# Brent Pappas

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## Education

University of Central Florida (UCF)
*Orlando, Florida* — Bachelor of Science - Computer Science; GPA: 3.849
August 2017 - May 2021
***Courses:*** *Data Structures and Algorithms, Systems Software, Programming Languages, Discrete Structures*

UCF
*Orlando, Florida* — PhD - Computer Science; GPA: 3.975
August 2021 - Present
***Courses:*** *Analysis of Algorithms, Complexity Theory, Computer Architecture, Compiler Construction*

## Skills Summary

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|---|---|
| **Languages**: | Python 3, C/C++, Bash, HTML/CSS/JavaScript |
| **Tools**: | Git, GitHub, LLVM/Clang |
| **Platforms**: | Linux, Web, Windows |
| **Soft Skills**: | Leadership, Writing, Communication, Time Management |

## Experience

UCF
*In-person* — Graduating Teaching Assistant
August 2023 - April 2024

- **Teaching**: Led weekly labs on the Linux command line, the Linux C programming interface, git, make, and compiler design with ANTLR.
- **Exam Proctoring**: Answered student questions during exams and monitored students to prevent cheating.
- **Performance Evaluations**: Link.

Trail of Bits
*Remote* — Intern
May 2023 - August 2023, December 2023

- **C Language Toolsmithing**: Created Macroni, a C static analysis tool that combines Trail of Bits' tools PASTA and VAST to lower C preprocessor macros down to MLIR. Macroni is available at https://github.com/trailofbits/macroni.
- **Peer-reviewed Development**: Leveraged GitHub to push changes to company repos, submit code for code review, and finally merge changes into mainline branches.
- **Research Discussion**: Exhibited research results and Macroni to team members and company CEO, Dan Guido, for advice and criticism.

UCF
*In-person/Remote* — Graduate Research Assistant
July 2021 - July 2023, May 2025 - Present

- **Research in Programming Languages**: Stay up-to-date on the latest academic developments in programming languages.
- **Implement Ideas**: Implement research ideas in languages such as C++, e.g. a Clang plugin for transforming C preprocessor macros to C functions.
- **Run Experiments**: Write Python and Bash scripts to automate running experiments.

SP+
*In-person/Remote* — Quality Assurance Coordinator
September 2019 - July 2021

- **Agile Software Development**: Engaged in agile software development methods within a small team to QA test software before moving on to later phases of development.
- **Testing Automation**: Refactored and wrote Python scripts to automate testing of various online user applications.
- **Mobile Application Testing**: Tested company Android apps for compatibility with various versions of Android.

Student Academic Resource Center of UCF
*In-person* — Peer Mentor
August 2018 - December 2019

- **Led Tutoring Sessions**: Led Computer Science 1 and Object Oriented Programming tutoring sessions involving Socratic learning methods.
- **Faculty Collaboration**: Collaborated with UCF teaching staff to enhance tutoring session quality.
- **Tutor Mentoring**: Observed other tutors' sessions and provided feedback as to how they may improve their communication and tutoring skills.

## Projects

**Macroni**: A C static analysis tool that combines Trail of Bits' tools PASTA and VAST to lower C preprocessor macros down to MLIR. Macroni is available at https://github.com/trailofbits/macroni.

**Maki**: C++ Clang plugin that analyzes hows C preprocessor macros affect the C AST. Maki provides language porting tools information they can use to port macros to target languages in a way that preserves not just macro behavior, but also macro abstractions. Maki is the tool associated with 2024 ICSE paper, *Semantic Analysis of Macro Usage for Portability*, for which I am the lead-author.

**Cpp2C**: C++ Clang plugin that automatically transforms eligible C preprocessor macros into C functions. This enables other static analysis tools to analyze C programs without needing to preprocess them first and lose developer abstractions.

**Chip-8 Emulator**: An emulator of the Chip-8 virtual machine, written in C.

## Publications

**Semantic Analysis of Macro Usage for Portability**: by Brent Pappas and Paul Gazzillo. International Conference on Software Engineering (ICSE), 2024. Acceptance rate of 22% (234 / 1,051). https://doi.org/10.1145/3597503.3623323

**Holy Macroni! A recipe for progressive language enhancement**: by Brent Pappas. Blog post written while interning at Trail of Bits. Summer 2023. https://blog.trailofbits.com/2023/09/11/holy-macroni-a-recipe-for-progressive-language-enhancement

**SugarC: Scalable Desugaring of Real-World Preprocessor Usage into Pure C**: by Zach Patterson, Zenong Zhang, Brent Pappas, Shiyi Wei, and Paul Gazzillo. ICSE, 2022. Acceptance rate of 28.5% (197 / 691).
https://dl.acm.org/doi/10.1145/3510003.3512763

## Presentations

**Invited Talk - The PhD Life**: Guest lecture on graduate student life presented to Dr. Suzanne Rivoire's undergraduate course, Computing Professions, at Sonoma State University. 2025-05-08. Slides link.

**Semantic Analysis of Macro Usage for Portability (ICSE 2024)**: Presentation at the 2024 International Conference on Software Engineering in Lisbon, Portugal. 2024-04-17. Recording link.

**Semantic Analysis of Macro Usage for Portability (CAE-R)**: Virtual presentation for Center of Academic Excellence in Cyber Research (CAE-R). 2023-08-31. Recording link; jump to 25:58.

## Posters

**Cpp2C: Transforming C Preprocessor Macros to C Language Constructs**: 2022 University of Central Florida Student Scholar Symposium.

**Holy Macroni! Finding Macro Usage Errors in the Linux Kernel**: 2024 International Symposium on Secure and Private Execution Environment Design.

## Honors and Awards

**UCF 3MT Finalist (2024)**: For effectively communicating my research to a non-specialist audience in a 3 minute talk.

**Distinguished artifact reviewer (2024)**: For my attention to detail while reviewing artifacts for OOPLSA 2024. Link.

**FCI Student Scholarship (2024)**: For my interest in interdisciplinary research, scholarship, and collaboration.

**Cum laude honors (2021)**: For having a cumulative undergraduate GPA greater than 3.8.

**Deans' list (2017-2021)**: For continued undergraduate scholastic achievement.

**Burnett Honors Scholar (2017)**: For academic talent, motivation, intellectual curiosity and creativity.

**Provost Scholarship (2017)**: For outstanding academic performance in high school.

## Certifications

- Level 2 College Readiness and Learning Assessment (CRLA) certified tutor.
- UCF Student Enhancement Training (SET) program certified.

## Volunteer Experience

**UCF Graduate School Info Session PhD Student Panel** Orlando, Florida - May 2025

- **Guide Undergraduates**: Answered undergraduate students' questions about UCF's Computer Science PhD program.

**OOPLSA 2024 Artifact Evaluation Committee Member** Virtual - January-February, July-August, 2024

- **Artifact Review**: Reviewed code artifacts associated with papers accepted to OOPLSA 2024.

**NAC - NAPC Volunteer** Orlando, Florida - May 2024

- **Competition Setup**: Moved computers and cables to the competition room for the 2024 North American Championship and Programming Camp (NAC-NAPC), hosted at UCF.

**EuroSys 2023 Shadow Program Committee Member** Virtual - November-December 2022

- **Paper Review**: Reviewed real paper submissions to EuroSys 2023. My Reviews were not considered by the actual program committee, but this experience gave me great insight into how conference papers are reviewed.

**Camp Connect (at UCF)** Orlando, Florida - June 2021, June 2023

- **Teaching**: Taught elementary, middle, and high school students the basics of computer programming in JavaScript.

**UCF CECS Senior Design Judge** Orlando, Florida - April 2022

- **Judging**: Followed a given rubric to judge the quality of capstone projects for seniors of the College of Engineering and Computer Science. Criteria included presentation quality, project design quality, and creativity.

**UCF CECS Career Kickoff Alumni Mentor** Orlando, Florida - October 2022

- **Mentoring**: Advised UCF freshmen on goal-setting, resume-building, and overall professionalism.
- **Job Application Prep**: Conducted mock interview with UCF freshmen and provided tips on how to effectively search for jobs in their field.