M. Hassan Shahzad

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Education

Habib University — Karachi, Pakistan
B.S. in Computer Science, Dhanani School of Science & Engineering — *2023 – 2027 (expected)*

- **Relevant coursework:** Introduction to Large Language Models (CS/CE 335/466), Machine Learning, Artificial Intelligence, Data Structures & Algorithms, Linear Algebra, Probability & Statistics, Database Systems.

Publications

[P1] **M. Affan, M. H. Shahzad, M. Imam, M. Zulfiqar, S. Kumar, and A. Samad.** "Habib University at SemEval-2026 Task 3: A Pipeline Approach for Dimensional Aspect-Based Sentiment Analysis." In *Proceedings of the 20th International Workshop on Semantic Evaluation (SemEval-2026)*, pp. 3449–3459, Association for Computational Linguistics, July 2026. **[Paper]**
Second author. Ranked 2nd internationally in Tatar and 6th in Russian for dimensional sentiment prediction. Best system RMSE of 0.5333 (Subtask 1) and cF1 of 0.5492 (Subtask 2).

[P2] **M. Affan, M. B. Qureshi, M. H. Shahzad, F. Alvi, and A. Samad.** "HU_LLM_Fin @ FinMMEval 2026 Task 2: A Structure-Aware Hybrid RAG Pipeline utilizing Mixture-of-Experts." **Accepted, in press.** To appear in *CLEF 2026 Working Notes*, CEUR Workshop Proceedings, CEUR-WS.org, Jena, Germany, September 2026. **[Camera-ready PDF]**
Joint first-author contribution. Placed 10th globally on the official blind test set, achieving ROUGE-1 scores of 0.3958 (Easy) and 0.3437 (Expert).

Research Experience

Deep Learning for Multilingual Sentiment Analysis — Habib University
Undergraduate Researcher (Advisor: Dr. Abdul Samad) | *Publication [P1]* — *2025 – 2026*

- Co-developed a **four-stage multilingual transformer pipeline** (extraction, aspect–opinion pairing, category classification, valence–arousal regression) for Dimensional Aspect-Based Sentiment Analysis across **six languages** and **four domains**.
- Designed and evaluated **regression stabilisation strategies**, including label rescaling to $[-1, 1]$, Gaussian label-noise injection, Concordance Correlation Coefficient loss, and Savitzky–Golay smoothing, reducing average development RMSE from 0.9572 to 0.9366 across ten language–domain pairs.
- Benchmarked four multilingual encoder backbones under a unified fine-tuning framework to isolate the effect of model capacity on continuous affect prediction.
- Ran **controlled data-augmentation ablations** (mention replacement, contextualised masked language modelling, synthetic generation, external SIGHAN-2024 integration), identifying a **cross-lingual regularisation effect** in which external Chinese data improved zero-shot transfer to low-resource languages despite degrading in-language performance.
- Established that entity-preserving contextual MLM **harms** BIO boundary detection (F1 0.7846 to 0.7693), a negative result that redirected the team's augmentation strategy toward semantic substitution.

Large Language Models for Cross-Lingual Financial QA — Habib University
Undergraduate Researcher (Advisor: Dr. Faisal Alvi) | *Publication [P2]* — *2026*

- Contributed to a **Structure-Aware Hybrid RAG pipeline** for cross-lingual question answering over SEC financial tables and multilingual news, spanning five languages.
- Co-designed a **row-aware chunking algorithm** that injects table headers and temporal context into fixed-size chunks, preventing the spatial degradation that standard recursive splitting inflicts on Markdown financial statements.
- Implemented **two-stage partitioned retrieval** fusing sparse lexical and dense multilingual signals with a cross-encoder reranker, mathematically constrained to rank tabular and narrative evidence independently so that descriptive text does not crowd out numerical grids.
- Deployed a **Mixture-of-Experts generation layer** with a constrained prompting protocol and scratchpad-based reasoning, chosen to bypass the token-rate limits that force context truncation in dense models.
- Conducted **qualitative error analysis** of reasoning traces, characterising mathematical-hallucination and zero-assumption failure modes in which the model overrode correct arithmetic or fabricated missing values rather than abstaining.

Professional Experience

Office Automation Services — Karachi, Pakistan

AI / Automation Developer — *Jun 2024 – Present*

- Built **automation pipelines** collecting shipment tracking data from **10+ carrier portals**, extracting delivery status and logistics metadata for daily cargo monitoring.
- Developed an **AI-driven document processing pipeline** using the Gemini API to convert heterogeneous, unstructured document formats into standardised structured datasets.
- Engineered a **cargo booking automation system** submitting bookings across multiple carrier portals via APIs and scripted workflows, centralising them into a single internal system.

Open Source Contributions — Remote

Contributor, Google Summer of Code Organizations — *Dec 2025 – Present*

- Contributed to **3 open-source codebases** including **Gemini CLI**, submitting **8 pull requests** with **2 merged**.
- Performed code review, bug triage, and feature implementation in collaboration with upstream maintainers; gained experience navigating large unfamiliar codebases and reproducing reported issues.

Selected Technical Projects

AI Chatbot with Tool Integration | *Python, Ollama, LangChain, FastAPI*

- Built a **locally deployed LLM assistant** with tool-calling for external APIs and function execution, avoiding third-party inference dependencies.
- Designed a **multi-agent modular pipeline** for query refinement, tool invocation, and output formatting; deployed into the **GAMA Suite platform serving 1000+ customers**.

Sequence Board Game AI | *Python, FastAPI, Next.js, WebSockets*

- Implemented an adversarial search agent using **Minimax with alpha–beta pruning** across multiple difficulty levels, with custom **heuristic evaluation functions** over board states.
- Architected a real-time multiplayer full-stack application with a FastAPI backend and WebSocket-driven Next.js frontend.

Technical Skills

Programming Languages: Python, C++, C, JavaScript, SQL
ML / NLP: PyTorch, Hugging Face Transformers, LangChain
Frameworks & Tools: FastAPI, Next.js, React.js, Selenium, Git, MongoDB, PostgreSQL, Linux, Google Colab, Kaggle
Languages (spoken): English (fluent), Urdu (native)

Honors & Awards

2nd place (Tatar), 6th place (Russian), SemEval-2026 Task 3: Dimensional Sentiment Regression — 2026

10th place globally, CLEF-2026 FinMMEval Lab, Task 2 (PolyFiQA) official blind test set — 2026

5th place (Tatar), 6th place (Russian and Ukrainian), SemEval-2026 Task 3: Triplet Extraction — 2026

Leadership & Service

Communications Cabinet, Student Governance — Habib University

Cabinet Member — *2026*

- Serve on the university student communications cabinet, coordinating outreach and information flow between the student body, societies, and university administration.

Inter-College STEM Olympiad — College

Director — *2023*

- Directed an inter-college STEM olympiad, leading a team of student organisers across event design, participant registration, judging logistics, and scheduling.

Recommendations

Dr. Abdul Samad, Dhanani School of Science & Engineering, Habib University: abdul.samad@sse.habib.edu.pk

Dr. Faisal Alvi, Dhanani School of Science & Engineering, Habib University: faisal.alvi@sse.habib.edu.pk