

Research Statement

My research focuses on building LLM-powered systems that improve human-to-human communication and decision-making in software development. I design human-AI collaborative systems that help stakeholders interpret ambiguity, ask better questions, and make informed decisions. My work aims to reduce barriers between technical and non-expert users across diverse and real-world settings through AI-assisted reasoning and interaction.

Education

Carnegie Mellon University, Software and Societal Systems Department

August 2024 – Present

Ph.D. in Software Engineering; Advised by: Travis Breaux

Pittsburgh, PA

Carnegie Mellon University, Software and Societal Systems Department

August 2024 – Present

Masters in Software Engineering; Cumulative GPA: 4.2/4.0

Pittsburgh, PA

Indraprastha Institute of Information Technology, Delhi

August 2017 – June 2021

B.Tech - Computer Science Engineering; CGPA: 9.10/10.00

New Delhi, India

Research Experience

Requirements Engineering Lab (RELab) at CMU

August 2024 – Present

Graduate Research Assistant

Pittsburgh, PA

- Designing LLM-powered systems to support requirements elicitation, facilitating shared understanding, and reducing miscommunication between diverse stakeholders during early-stage software design.
- Developing retrieval-augmented frameworks for real-time decision support in multi-stakeholder discussions.
- Conducting empirical research to investigate how human-AI collaboration can reduce ambiguity and improve coverage in complex design and requirements processes.

TCS Research

September 2021 – July 2024

Researcher, Data and Decision Sciences Area

New Delhi, India

- Led development of AI systems for legal text understanding and contract analysis, reducing interpretation barriers between legal professionals and non-expert stakeholders through AI-assisted reasoning.
- Designed semi-supervised learning and retrieval-augmented prompting frameworks for ambiguity resolution in contracts, achieving +20% accuracy over open-source baselines.
- Conducted user studies with legal professionals to evaluate how AI systems support decision-making and reduce interpretation barriers.

Multimodal Digital Media Analysis Lab (MIDAS)

January 2020 – June 2021

Undergraduate Researcher

New Delhi, India

- Developed a hybrid rule-based and Transformer-based approach for English grammar error correction (GEC).
- Deployed the solution as a GEC tool for i-Saksham NGO, supporting the education of approximately **2000** underprivileged children in Bihar, India.
- Proposed a synthetic data generation method and built a data-agnostic evaluation framework for Hindi GEC, focusing on linguistic error types.

Indraprastha Institute of Information Technology, Delhi

August 2019 – May 2020

Undergraduate Researcher

New Delhi, India

- Investigated Human Activity Recognition (HAR) in IoT-enabled smart environments, identifying limitations of probabilistic models (e.g., Bayesian networks) in capturing complex feature dependencies.
- Conducted statistical analysis of feature relationships and developed a novel Transformer-based model to improve activity recognition and intent inference.

Refereed Conference Papers

- **Legal Requirements Translation from Law**
Anmol Singhal, Travis Breaux
IEEE International Requirements Engineering Conference (RE) 2025 ([Paper](#)) ([Code](#))
- **Requirements Elicitation Follow-up Question Generation**
Yuchen Shen, Anmol Singhal, Travis Breaux
IEEE International Requirements Engineering Conference (RE) 2025 ([Paper](#)) ([Code](#))
- **From Legal Text to Tech Specs: Generative AIs Interpretation of Consent in Privacy Law**
Aniket Kesari, Travis Breaux, Sarah Santos, Tom Norton, Anmol Singhal
Proceedings of the Twentieth International Conference on Artificial Intelligence and Law (ICAIL) 2025 ([Paper](#))
- **Optimized Domain-Specific Text Processing with Keyword Knowledge Distillation (KKD)**
Momojit Biswas, Anmol Singhal, Preethu Rose Anish
International Joint Conference on Neural Networks (IJCNN), 2025 ([Paper](#))
- **Generating Clarification Questions for Disambiguating Contracts**
Anmol Singhal, Preethu Anish, Chirag Jain, Arkajyoti Chakraborty, Smita Ghaisas
Joint International Conference on Computational Linguistics, Language Resources and Evaluation (LREC-COLING) 2024 ([Paper](#)) ([Code](#))
- **Data is about Detail- An Empirical Investigation for Software Systems with NLP at Core**
Anmol Singhal, Preethu Anish, Pratik Sonar and Smita Ghaisas
IEEE/ACM International Conference on AI Engineering (CAIN) 2022 ([Paper](#))

Refereed Book Chapters

- **Dealing with Data for RE: Mitigating Challenges while using NLP and Generative AI**
Smita Ghaisas, Anmol Singhal
Handbook on Natural Language Processing for Requirements Engineering, Springer-Verlag 2025 ([Chapter](#))

Refereed Workshop Papers

* denotes equal contribution

- **Emergent Role Differentiation in AI-Assisted Requirements Elicitation: A Wizard-of-Oz Pilot Study**
Anmol Singhal*, Jiwoo Bae*, Rose Kimu
Cultivating Effective Human-LLM Collaboration for Collaborative Data Processing Workshop (Co-Data) at CHI 2026
- **Towards Mitigating Unfairness in Contracts from a Non-legal Stakeholder's Perspective**
Anmol Singhal, Preethu Anish, Shirish Karande, Smita Ghaisas
Proceedings of the Natural Legal Language Processing Workshop (NLLP) at EMNLP 2023 ([Paper](#))

Selected Projects

LLM-based Collaborative Brainstorming for Requirements Elicitation

- Built a personality-aware LLM system for real-time brainstorming support in software design discussions.
- Designed and evaluated system using a Wizard-of-Oz study to analyze human-AI collaboration dynamics.

Neuro-Symbolic Translation of Legal Requirements

- Developed a neuro-symbolic pipeline to convert legal text into executable Python code for compliance checking.
- Bridge the gap between legislative language and technical implementation, ensuring legal requirements are accurately reflected in software code.
- Achieved **89.4%** test pass rate on 13 U.S. state laws, outperforming JSON parsing by **30%**.

Program-Aided Reasoning for Language Models

- Proposed a structured reasoning framework using pseudocode to improve argument mining in LLMs.
- Improved accuracy by **28%** over standard chain-of-thought under constrained token budgets.

Awards and Honors

- **Best Artifact Award**, RE 2025 Legal Requirements Translation from Law [[RE'25](#)]
- **Best Paper Runner-Up**, CAIN 2022 Data Requirements in NLP-Centric Software [[CAIN'22](#)]
- **Deans Award for Academic Excellence**, IIT-Delhi, 2019–2021

Teaching Experience

17626 Requirements in Information Systems

Teaching Assistant for a class of 70 graduate students

Carnegie Mellon University

August 2025 – December 2025

CSE343 Machine Learning

Teaching Assistant for a class of 150 senior undergraduate students

IIIT Delhi

August 2020 – December 2020

CSE508 Information Retrieval

Teaching Assistant for a class of 190 senior undergraduate and graduate students

IIIT Delhi

January 2021 – May 2021

Service

Mentorship

- *REU Mentor, Summer 2025*: Supervised undergraduate research on LLM-assisted requirements tools.
- *Student Mentor (2024, 2025)*: CMU Graduate Application Support Program
- *Project Lead at TCS Research*: Supervised two interns and one full-time associate
- *Student Mentor at IIIT Delhi*: Responsible for mentoring 6 freshman students to help them navigate college life

Professional Service

- *Student Volunteer: RE 2025 and NSF DASS Workshop 2024* – Assisted in session organization.
- *Reviewer*: Information & Software Technology Journal (2025), Springer NLP4RE Book.
- *Invited talk at ICON 2022*: Gave a talk on data-related challenges encountered in industry-scale AI projects

University Service

- *Student Representative*: CMU S3D Ph.D. Admissions Committee (2026)
- *Student Representative*: CMU REUSE Admissions Committee (2025)
- *Member, Cultural Committee, IIIT Delhi*: Organized events to bolster student life in campus
- *Member, Event Organizing Team, IIIT Delhi*: Organized a flagship event for Odyssey, Cultural Fest of IIIT Delhi