Shizra Tariq

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Education

University of Minnesota, MS in Robotics, GPA: 3.8/4.0 — Expected Graduation: Spring 2026

- Intelligent Robotic Systems, Machine Learning, Artificial Intelligence, Natural Language Processing, Computer Vision, Project Management

Khwaja Fareed University of Engineering KFUEIT, BS Computer Engineering, GPA: 3.85/4.00 — **Gold medalist**, 2022

Minnesota State University, Global UGRAD Exchange Program — 2021

Experience

Research Assistant Biosensing and biorobotics laboratory, University of Minnesota — Summer 2025 - Present

- I am developing a real-time computer vision and robotics pipeline for automated probe insertion in the mouse brain to monitor neural activity. My work integrates object detection with keypoint-based pose estimation and Perspective-n-Point (PnP) to recover the full 6-DoF probe pose, while employing CNN-based classification to assess probe bending and stability under challenging visual conditions.

Teaching Assistant Carlson School of Management, University of Minnesota — Summer 2025

- Assisted students in MSF 6921: Introduction to Python with hands-on coding exercises, clarifying core Python concepts and use of data analysis libraries. Supported the instructor by grading assignments and providing guidance during class and office hours.

Research Assistant College of Science and Engineering, University of Minnesota — Summer 2024

- Collaborated on robotic surgery for histotripsy using the UR5e robotic arm with ROS2 and MoveIt2 using python.
- Mapped singular configurations in C-space to improve motion planning. Developed path-planning algorithms for constrained and unconstrained trajectories, ensuring collision avoidance in an aquatic environment.

Technical Project Manager Quantum-h, UK — 2023 - 2024

- Coordinated work of the Cross-Functional Agile (CSA) team for international development, QA, and project management.
- Engineered scalable database architectures and fine-tuned complex queries, resulting in a 30% increase in data retrieval speed while ensuring complete accuracy across all datasets to maintain high standards of integrity.

Research Assistant Abel & Mercer Co., UK — 2022-2023

- Proposed and implemented AI solutions for business websites and applications that improved customer interaction metrics by 20%.
- Utilized TensorFlow and PyTorch to design and train deep learning models for image recognition and segmentation, enabling the core functionality of the visual AI tool for virtual try-ons.
- Developed high-performance mathematical computations using Numpy to enhance real-time image processing and model inference, resulting in a 20% improvement in response time for the virtual try-on tool's user interface.

Machine Learning Intern Advance Automation & Robotics Lab - ARAL, Pakistan — 2022

- Contributed to the Prosthetic Arm project, implementing SVM classification using MATLAB and Python.
- Processed muscle signal data using FMG sensors. Utilized Python libraries like scikit-learn, pandas, and TensorFlow for data analysis.

Artificial Intelligence Intern OPENAIMP, United States — 2021

- Engineered and deployed AI chatbots using RASA, enhancing user engagement by crafting 15 distinct conversational flows that improved interaction efficiency and reduced average response time by over 10 seconds per inquiry.

Projects

- **Auto Probe Insertion:** Developed a computer vision pipeline using YOLOv8 segmentation and keypoint detection to localize neural probe shafts and tips in dual-camera recordings, incorporating geometric modeling and PnP algorithms for accurate 6-DoF pose estimation under tilt and occlusion. Engineered a two-stage system combining real-time probe tracking with CNN-based bend classification to enable automated and precise probe insertion.
- **Breast Cancer Detection:** Developed a mammography-based breast cancer detection system using SVM, KNN, Logistic Regression, Neural Networks, and XGBoost, achieving (96.49%) accuracy, 100% precision, 92.86% recall, 95.12% F1-score, and 0.996 AUC. (Github)
- **Super Resolution and Object Detection on Remote Sensing Imagery:** Used SRGAN (4x super-resolution), improving PSNR/SSIM metrics, and achieved +18.7% mAP (68.3% vs. 49.6%) in aerial object detection with YOLOv11-OBB on the DOTA dataset (8 classes).(Github)
- **Turtlebot3 RRT Pathfinder:** Implemented RRT algorithm for autonomous maze navigation through Gazebo simulations, refining motor command accuracy and addressing Lidar inconsistencies to achieve a 40% success rate and 1:42 fastest traversal time. (Github)
- **Accurate Subtitle Generation in Videos:** Integrated Whisper-Timestamped with Large Language models (Gemini-1.5/GPT-40) and a custom segmentation function, reducing WER/CER by 30% and achieving precise timestamp alignment. (Github)
- **Prosthetic Arm and Bionic Arm:** Engineered an IoT and AI-driven bionic arm using SVM for EMG signal classification, achieving 91.67% gesture recognition accuracy, and integrated 3D-printed hardware for prosthetic control.

Skills and Certificates

Programming Languages: Python, C/C++, C#, JavaScript, MATLAB, SQL

Tools & Frameworks: Git/GitHub, Linux, CUDA, PyTorch, OpenCV, PyBullet, JIRA

Certificates: Machine Learning, Python for AI, Convolution Neural Networks, SQL

Awards

- Fulbright Scholarship Program 2023 Awardee - (IIE), USA.
- Nominated for the National Youth Award by the Higher Education Commission, Pakistan.
- Global UGRAD Program Awardee, Fall 2021 by IREX, USA.