council (ERC) 2023
38. External Reviewer, UIST 2023
39. Reviewer, MIT Press 2022
40. Mentor, PLMW at SPLASH 2022
41. Program Committee, IFL 2022
42. Program Committee, HATRA 2022
43. Program Committee, SPLASH Student Research Competition (SPLASH SRC) 2022
44. Program Committee, VL/HCC 2022
45. Program Committee, HATRA 2021
46. External Reviewer, UIST 2021
47. Program Committee, ICFP 2021
48. Program Committee, LIVE 2020
49. Program Committee, HATRA 2020

50. Co-Chair, Midwest PL Summit (MWPLS) 2020 [canceled due to COVID]
51. Co-Chair, Type-Driven Development (TyDe) workshop at ICFP 2020
52. External Review Committee, ICFP 2020
53. Student Research Competition Committee, ICFP 2020
54. Program Committee, HATRA 2020
55. Program Committee, Onward! Papers 2019
56. Program Committee, LIVE 2019
57. Program Committee, META 2019
58. Program Committee, ML Family Workshop 2019
59. Artifact Evaluation Committee, ICFP 2019
60. Program Committee, LIVE 2018
61. Program Committee, SPLASH Student Research Competition 2018
62. Referee, Journal of Visual Languages and Computing 2018
63. Program Committee, META 2017
64. Publicity Chair and Program Committee, GPCE 2017
65. Program Committee, DSLDI 2015
66. Artifact Evaluation Committee, ECOOP 2015

Internal Service

1. Co-Chair, CSE Curriculum Innovation Committee, Fall 2024-Summer 2025
2. Member, CSE Diversity Committee, Fall 2019-Winter 2024
3. Member, CSE Hosting Committee, Fall 2020-Winter 2023
4. Organizer, CSE New Faculty Handbook project, Fall 2022-present
5. Organizer, MPLSE (Michigan PL + SE) Group, Fall 2019-present
6. Proposal Reviewer, Michigan Institute for Computational Discovery and Engineering (MICDE), 2023
7. Proposal Reviewer, Michigan Institute for Data & AI in Society (MIDAS), 2025
8. Mentor, Girls Encoded / Explore CS Research program, Winter 2021
9. Mentor, African Undergraduate Research Adventure (AURA) program, Summer 2021
10. Mentor, Summer Undergraduate Research in Engineering (SURE) program, Summer 2020-2025

Funding

Safeguarded Collaboration with AI Agents in a Type-Theoretic Computational Commons (2025-2027)

UK Advanced Research and Invention Agency (ARIA)

PI: Cyrus Omar

Total: $745,134

FMiTF: Track III: Customizing a Classroom Proof Assistant for Mathematical Computing and Engineering Courses (2024-2026)

National Science Foundation
PIs: Cyrus Omar, Jean-Baptiste Jeannin
Total: $250,000, My portion: $180,202

Modularizing Foundational Engineering Courses with Classroom Proof Assistants (2024-2025)
E3 Strategic Technology Grant
PIs: Cyrus Omar, Greg Bodwin, Jean-Baptiste Jeannin, Max New
Total: $50,000

Interactively Deriving Formal Proofs (2023-2024)
Michigan Engineering Seeding to Accelerate Research Themes (START)
PIs: Cyrus Omar, Jean-Baptiste Jeannin
Total: $30,000, My portion: $15,000

CSE Course Development Funding for EECS 490 (2020-2022)
Total: $4,950

NSF support for Midwest Programming Languages Summit (2023-2026)
National Science Foundation
PIs: Jean-Baptiste Jeannin, Cyrus Omar
Total: $15,000

Provost Early Tenure Track Faculty Research Support Initiative (2023)
Total: $3,000

CAREER: Live and Direct Programming Environments (2023-2028)
National Science Foundation
Total: $550,000 + $20,000 (REU Supplement) + $6,000 (Cloudbank Supplement) = $576,000

Infrastructure for Developing Interactive Rust Learning Material (2022-2023)
Futurewei via Portland State University (subcontract)
Total: $52,000

College of Engineering COVID Support Funding (2022)
Total: $50,000

SHF: Small: Semantic Foundations for Hole-Driven Development (2018-2021)
National Science Foundation (prime), University of Colorado Boulder (subcontract)
PIs: Cyrus Omar (Michigan subcontract), Matthew A. Hammer, Ravi Chugh
Total: $500,000, My portion: $178,136

Last updated: July 1, 2025