

Sourish Tetakayala

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Work Experience

Robotics Research Engineer, University of Arizona, AZ

January 2023 – June 2024

- Developed a configurable quadcopter team coordination system in a heterogeneous aerial-ground robotic environment using ROS2, PX4, and Gazebo, enabling safe deformation maneuvers and reducing collision risks by 35%.
- Modeled safe multi-agent coordination via Affine Transformation and Jacobian Matrix decomposition, achieving a 100% success rate in maintaining quadraped enclosure during simulated rescue scenarios.
- Led the integration of Vicom Motion Capture with ROS2-based quadcopter control, enabling high-precision localization and reducing positional error by 25% across 170+ experimental trials.
- Spearheaded hardware-in-the-loop (HIL) mixed simulation using uXRCE-DDS middleware between Pixhawk and Raspberry Pi 4, improving offboard UAV communication and boosting waypoint reliability by 30%.

Fluid Flow-Based Quadraped Navigation

- Developed a dynamic fluid flow navigation model for multi-agent quadraped teams in contested spaces using Laplace PDEs, ROS2, C++ and Vicom Motion Capture, enabling collision-free trajectories with 98% success rate across static and dynamic obstacle scenarios.
- Integrated high-frequency real-time position feedback from Vicom with Unitree Go1 control through a custom ROS2 node, reducing positional drift by 22% in dense obstacle environments.
- Executed 50+ experimental trials across SGFE, SGOLE, and CTVE setups, demonstrating robust 5% path deviation tolerance despite dynamic agent interactions in a 5m x 5m indoor testbed.
- Engineered dynamic waypoint adjustment algorithms using time-varying streamlines, boosting navigation stability by 35% compared to traditional fixed-trajectory planning methods.

Control System Researcher, University of Arizona, AZ

July 2024 – December 2024

- Designed a bicopter using Arduino Nano, Simulink, and IMU sensors, achieving stable tilt control under varying motor speeds.
- Executed system identification via ARX and N4SID, achieving 64.41% and 58.15% model fit for dynamic response prediction.
- Developed PID and LQR controllers, achieving 0.0094 rad steady-state error and reducing settling time to 17.99s.
- Validated performance over 50+ trials, correcting 17.45% average overshoot and enhancing responsiveness during motor ramp-up.

Projects

Generative Design and Additive Manufacturing

July 2023 – December 2024

- Engineered a lightweight redesign of a GE Engine Bracket using Fusion 360 Generative Design, achieving a 30% weight reduction while maintaining a safety factor above 2.0 across Titanium, Cobalt Chrome, and Aluminum; simulated stress responses under 1.5x loading, identifying critical zones exceeding 3004 MPa.
- Optimized additive manufacturing by analyzing post-processing costs and validating build precision via G-code simulation, revealing that 47% of costs stemmed from post-processing and achieving 0.351 mm tolerance in final prints.

Design and Analysis of Centrifugal Pump Impeller

February 2022 – May 2022

- Engineered a centrifugal pump impeller using Fusion 360, SolidWorks, and GFRP, achieving 72% mass reduction, enhanced corrosion resistance, and 2x higher natural frequencies through semi-open blade designs and advanced material selection.
- Validated structural performance via CFD and FEA simulations in Ansys Workbench, confirming 90% accuracy in flow behavior and achieving 40% stress reduction through dynamic deformation and pressure gradient analysis.

Research Publications

- M. Ghufuran, S. Tetakayala, H. Rastgoftar, “Motion Planning for Quadraped Teams: An Experimental Evaluation Using a Dynamic Fluid Flow Model,” IEEE, DOI: 10.1109/ICARCV63323.2024.10821616.
- M. Ghufuran, S. Tetakayala, J. Hughes, A. Wilson, H. Rastgoftar, “Quadcopter Team Configurable Motion Guided by a Quadraped,” IEEE, DOI: 10.1109/ICARCV63323.2024.10821600.

Technical Skills

Languages: Python, C++, MATLAB, Arduino, Simulink
Tools: ROS2, PX4, Gazebo, SolidWorks, Fusion 360, Ansys, FEA, CFD, SAP
Technologies: Vicom, IMU, LIDAR, PID, LQR, MPC, uXRCE-DDS, G-code Simulation, PLC

Education

M.E. Robotics and Automation, University of Arizona, AZ

January 2023 – December 2024

B.Tech Mechanical Engineering, Hindustan Institute of Technology and Science, India

June 2018 – April 2022