

Brent Pappas

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EDUCATION

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: 4.000

SKILLS SUMMARY

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

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

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

Semantic Analysis of Macro Usage for Portability: by Brent Pappas and Paul Gazzillo. International Conference on Software Engineering (ICSE), 2024. <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. International Conference on Software Engineering (ICSE), 2022. <https://dl.acm.org/doi/10.1145/3510003.3512763>

PRESENTATIONS

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

Cpp2C: Transforming C Preprocessor Macros to C Language Constructs: Presented a poster on transforming C preprocessor macros to C functions at the UCF 2022 Student Scholar Symposium.

HONORS AND AWARDS

- 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

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

VOLUNTEER EXPERIENCE

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.