Mohammad Shahriar Hossain

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RESEARCH INTERESTS

Research interests include artificial intelligence and machine learning with a focus on natural language processing, large language models, and computational semantics. Current work explores how large language models represent meaning across languages and how lexical information, such as word senses and semantic relations, can improve interpretability, robustness, and reliability. Ongoing projects involve cross lingual sense projection, multilingual modeling of online polarization, and figurative language detection, with particular attention to low resource languages such as Bengali. More broadly, the goal is to develop methods that improve contextual understanding, reduce bias, and better support multilingual and marginalized language communities in real world NLP systems.

EDUCATION

University of Alberta   Edmonton, AB
B.Sc. Computing Science (Specialization in Software Practice)   *Expected Graduation: Apr 2026*
Relevant Coursework:

- Artificial Intelligence Capstone
- Computational Semantics
- Predictive Business Analytics
- Machine Learning I
- Reinforcement Learning Specialization
- Search and Planning in Artificial Intelligence
- File and Database Management (SQL & MongoDB)
- Software Engineering Specialization
- Computer Architecture I
- Operations Management

WORK EXPERIENCE

Undergraduate Teaching Assistant   Sep 2025 – Present
University of Alberta, Department of Computing Science   *Edmonton, AB*

- Mentor student teams on Agile and Scrum, lead labs and workshops, and help plan and deliver software projects in a collaborative setting.
- Review Git/GitHub work with code reviews, testing, and peer feedback, and support clear communication through stand ups, sprint reviews, and client meetings.

Data Analytics Co-op   Jan 2025 – Present
Nutrien   *Calgary, AB*

- Analyze and visualize health, safety, procurement, and fleet data using Excel, Power Query, Power BI, SQL, and SAP HANA to build reports and dashboards for decision makers.
- Build time series and risk prediction models in Python on AWS SageMaker and work with cross functional teams to improve data pipelines, automate workflows, and align machine learning solutions with business needs.

Software Developer Co-op   May 2024 – Dec 2024
SensiImage Technologies Ltd.   *Edmonton, AB*

- Maintained and extended the company web application across frontend and backend, using cloud infrastructure and basic DevOps practices to keep the product stable and responsive.
- Designed and refined the display module interface and used data cleaning, analysis, and simple predictive models to improve product performance and user experience.

RESEARCH EXPERIENCE

Cross-Lingual Semantics Research with Dr. Greg Kondrak   Sep 2025 - Present
University of Alberta, Department of Computing Science   *Edmonton, AB*

- Build a cross-lingual sense projection pipeline between English and Bengali using word sense disambiguation, machine translation, and word alignment to create semantic resources for a low-resource language.
- Analyze pipeline errors and add Bengali-side WSD, bilingual dictionary filters, and LLM-based checks so that projected senses better match how words are used in context.
- Contribute to SemEval 2026 Task 9 on multilingual online polarization by preparing multilingual datasets and training an ensemble of XLM-R and DeBERTa models to classify polarization level and type.

LLMs and Figurative Language Research with Dr. Alona Fyshe   Sep 2025 - Present
University of Alberta, Department of Computing Science   *Edmonton, AB*

- Compare a multilingual encoder only BERT model and a multilingual LLM on figurative vs literal meaning classification across English, Bengali, Punjabi, Malayalam, and Portuguese.
- Use word sense disambiguation models in the pipeline to see whether adding sense information improves performance for both the BERT model and the LLM.

Academic and Personal Projects

Sense Aware Multilingual Polarization Detection | *XLM R, DeBERTa, WSD*
- Built a two path ensemble with multilingual encoders and sense aware features for POLAR@SemEval 2026 polarization and type classification, improving Macro F1 over lexical and LLM prompting baselines.

Cross Lingual Sense Projection for Bengali | *WSD, MT, Alignment, LLM Filtering*
- Implemented an English to Bengali sense projection pipeline with WSD, machine translation, and alignment, plus staged filters such as target side WSD, a bilingual dictionary, and LLM checks to improve coverage and precision of Bengali sense annotations.

Idiom Idiomaticity Detection (SemEval 2022 Task 2) | *Multilingual encoder, LLMs*
- Fine tuned a multilingual encoder and designed short prompts for instruction tuned LLMs to classify idiomatic vs literal uses of multiword expressions in English and Portuguese, with a shared F1 based evaluation setup.

Edmonton Housing Data Analysis | *SQL, Python, Power BI*
- Developed a Power BI dashboard using SQL and Python cleaned Edmonton housing data to help newcomers filter rentals by price, rooms, size, and community.

Predictive Modeling of Traffic Accidents | *R, ggplot2, dplyr, randomForest*
- Modeled accident severity using weather, road type, and time of day features with KNN, LDA, and Random Forest to support data informed road safety and traffic planning.

Oxygen: Chronic Illness Management App | *React Native, TypeScript, Expo, AI*
- Co developed a cross platform app for chronic illness patients and caregivers with symptom and appointment tracking, a secure medical wallet, caregiver access, and AI assisted medication and diagnosis support.

Co-curricular & Extra-curricular Activities

Communications Director, International Students' Association   Jul 2021 - Apr 2024
University of Alberta   *Edmonton, AB*
- Planned International Students' Day and helped lead advocacy campaigns against international tuition increases.

UAlberta International Volunteer   Mar 2022 - Present
University of Alberta   *Edmonton, AB*
- Supported international students during orientation and transition, guiding them to campus services, programs, and community spaces.

Resident Assistant   Sep 2021 - Apr 2022
Residence Services, University of Alberta   *Edmonton, AB*
- Promoted equity, diversity, and inclusion through weekly check ins, floor events, and community activities.
- Handled student concerns and safety issues such as lockouts, alcohol incidents, first aid, and late night support.

Awards & Scholarships

International Student Scholarship
International Student Scholarship Fund, University of Alberta
- Merit-based scholarship awarded to international undergraduate students demonstrating strong academic performance.

University of Alberta International Country Scholarship
University of Alberta
- Awarded to students on study permits entering the first year of an undergraduate degree with superior academic achievement; selection based on academic standing, with preference for students from University of Alberta target regions.

Achievements & Competitions

1st Place – CMPUT 401 Hackathon: Job application tracker platform   Sep 2024
- Built a job application tracking platform in a short hackathon, using software process and product management practices.

2nd Place – natHACKS 2024: EEG based EMDR therapy aid   Nov 2024
- Co developed an EEG based aid for EMDR inspired therapy, exploring how neurotechnology and ML can support mental health.

PCL x BTMC Case Competition: Interdisciplinary solution design   Oct 2024
- Worked in an interdisciplinary team to design and present a data informed solution to an industry case, combining technical, business, and communication skills.