Burhanuddin Shirose

+1 (412) 909 7497 | bshirose@andrew.cmu.edu | www.linkedin.com/in/burhan-shirose

EDUCATION

Carnegie Mellon University — Pittsburgh, PA
Masters of Science in Mechanical Engineering, Specialization: Robotics GPA 3.88/4.0 — *Aug. 22 – Present*

National Institute of Technology (NIT), Trichy — Tamil Nadu, India
Bachelor of Technology in Mechanical Engineering GPA 8.41/10.0 — *Aug. 18 – May 22*

TECHNICAL SKILLS

Languages/Softwares: Python, C/C++, ROS, Solidworks, Ansys, CATIA
Libraries/Tools: PyTorch, OpenCV, SKlearn, pandas, NumPy, Matplotlib, Docker, Git

RESEARCH EXPERIENCE

Multi Model Perception Uber Good - Biorobotics Lab - Robotics Institute — Jan 23 – Present
Multi Agent Convoy - Advised by Prof. Matthew Travers and Prof. Howie Choset — *Pittsburgh, PA*

- Engineered a **decentralized multi-agent system**, allowing users to effortlessly control multiple fleets of robots with minimal manual intervention, while accomplishing search and rescue missions in challenging environment
- Brought convoy formation time for the current system to **under 5 seconds** by inventing a **novel decentralized formation control** algorithm, with addition **exponential** savings with additional agents in the system
- Developed a robust multi agent **rendezvous** algorithm, which identifies the optimal rendezvous location within **1 second** and brings robots **within 7m of each other** while coordinating the convoy's actions seamlessly
- System excels in its adaptability, seamlessly accommodating both **homogeneous and heterogeneous agents** while dynamically adjusting the controller to ensure optimal performance and speed of command execution

Multi agent Getting out Maneuver - Advised by Prof. Matthew Travers and Prof. Howie Choset

- Devised an innovative **lightweight and robust egress maneuver**, making sure agent is out of the way **within 4 seconds** therefore minimizing the impact on task completion speed and ease of operation by the user
- Successfully demonstrated results with obstacle filled environments with open spaces as narrow as **0.5m**
- The solution is seamlessly integrates various agent types, including **RC cars and Boston Dynamics Spot robots** and adjusting controls accordingly

PROJECTS

Robust Bi-Copter Control — Mar 23 – May 23

- Implemented and tested some of the well-known robust control techniques such as **H-infinity Loop-shaping, H-infinity Optimal Control, H2 Optimal Control, and Mu-synthesis** on the Quanser Bi-copter system
- Attained a remarkable **robust stability margin of 0.15** demonstrating the robustness of the control under highly coupled dynamics thus making the system very uncertain

Race Car Control Optimization and LQR Integration — Oct 22 – Nov 22

- Employed **state-space analysis and control theory** to tune parameters and ensure optimal performance
- Successfully integrated an **LQR (Linear Quadratic Regulator) controller** into the race car simulation
- Reduced the track traversal time by **2x** over the stock tuned PID controller with a mean deviation of 0.48m

Robotic arm for brake performance testing — Nov 19 – Jan 20

- Designed a detachable robotic arm for the precise application of a programmable and consistent force on bicycle braking systems during standardized brake testing
- Implemented a responsive **Bang Bang control algorithm** to minimize error and ensure rapid adjustments
- Achieved a remarkable **51-fold reduction** in mean deviation of braking force induced by judder, demonstrating exceptional performance

WORK EXPERIENCE

Summer Intern | *SKF Banglore, India* — June 21 – July 21

- Utilized Ulrich's design approach to develop an innovative dishwasher seal that precisely aligned with requirements
- Strategically enhanced the pump efficiency by **50 percent** while simultaneously minimizing contact surface area

PUBLICATIONS

IOP Science "Robotic arm for brake performance testing" ICRoAI 2021
IEEE Xplore "Design of a Remotely Operated Vehicle (ROV) for Biofoul Cleaning and Inspection of Variety of Underwater Structures" ICROM 2021