

Syed Izzat Ullah

Robotics / Autonomy Engineer

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📄 Syed Izzat Ullah | 📍 Corpus Christi, TX, USA (Willing to Relocate)

Professional Summary

Ph.D. candidate and Research Scientist in robotics and autonomous systems, with expertise in autonomous navigation, motion planning, sensor fusion, and multi-modal trajectory forecasting for collision avoidance. Skilled in designing robotic assemblies, developing ML-based control strategies, and validating solutions in both simulation and hardware. Collaborative team member with a publication record. seeking to apply expertise to tackle complex autonomy challenges in industry.

Education

Ph.D. Computer Science — Robotics & AI	3.75 (4.00) CGPA
Texas A&M University-Corpus Christi, USA	May 2022– Jan 26 (Exp.)
Dissertation focus: “Developing a predictive navigation system that enables UAVs to safely operate alongside unpredictable dynamic obstacles, such as birds, by forecasting their motion in real-time.”	
M.S. Electrical Engineering — Robotics & Control	3.16 (4.00) CGPA
Lahore University of Management Sciences (LUMS), Pakistan	2017-19
B.S. Telecommunication Engineering	3.83 (4.00) CGPA
Balochistan University of IT, Engineering & Management Sciences, Pakistan	2012-16

Technical Expertise

Robotics: ROS, Gazebo, CARLA, Unreal Engine, VICON, OptiTrack, Crazyflie, Turtlebot3, UR5
AI/ML: Reinforcement Learning (DRL), Transformers, Multi-modal Learning, Time Series Forecasting
Languages: Python (PyTorch, NumPy, SciPy), C++, MATLAB, Shell scripting
Control: Feedback control, Digital control theory, Optimization (CVX, Gurobi)
Planning: Search-Based (A*, D*), Sampling-based (RRT*, PRM), Multiagent, Uncertainty-aware Navigation
Sensors: IMUs, LiDAR, RGB-D cameras, Sensor fusion, UAV autopilots, Comm protocols
Tools: Docker, Git, SolidWorks, LabVIEW

Research Experience

Graduate Research Assistant — Texas A&M University-Corpus Christi May '22 – Present

- **Developed POF+MADER**, a novel UAV trajectory planner that integrates a real-time probabilistic obstacle filter with optimization-based planning, reducing collisions by 39% in simulation and 25% in hardware trials.
- **Developed transformer-based multi-modal forecasting** system fusing vision/LiDAR data, to forecast long-horizon future trajectories of complex, non-cooperative, and non-linear moving obstacles, for UAVs' safe collision avoidance and navigation.
- **Advancing an uncertainty-aware framework** that accounts for sensor noise, wind disturbances, and obstacle behaviors, targeting a 30% reduction in collision risks in real-world conditions (ongoing).
- **Conducting validation** through simulations (ROS/Gazebo) and on hardware (Crazyflies) to demonstrate the safety and efficiency of the framework for urban air mobility and package delivery applications.

Team Lead — National Center of Robotics & Automation Dec '19 – May '22

- **Led a team of 10 researchers** in conducting research on a search and rescue robot, using formal methods and Deep Reinforcement Learning (DRL).
- Part of the team to develop an assistive social robot, communicating with contextually relevant information in different environments using **Natural Language Processing**.

Visiting Researcher — Robotics Research Lab, TU Kaiserslautern Jul – Sep '19

- Created a realistic canal-like environment in Unreal Engine (UE4) and Microsoft Airsim for testing autonomous drone navigation systems.
- Implemented advanced motion and trajectory planning algorithms, ensuring autonomous drone navigation with collision avoidance.

Research Assistant - National Center of Robotics & Automation

Jan – Jun '19

- Conducted comprehensive investigations and testing of various Motion Planning and Obstacle Avoidance algorithms to ensure a safe and reliable navigation of drones in dynamic environments.
- Explored and implemented pointcloud data fusion methods, integrating stereo camera and 2D LiDAR data, enhancing environment perception, and boosting drone navigation accuracy and reliability.

Key Projects

- **Autonomous Restaurant Robot:** ROS/Gazebo-based autonomous serving robot with optimized path planning (99% success rate).
- **DRL Obstacle Avoidance:** End-to-end deep-RL pipeline in Unreal Engine + Microsoft AirSim for UAVs collision-free navigation (95% success rate).
- **Urban Mobility Simulation:** CARLA/ROS environment for autonomous multi-agent navigation testing.
- **Agriculture Navigation Simulation:** Designed a ROS/Gazebo-based autonomous agriculture robot. Integrated sensor data (camera, IMU) for mapping and autopilot control.

Research Publications

- **Syed I. Ullah et al.** "Transformer-Based Multi-Modal Trajectory Forecasting for UAV Navigation in Dynamic, Uncertain Environments", IEEE RA-L (Submitted)
- **Syed I. Ullah et al.** "SynTraG: A Synthetic Trajectory Generator for Non-Cooperative Dynamic Obstacles in UAV Navigation", IEEE Access (Under Revision)
- **Syed I. Ullah et al.** "POF+MADER: Trajectory Planner in Multiagent and Dynamic Environments with Improved Collision Avoidance", IEEE Access (Under Final Revision)
- **Syed I. Ullah et al.** "Coaxial Modular Aerial System and the Reconfiguration Applications", IEEE ICRA 2023
- **Syed I. Ullah et al.** "Autonomous Navigation and Mapping of Snake Robots for Urban Search and Rescue (USAR)", IEEE ICRAI-2023
- **Syed I. Ullah et al.** "Autonomous Navigation and Mapping of Water Channels in a Simulated Environment Using Micro-Aerial Vehicles", IEEE ICRAI-2023
- **Syed I. Ullah et al.** "Motion Planning for a Snake Robot using Double Deep Q-Learning", IEEE ICAI-2021

Academic Awards

IEEE ICRA 2025 Attendee	May 2025
IEEE ICRA 2025 - Atlanta, GA	
1st Place Engineering Research	Oct 2023
11th Annual MSGSO Research Symposium	
IEEE RAS Summer School on Multi-Robot Systems Attendee	Jul 2023
Czech Technical University	
3rd Place Throughout the Engineering and Computer Science Category	Mar 2023
18th Annual TAMUS Pathways Student Research Symposium	
Silver Medalist in BS – Telecommunication Engineering	Dec 2016
Balochistan University of IT, Engineering & Management Sciences (BUIEMS)	

Professional Certifications & Training

Udacity Nano-Degrees

Robotics Software Engineer, Introduction to Self Driving Cars, Flying Cars & Autonomous Flight Engineer

Coursera Specialization

Mathematics for Machine Learning, Robotics: Computational Motion Planning, Python for Everybody

Robotics, Computing & AI

Mobile Robotics, Robot Motion Planning, Data Structures and Algorithms, Design and Analysis of Algorithms, Multi-Agent Systems, Deep Learning, Machine Learning, Reinforcement Learning

Control & Communication

Digital Control Systems, Feedback Control Systems, Digital Communication, Digital Signal Processing, Wireless & Mobile Communication, Optical Fiber Communication, Satellite Communication

Mathematics & Optimization

Convex Optimization, Stochastic Systems, Probability and Statistics, Operation Research, Numerical Methods in Engineering, Complex Variable & Transform, Linear Algebra & Differential Equations