Aron Wilson Mathias

Arizona, AZ | www.linkedin.com/in/am8466|+1 (520)-203-5971 |aronwilsonm@gmail.com |Portfolio

SKILLS

Programming: Python, C++, C, HTML, MATLAB, Simulink, ROS, Machine Learning & AI, PLC Programming (Siemens), Robotics Programming, Control Systems & Automation, SLAM,Ladder Logic,Structured Text

Software: SOLIDWORKS, Fusion 360, AutoCAD, ANSYS, Adobe Creative Cloud, Simatic Manager, Docker Container, Linux(Ubuntu),SCADA, HMI,MS Office, RoboDK,Studio 5000,RSLogic 500,TIA Portal,

Tools: Raspberry Pi, Arduino, CAD Modeling, Data Analysis, 3D Printing, Casting, Soldering, FANUC, Allen-BradleyPLC

PUBLICATION

M. Ghufran, S. Tetakayala, A. Mathias, J. Hughes and H. Rastgoftar, "Quadcopter Team Configurable Motion Guided by a Quadruped," 2024 18th International Conference on Control, Automation, Robotics and Vision (ICARCV), 2024, Accepted for Publication.

WORK EXPERIENCE

***Graduate Research Assistant* , University of Arizona,** Tucson, USA   *January 2024 – Present*
- Led DGUV development using ROS2, integrating IoT sensors for real-time monitoring and improving mobility, response time, and testing efficiency through Gazebo simulations.
- Developed and optimized **multi-robot** systems using Affine transformations, **Vicon motion capture**, and **Gazebo**, ensuring collision-free **navigation**, **improved stability**, and reliable UAV flight through IoT telemetry.
- Implemented AI-driven control strategies, applying deep learning, PID controllers, and **sensor fusion** for SLAM, **LiDAR mapping**, and obstacle **avoidance**, while optimizing **real-time inference** on **embedded hardware**.

***Marine Automation Engineer-Internship*, Fareast Marine Services India Private Limited,** Mumbai,India   *June 2022 – June 2023*
- Designed, tested, and debugged **ship automation** systems, programming Siemens S7-300 and Allen-Bradley CompactLogix PLCs **for** propulsion, ballast water, and power distribution, **reducing downtime** by **30%** and aligning with industrial robotic integration**.**
- Performed **emergency troubleshooting** on 11kV switchgear, **SCADA/HMI systems**, and diagnostics—applying **strong analytical and problem-solving** skills to prevent failures and support robot commissioning and safety compliance (EN ISO 13849-1, EN ISO 12100).
- Collaborated with teams and OEMs to **interface with engineering/project management**, **present solutions**, and **manage projects end-to-end**, optimizing motor control, PLC-to-HMI integration, and ensuring **budget-aware**, safety-compliant deployments (ANSI/RIA R15.06).

***Technical Assistant- Internship,* Fareast Marine Services India Private Limited,** Mumbai, India   *November 2019 - December 2019*
- Resolved **30+** critical issues in robotic and automated systems, **improving reliability and reducing downtime**. Supported **system programming** for seamless **FANUC** robot integration with **Siemens and Allen-Bradley PLCs**, **boosting efficiency** and **cutting delays** by **35%** via enhanced **system monitoring** and HMI setup.
- Performed preventive **maintenance, calibration, and troubleshooting** of robotic arms, **CNC machines**, and industrial control systems**,** ensuring **long-term functionality**, precision, and **seamless automation performance**.

RESEARCH PROJECTS/ACADEMIC PROJECTS

Quanser QCar 2 and Qdrone2 – Autonomous Vehicle Simulation & Control (Funded by National Defense)
- Developed advanced **motion planning** and **control algorithms** for real-time autonomous navigation and obstacle avoidance, achieving high-precision localization and ensuring robust environmental awareness through **deep learning-based** object detection, SLAM, and sensor fusion.
- Optimized deep learning architectures for real-time inference on embedded hardware, enhancing control efficiency, trajectory accuracy, and adaptive **decision-making** for **improved autonomous path planning**.

Affine Transformable Unmanned Ground Vehicle (Funded -TLA) (Paper Submitted to IROS 2025) -Patent for Structure and Design
- Developed a Deformable Ground Unmanned Vehicle (DGUV) with modular circular frames, **enhancing** mobility, adaptability (**40%** improvement), and navigation capabilities in **dynamic environments**.
- Implemented **Affine transformations** with ROS2 and Python, achieving precise **motion control, real-time localization**, and robust collision avoidance, **reducing** system response time by **30%**
- Validated system performance through Gazebo simulations, leading to **50%** fewer physical tests, refining control strategies, localization accuracy, and obstacle avoidance, while optimizing structural design with carbon-fiber and 3D-printed components (25% weight reduction, 35% stability improvement).

Quadcopter Team Configurable Motion Guided by a Quadruped (University of Arizona) Paper Accepted for Publication at ICARRCV
- Developed and validated a **heterogeneous aerial-ground** robotic system using **Affine transformations**, ROS2, and Python, enabling safe and **collision-free** quadcopter **coordination** guided by a **quadruped robot.**
- Implemented a **configurable** motion model where the quadruped dictates **global translation** while quadcopters execute **controlled deformation** via a nonsingular Jacobian matrix**, ensuring adaptive navigation**, precise **control**, and **real-time localization.**
- Optimized system performance by **integrating** PX4-based quadcopters, ROS1-ROS2 communication bridges, and real-time control algorithms, improving response time by **30%, boosting formation** stability by **35%,** and ensuring **obstacle avoidanc**e in complex environments.

Deformable Continuum UAV (DCU) (University of Arizona-TLA) Patent for Unique Design and Structure
- Designed and optimized **three UAVs** with a deformable continuum structure, enhancing maneuverability, stability, and adaptability in dynamic environments while achieving a **98% reliability** rate during testing.
- Developed robust control systems and advanced algorithms for real-time structural deformation, precision maneuvering, and stability, ensuring consistent and stable UAV **performanc**e in real-world deployments.

EDUCATION

University Of Arizona, Arizona, USA   *August 2023- May 2025*
ME in Robotics and Automation.

 Relevant Coursework: Design of Mechatronics System, Introduction to Advanced Control Theory, Robot Operating System, Non-linear and Optimal Control, Introductory Robotics: Kinematics, Dynamics and Path Planning ,Principles of Artificial Intelligence ,Semi-conductor Process

SRM Institute of Science and Technology, Kattankulathur , India   *August 2018- May 2022*
 B-Tech in Mechatronics Engineering.