Shashank Kirtania

Research Fellow, PROSE Team
Microsoft

shashankkirtania123@gmail.com
5hv5hvnk.github.io | GitHub |
LinkedIn | Google Scholar

Education

Thapar Institute of Engineering and Technology 2019 - 2023
Bachelors of Engineering in Computer Engineering

Research Interests

AI for Code, AI for Math, Mechanistic Interpretability of Foundational Models, Neuro-symbolic Reasoning

Experience

Microsoft Research Sep. 2025 – Present
Research Fellow *Bengaluru*
Projects: *AI for Math*

Microsoft, India Sep. 2023 – Sep. 2025
Research Fellow (Predoctoral) with the PROSE group *Remote / Bengaluru*
Projects: StackFeed, MetaReflection, Logic-LM++

Wadhwani AI Jan. 2023 - July 2023
Machine Learning Research Intern *Remote / Bengaluru*
Project: Oral Reading Fluency for Indic languages

Google Summer of Code, PyMC May 2022 - Sep 2022
Open Source Contributor *Remote*
Project: APIs for probabilistic ML models.

Indian Institute of Information Technology June 2021 - May 2022
Research Intern *Remote*
Project: Semi-Compressed Image understanding

Publications And Preprints

C = Conference, W = Workshop, J = Journal

C.1 ***MetaReflection: Learning Instructions for Language Agents using Past Self-Reflections***
Shashank Kirtania*, Priyanshu Gupta*, Ananya Singha*, Sumit Gulwani, Arjun Radhakrishna, Sherry Shi, Gustavo Soares.
Empirical Methods in Natural Language Processing 2024 **[EMNLP'24]**

C.2 ***STACKFEED: Structured Textual Actor-Critic Knowledge Base Editing with Feedback***
Shashank Kirtania*, Naman Gupta*, Priyanshu Gupta, Krishna Kariya, Sumit Gulwani, Arun Iyer, Suresh Parthasarathy, Arjun Radhakrishna, Sriram K. Rajamani, Gustavo Soares
Deep Learning for Code Workshop at NeurIPS 2025 &
Empirical Methods in Natural Language Processing 2025 **[EMNLP'25]**

W.1 ***Activation Steering in Neural Theorem Provers***
Shashank Kirtania, Arun Iyer
FM in Wild Workshop at ICLR, *Under submission at ICLR'26* **[FMWild @ ICLR'25]**

W.2 ***Logic-LM++: Multi-Step Refinement for Symbolic Formulations***
Shashank Kirtania, Priyanshu Gupta, Arjun Radhakrishna.
NL Reasoning and Structured Explanation Workshop at ACL **[NLRSE @ ACL'24]**

W.3 **BREW: Bootstrapping expeRientially-learned Environmental knoWledge**
Shashank Kirtania, Priyanshu Gupta, Param Biyani, Yasharth Bajpai, Roshni Iyer, Sumit Gulwani, Gustavo Soares
Multi-Turn Interactions in LLMs at NeurIPS 2025, *Under Submission at ICLR'26* **[MTI @ NeurIPS'25]**

P.1 **IndiMathBench: Autoformalizing Mathematical Reasoning Problems with a Human Touch**
Param Biyani, **Shashank Kirtania**, Yasharth Bajpai, Sumit Gulwani, Ashish Tiwari
Under submission at ICLR 2026 [preprint]

J.1 ***DWT-CompCNN: Deep Image Classification Network for High-Throughput JPEG2000 Compressed Documents.***
Tejasvee Bisen, M Javed, **Shashank Kirtania**, P Nagabhushan.
Pattern Analysis and Applications Journal **[Springer 2023]**

Selected Projects And Collaborations

Automated Theorem Proving Dec. 2024 - Present
Advisor: Dr. Arun Iyer, Dr. Emiliy First *MSR India*

- **Identified transformer circuits** in LLMs to create activation patches for proof writing style.
- Worked on **formalizing 400+ problems for INMOBench** in lean, and did a mechanical study of LLMs and their failures in autoformalization.
- Working on **Mechanistic interpretability** of LLMs to improve their **ability of mathematical reasoning**.

Automated Code Repair Jan. 2024 – June 2024
Advisor: Dr. Gustavo Soares, Dr. Arjun Radhakrishna *Microsoft PROSE*

- Developed **MetaReflection**, an offline reinforcement learning technique **enhancing language agents by leveraging past failures**, improving performance in code **vulnerability detection**. Published @ EMNLP Main.
- This technique showed significant improvements in low resource programming languages and in distilling capabilities of LLMs into SLMs, It is currently **used by GitHub for secret key detection**. blog from github
- Worked on **fixing component governance issues from alerts for C#** using tool-aided LLM system. Developed Roslyn APIs as tools to improve code understanding for LLMs.
- Worked on **automatic bug reproduction for GitHub issues** in repositories to improve **bug localization** in Python repositories.

Knowledge Learning from LLM Interactions Aug. 2024 – Present
Advisor: Dr. Arun Iyer, Dr. Gustavo Soares *MSR India*

- Developed **STACKFEED**, a multi-agent actor-critic framework for **iterative knowledge base refinement** using expert feedback, enhancing Retrieval-Augmented Generation (RAG) systems by up to 8% over baselines.
- Built pipeline to use compiler feedback to generate edits in knowledge bases for **code migration and generation.**
- Working on learning knowledge bases from interactions of LLM agents on benchmarks like $\tau^2 - bench$, OSWorld.

Language Models for Automated Reasoning Apr. 2024 – Present
Advisor: Dr. Arun Iyer, Dr. Arjun Radhakrishna

- Introduced **Logic-LM++**, a **multi-step refinement framework** leveraging LLMs for symbolic reasoning, achieving significant improvements over existing methods. Published at NLRSE Workshop @ ACL
- Built pipeline to capture **activation vectors** representing natural language reasoning for LLMs. Used this technique to imporve performance on *miniF2F-test* and *PutnamBench*. Published at FM in Wild Workshop @ ICLR.

Automated Repository Code Migration Sep. 2023 – May 2024
Advisor: Dr. Gustavo Soares, Dr. Sumit Gulwani *Microsoft PROSE*

- Built pipeline for using LLMs as pseudo-domain experts that learn from failures to detect code vulnerability.
- Employed novel strategy of automatic instruction learning to optimize performance of LLM agent trajectories.

Autofill for data manipulation Aug 2023
Advisor: Prof. Shalini Batra *github*

- Implemented PBE based approach same as FlashFill, to generate programs from input-output examples in Julia.
- Developed directed acyclic graphs with iterative intersection and unification functions for data process optimization.

Achievements and Position of Responsibilities

- Reviewer at AI4Math workshop at ICML 2025, NeurIPS 2025 and at DL4Code workshop at NeurIPS 2025.
- Volunteer at PLDI 2024, ICLR 2025.
- Positioned **6th nationally among 5000 + teams** in Amazon Machine Learning challenge 2023.
- **Bronze Medal** in American Express Time Series Forecasting Challenge 2022.
- PyData Delhi talk on "Introduction to Probabilistic Programming".
- **Top 5 percentile** in Facebook Hackercup 2020 Qualifiers