Atharv Sonwane

Research Fellow, Microsoft Research

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Research Interests: *Planning & Reasoning, LMs for Code (Generation/Maintenance/Verification), Robotics*

Education

Birla Institute of Technology and Science, Pilani *2018 - 2022*
Bachelor in Engineering, Computer Science. *India*

Experience

Microsoft Research India *Aug 2022 - Present*
Research Fellow | Advisors: Dr. Aditya Kanade and Dr. Sriram Rajamani

- Machine learning and program analysis for software engineering tasks.
- Developed **CodePlan**: a framework for repository-level code tasks that does *planning* and *reasoning* using LLMs and program analysis. Poster at **FMDM at NeurIPS '23**. Accepted at **FSE '24**
- Studied evaluation and ranking of LLM generated rewrites for code-quality issues. Accepted at **FSE '24**

Robot Vision and Learning Lab, University of Toronto *Sept 2021 - Jan 2022*
Research Intern | Advisor: Dr. Florian Shkurti

- Designed and implemented a novel combination of lazy search and learning from experience to tackle task and motion planning (TAMP) problems for tabletop robotics tasks. Published at **ICRA '23**.

TCS Research & Innovation *June 2021 - Sept 2021*
Research Intern | Advisor: Dr. Gautam Shroff

- Studied neuro-symbolic combination of representation learning and search to perform analogical reasoning with images by finding neural programs that represent the analogical concept. Student Poster **AAAI '21**, **NeSy '21**.

APP Centre for Artificial Intelligence Research *Jan 2021 - June 2021*
Undergraduate Researcher | Advisor: Prof Ashwin Srinivasan

- Developed a novel approach to solve visual reasoning (Bongard) problems using program synthesis (Dreamcoder) for representation and Inductive Logic Programming (ILP) for concept identification. **AAIP '21**

Publications

CodePlan: Repository-level Coding using LLMs and Planning
*Ramakrishna Bairi, **Atharv Sonwane**, Aditya Kanade, Vageesh D C, Arun Iyer, Suresh Parthasarathy, Sriram Rajamani, B. Ashok, Shashank Shet*
ACM International Conference on the Foundations of Software Engineering (**FSE**) 2024. Link.
Foundation Models for Decision Making (**FMDM**) Workshop at **NeurIPS** 2023

Policy-Guided Lazy Search with Feedback for Task and Motion Planning
*Mohamed Khodeir, **Atharv Sonwane**, Ruthrash Hari, Florian Shkurti*
International Conference on Robotics and Automation (**ICRA**). 2023. Link.
Best Paper Award at the Long-Horizon Planning Workshop, **CoRL** 2022

Neural Analogical Reasoning
***Atharv Sonwane**, Abhinav Lalwani, Sweta Mahajan, Gautam Shroff, Lovekesh Vig*
International Workshop on Neural-Symbolic Learning and Reasoning (**NeSy**). 2022. Link.

Solving Visual Analogies Using Neural Algorithmic Reasoning
***Atharv Sonwane**, Gautam Shroff, Lovekesh Vig, Ashwin Srinivasan, Tirtharaj Dash.*
Finalist in the Oral Presentation Competition. Student Abstract and Poster Program, **AAAI-22**. Link.

Using Program Synthesis and Inductive Logic Programming to solve Bongard Problems.
Atharv Sonwane*, *Sharad Chitlangia**, *Tirtharaj Dash, Lovekesh Vig, Gautam Shroff, Ashwin Srinivasan.*
International Workshop on Approaches and Applications of Inductive Programming (**AAIP**) 2021. Link.

Frustrated with Code Quality Issues? LLMs can Help!
Nalin Wadhwa, Jui Pradhan, ***Atharv Sonwane****, Surya Prakash Sahu, Nagarajan Natarajan, Aditya Kanade, Suresh Parthasarathy, Sriram Rajamani*
ACM International Conference on the Foundations of Software Engineering (**FSE**) 2024. Link.

Selected Engineering Projects

AutoFill.jl | Julia library for data manipulation | CODE
Implemented FlashFill program synthesis for tabular data analysis during Google Summer of Code (GSoC) 2022

GenRL | PyTorch Reinforcement Learning Library | CODE
Contributed implementations of Deep Contextual Bandits along with distributed RL support using RPC.

Trotbot | Autonomous Delivery Robot | CODE
Built stack for obstacle detection and path planning with RRT variants using Robot Operating System (ROS).

GenNav | Python library for Robotics Navigation | CODE
Implemented navigation algorithms and utilities commonly used in Robotics with a ROS wrapper

Other Roles

Reviewing

- FMDM Workshop @ NeurIPS 2023

Teaching

- Meta Learning (BITS G513): Conducted tutorials for graduate level course taught by Dr Gautam Shroff
- Deep Learning (CS F425): Conducted weekly labs and tutorials for first instance of the course.
- Machine Learning (BITS F464): Conducted weekly labs and organised final project for course taught by Prof Ashwin Srinivasan
- Discrete Structures for Computer Science (CS F222): Mentored undergraduate students in weekly tutorials.
- Instructor for Student Run Courses on Robotics and Deep Learning

Leadership

- Hardware Lead @ Curem Biotech: Designed and wrote firmware for blood sample imaging device with ML integration. Raised pre-seed funding worth $10,000 for diagnosis of Neglected Tropical Diseases
- Lead Organiser of APPCAIR AI Symposium 2021: Organised an event with 500+ attendees aimed at bringing together the AI community in India.
- President of the Society for Artificial Intelligence and Deep Learning: Organising research, open-source projects and student-run courses for a group of undergraduates interested in AI.
- Student Coordinator of the Electronics and Robotics Club: Organising research, funding and discussion sessions for 100+ undergraduates interested in Robotics.

Relevant Coursework

Meta Learning (*graduate level, ranked first*), **Machine Learning** (*ranked second*), **Artificial Intelligence**.

Technical Skills

Programming	Python, Julia, C/C++, MATLAB, SQL, Bash
Deep Learning	PyTorch, NumPy, JAX, pandas, scikit-learn
Robotics	Robot Operating System (ROS), Gazebo, MAVROS, PX4