

Matthew J. Davis

2319 Teal Fern Ct. • Houston, TX. • 77059
(713)-806-0852 • matthewdavis.professional@gmail.com
<https://github.com/davis-matthew> • <https://davis-matthew.github.io>

Education

- **Georgia Institute of Technology** *2nd Year*
Ph.D Computer Science *Advisor: Dr. Vivek Sarkar*
 - **Texas A&M University – College Station** *2022*
B.S. of Computer Science & Engineering
 - Engineering Honors
 - Summa Cum Laude
 - Undergraduate Research Scholar
-

Technical Skills

Languages: Java, C++, Python, Cuda, C, Bash, SQL, JavaScript
Tools & Frameworks: MPI, OpenMP, Google Thread Sanitizer, LLVM

Experience

- **Helios Solutions** *May 2022 – August 2022*
Software Engineering Intern *Supervisor: Mr. Joel Busa*
 - Developed software and developer infrastructure tools used by customer Intuitive Machines on their lunar landers: IM-1, IM-2, & IM-3.
 - Created graphic user interface tools for customer TTEch’s switch and cable modeling.
 - **Argonne National Lab** *May 2021 – August 2021*
Research Aide *Supervisor: Dr. Yanfei Guo*
 - Assisted the pmodel’s MPICH team by integrating automated concurrency bug detection passes into the library’s CI systems.
 - Created a symbolic execution tool which automatically generates values for unit testing of MPI functions.
-

Research

- **Extending OpenRace for CUDA Race Detection** *2020 – 2021*
Advisor: Dr. Jeff Huang *Collaborators: Brad Swain, Coderrect Inc.*
 - OpenRace is a static data race detection tool which handles std::threads, pthreads, & OpenMP constructs.
 - Extended the tool to model and detect races in CUDA 8 and before (no cooperative groups) and fixed flaws in the OpenMP Device offload modeling which improved the behavior on the DataRaceBench benchmark.
 - This work was merged into the OpenRace repository.
- **Dynamic OpenMP Race Detector** *2019 – 2020*
Advisor: Dr. Jeff Huang *Collaborators: Dylan Theriot, Fatma Elsheimy*
 - Developed a hybrid (static & dynamic) program analysis tool. This tool finds data race bugs in OpenMP programs by combining HPCRace static analysis tool analysis Google Thread Sanitizer reports. Leveraged the results of HPCRace and Thread Sanitizer to improve the performance on benchmark DataRaceBench, keeping all true positives of HPCRace and disproving all false positives.
 - This work is published at: Dynamic: An OpenMP Race Detection Tool Combining Static and Dynamic Analysis

- **NEO-UFO**

2019

Advisor: Dr. Jeff Huang

Collaborators: Yahui Sun, Matthew Chen, Andrew Chin, Andreas Tsouloupas

- UFO is a dynamic program analysis tool. This tool finds Use-After-Free (UAF) bugs while Chromium is running through the use of Google Thread Sanitizer to generate traces, then running a predictive trace analysis to report bugs.
 - Wrote a static analysis pass to identify regions in the Chromium browser base which were unlikely to have a UAF. Converted these regions into Thread Sanitizer blacklist files to toggle off the expensive tracing and analysis, greatly reducing the overhead.
-

Honors & Awards

- Georgia Tech President's Fellowship
 - Eagle Scout
-

Publications

Georgia Institute of Technology (2022 – Present)

Texas A&M University (2018 – 2022)

2022 - Davis, Matthew James; Theriot, Dylan (2022). Dynamatic: An OpenMP Race Detection Tool Combining Static and Dynamic Analysis. [Link](#)