

# KHUZEMA HABIB

240-305-2240 [khabib@umd.edu](mailto:khabib@umd.edu) [linkedin.com/in/khuzema-habib](https://linkedin.com/in/khuzema-habib) [khuzema-h.github.io](https://github.com/khuzema-h)

## Education

### University of Maryland, College Park

Master of Engineering, Robotics

2024 - 2026

GPA 3.73/4

### Manipal Institute of Technology

Bachelor of Technology, Mechanical Engineering

2019 - 2023

GPA 8.03/10

## Technical Skills

Languages: Python, C++

Robotics & AI: ROS2, PyTorch, OpenCV, Gazebo, Isaac Sim, CARLA, Gym, LeRobot

Hardware: UR3e, UR5e, Turtlebot, Quadruped, Raspberry Pi, Jetson Nano, Arduino, Crazyflie, PixHawk, Gelsight

Mechanical & CFD: SolidWorks, Creo, Fusion360, 3D Printing, Ansys (Fluent, CFX), COMSOL, FluidX3D, MATLAB

## Experience

### Graduate Research Assistant

Aug 2025 – Present

*Robotics Algorithms and Autonomous Systems Lab - University of Maryland*

- Gathered 100+ expert demonstration data via teleoperation of a **UR3e** robotic arm and tested on lightweight Imitation learning models using an **affordance-guided** framework that distills a minimal set of **semantic 2D keypoints** from a text prompt and a single image.
- Built an agile **Quadruped** robot based on Stanford Doggo to serve as a testbed for **multi-terrain navigation** and **reinforcement learning**.
- Conducted flight trials to collect trajectory datasets for **Crazyflie drone control systems**, developing **Contextual NeuroMHE Controllers** to **improve adaptability** and reduce trajectory deviations in **turbulent environments**.
- Autonomous Indoor Navigation(**SLAM/LiDAR**) and **Mobile Manipulation** with Jetson Nano on Turtlebot2 Platform and a LeRobot based Arm to execute RL Policies through **LLM** prompts
- Real-time **CFD Based Wind Flow Estimation** with FluidX3D for Contextual NeuroMHE **Quadrotor Controller** for efficient path planning and control in Turbulent Environments
- Employing **tactile sensor** (GelSight) data with **Foundation models(Pi0)** to enhance reinforcement learning policies for fine-grained robotic manipulation on a **UR5e** and custom UMI gripper.

### Grading Assistant - Control of Robotic Systems

Sep 2025 – Dec 2025

*Maryland Applied Graduate Engineering - ENPM 667*

MD, USA

- Assisted in grading assignments for Control of Robotic Systems, helping 35+ students understand control system design, including PID and LQR controllers, and real-world applications in robotics, for system modeling and optimization.

### Graduate Research Assistant

Feb 2025 – Aug 2025

*Smart Materials and Structures Lab - University of Maryland*

MD, USA

- Conducted advanced simulations using ANSYS to model and analyze the behavior of smart materials, including piezoelectric materials, for applications in energy harvesting.
- Mathematical Modeling of Flow Environments by leveraging CFD with Ansys Fluent.
- Acoustics and Vibration Analysis for Vibration Dampening solutions in Acoustic Black-Hole applications.

### Computational Fluid Dynamics Simulation Intern

Jun 2022 – Jul 2022

*Indian Institute of Technology, Bombay*

Mumbai, India

- Conducted 2D and 3D CFD simulations of a rocket thruster to optimize fuel/oxidizer injector configurations for enhanced atomization and propulsion efficiency.

## Publications

### Contextual Neural Moving Horizon Estimation for Robust Quadrotor Control in Varying Conditions

*Kasra Torshizi, Chak Lam Shek, Khuzema Habib, Guangyao Shi, Pratap Tokekar, Troi Williams*

- Developed a reinforcement learning-based adaptive controller enabling robust quadrotor trajectory tracking across diverse environments with 20.3% trajectory error reduction on Crazyflie Drones

### AFFORD2ACT: Affordance-Guided Automatic Keypoint Selection for Generalizable and Lightweight Robotic Manipulation

*Anukriti Singh, Kasra Torshizi, Khuzema Habib, Kelin Yu, Ruohan Gao, Pratap Tokekar*

- Developed an affordance-guided keypoint selection framework enabling lightweight, real-time robotic manipulation with 82% success on unseen objects.

## Projects

- **Multi-Agent Reinforcement Learning for Drone Swarm Control** : Custom MAPPO and IPPO Implementation with Pytorch for Advanced Coordination Tasks. Achieved a 3x performance improvement over Stable-Baselines3
- **Autonomous Vehicle Behaviour Planning in CARLA** : Used Behaviour Trees for decision making and trajectory planning for lane change, following and overtaking. **SLAM** with **LiDAR Sensor-Fusion** for odometry on KITTI Dataset.