

# Brent Pappas

Portfolio: pappasbrent.com

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## EDUCATION

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Orlando, Florida

August 2017 - May 2021

*Courses: Data Structures and Algorithms, Systems Software, Programming Languages, Discrete Structures*

University of Central Florida (UCF)

Bachelor of Science - Computer Science; GPA: 3.849

Orlando, Florida

August 2021 - Present

*Courses: Analysis of Algorithms, Complexity Theory, Computer Architecture, Compiler Construction*

UCF

PhD - Computer Science; GPA: 3.975

## SKILLS SUMMARY

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**Languages:** Python 3, C/C++, Bash, HTML/CSS/JavaScript, Go, Haskell, Coq, SQL

**Tools:** Git, GitHub, LLVM/Clang

**Platforms:** Linux, Web, Windows

**Soft Skills:** Leadership, Writing, Communication, Time Management

## EXPERIENCE

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Remote

May 2023 - August 2023, December 2023

Trail of Bits  
Summer Associate

- **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.

In-person/Remote

July 2021 - Present

UCF  
Graduate Research Assistant

- **Research in Programming Languages:** Stay up-to-date on the latest academic developments in programming languages.
- **Formal Methods:** Formulate theorems about programming languages and try to prove them using the Coq Proof Assistant.
- **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.

In-person/Remote

September 2019 - July 2021

SP+  
Quality Assurance Coordinator

- **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.

In-person

August 2018 - December 2019

Student Academic Resource Center of UCF  
Peer Mentor

- **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

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**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 how 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

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**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>

**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

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

## POSTERS

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**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

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- I was awarded the UCF FCI Student Scholarship in 2024 for the ability to demonstrate interest in interdisciplinary research, scholarship, and collaboration.
- I received my Bachelor's degree from UCF in 2021 with cum laude honors for having a cumulative GPA greater than 3.8.
- I was present on the UCF's Dean's List throughout all my undergraduate degree for scholastic achievement.
- I was admitted to the Burnett Honors College at UCF in 2017 for showing clear evidence of academic talent, motivation, intellectual curiosity and creativity.
- I received the Provost Scholarship from UCF in 2017 for outstanding academic performance in high school.

## CERTIFICATIONS

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

## VOLUNTEER EXPERIENCE

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**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.

**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.

**OOPLSA 2024 Artifact Evaluation Committee Member** Virtual - January-February 2024  
◦ **Artifact Review:** Reviewed code artifacts associated with papers accepted to OOPLSA 2024.