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: 4.000
August 2021 - Present	

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

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

	Trail of Bits
Remote	Summer Associate
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 - Present	

- **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.

	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 my 2024 ICSE paper, *Semantic Analysis of Macro Usage for Portability*.

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

- Provost Scholarship from UCF.
- Member of the Burnett Honors College at UCF.
- On the Dean's List at UCF for all of undergraduate degree.
- Received Bachelor's degree with cum laude honors from UCF.
- College Readiness and Learning Assessment (CRLA) Level 1 certified tutor.
- CRLA Level 2 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.