

Cyrus Omar

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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

1. Distinguished Paper Award, POPL 2024
2. Distinguished Paper Award, OOPSLA 2023
3. NSF CAREER Award, 2023-2028
4. Distinguished Paper Award, ECOOP 2014
5. Alan J. Perlis SCS Graduate Teaching Award
6. DOE Computational Science Graduate Fellowship
7. NSF Graduate Research Fellowship
8. Inductee, University of Illinois Bronze Tablet

Professional Societies

1. Member, IFIP Working Group 2.3 (Language Design), 2024-present
2. Member, ACM SIGPLAN, 2010-present

Research Papers

Primary Research Area: programming languages

Secondary Research Areas: human-computer interaction, learning technology, artificial intelligence

† = primary advisor during paper preparation

POPL 2025 Grove: A Bidirectionally Typed Collaborative Structure Editor Calculus

M. Adams[†], E. Griffis[†], 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. Porter[†], C. Omar

25th 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

Proceedings of the 2022 ACM SIGPLAN International Symposium on New Ideas, New Paradigms, and Reflections on Programming and Software

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

Proceedings of the 2022 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

42nd ACM SIGPLAN International Conference on Programming Language Design and Implementation

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
2nd 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
44th ACM SIGPLAN Symposium on Principles of Programming Languages
- GPCE 2016** Programmable Semantic Fragments: The Design and Implementation of typy
C. Omar and J. Aldrich.
15th ACM SIGPLAN International Conference on Generative Programming: Concepts & Experiences
- SAC 2015** Composable and Hygienic Typed Syntax Macros
C. Omar, C. Wang and J. Aldrich
30th 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.
28th 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
1st International Workshop on Privacy and Security in Programming (PSP 2014)
Best Paper Award
- ICSE 2014** Collaborative Infrastructure for Test-Driven Scientific Model Validation
C. Omar, J. Aldrich and R. Gerkin
47th 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
6th 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
2013 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

45th 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

2008 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

2008 IEEE International Conference on Acoustics, Speech, and Signal Processing

IJCNN 2008 Shedding the weights: more with less

T. Achler, C. Omar and E. Amir

2008 International Joint Conference on Neural Networks

Selected Talks

1. Invited talk, Topos Institute, August 2024
2. Invited talk, IFIP Working Group 2.3 (Language Design), March 2024
3. Invited talk, University of Washington, Sep 2023
4. Invited talk, IFIP Working Group 2.3 (Language Design), Jan 2023
5. Invited talk, Ink & Switch, May 2022
6. Invited talk, University of Toledo, Feb 2022
7. Invited talk, University of Washington, December 2021
8. Invited talk, Strumenta Community, December 2021
9. Invited talk, UC Berkeley, October 2021
10. Invited talk, UC San Diego, Summer 2021
11. Invited talk, Hackworth Ltd., Summer 2021
12. Invited talk, Webflow, Summer 2021
13. Invited Talk, PPIG 2020
14. Accepted talk, Midwest PL Summit 2019
15. Accepted talk, TyDe 2019
16. Invited talk, Chicago Functional Programming Meetup + Reason Meetup (joint talk), 2018

17. Accepted talk, LIVE 2018
18. Accepted talk, META 2018
19. Invited talk, CMU Principles of Programming Seminar, 2018
20. Accepted talk, Strange Loop, 2018
21. Invited talk, Ink & Switch, 2018
22. Invited talk, Purdue University, 2017
23. Invited talk, TU Darmstadt, 2017
24. Accepted talk, LIVE 2017
25. Invited talk, HARC (Y Combinator Research), 2016

Teaching

University of Michigan

EECS 490: Programming Languages

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

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. Daniël Pelsmaeker (TU Delft, expected 2025)
2. Matthías Páll Gissurarson (Chalmers University of Technology, 2024)
3. April Wang (School of Information, 2023)
4. Xiaoying Pu (CSE, 2022)

Masters and Undergraduates (the following lists students who went on to PhD programs only)

1. Eric Zhao (Summer 2021-Summer 2024; PhD student at Brown University)

NSF Graduate Research Fellowship

2. Matthew Ruiz (Winter 2023-Summer 2024; PhD student at Purdue University)
3. Alaric Chen (Winter 2023-Winter 2024; PhD student at Purdue University)
4. Yanjun Chen (Winter 2021-Winter 2023; PhD student at UC Irvine)
5. Luoxi (Rosie) Meng (Winter 2022-Fall 2022; PhD student at UCSD)
6. Siyuan He (Winter 2020-Summer 2021; PhD student at Purdue University)
7. Yuning Wang (Winter 2020-Summer 2021; PhD student at Rutgers University)
8. Hannah Potter (Fall 2019-Summer 2021; PhD student at University of Washington)
9. Yongwei Yuan (Fall 2019-Summer 2020; PhD student at Purdue University)
10. Ke Du (Fall 2019-Summer 2020; PhD student at UIC)
- ... (100+ other undergraduate and masters research students as of October 20, 2024, see lab website for full listing)

Prior to Faculty Position

Undergraduates (year; faculty advisor; subsequent placement)

1. Charles Chamberlain (2017-present; -, Jane Street Capital)
2. Andrew Benson (2016; Jonathan Aldrich; Facebook)
3. Chenglong Wang (2015; Jonathan Aldrich; PhD student, University of Washington)
4. Benjamin Chung (2014; Jonathan Aldrich; PhD student, Northeastern University)
5. Nathan Fulton (2012; Jonathan Aldrich; PhD student, Carnegie Mellon University)
6. Michael Rule (2009; Nathan Urban; PhD student, Brown University)

External Service

1. Program Committee, PLDI 2025
2. Program Committee, POPL 2025
3. Reviewer, CHI 2025
4. Reviewer, Journal of Functional Programming (JFP), 2024
5. Program Committee, OOPSLA 2024
6. Program Committee, VL/HCC 2024
7. Program Committee, Onward! 2024
8. Program Committee, LIVE 2024
9. Program Committee, SPLASH-E 2024
10. Publicity Chair, HATRA 2024

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

47. Program Committee, Onward! Papers 2019
48. Program Committee, LIVE 2019
49. Program Committee, META 2019
50. Program Committee, ML Family Workshop 2019
51. Artifact Evaluation Committee, ICFP 2019
52. Program Committee, LIVE 2018
53. Program Committee, SPLASH Student Research Competition 2018
54. Referee, Journal of Visual Languages and Computing 2018
55. Program Committee, META 2017
56. Publicity Chair and Program Committee, GPCE 2017
57. Program Committee, DSLDI 2015
58. Artifact Evaluation Committee, ECOOP 2015

Internal Service

1. Member, CSE Undergraduate Curriculum Committee (Subcommittee on Curricular Innovation), Fall 2024-present
2. Member, CSE Diversity Committee, Fall 2019-Winter 2024
 - (a) External engagement
 - (b) Coordinated engagement with MS Admissions
 - (c) Led development of the CSE Departmental Broadening Participation in Computing (BPC) Plan
 - (d) Participated in the development of the Summer 2020 Graduate Student Individual Check-In program
 - (e) Wrote Faculty Recruiting section of DEI Committee Annual Report (each year)
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. Mentor, Girls Encoded / Explore CS Research program, Winter 2021
8. Mentor, African Undergraduate Research Adventure (AURA) program, Summer 2021
9. Mentor, Summer Undergraduate Research in Engineering (SURE) program, Summer 2020-2024

Funding

NSF FMITF: Track III: Customizing a Classroom Proof Assistant for Mathematical Computing and Engineering Courses

PI: Cyrus Omar, Co-PI: Jean-Baptiste Jeannin

Total: \$250,000

E3 Strategic Technology Grant: Modularizing Foundational Engineering Courses with Classroom Proof Assistants

PIs: Cyrus Omar, Greg Bodwin, Jean-Baptiste Jeannin, Max New

Total: \$50,000

Michigan Engineering Seeding to Accelerate Research Themes (START): Interactively Deriving Formal Proofs (2023-2024)

PIs: Cyrus Omar, Jean-Baptiste Jeannin

Total: \$30,000, My portion: \$15,000

CSE Course Development Funding for EECS 490

Total: \$7,280

NSF support for Midwest Programming Languages Summit (2023-2026)

Total: \$15,000

Provost Early Tenure Track Faculty Research Support Initiative (2023)

Total: \$3,000

NSF CAREER: Live and Direct Programming Environments (2023-2028)

Total: \$550,000

Cloudbank Supplement: \$6,000

REU Supplement: \$20,000

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

NSF SHF:Small:Semantic Foundations for Hole-Driven Development (2018-2021)

Total: \$500,000 / My portion: \$192,635 (subcontract from CU Boulder)

Last updated: October 20, 2024