Walid Abu Al-Afia

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Education

The University of Texas at Austin Austin, TX
Master of Science, Computer Science. GPA 4.0 Expected December 2028
Relevant Coursework: Parallel Systems, Deep Learning

Rhodes College Memphis, TN
Bachelor of Science, Computer Science. GPA 3.87 May 2023
Minor: Religious Studies
Awards and honors: Magna Cum Laude, Upsilon Pi Epsilon, Theta Alpha Kappa, Jack U. Russell Award, Joseph Reeves Hyde Award, Presdential Scholar, Dean's List, Honor Roll
Relevant Coursework: Parallel Systems, Distributed Systems, Operating Systems, Artificial Intelligence, Theory of Computation (Automata), Computer Organization, Programming Languages, Data Structures and Algorithms

King's Academy Manja-Madaba, Jordan
High School Diploma. GPA 3.86 May 2019
Awards and Honors: Student Body President, Student Leadership Council Founder/President, President's Award for Outstanding Leadership
Relevant Coursework: AP Computer Science A, AP Physics 1, AP Calculus AB, AP English Language and Composition, AP English Literature, AP Macroeconomics, AP Microeconomics, AP Capstone Seminar, AP Art History, IGCSE A-Level Arabic

Study Abroad Scotch College Perth, Australia
Study abroad coursework in third year of high school. April 2016 – September 2019
Part of the Round Square Program's Global Cultural Exchange.

Publications

S. Balali, M. Hudspeth, I. Afflerbach, H. Helgesen, J. McCurry, **W. Abu Al-Afia** et al., "Development and Evaluation of Exploratory Experiences to Facilitate Reasoning About Robotic Systems,"2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Detroit, MI, USA, 2023, pp. 4107-4114, doi: 10.1109/IROS55552.2023.10342409.

Abstract: This paper introduces a novel interactive approach —Exploratory Experiences— that aims to improve the ability of people to reason about the capabilities and limitations of robotic technology. We focus on two areas: robot navigation and object detection. We evaluate the Exploratory Experiences with a novel approach that measures the participant's ability to predict when the robot will fail, following up with asking the reason and a possible fix. We show that our approach is effective at improving participants' understanding of potential robot navigation failures and that they already have the skills to detect potential object detection failures when presented with the correct stimuli.

Keywords: Navigation; Atmospheric measurements; Object detection; Particle measurements; Cognition; Intelligent robots; Explainable AI

URL: https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10342409&isnumber=10341342

Experience

St. Jude Children's Research Hospital Memphis, TN
Information Services Internship Coordinator May 2023 – Present

- Manages the internship program at St. Jude, reviewing 300-500 applications yearly.
- Conducts interviews and coordinates with hiring managers to hire 15 interns annually.
- Mentors interns throughout the summer program.
- Established an intern-to-full-time pipeline, creating a career track for interns to transition to permanent positions.

Keywords: Program Management; Recruiting; Mentorship; Interviewing; Hiring; Career Development

St. Jude Children's Research Hospital Memphis, TN
Computational Engineer II May 2024 – Present

- Designs and implements large-scale monitoring infrastructure using Prometheus and Grafana, presenting CPU, GPU, and node-level metrics alongside Slurm job-level metrics for comprehensive cluster observability.
- Develops custom Grafana dashboards and alerting systems to proactively identify performance bottlenecks and resource utilization issues across HPC infrastructure.
- Optimizes parallel programs for researchers, debugging performance issues and helping users write scalable software for distributed computing environments.
- Implements infrastructure projects that improve cluster usability, reliability, and user experience for hundreds of researchers.
- Expanded Open OnDemand instance from a single cluster to a multi-cluster deployment spanning four environments: Slurm HPC Model Training cluster, Secure Compliant Computing Environment (SCCE/GDPR) cluster, colocation facility cluster, and main HPC cluster.
- Led implementation efforts for the SCCE cluster (GDPR-compliant secure computing environment) and Slurm HPC Model Training cluster, architecting solutions that work across both LSF and Slurm workload managers.
- Administers and maintains hybrid LSF/Slurm environments, handling job scheduling, queue configuration, and workload management across multiple clusters.
- Piloted the secure adoption of AI Agents across all St. Jude HPC clusters, negotiating and managing working contracts with OpenAI, Anthropic, GitHub, Cursor, and other AI vendors.
- Serves as the institutional resource and subject matter expert for AI Agents at St. Jude, advising teams on secure integration and best practices.
- Architected and built a 20,000-line MLOps-focused Python package enabling researchers to quickly and iteratively train machine learning models in a low-code/no-code fashion.
- Developed comprehensive Jupyter notebooks and documentation providing users with modular building blocks to construct various ML architecture models, from data preprocessing to model deployment.
- Continues authoring Open OnDemand Interactive Applications and maintaining software/module installations across RHEL environments.
- Transformed the module installation system from bare-metal compilation to container-based builds, wrapping containers to abstract complexity from users; enables modules to survive OS upgrades and allows continued use of legacy software after system updates.
- Eligible for promotion to Sr. Computational Engineer in May 2026.

Keywords: Prometheus; Grafana; Slurm; LSF; Monitoring; Observability; Alerting; MLOps; Machine Learning; AI Agents; Open OnDemand; GDPR; SCCE; HPC; Python; GPU Optimization; Jupyter; Low-Code; Infrastructure; Multi-Cluster; Containerization; Apptainer; Singularity

Structural Biology Support (Sole Resource):

- Administers 19 CryoSPARC instances for various PIs and labs, enabling researchers to process cryo-EM/ET jobs quickly and easily through a GUI interface.

- Built an On-The-Fly processing pipeline that processes cryo-EM/ET data while in-flight from staging storage to the main storage system, reducing time-to-results for researchers.
- Conducted a 4-month, 30 PB data migration from main GPFS storage to a new dedicated Imaging Storage system for all cryo-EM/ET data.
- Contributed to various open-source cryo-EM/ET packages and built a cluster monitoring tool that helps users view available GPU allocations (1, 2, 4, 8 GPU configurations) before submitting jobs.

Keywords: CryoSPARC; Cryo-EM; Cryo-ET; Structural Biology; GPFS; Data Migration; GPU Allocation; Pipeline Development

St. Jude Children's Research Hospital Memphis, TN
Computational Engineer I May 2023 – May 2024

- Built and deployed Open OnDemand instance serving 20,000+ core cluster, providing researchers with web-based access to HPC resources.
- Authored multiple OnDemand Interactive Applications (Maestro, VMD, Scipion), enabling GUI-based scientific workflows on HPC infrastructure.
- Managed all software and module installations on the cluster across RHEL7 and RHEL8 environments, ensuring compatibility and reproducibility for research workflows.
- Organized and taught seminars on HPC programming tools (Conda, containerization, Open OnDemand, Intro HPC), training researchers on best practices for computational workflows.
- Optimized and debugged parallel programs for researchers, identifying performance bottlenecks and helping users write scalable MPI, OpenMP, and CUDA software.
- Provided consulting and support to researchers on code optimization, data distribution strategies, and GPU acceleration techniques.
- Developed documentation and knowledge base articles to improve user self-service and reduce support overhead.
- Collaborated with HPC team to maintain and improve cluster infrastructure, contributing to system reliability and uptime.

Keywords: Python; Bash; C; Rust; Ruby; GCC; GNU; MPI; OpenMP; Virtual Environments; Conda; Open OnDemand; VNC; Virtual Desktop Manager; Parallel Programming; SPMD Programming; CUDA Programming; GPU Optimization; Data Distribution; Containerization; HPC; Environment Modules

St. Jude Children's Research Hospital Memphis, TN
High Performance Research Computing - Engineering Student September 2022 – May 2023

- Performed routine module installations and software builds on RHEL7 HPC Cluster, gaining hands-on experience with environment modules and dependency management.
- Built a metrics collection development environment utilizing Prometheus as a data source, laying the groundwork for future cluster monitoring infrastructure.
- Designed and implemented Grafana dashboards to visualize cluster metrics, providing insights into resource utilization and system health.
- Gained proficiency in LSF workload manager from an administrative perspective, learning job scheduling, queue management, and resource allocation.
- Assisted senior engineers with troubleshooting user issues and cluster maintenance tasks.
- Developed shell scripts to automate routine administrative tasks and improve operational efficiency.

Keywords: LSF; Slurm; Linux Administration; Prometheus; Grafana; Shell Scripting; Environment Modules; RHEL

St. Jude Children's Research Hospital Memphis, TN
High Performance Research Computing - Intern June 2022 – August 2022

- Developed and built a VR application using Unity and Meta Interaction SDK that delivers immersive training to pediatric patients preparing for Radiation Oncology treatments, reducing patient anxiety.

- Designed user experience and interaction flows for the VR training module, incorporating feedback from clinical staff and child life specialists.
- Built and deployed a REST API endpoint running a renowned protein-protein complex structure prediction algorithm (AlphaFold-based), enabling researchers to submit prediction jobs via web interface.
- Implemented job queuing and result retrieval mechanisms for the protein structure prediction service, handling concurrent requests from multiple research teams.
- Compiled documentation and knowledge base articles for other engineers on how to deploy endpoints to St. Jude's in-house HPC clusters.
- Presented project outcomes to HPC leadership and received offer for continued part-time position during academic year.

Keywords: Virtual Reality; Unity; Meta Interaction SDK; REST API; Web Endpoints; Protein Folding; AlphaFold; C#; User Experience

Rhodes College Memphis, TN
Computer Science Tutor August 2020 – May 2023

- Tutored approximately 20 introductory computer science students in one-on-one weekly sessions across three academic years.
- Created customized lesson plans and individualized help tailored to each student's learning style and course requirements.
- Covered topics including Python, Java, C programming, data structures, algorithms, and systems concepts.
- Helped students debug code, understand error messages, and develop problem-solving strategies for programming assignments.
- Maintained high student satisfaction and contributed to improved course outcomes for tutees.

Keywords: Tutoring; Python; Java; C; Data Structures; Algorithms; Systems; Debugging; Teaching

Rhodes College Memphis, TN
Computer Science Head Tutor September 2022 – May 2023

- Hired, trained, and managed a team of 9 tutors, conducting interviews and onboarding new tutors each semester.
- Created and assigned weekly shift schedules, ensuring adequate coverage for all tutoring hours.
- Served as primary liaison between professors and tutoring staff, communicating course updates and identifying topics requiring additional support.
- Led the transition to in-person tutoring post-pandemic by helping establish TutoringBot: a Raspberry Pi-based application that manages student queues and tracks session metrics.
- Contributed to TutoringBot development, implementing API integrations and improving queue management features.
- Resolved conflicts and addressed performance issues within the tutoring team, maintaining a productive work environment.

Keywords: Tutoring; Team Management; Leadership; API Requests; Raspberry Pi; Python; Java; C; Hiring; Training

Rhodes College Memphis, TN
Cloud Application Student Administrator May 2022 – May 2023

- Managed and maintained cloud-based applications running on Google Cloud Platform, ensuring high availability for academic users.
- Administered JupyterHub Kubernetes cluster, handling user provisioning, resource allocation, and troubleshooting notebook environments.
- Integrated cloud applications with OneLogin SSO, implementing secure authentication for campus-wide access.

- Monitored cluster health and resource utilization, scaling infrastructure to meet demand during peak usage periods.
- Collaborated with faculty to customize JupyterHub environments for specific course requirements, installing packages and configuring kernels.
- Documented administrative procedures and created user guides for students and faculty.

Keywords: Jupyter; Jupyter Notebook; Jupyter Lab; Kubernetes; Google Cloud Platform (GCP); SSO; OneLogin; Cloud Administration

Rhodes College Memphis, TN
Robotic Grasping Research Fellow January 2021 – March 2022

- Served as a research investigator, contributing to a published research project on human-robot interaction and explainable AI.
- Co-authored paper published at IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2023.
- Designed and developed AR application using Unity to teach users about robot navigation using Laserscan data visualization.
- Created accompanying set of user tasks and evaluation metrics to assess learning outcomes from the AR experience.
- Conducted IRB-approved user studies with human participants, collecting and analyzing data on robot perception and trust.
- Investigated the effect of privacy considerations in tele-presence robots, contributing findings to ongoing research discussions.
- Presented research progress at weekly lab meetings and contributed to grant proposal writing.

Keywords: Human-Robot Interaction; AR/VR; Unity; Navigation; Object Detection; Explainable AI; User Studies; Research

INTRASOFT Middle East Amman, Jordan
Data Science Intern June 2018 – August 2018

- Created a Bitcoin trading bot that executed trades based on live price data and technical indicators.
- Integrated with cryptocurrency exchange APIs to fetch real-time market data and execute automated trades.
- Learned best practices for working with RESTful APIs, including authentication, rate limiting, and error handling.
- Developed data processing pipelines in Python and Java to analyze market trends and generate trading signals.
- Gained foundational experience in algorithmic trading concepts and financial data analysis.

Keywords: Data Engineering; Data Science; API; RESTful API; Python; Java; Algorithmic Trading; Automation

Leadership & Activities

Rhodes College Student Government Memphis, TN
Class Council Treasurer and Vice President November 2019 – May 2021

- Used Microsoft Excel to compile budgets for all events planned by the Class Council.
- Organized and supervised class-wide and school-wide events for students.
- Worked directly on vendor planning and recruitment.
- Planned and managed Rhodes College Homecoming 2019 and 2020.

Skills & Interests

Technical: Python, C/C++, Java, Go, Rust, R, Ruby, Bash, HTML, CSS, JavaScript, React.js, Racket
Language: English (native), Arabic (native), French (working proficiency), Spanish (working proficiency)
Tools: Bash, Vim, Emacs, VSCode, RStudio, Jupyter, IntelliJ Suite, MS Office, Open OnDemand
Interests: High-Performance Computing, Software Engineering, Compiler Design, Parallel Programming
Hobbies: Reading, Guitar, Cats, Coffee, Keyboards, Gaming