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 quadruped enclosure during simulated rescue scenarios.
- Led the integration of **Vicon 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 Quadruped Navigation

- **Developed** a dynamic fluid flow navigation model for multi-agent quadruped teams in contested spaces using **Laplace PDEs**, **ROS2**, **C++** and **Vicon Motion Capture**, enabling **collision-free trajectories with 98% success rate** across static and dynamic obstacle scenarios.
- **Integrated** high-frequency real-time position feedback from **Vicon** 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 × 5m indoor testbed.
- **Engineered** dynamic waypoint adjustment algorithms using time-varying streamlines, **boosting navigation stability** by 35% compared to traditional fixed-trajectory planning methods.

junior Control Engineer, *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 **1.5× 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 **2× 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. Ghufran, S. Tetakayala, H. Rastgoftar**, "Motion Planning for Quadruped Teams: An Experimental Evaluation Using a Dynamic Fluid Flow Model," IEEE, DOI: 10.1109/ICARCV63323.2024.10821616.
- **M. Ghufran, S. Tetakayala, J. Hughes, A. Wilson, H. Rastgoftar**, "Quadcopter Team Configurable Motion Guided by a Quadruped," 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:	Vicon, 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