

Postgraduate Seminar Series

Venue: Graduate Seminar Room

Date & Time: June 06, 2026 at 2:30 PM

Speaker Information

MD. FAKHRUDDIN GAZZALI (Std No. 0423052033) is a part-time M.Sc. student in the Department of CSE, BUET. He completed his undergraduate studies at the Islamic University of Technology (IUT) in 2021 and is currently serving as a full-time lecturer at BRAC University. His research interests lie in the field(s) of Software Engineering, Large Language Models (LLMs), and their application in SE and Education. He is currently doing her postgraduate thesis under the supervision of Dr. Anindya Iqbal. He will be speaking about his ongoing research in this talk.



Agentic And Adaptive Conversational Tutoring System Using Open-Source LLMs

Despite the remarkable fluency of large language models, current AI programming tutors still struggle to teach the way human teachers do. These LLM tutors often jump to full solutions, provide generic hints, hallucinate feedback, and fail to maintain consistent instructional continuity across sessions. Expert human tutors do not simply talk at students; rather, they explain, explore, evaluate, and guide in turn. Reproducing that choreography inside a single monolithic model has proven notably difficult.

Our thesis presents CAATS (Conversational Adaptive and Agentic Tutoring System), an **open-source, multi-agent conversational tutoring framework** designed to deliver **personalized, adaptive, and pedagogically structured** programming lessons. Instead of relying on a single monolithic chatbot, CAATS distributes the tutoring cycle across four specialized agents: TutorBot for personalized lessons, QuestionBot for adaptive assessment, GraderBot for constructive evaluation, and RecommenderBot for guiding further learning routes. These agents collaborate through prompt engineering and context management to simulate the full “teach-question-grade-recommend” loop of human tutoring while remaining computationally affordable. Crucially, the entire system runs on LLaMA 3.1 8B, the smallest and most cost-effective open-source model in our setup, with prompt and context engineering doing the heavy lifting that larger proprietary models typically rely on massive parameters to achieve. CAATS is also language-agnostic, meaning it supports any programming language rather than being limited to a specific environment.

The results are impressive: **88% overall student satisfaction**, a **4.24/5 rating for personalized explanation** (the highest-rated tutoring dimension), consistently strong scores for clarity, technical accuracy, tone, and engagement, and **94% of participants expressing a desire to continue** using the system. Human evaluations and LLM-as-a-Judge scores agreed closely across agents, providing dual validation for the findings. Additionally, CAATS’s median **satisfaction rating of 4/5 meets or exceeds** prior programming-specific tutors such as Hendrix while operating across a more diverse group of people and any programming language.