Aron Wilson Mathias

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

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

PUBLICATION

- A. Mathias, M. Ghufran, J. Hughes and H. Rastgoftar, " **Affine Transformable Unmanned Ground Vehicle** " 2025 has been submitted to IEEE/ASME Transactions on Mechatronics **(Patent for Design and Structure)**
- 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 – May 2025*
- Executed firmware-level motion control for DGUV using **ROS2**, combining **real-time embedded systems**, **sensor fusion**, and **IoT integration** on **Linux-based platforms**..
- Implemented real-time tracking algorithms and **point cloud calibration** validated through **sub-centimeter accuracy** using **Vicon**, aligning hardware performance with **SLAM-based UAVs**.
- Utilized **SolidWorks** for CAD modeling of robotic frames and sensor mounts, integrating with **embedded firmware** tests and onboard control logic
- Collaborated across EE/software teams during system validation, scripting automated tests using **Python** for verifying sensor outputs, actuation responses, and **firmware behavior**.

Marine Automation Engineer-Internship, ***Fareast Marine Services India Private Limited,*** *Mumbai,India* *June 2022 – June 2023*
- Programmed bare-metal logic on **Siemens S7-300** and **Allen-Bradley PLCs**, integrating **propulsion**, **power**, and safety systems in compliance with **EN ISO 13849-1**, **ISO 12100**, and **ANSI/RIA R15.06**.
- Probed marine hardware using **oscilloscopes** and **Ethernet/IP diagnostics**; maintained and updated electrical schematics in **AutoCAD** during panel validation and testing.

Technical Assistant- Internship, Fareast Marine Services India Private Limited, *Mumbai, India* *November 2019 - December 2019*
- Resolved embedded signal-trace faults during **FANUC robot integration**, improving **control loop responsiveness** and **HMI communication**.
- **Performed** hardware diagnostics using **JTAG** and probing tools; documented **firmware-linked schematics** and panel layouts in **AutoCAD** for deployment readiness.

RESEARCH PROJECTS/ACADEMIC PROJECTS

Quanser QCar 2 and Qdrone2 – Autonomous Vehicle Simulation & Control (Funded by National Defense)
- **Engineered** real-time **motion planning** and **control algorithms** for autonomous navigation, ensuring obstacle avoidance and **trajectory stability** in simulation and hardware loops.
- **Achieved** high-precision localization using **deep learning**, **SLAM**, and **sensor fusion**, improving overall map accuracy and adaptive trajectory control.
- **Optimized** inference models for **embedded deployment**, enhancing **real-time performance** and reducing latency in path prediction and planning.

Affine Transformable Unmanned Ground Vehicle (University of Arizona-TLA) Link
- Built a modular, **3D-printed**, carbon-fiber UGV chassis using circular deformable frames, increasing adaptability by 40% and reducing system weight by 25%.
- Implemented affine control via **ROS2 (Python)** for **precise localization**, real-time **obstacle avoidance**, and motion adaptation; **Gazebo simulations** validated system behavior with 50% fewer physical tests.

Quadcopter Team Configurable Motion Guided by a Quadruped Link
- Integrated a **heterogeneous multi-robot** system using **ROS2**, **PX4**, and **Python**, enabling safe and stable coordination between a quadruped and a swarm of UAVs.
- Formulated a motion planning framework with **ROS1–ROS2 bridging** and **nonsingular Jacobians**, resulting in a **30%** faster system response and more precise formation control.

Deformable Continuum UAV (DCU) (University of Arizona-TLA) Link
- Constructed three deformable **UAV** prototypes featuring real-time **structural reconfiguration**, improving **maneuverability**, **adaptability**, and flight **stability** in dynamic test environments.
- **Created** robust **real-time control systems** and feedback algorithms to maintain performance consistency; achieved a 98% reliability rate in live field trials.

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, Agile, Bitbucket, Jira ,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