

# 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**, 2008  
**B.S. in Molecular & Cellular Biology**, 2008

## Internships

### *Los Alamos National Lab*

Synthetic Visual Cognition Group (May 2010-August 2010)

Supervisor: Garrett Kenyon

## Individual Awards

1. NSF CAREER Award
2. Alan J. Perlis SCS Graduate Teaching Award
3. DOE Computational Science Graduate Fellowship
4. NSF Graduate Research Fellowship
5. Inductee, University of Illinois Bronze Tablet

## Professional Societies

1. Invited 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

† = advised during paper preparation

**POPL 2024** Total Type Error Localization and Recovery with Holes

E. Zhao<sup>†</sup>, R. Maroof<sup>†</sup>, A. Dukkupati<sup>†</sup>, A. Blinn<sup>†</sup>, Z. Pan<sup>†</sup>, 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<sup>†</sup>, A. Blinn<sup>†</sup>, C. Omar

*Programming for the Planet (PROPL) Workshop*, colocated with POPL 2024

**TFP 2024** Polymorphism with Typed Holes (draft paper, accepted for presentation)

A. Chen<sup>†</sup>, T. Porter<sup>†</sup>, C. Omar

*25th Symposium on Trends in Functional Programming (TFP 2024)*

**OOPSLA 2023** Live Pattern Matching with Typed Holes

Y. Yuan<sup>†</sup>, S. Guest<sup>†</sup>, E. Griffis<sup>†</sup>, H. Potter<sup>†</sup>, D. Moon<sup>†</sup>, C. Omar

*Proc. ACM Program. Lang.*, Issue: OOPSLA 2023

**Distinguished Paper Award**

**VL/HCC 2023** Gradual Structure Editing with Obligations

D. Moon<sup>†</sup>, A. Blinn<sup>†</sup>, C. Omar

*IEEE Symposium on Visual Languages and Human-Centered Computing*

- Onward! 2022** Contextualized Programming Language Documentation  
H. Potter<sup>†</sup>, 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<sup>†</sup>, G. Cole<sup>†</sup>, K. Du<sup>†</sup>, G. Luo<sup>†</sup>, S. Pan<sup>†</sup>, Y. Pan<sup>†</sup>, K. Qiu<sup>†</sup>, V. Reddy<sup>†</sup>, H. Zhang<sup>†</sup>, Y. Zhu<sup>†</sup>, 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<sup>†</sup>, D. Moon<sup>†</sup>, E. Griffiths<sup>†</sup>, C. Omar  
*IEEE Symposium on Visual Languages and Human-Centered Computing*
- TyDe 2022** tylr: A Tiny Tile-Based Structure Editor  
D. Moon<sup>†</sup>, A. Blinn<sup>†</sup>, and C. Omar  
*Proceedings of the 2022 Workshop on Type-Driven Development*
- PLDI 2021** Filling Typed Holes with Live GUIs  
C. Omar, D. Moon<sup>†</sup>, A. Blinn<sup>†</sup>, 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<sup>†</sup> and C. Omar  
*1st 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, IFIP Working Group 2.3 (Language Design), March 2024
2. Invited talk, University of Washington, Sep 2023
3. Invited talk, IFIP Working Group 2.3 (Language Design), Jan 2023
4. Invited talk, Ink & Switch, May 2022
5. Invited talk, University of Toledo, Feb 2022
6. Invited talk, University of Washington, December 2021
7. Invited talk, Strumenta Community, December 2021
8. Invited talk, UC Berkeley, October 2021
9. Invited talk, UC San Diego, Summer 2021
10. Invited talk, Hackworth Ltd., Summer 2021
11. Invited talk, Webflow, Summer 2021
12. Invited Talk, PPIG 2020
13. Accepted talk, Midwest PL Summit 2019
14. Accepted talk, TyDe 2019
15. Invited talk, Chicago Functional Programming Meetup + Reason Meetup (joint talk), 2018
16. Accepted talk, LIVE 2018
17. Accepted talk, META 2018
18. Invited talk, CMU Principles of Programming Seminar, 2018
19. Accepted talk, Strange Loop, 2018
20. Invited talk, Ink & Switch, 2018
21. Invited talk, Purdue University, 2017
22. Invited talk, TU Darmstadt, 2017
23. Accepted talk, LIVE 2017
24. 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

**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 (incoming Fall 2024)

**NSF CSGrad4US Fellowship**

2. Thomas Porter (incoming Fall 2024)
3. Matthew Keenan (Fall 2023-present)
4. Andrew Blinn (Fall 2020-present)
5. Eric Griffis (Fall 2020-Summer 2022)
6. David Moon (Fall 2019-present)

PhD Students (committee membership)

1. Xiaoying Pu (CSE, 2022)
2. April Wang (School of Information, 2023)
3. Matthias Gissurarson (Chalmers University of Technology, anticipated Summer 2024)

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

1. Eric Zhao (Fall 2022-Winter 2024; PhD student at Brown University)
  2. Matthew Ruiz (Winter 2023-Winter 2024; PhD student at Purdue University)
  3. Yuxiang (Alaric) Chen (Fall 2022-Winter 2024; PhD student at Purdue University)
  4. Yanjun Chen (Winter 2020-Winter 2024; 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 May 1, 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, OOPSLA 2024
2. Program Committee, VL/HCC 2024
3. Program Committee, Onward! 2024
4. Program Committee, LIVE 2024
5. Programm Committee, SPLASH-E 2024
6. Publicity Chair, HATRA 2024
7. Panelist, NSF SHF Core Panel 2024
8. Steering Committee Co-chair, MWPLS 2024-2025
9. Co-founder and Steering Committee Member, Rust Edu working group, 2022-present
10. Reviewer, CHI 2024
11. Reviewer, ICFP 2024
12. Reviewer, Wiley Publishing 2023
13. Reviewer, ACM Transactions on Programming Languages and Systems (TOPLAS), 2023
14. Panelist, Programming Languages Mentoring Workshop (PLMW) at ICFP 2023
15. Program Committee, SPLASH-E 2023
16. Co-chair, Midwest PL Summit (MWPLS) 2023
17. Steering Committee Chair, TyDe (2022-2023)
18. Program Committee, PLDI 2023
19. Program Committee, ECOOP 2023
20. Program Committee, VL/HCC 2023
21. Program Committee, HATRA 2023
22. Program Committee, IFL 2023
23. Program Committee and Area Chair (Brave New Ideas and Pearls), ECOOP 2023
24. Panelist, NSF SHF Core Panel 2023
25. Panelist, European Research Council (ERC) 2023
26. External Reviewer, UIST 2023
27. Reviewer, MIT Press 2022
28. Mentor, PLMW at SPLASH 2022
29. Program Committee, IFL 2022

30. Program Committee, HATRA 2022
31. Program Committee, SPLASH Student Research Competition (SPLASH SRC) 2022
32. Program Committee, VL/HCC 2022
33. Program Committee, HATRA 2021
34. External Reviewer, UIST 2021
35. Program Committee, ICFP 2021
36. Program Committee, LIVE 2020
37. Program Committee, HATRA 2020
38. Co-Chair, Midwest PL Summit (MWPLS) 2020 [canceled due to COVID]
39. Co-Chair, Type-Driven Development (TyDe) workshop at ICFP 2020
40. External Review Committee, ICFP 2020
41. Student Research Competition Committee, ICFP 2020
42. Program Committee, HATRA 2020
43. Program Committee, Onward! Papers 2019
44. Program Committee, LIVE 2019
45. Program Committee, META 2019
46. Program Committee, ML Family Workshop 2019
47. Artifact Evaluation Committee, ICFP 2019
48. Program Committee, LIVE 2018
49. Program Committee, SPLASH Student Research Competition 2018
50. Referee, Journal of Visual Languages and Computing 2018
51. Program Committee, META 2017
52. Publicity Chair and Program Committee, GPCE 2017
53. Program Committee, DSLDI 2015
54. Artifact Evaluation Committee, ECOOP 2015

## Internal Service

1. Member, CSE Diversity Committee, Fall 2019-present
  - (a) External engagement (ongoing)
  - (b) Coordinated engagement with MS Admissions (ongoing)
  - (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)
2. Member, CSE Hosting Committee, Fall 2020-Winter 2023
3. Organizer, CSE New Faculty Handbook project, Fall 2022-present



4. Organizer, MPLSE (Michigan PL + SE) Group, Fall 2019-present
5. Proposal Reviewer, Michigan Institute for Computational Discovery and Engineering (MICDE), 2023
6. Mentor, Girls Encoded / Explore CS Research program, Winter 2021
7. Mentor, African Undergraduate Research Adventure (AURA) program, Summer 2021
8. Mentor, Summer Undergraduate Research in Engineering (SURE) program, Summer 2020-2023

## Funding

Enhancing Engineering Education (E3): Modularizing Foundational Engineering Courses with Classroom Proof Assistants (2024-2025)

Co-PIs: Greg Bodwin, Max New, Jean-Baptiste Jeannin

Total: \$50,000

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

Co-PI: 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

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

Total: \$550,000

NSF Cloudbank Supplement: \$6,000

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

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

Last updated: May 20, 2024