Alexander Totah

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About Me

Electrical Engineer and Computer Scientist at UC Riverside with a specialization in **Robotics Engineering**. I am a proven leader, founder, and President of Highlander Combat Robotics and an undergraduate researcher with a passion for integrating software and hardware. My technical experiences and interests include PID control and tuning, sensor calibration, and simulation.

Education

UC Riverside (UCR), BS in Electrical Engineering and Computer Science *Sept 2022 – May 2026*

- GPA: 3.55/4.0, 4x Dean's Honor List Recipient, IEEE, ASME, Highlander Combat Robotics

Skills

Areas of Expertise: Robotics and Mechatronics, Control Systems, Hardware Design, Sensor Integration,

Electronic Testing/Monitoring: Soldering, Digital multimeter, Function Generator, Oscilloscope, DC/AC Power Supply

Software Skills: C/C++, Python, MATLAB, PyTorch, SciPy, NumPy, Pandas, TensorFlow, ROS, Agile Development, Nvidia Jetson Deployment

Applications: Simulink, Pspice, Altium, ROS, Ubuntu/Linux CLI, Arduino, SolidWorks, Docker, Overleaf/Latex, MS Office

Publications

An mri-conditional flexible endoscopic robot with a hydraulic tendon-driven actuation system, Journal of Medical Robotics Research

https://doi.org/10.1142/S2424905X24400038

Remote Teleoperation System for Autonomous Vehicles: Enhancing Human Intervention in Critical Scenarios, (*Under Development, Targeting Summer 2025*)

Experience

Autonomous Vehicle Engineer, Collaborative Intelligence Systems Lab, UCR *January 2024 – Present*

- Simulated a fully autonomous scale model of a Formula One car using **ROS** deployed from **Docker**.
- Trained autonomous navigation models using **TensorFlow** on LiDAR and real-world data, enhancing object avoidance.
- Containerized environment with **Docker** to ease deployment on multiple systems.
- Designed and constructed a 1/10 scale model of a Formula One car to run autonomously to compete in an international competition.
- Conducting research on remote operation of AVs, exploring AI-driven network adaptation and real-time latency mitigation strategies to improve teleoperation performance.

Co-Founder and Club President, Highlander Combat Robotics, UCR *May 2023 – Present*

- Secured $5,000+ in sponsorships and funding, enabling expansion of robotics initiatives.
- Created and taught workshops teaching new members **Solidworks**, robot design, and **Arduino** skills increasing member retention by 50%.
- Directed an annual competition showcasing six student-created robots with 40+ spectators.
- Engineered and integrated a manual off-switch for fire risk reduction, manually fabricated custom wiring harnesses, and led safety team training on proper PPE and emergency response protocols.
- Led the creation of an engineering space in collaboration with five student organizations, enhancing access to essential tools and resources for hands-on projects and innovation.

Systems and Control Engineer, Robotics and Medical Systems Lab, UCR *October 2022 – January 2024*

- Designed a **PID control** system using **Matlab** to control a steerable needle with < 1 ms latency.
- Engineered intuitive **Arduino-based** controls for the remote operation of an MRI-compatible biopsy robot, reducing user error during long procedures.
- Calibrated MRI-compatible fiber optic proximity sensor using **SIMULINK** to accurately measure the bend of a steerable needle within <0.5mm using a 3D-printed test frame.

Program Director and Lead Instructor, Kids That Code Inc., Riverside, CA *February 2024 - Present*

- Developed a robust robotics education program tailored for young learners, making complex concepts simple and accessible. Positioned the company to be a leader in STEM education.
- Taught coding, robotics, and CAD to 1,000+ students per month, fostering a strong STEM foundation for elementary learners.

Projects

"JUST DANCE!" Embedded Systems Project Project Repo Link

- Developed an interactive, motion-based game using **AVR microcontrollers** programmed in **C/C++**
- Established communication protocols for accelerometer using **I2C**, display using **SPI**, and remote control using Bluetooth **USART**

F1Tenth Custom Docker Environment Project Repo Link

- Constructed a **Docker** environment to run remote operation drivers on a 1/10-scale vehicle.
- Contains lidar, motor controller, and remote control drivers

Make Your Own Adventure, CLI Role-play-game Project Repo Link

- Managed **Agile Development** workflow for a final project, facilitating sprint planning, code reviews, and iterative improvements.
- Developed login page with connections to a **SQLite3 database**
- Created custom graph data structure to store current games in memory
- Configured GitHub Workflow for **Continuous Integration**.

Autonomous Go-Kart Project

- Designed and analyzed the electrical power system for an autonomous go-kart, performing load calculations, voltage regulation, and power distribution analysis to ensure system stability.
- Manually drafted circuit schematics and utilized **PSpice** for simulations.
- Assisted in component selection, ensuring optimal power distribution and safety.

First Robotics Competition (FRC) Lead Programmer, 2022 Project Repo Link

- Developed **autonomous navigation and control algorithms** for Team 4276's robotics training program, enabling precise and efficient robot movement.
- Optimized autonomous navigation, boosting team performance by 10 points enabeling team to reach semi-finals of the FRC Los Angeles Regional Competition.
- Implemented **PID control** for a shooting mechanism, optimizing accuracy and response time with Victor SPX motor controllers.
- Utilized motion profiling and real-time debugging to enhance robot performance and ensure seamless integration with mechanical and electrical systems.