Kazi Rafat Haa Meem

PhD Applicant | Speech & Language Technologies | Low-Resource NLP & Health AI
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RESEARCH STATEMENT

I study the gap between high-resource and underserved languages in spoken and written AI systems. My work spans automatic speech recognition (ASR), text-to-speech (TTS), large language models (LLMs), and agentic AI, with a unifying focus on deployability in low-resource, multilingual, and health-critical settings. Concretely, I build systems that work for languages like Bangla, Swahili, and Yoruba — not just English — and that run on constrained hardware. I am drawn to PhD programmes where I can deepen theoretical foundations in speech processing, multilingual representation learning, and efficient ML, while continuing to ground my work in real-world deployment and measurable social impact.

EDUCATION

North South University Dhaka, Bangladesh
B.Sc. in Computer Science and Engineering | CGPA: 3.90 / 4.00 | Summa Cum Laude (Highest Distinction) Jan 2019 – May 2022

- Merit-Based Scholarship (nationwide competitive admission) throughout degree
- Relevant courses: Pattern Recognition & Neural Networks, Machine Learning, Probability & Statistics, Algorithms, Data Structures
- Earned 'A' in all core ML, AI, and CS courses

PUBLICATIONS

** = corresponding / first author*

[1] K. R. Haa Meem et al.* "Dynamic Block-Online Streaming ASR for Low-Resource Agglutinative Code-Switching Speech with Morphology-Aware Evaluation." Interspeech 2026. [Published]

First-authored. Proposes a Dynamic Block-Online framework for morphological truncation in Bangla-English code-switching ASR, and introduces CS-WER — a novel metric for suffix-, switch-, and root-level evaluation.

[2] K. R. Haa Meem et al.* "Mitigating Carbon Footprint in Deep Learning via Knowledge Distillation." PLOS One, 2023. [Published]

First-authored. Novel knowledge distillation technique eliminating exhaustive hyperparameter tuning, reducing training carbon cost. Published in Nature-family open-access journal.

[3] K. R. Haa Meem et al.* "A Point Cloud Transformer for Remote Monitoring and Automated Assessment of Physical Rehabilitation Exercises." IEEE JBHI, 2025. [Under Review]

First-authored. Geometric-transformer architecture classifying and scoring physical rehabilitation quality from 3D pose and time-series motion data.

[4] K. R. Haa Meem et al. "DeepMarkerNet: Supervised Duchenne Marker Modeling for Spontaneous Smile Recognition." Pattern Recognition Letters, Elsevier, 2024. [Published]

Deep learning model distinguishing genuine from non-genuine smiles using facial landmark detection and expression encoding.

[5] K. R. Haa Meem et al. "Precision-Driven Low-Resource Bangla Text-to-Speech System." ICLR Workshop on Practical ML for Low-Resource Settings, 2024. [Published]

High-fidelity Bangla TTS with voice cloning and phoneme-level preprocessing. Presented at ICLR workshop on low-resource ML.

RESEARCH EXPERIENCE

Apurba Technologies, NSU R&D Lab Dhaka, Bangladesh
Research Assistant Jun 2022 – 2023 | 2025 – Present

- Lead researcher on LLMs, ASR, TTS, knowledge distillation, and agentic AI; published at Interspeech 2026, ICLR, PLOS One, Pattern Recognition Letters, IEEE JBHI.
- Designed and deployed agentic LLM pipelines for health and assistive applications in low-resource multilingual settings.
- Built MenoChat — agentic health chatbot using RAG, LLM hybrid generation, STT/TTS, and RL-based dialogue control for low-literacy users — awarded $30,000 and Best Idea + Best Poster at NCSRHR 2023.
- Directed multilingual data collection, curation pipelines, and full project lifecycles as team lead; mentored junior researchers.

- Awarded CTRG 2023 research grant (5 Lac BDT, ~$4,500) for rehabilitation exercise assessment research.

North South University Dhaka, Bangladesh
Research Student Oct 2021 – May 2022

- Led early-stage ML research on classification, statistical analysis, and speech/text applications for clinical datasets.
- Built interpretable ML models for clinical and social data; prototyped systems later evolved into funded lab projects.

INDUSTRY EXPERIENCE

Decodis Boston, MA, USA — Remote
Machine Learning Engineer 2023 – Jan 2026

- Built production-grade ASR systems for Swahili, Yoruba, Azeri, Bangla, Hindi, and Urdu integrated into end-to-end interview workflows at 1,000-interview scale.
- Contributed to a pending patent for multilingual seamless timestamping for real-time transcription; delivered $45,000+ in cost savings.

AWARDS & GRANTS

- $30,000 Research Grant + Best Idea Award + Best Poster Award — NCSRHR 2023 (MenoChat project)
- Adaption Labs Inaugural Grant Cohort — Accepted April 2026 (AdaptBench benchmark for LLM evaluation)
- CTRG 2023 Research Grant — 5 Lac BDT (~$4,500) — Bangladesh national research grant
- NAACL 2023 Mentorship Program — Selected mentee, low-resource virtual assistant project
- Summa Cum Laude — North South University (CGPA 3.90 / 4.00)
- Merit-Based Scholarship — North South University, nationwide competitive admission, 2019
- The Daily Star Award — Outstanding O-Levels (2016) and A-Levels (2018) performance

TECHNICAL SKILLS

Languages: Python, Java, C/C++, JavaScript, SQL
ML Frameworks: PyTorch, TensorFlow, Hugging Face Transformers, LangChain, ESPnet, torchaudio, ONNX, Scikit-learn
Research Areas: ASR, TTS, LLMs, NLP, Knowledge Distillation, Model Compression, Agentic AI, Health AI, Low-Resource ML, Code-Switching
Tools: Linux, Git, Docker, Bash, LaTeX | **Languages:** English (Professional) | Bengali/Bangla (Native)

REFERENCES

Dr. Nabeel Mohammed (Primary Supervisor)
Associate Professor, Dept. of CSE | North South University, Dhaka, Bangladesh
nabeel.mohammed@northsouth.edu | Supervisor, Apurba NSU R&D Lab

Dr. Shafin Rahman (Co-Supervisor)
Professor, Dept. of CSE | North South University, Dhaka, Bangladesh
shafin.rahman@northsouth.edu | Co-Supervisor, Apurba NSU R&D Lab

Pravarakya Reddy Battula (Industry Supervisor)
Director of Data Analytics | Decodis, Boston, MA, USA
prava@decodis.com | Direct industry supervisor (2023–2026)