Cyrus Omar

Computer Science and Engineering
University of Michigan
2260 Hayward Street
Ann Arbor, MI 48109-2121

Office: 4624 Bob and Betty Beyster Building (BBB)
Email: comar@umich.edu
Webpage: https://web.eecs.umich.edu/~comar
Citizenship: USA

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. Distinguished Paper Award, OOPSLA 2025
2. 1938E Award, College of Engineering, University of Michigan, 2025
3. Distinguished Paper Award, POPL 2024
4. Distinguished Paper Award, OOPSLA 2023
5. NSF CAREER Award, 2023
6. Distinguished Paper Award, ECOOP 2014
7. Alan J. Perlis SCS Graduate Teaching Award, 2013
8. DOE Computational Science Graduate Fellowship, 2008-2012
9. NSF Graduate Research Fellowship, 2008-2013
10. 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

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

Distinguished Paper Award

OOPSLA 2025 Syntactic Completions with Material Obligations

D. Moon, A. Blinn, T. J. Porter, **C. Omar**

Proc. ACM Program. Lang., Issue: OOPSLA 2025

PROPL 2025 A FAIR Case for a Live Computational Commons

C. Omar, M. Coblenz, A. Madhavapeddy

Programming for the Planet (PROPL) Workshop, colocated with SPLASH 2025

VL/HCC 2025 Hazel Deriver: A Live Editor for Constructing Rule-Based Derivations

Z. Zhong, **C. Omar**

IEEE Symposium on Visual Languages and Human-Centered Computing

VL/HCC 2025   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**

IEEE Symposium on Visual Languages and Human-Centered Computing

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

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, Ink & Switch London Meetup, August 2025
2. Invited talk, PurPL Seminar, Purdue University, May 2025
3. Invited Guest, Dead Code Podcast, 2025
4. Invited Guest, Maize and AI Podcast, 2024
5. Keynote Address, *Research Methods for Designing Next-Generation Programming Systems*, HATRA 2024
6. Invited talk, Topos Institute, August 2024
7. Invited talk, IFIP Working Group 2.3 (Language Design), March 2024
8. Invited talk, University of Washington, Sep 2023
9. Invited talk, IFIP Working Group 2.3 (Language Design), Jan 2023
10. Invited talk, Ink & Switch, May 2022
11. Invited talk, University of Toledo, Feb 2022
12. Invited talk, University of Washington, December 2021
13. Invited talk, Strumenta Community, December 2021
14. Invited talk, UC Berkeley, October 2021
15. Invited talk, UC San Diego, Summer 2021
16. Invited talk, Hackworth Ltd., Summer 2021
17. Invited talk, Webflow, Summer 2021
18. Invited Talk, PPIG 2020
19. Accepted talk, Midwest PL Summit 2019
20. Accepted talk, TyDe 2019
21. Invited talk, Chicago Functional Programming Meetup + Reason Meetup (joint talk), 2018
22. Accepted talk, LIVE 2018
23. Accepted talk, META 2018
24. Invited talk, CMU Principles of Programming Seminar, 2018
25. Accepted talk, Strange Loop, 2018
26. Invited talk, Ink & Switch, 2018
27. Invited talk, Purdue University, 2017
28. Invited talk, TU Darmstadt, 2017
29. Accepted talk, LIVE 2017
30. 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

CSE 590: Advanced Programming Languages

Winter 2026

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. David Moon (Fall 2026-present)
2. 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-Summer 2025)
4. Matthew Keenan (Fall 2023-present)
5. Andrew Blinn (Fall 2020-present)
6. Eric Griffis (Fall 2020-Summer 2022)
   Rackham Merit Fellowship
7. David Moon (Fall 2019-Summer 2025)
   Dissertation: *Syntactic Completions with Material Obligations*

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 February 17, 2026, 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. Chair, ACM SIGPLAN International Workshop on Programming for the Planet, PROPL 2026

2. Program Committee, PLDI 2026

3. Program Committee, POPL 2025

4. Program Committee, GPCE 2025

5. Program Committee, VL/HCC 2025

6. Program Committee, ML Family Workshop 2025

7. Program Committee, HATRA 2025

8. Program Committee, LIVE 2025

9. Reviewer, CHI 2025

10. Reviewer, Journal of Functional Programming (JFP), 2025

11. Reviewer, ACM Computing Surveys, 2025

12. Reviewer, ACM Transactions on Computing Education (TOCE), 2025

13. Reviewer, Journal of Functional Programming (JFP), 2024

14. Program Committee, OOPSLA 2024

15. Program Committee, VL/HCC 2024

16. Program Committee, Onward! 2024

17. Program Committee, LIVE 2024

18. Program Committee, SPLASH-E 2024

19. Publicity Chair, HATRA 2024

20. Panelist, NSF SHF Core Panel 2024

21. Steering Committee Co-chair, MWPLS 2024-2025

22. Co-founder and Steering Committee Member, Rust Edu working group, 2022-present

23. Reviewer, CHI 2024

24. Reviewer, ICFP 2024

25. Reviewer, Wiley Publishing 2023

26. Reviewer, ACM Transactions on Programming Languages and Systems (TOPLAS), 2023

27. Panelist, Programming Languages Mentoring Workshop (PLMW) at ICFP 2023

28. Program Committee, SPLASH-E 2023

29. Co-chair, Midwest PL Summit (MWPLS) 2023

30. Steering Committee Chair, TyDe (2022-2023)

31. Program Committee, PLDI 2023

32. Program Committee, ECOOP 2023

33. Program Committee, VL/HCC 2023

34. Program Committee, HATRA 2023

35. Program Committee, IFL 2023

36. Program Committee and Area Chair (Brave New Ideas and Pearls), ECOOP 2023

37. Panelist, NSF SHF Core Panel 2023

38. Panelist, European Research Council (ERC) 2023

39. External Reviewer, UIST 2023

40. Reviewer, MIT Press 2022

41. Mentor, PLMW at SPLASH 2022

42. Program Committee, IFL 2022

43. Program Committee, HATRA 2022

44. Program Committee, SPLASH Student Research Competition (SPLASH SRC) 2022

45. Program Committee, VL/HCC 2022

46. Program Committee, HATRA 2021

47. External Reviewer, UIST 2021

48. Program Committee, ICFP 2021

49. Program Committee, LIVE 2020

50. Program Committee, HATRA 2020

51. Co-Chair, Midwest PL Summit (MWPLS) 2020 [canceled due to COVID]

52. Co-Chair, Type-Driven Development (TyDe) workshop at ICFP 2020

53. External Review Committee, ICFP 2020

54. Student Research Competition Committee, ICFP 2020

55. Program Committee, HATRA 2020

56. Program Committee, Onward! Papers 2019

57. Program Committee, LIVE 2019

58. Program Committee, META 2019

59. Program Committee, ML Family Workshop 2019

60. Artifact Evaluation Committee, ICFP 2019

61. Program Committee, LIVE 2018

62. Program Committee, SPLASH Student Research Competition 2018

63. Referee, Journal of Visual Languages and Computing 2018

64. Program Committee, META 2017

65. Publicity Chair and Program Committee, GPCE 2017

66. Program Committee, DSLDI 2015

67. Artifact Evaluation Committee, ECOOP 2015

Internal Service

1. Member, CSE Course Review Committee, Fall 2025-Winter 2026

2. Co-Chair, CSE Curriculum Innovation Committee, Fall 2024-Summer 2025

3. Member, CSE Diversity Committee, Fall 2019-Winter 2024

4. Member, CSE Hosting Committee, Fall 2020-Winter 2023

5. Organizer, CSE New Faculty Handbook project, Fall 2022-present

6. Organizer, MPLSE (Michigan PL + SE) Group, Fall 2019-present

7. Proposal Reviewer, Michigan Institute for Computational Discovery and Engineering (MICDE), 2023

8. Proposal Reviewer, Michigan Institute for Data & AI in Society (MIDAS), 2025

9. Mentor, Girls Encoded / Explore CS Research program, Winter 2021

10. Mentor, African Undergraduate Research Adventure (AURA) program, Summer 2021

11. 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