Tyler M. Garrett

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Education

Graduate Student: Electrical and Computer Engineering (ECE) PhD Candidate at the University of Pittsburgh
Research Areas: Computer Architecture, Fault-Tolerant Design, Machine Learning, High-Performance and Heterogeneous Computing, Safety-Critical Systems, and Nonvolatile Memories
Fellowship Recipient: Awarded the Rath Fellowships from the University of Pittsburgh

Master of Science in Electrical and Computer Engineering Graduated: Dec 2018
GPA: 3.8/4.0
University of Pittsburgh, Pittsburgh, PA (ABET accredited)

Bachelor of Science in Computer Engineering Graduated: May 2016
Major: **Computer Engineering**, Minor: **Mathematics**
GPA: 3.744/4.0 Dean's List
Shippensburg University of Pennsylvania, Shippensburg, PA (ABET accredited)

Honors & Awards: Rath Fellowship Recipient (Pitt), Shippensburg University Honors Program, Board of Governors Scholarship Recipient, Upsilon Pi Epsilon, Phi Kappa Phi, Kappa Mu Epsilon, Order of Omega Greek Honors Fraternity

Skills

» Computer Architecture	» Avionic System Design	» GPUs/TPUs
» Fault Injection/Simulation	» Computer Vision	» Heterogeneous Computing
» Radiation Testing	» GitHub	» Graphics Processing
» Dependable Computing	» Non-volatile Memories	» Vivado
» Machine Learning	» Embedded System Design	» Petalinux
» FPGAs (VHDL)	» Parallel Programming	» Autonomous Drones
» Edge Computing	» CUDA/OpenCL/Vulkan	» MATLAB
» Altium	» TensorFlow/PyTorch	» Microsoft Office

Languages: C/C++, Python, and Java
Operating Systems: Linux, macOS, Windows

Research Experience/Publications

Publications

Paromita Mitra, Briana Krygier, Sarosh Nandwani, Matthew Noyes, Tyler Garrett, Amanda Smith, Vishnuvardhan Selvakumar, and Matthew Miller. Trades, Architecture, and Design of the Joint Augmented Reality Visual Informatics System (Joint AR) Product. *2023 52nd International Conference on Environmental Systems (ICES).*

Tyler Garrett and Alan George. Improving Dependability of Onboard Deep Learning with Resilient TensorFlow. *2021 IEEE Space Computing Conference (SCC)*

Sami Mian, Tyler Garrett, Alex Glandon, and Cesar Munoz. Autonomous Spacecraft Inspection with Free-Flying Drones. 2020 *DASC 39th AIAA/IEEE Digital Avionics Systems Conference*

S. Roffé et al. CASPR: Autonomous Sensor Processing Experiment for STP-H7, Proceedings of the AIAA/USU Small Satellite Conference, Logan, UT, Aug 1-6, 2020.

Tyler Garrett, Jun Yang, and Youtao Zhang (2018). Enabling Intra-Plane Parallel Block Erase in NAND Flash to Alleviate the Impact of Garbage Collection. 2018 *ACM/IEEE International Symposium on Low Power Electronics and Design*

Radiation-Tolerant Crew Displays: Lead system architect for a radiation-tolerant display system prototype at NASA for future astronaut displays. Developed a modular and scalable solution for spacesuits, rovers, and spacecraft which balances high-performance computing with radiation-tolerance. Constructed and managed a multi-phase development plan starting with a table-top demonstration evolving to engineering and flight model.

CASPR: Hardware and Software team member for an International Space Station (ISS) research experiment to study and evaluate novel technologies in sensors, computers, and intelligent applications for SmallSat-based sensing with autonomous data processing. Configurable and Autonomous Sensor Processing Research (CASPR) was designed to evaluate autonomous, onboard processing strategies on novel sensors and has been operating on the ISS since 2021 as part of the DoD/NASA Space Test Program – Houston 7 (STP-H7) mission. Lead GPU fault-tolerance sub-experiment.

Radiation Testing of Complex Devices: Conducted radiation test campaigns to evaluate and characterize complex computing devices (System-on-chip, GPUs, TPUs, etc.) By understanding faults and failure modes of each device under test (DUT), mitigation strategies can be developed to enhance reliability. A variety of testing was conducted at Lawrence Berkeley National Laboratory (LBNL) for Total Ionizing Dose (TID) and Destructive Single-Event Effects (SEEs). Additional testing for non-destructive Single-Event Effects were conducted under neutron radiation at Los Alamos National Labs (LANL).

Environmental Data Sensors: Participated on and led a team that utilized rapid prototyping to develop sensors to measure characteristics (pH, temperature, water level, conductivity, etc.) of water in natural environments, especially in coastal settings. Developing wireless implementation for real-time data collection. This project is in partnership with the Chincoteague Bay Field Station at Wallops Island, VA and ongoing research programs with various universities. The abstract of this project was published in the ACM digital library.

PALMER: Personal Assistant Logging My Exercise Routine (PALMER) is an embedded system solution, coupled with machine learning, workout glove that automatically tracks a user's weight lifted, exercise, and reps. This information is then sent to a custom Android application to log all details of the exercise so that it can be available to the user later without having to stop and log the information manually.

Conference Presentations:

IEEE Space Computing Conference	Summer 2021 & 2023
AIAA/IEEE Digital Avionics Systems Conference	Summer 2020
AIAA/USU Small Satellite Conference	Summer 2020
ACM/IEEE International Symposium on Low Power Electronics and Design	Summer 2018
Shippensburg University Minds at Work	Spring 2015 & 2016
Advocacy Day at Pennsylvania State Capital (Presented to the Chancellor of the PA State System of Higher Education, Board of Governor Members, and State Representatives)	Spring 2016
PACIS (Pennsylvania Computer Science and Information Science Educators Conference)	Spring 2015 & 2016

Work Experience

Human Computer Interface Intern   NASA Johnson Space Center, Houston, TX
Jan 2020 – Present
Supporting Avionic Systems Division as a fault-tolerant computing subject matter expert. Researching radiation-tolerant techniques for GPUs to enable resilient display systems and high-performance computing in orbit and beyond. Devised an avionic system architecture for a radiation-tolerant display system for future astronaut displays in deep space. Implemented an advanced gesture-based control scheme for the next generation spacesuits (xEMU) Heads-In Display leveraging computer vision and machine learning techniques in a resource-constrained embedded system.

Safety-Critical Avionics Systems Intern   NASA Langley Research Center, Hampton, VA
May 2019 – July 2019
Designed and developed a multi-agent drone systems that utilized distributed computing and computer vision to simulate autonomous free flier inspection of spacecraft.

Pre-Doctoral Fellow   University of Pittsburgh, Pittsburgh, PA
Jan 2019 – Present
PhD student at the National Science Foundation Center for Space, High-Performance, and Resilient Computing (NSF-SHREC). Researching fault-mitigation strategies for advanced computer architectures, GPUs, and other hardware accelerators.

Graduate Student Researcher   University of Pittsburgh, Pittsburgh, PA
Sept 2016 – Dec 2018
Researched various topics in computer architecture. Investigated how to apply machine learning to various problems within computer architecture to improve performance. Researched 3D NAND Flash Memory to improve performance and endurance by designing disturbance tolerance during read/write/erase operations.

Android Application Developer   HanoverST, Hanover, PA
Dec 2014 – May 2017
Registered Google Play developer. Develops Android applications in spare time.

IT Intern   JLG Industries, McConnellsburg, PA
May 2015 – Aug 2015
Served as a member of their networking team. Helped maintain and update their network domestically and abroad. Headed a project to establish an out-of-band management system.

IT Intern   JLG Industries, McConnellsburg, PA
May 2014 – Aug 2014
Served as a member of their infrastructure team assisting in technical support across seven locations. Headed a project to provide shop workers with online access to HR resources in a way that was easy for the user and did not compromise the security of the network.