ALI JAFAR

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ACHIEVEMENTS & HONORS

- Co-first and corresponding author of a manuscript under review at *Computer Speech & Language* (2026).
- 1st Place – MIT × Hack-Nation Global AI Hackathon (Feb. 2026); MedDesert AI.
- 1st Place – WebMind Innovation Hackathon (Oct. 2025); Vision Chroma Pro.
- Silver Brick Award, UC Berkeley CALICO Programming Competition (Apr. 2025).
- 4× Dean's List of Honor and fully funded merit scholarship, FAST-NUCES (2023–Present).
- English Proficiency: IELTS 7.5 (CEFR C1).

EDUCATION

FAST National University of Computer and Emerging Sciences (FAST-NUCES) Lahore, Pakistan
Bachelor of Science in Computer Science Aug. 2023 – May 2027

- CGPA: 3.57/4.00 | Rank: Top 5% of batch
- **Final-Year Project:** AI Reliability Under Distribution Shift – studying model confidence and reliability under changing data distributions.

Selected Coursework: Natural Language Processing, Computer Vision, Human-Computer Interaction, Compiler Construction, Computer Architecture, Parallel & Distributed Computing.

PUBLICATIONS & MANUSCRIPTS

A. Jafar*, A. Sarmad*, S. Yousaf*, and M. Bashir, "Domain-Specific Evaluation of Text-to-Speech Systems: A Multi-Metric Benchmarking Study," *Computer Speech & Language*, under peer review, 2026. Corresponding author. *Equal contribution. [arXiv] [Code]

RESEARCH EXPERIENCE

Department of AI and Data Science, FAST-NUCES Lahore, Pakistan
Research Assistant | Supervisor: Dr. Maryam Bashir (PhD, Northeastern University) Feb. 2026 – Present

- Co-designed a reproducible benchmark of four Urdu TTS systems across four speech domains and 960 reference-synthetic audio pairs, combining acoustic, speaker-similarity, and human perceptual evaluation.
- Built evaluation software for MCD, F0 RMSE, speaker embeddings, MUSHRA-style tests, and ABX analysis; found strong domain sensitivity and rank disagreement between objective and perceptual measures.
- Contributed to study design, evaluation software, experimental analysis, and manuscript writing.

Research Collaborator | **Purdue University** Remote
Online Reinforcement Learning for Adaptive AI Agents Sep. 2026 – Present

- Working with a research team on agents that continue acting while learning from feedback, connecting reliability detection with adaptation under changing environments.

Undergraduate Researcher | **Final-Year Project, FAST-NUCES** Lahore, Pakistan
AI Reliability Under Distribution Shift Aug. 2026 – Present

- Evaluating whether lightweight confidence estimates stay reliable across changing domains using controlled train/test comparisons.
- Studying transfer loss and limited-data adaptation with held-out testing rather than relying only on in-domain results.

TEACHING & MENTORING

FAST National University of Computer and Emerging Sciences Lahore, Pakistan
Teaching Assistant – Data Structures (2025); Design and Analysis of Algorithms (2026) Aug. 2025 – Present

- Supported 100+ students through assignment design/grading, vivas, tutorials, and problem-solving sessions covering data structures, dynamic programming, greedy methods, graph traversal, shortest paths, and minimum spanning trees. [Appointment]

Stanford University – Code in Place 2025 Remote
Section Leader Mentor Apr. – Jun. 2025

- Selected to lead 24+ live Python sessions over eight weeks for students from 15+ countries, using live coding and small-group exercises to teach programming and problem solving. [Certificate]

WPBrigade Bootcamp Lahore, Pakistan
Python & AI Trainer Feb. – Mar. 2026

- Taught Python, introductory machine learning, and image processing to students from underserved communities across Pakistan. [Certificate] [YouTube]

SELECTED TECHNICAL PROJECTS

HMSTUNet – Crowd Counting via Density Estimation [GitHub]

- Implemented a hybrid crowd-counting network that predicts spatial density maps rather than detecting each individual in heavily occluded scenes.
- Combined a ConvNeXt feature encoder, Transformer attention, and U-Net skip connections for multi-scale density regression; visualized prediction maps and spatial errors.
- Evaluated on ShanghaiTech Parts A/B, reporting MAE of 62.4 and 7.5, respectively.

Alvira – Speech and Multimodal ML Prototype [GitHub]

- Integrated a PyTorch WaveNet-style speech classifier using dilated 1D convolutions and attention, with 16 kHz audio preprocessing, for an exploratory cognitive-health screening application.
- Added separate scikit-learn SVM pipelines for structured symptom and image-derived inputs, connecting audio, text, and image inference routes to a Flask API and React interface.

Hybrid Semantic Code Search [GitHub]

- Built repository search over 10,000+ code chunks using AST-aware segmentation, BM25 + dense retrieval, and Qdrant; reported MRR@5 of 0.84 with sub-50 ms retrieval, 35% above keyword search.
- Separated retrieval from LLM change planning so that only repository-relevant files and code sections are passed to the generation stage.

Healthcare Infrastructure Intelligence India [GitHub] [Demo]

- Built a LangGraph/FastAPI workflow over 10,000+ facility records, routing requests through structured querying, semantic retrieval, extraction, validation, and geospatial analysis.
- Added evidence checks that distinguish missing documentation from missing clinical capacity, producing medical-desert and data-desert warnings instead of treating absent text as proof of absent services.

Real-Time Rear-Obstacle Detection System [GitHub]

- Built an offline Android system using YOLOv8n TensorFlow Lite, camera-based monocular distance estimation, and EMA smoothing; reported $\pm$4.2% error across 0.5–5.0 m.
- Ran inference on background compute threads at about 5 FPS so detection and warning updates did not block the live Flutter interface.

INTERNATIONAL COMPETITIONS

1st Place – MIT × Hack-Nation Global AI Hackathon Feb. 2026
Project: MedDesert AI [GitHub] [Demo]

- Built a multi-agent healthcare-infrastructure system over 987 Ghanaian facility records, combining structured querying, semantic retrieval, validation, and geospatial reasoning; achieved 15/15 across the challenge's five official query-intent types.

1st Place – WebMind Innovation Hackathon Oct. 2025
Project: Vision Chroma Pro [Demo]

- Developed a web-accessibility and readability analyzer that checks WCAG 2.1 contrast ratios, simulates common color-vision deficiencies, evaluates readability/typography, and exports visual/PDF reports for remediation.

Finalist – Building AI Agents Hackathon @ Traversaal.AI Apr. 2025
Project: Diabetes Prediction Agent [GitHub]

- Wrapped a classical SVM predictor as an AgentPro ReAct tool, reporting 88.2% dataset accuracy; the project implementation was merged into the AgentPro repository.

NASA Space Apps Challenge Oct. 2025
Project: NASA Kepler Exoplanet Classifier [GitHub]

- Trained XGBoost on 9,500+ Kepler records across 15 orbital/stellar features, reporting 94.1% ROC-AUC; added FastAPI/React single and batch prediction workflows with downloadable reports.

Silver Brick Award – UC Berkeley CALICO Programming Competition Apr. 2025

- Solved time-constrained programming problems in dynamic programming, graph traversal, data structures, and combinatorics. [Certificate]

TECHNICAL SKILLS

Programming: Python, C++, SQL, JavaScript/TypeScript, Dart.
ML / Data Libs: PyTorch, scikit-learn, XGBoost, Hugging Face Transformers, OpenCV, TFLite, NumPy, pandas.
Frameworks: FastAPI, Flask, LangGraph, Streamlit, React, Next.js, Flutter.
Data / Systems: PostgreSQL, SQLite, Supabase, Qdrant, Databricks Vector Search, Apache Kafka.
DevOps / Tooling: Docker, MLflow, Git/GitHub, Vercel, Jupyter, Google Colab.

LEADERSHIP & SERVICE

- **Global AI Ambassador, Hack-Nation** (Nov. 2025–Apr. 2026): supported three consecutive editions of the MIT Global AI Hackathon; was among the early ambassadors introducing and promoting the competition to student communities in Pakistan, mentoring prospective teams and helping with resources, registration, and submission questions. [Post]
- **Hackathon Judge, HEC Pakistan & DEVLAUNCH** (2026): reviewed 50+ AI/software projects and provided technical feedback on implementation, usefulness, and presentation. [Certificate]
- **Accommodation Officer, SOFTEC 2025**: coordinated room assignments, bedding, and participant logistics for 500+ attendees during Pakistan's largest student-run international IT event, held at FAST-NUCES Lahore.