

Usmi Mukherjee

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PROFESSIONAL SUMMARY

I'm a PhD Student in Computer Science at Dalhousie University, where I explore how artificial intelligence can transform the way we build, reason about, and model complex systems. My work bridges AI for Software Engineering (AI4SE) and simulation modelling, focusing on developing adaptive, data-driven approaches that make software development more intelligent, explainable, and better aligned with real-world dynamics.

TECHNICAL SKILLS

Languages: Python, JavaScript/TypeScript, Java, Go, C#, C/C++, SQL, PHP, Perl

Web / Backend: Node.js, Express.js, Vue.js, Flask, Django, REST APIs, Microservices, SPA/PWA, Webpack, jQuery, Bootstrap, CSS3

ML / AI: PyTorch, TensorFlow, Keras, scikit-learn, CNN, SVM, Decision Tree, Random Forest, Word Embeddings, LLMs, RAG, Topic Modelling, NumPy, pandas, matplotlib

Databases: PostgreSQL, MySQL

DevOps / Cloud: Docker, Docker Compose, Linux, Git, Google Cloud Platform

Testing / Agile: TDD, Unit Testing, Espresso (Android), Jira, CI/CD, Agile/XP

Platforms: Android, Windows, Firebase, Google Maps API, PayPal API

INDUSTRY EXPERIENCE

Associate IT Consultant | ITC Infotech, Bangalore, India, Feb 2021 – Aug 2021

- Customised enterprise web applications for Consumer Packaged Goods (CPG) clients using Java, J2EE, HTML/CSS/JS, and Bootstrap, improving product lifecycle management workflows end-to-end.
- Configured and optimised the PTC FlexPLM (Windchill) PLM system to streamline complex product design and maintenance processes, directly reducing manual overhead for client teams.
- Enforced rigorous QA procedures — test planning, validation suites, and code reviews — raising code quality and maintainability across the codebase.

Software Developer Intern | Unilever, Bangalore, India, Jan 2020 – Jun 2020

- Built a full-stack application (Node.js, PostgreSQL, Express.js, Vue.js) that auto-generates Process Flow Algorithms for product manufacturing recipes, cutting production errors and optimising timelines.
- Designed and implemented the algorithm engine for automated analysis of product requirements, reducing manual intervention in recipe-to-process translation.
- Created an intuitive operator-facing UI enabling manufacturing personnel to input recipe data and instantly retrieve generated process flows.
- Delivered comprehensive testing and validation, ensuring reliability and accuracy of generated outputs in a production manufacturing context.

TEACHING & MENTORSHIP

Teaching Assistant | Dalhousie University, Halifax, NS, Fall 2022 – Present

Software Engineering (CSCI 3130) - Led labs on Agile/XP practices, including TDD, CI, and unit testing; mentored student teams in Android development with Espresso, Firebase, Google Maps, PayPal, and Google Cloud integrations. Resolved real-world Android and Git debugging issues for students, sharpening their ability to ship working software under deadlines.

Adv. Software Development (CSCI 5308)- Facilitated hands-on labs on TDD, refactoring, and software quality; ran weekly standups to track team progress and delivered targeted, personalised feedback.

Information Retrieval (CSCI 4141) - Taught inverted-index document retrieval, vector-database image retrieval, collaborative-filtering recommender systems, and Retrieval-Augmented Generation (RAG).

Social Computing (CSCI 1107) - Delivered tutorials on MySQL databases, LAMP stack networking, UX prototyping, user-study design, and software evaluation.

Project Courses (CSCI x691) - Managed weekly standups for multiple capstone project groups; provided concrete technical guidance to keep projects on track.

RESEARCH EXPERIENCE - DALHOUSIE UNIVERSITY

Research Assistant | PhD & MSc Researcher, supervised by Prof. Masud Rahman, Jan 2022 – Present

- Designed and evaluated LLM + structured-retrieval pipeline (BugMentor) for answering follow-up questions from software bug reports — published in *Journal of Systems and Software* (2025).
- Applied neural translation models to auto-generate domain term explanations in bug reports, improving duplicate bug detection accuracy — *EASE 2025* (pre-print: arxiv.org/abs/2503.18832).
- Built a multi-agent reinforcement learning simulation of housing market dynamics to study emergent behaviour and RL training challenges — presented at *TRB Annual Meeting 2026, Washington D.C.*
- Developed a topic-modelling + interactive-visualisation tool for analysing evolution patterns across large bug report repositories.
- Undergraduate research on CNN-based cyberbullying detection in social media — published in *Journal of Green Engineering* (2020).

PUBLICATIONS

- [1] Mukherjee U., Rahman M.M. (2025). "BugMentor: Generating Answers to Follow-Up Questions from Bug Reports Using Structured Information Retrieval and Neural Text Generation.." **Journal of Systems and Software, Sep 2025.**
- [2] Mukherjee U., Rahman M.M. (2025). "Understanding the Impact of Domain Term Explanation on Duplicate Bug Report Detection.." **EASE 2025.** Pre-print: arxiv.org/abs/2503.18832
- [3] Mukherjee U., Rahman M.M. (2025). "Housing Market Dynamics in Multi-Agent Simulation: Reinforcement and Deep Reinforcement Learning Approaches.." **TRB Annual Meeting 2026, Washington D.C.**
- [4] Savitha N.J., Vedhitha S., Mukherjee U. et al. (2020). "Cyber Bullying Prediction for Safe Environment in Social Media.." **Journal of Green Engineering, Vol. 10, Issue 9.**

EDUCATION

Doctor of Philosophy — Computer Science | Dalhousie University, Halifax, NS, Jan 2024 – Present

- Focus: Software Engineering, LLMs, Multi-Agent Systems. Supervisors: Prof. Masud Rahman & Prof. Ahsan Habib.

Master of Science — Computer Science | Dalhousie University, Halifax, NS, Sep 2021 – 2023

- Thesis: Complementing Deficient Bug Reports With Missing Information Leveraging Neural Text Generation. Supervisor: Prof. Masud Rahman.

B.Eng. — Computer Science | Visvesvaraya Technological University, India, Aug 2016 – Aug 2020

- Thesis: Cyberbullying Prediction for a Safe Environment in Social Media

AWARDS & SCHOLARSHIPS

- Department Scholarship — Faculty of Computer Science, Dalhousie University (\$4,000) — 2023
- Research Grant — Software Engineering Research, Dalhousie University (\$8,000) — 2022–2023
- Best Semester Project — Internal Assessment Test Question Paper Management System — 2020
- Finalist (Round 3) — Deloitte Techno Utsav National Level Innovation Challenge — 2019