

KHUZEMA HABIB

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Education

University of Maryland, College Park

2024 - 2026

Master of Engineering, Robotics

GPA 3.73/4

Manipal Institute of Technology

2019 - 2023

Bachelor of Technology, Mechanical Engineering

GPA 8.03/10

Technical Skills

Languages: Python, C++

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

Hardware: UR3e, UR5e, Turtlebot, Quadraped, 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

MD, USA

- 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 **Quadraped** 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.