Atharv Sonwane

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Research Interests

⋆ Robotics ⋆ Neurosymbolic AI ⋆ Meta Learning ⋆ Task and Motion Planning ⋆ Reinforcement Learning
⋆ Cognitive Science ⋆ Program Synthesis ⋆ Automata Theory ⋆ Hierarchical Learning ⋆ Distributed Systems

Education

⋆ **Birla Institute of Technology and Science, Pilani** *2018 - 2022 (Expected)*
Bachelor in Engineering, Computer Science. CGPA = 8.76 / 10 *Goa, India*

Publications

2. **Atharv Sonwane**, Gautam Shroff, Lovekesh Vig, Ashwin Srinivasan, Tirtharaj Dash. Solving Visual Analogies Using Neural Algorithmic Reasoning. In *AAAI-22 Student Abstract and Poster Program*. Link

1. **Atharv Sonwane***, Sharad Chitlangia*, Tirtharaj Dash, Lovekesh Vig, Gautam Shroff, Ashwin Srinivasan. Using Program Synthesis and Inductive Logic Programming to solve Bongard Problems. As a *Work in Progress Report* at the *10th International Workshop on Approaches and Applications of Inductive Programming*. Link

Experience

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

- ▷ Developing a task and motion planning approach for robotic arms that integrates learning from experience.

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

- ▷ Investigated the use of neural algorithmic approach to perform analogical reasoning in a visual domain.
- ▷ Demonstrated that search over learned neural primitives can perform equivalently to symbolic ones.

⋆ **APP Centre for Artificial Intelligence Research & TCS Research** | **WEB** *Jan 2021 - June 2021*
Undergraduate Researcher | Primary Advisor: Prof Ashwin Srinivasan

- ▷ Developed an Inductive Programming approach to solve visual reasoning problems using program synthesis for representation and ILP for concept identification.
- ▷ Contributed to a project on automaton augmented reinforcement learning

⋆ **Centre of Robotics and Machine Intelligence IIIT Allahabad** | **WEB** *Summer 2020*
Research Intern | Advisor: Prof G.C. Nandi

- ▷ Implemented and tested performance of various Deep RL algorithms from scratch in PyTorch

⋆ **Council of Scientific and Industrial Research - CERRI** | **WEB** | **CODE** *Summer 2020*
Research Intern | Advisors: Samarth Singh and Dr. Rakesh Warier

- ▷ Built a drone controller module and OpenAI Gym Environment on top of the MAVROS and PX4 frameworks

Technical Skills

Programming	C/C++, Python, Julia, Java, MATLAB, SQL, Bash
Deep Learning	PyTorch, Tensorflow, Keras, NumPy, JAX, scikit-learn, pandas, Matplotlib
Robotics	Robot Operating System (ROS), rViz, Gazebo, MAVROS, PX4, Raspberry Pi
Tools	Git, LaTeX , Unix, TravisCI, AutoCAD, Qiskit

Selected Projects

⋆ **GenRL | PyTorch Reinforcement Learning Library | CODE** *June 2020 – Jan 2021*
Society for Artificial Intelligence and Deep Learning (SAiDL)

- ▷ Contributed implementations of various Deep Contextual Bandits
- ▷ Core Maintainer and worked on implementation of distributed RL using RPC

⋆ **Trotbot | Autonomous Delivery Robot | CODE** *Sep 2018 – Dec 2020*
Electronics and Robotics Club, BITS Goa (ERC)

- ▷ Built obstacle detection and path planning stack using Robot Operating System (ROS) in Python
- ▷ Implemented Rapidly Exploring Random Trees (RRT) for path planning in complex indoor environments

⋆ **GenNav | Python library for Robotics Navigation | CODE** *March 2020 – Dec 2020*
Electronics and Robotics Club, BITS Goa (ERC)

- ▷ Co-author and Lead Maintainer working with a team of 10+ student contributors
- ▷ Modular collection of navigation algorithms and utilities commonly used in Robotics with a ROS wrapper

⋆ **Causal Reasoning from Meta-Reinforcement Learning Exploration | CODE** *March 2021 - May 2021*
Meta Learning Course Project

- ▷ Implemented methods described in the paper and reproduced results on various experiments.
- ▷ Devised, performed and documented additional experiments to futher evaluate the central claim that Meta RL agents can performs Causal Inference.

⋆ **Structure and Inductive Biases in Reinforcement Learning | CODE** *July 2020 – Dec 2020*

- ▷ Implemented methods which used graph representations in RL to explore structural inductive biases

Teaching and Leadership Roles

⋆ **Teaching Assistant - Deep Learning (CS F425) | WEB** *Aug 2021 – Present*

- ▷ Conducting weekly labs and tutorials for course taught by Prof Tirtharaj Dash

⋆ **Teaching Assistant - Machine Learning (BITS F464) | WEB** *Jan 2021 – May 2021*

- ▷ Conducted weekly labs and organised course project for course taught by Prof Ashwin Srinivasan

⋆ **Teaching Assistant - Discrete Structures for Computer Science (CS F222)** *Aug 2020 – Dec 2020*

- ▷ Mentored undergraduate students in weekly problem solving sessions for course taught by Prof AB Matthews

⋆ **Organising Co-Lead - APPCAIR AI Symposium 2021 | WEB** *October 2021*

- ▷ Organised an event with 500+ attendees aimed at bringing together the AI community in India. Included a social along with talks from a mix of senior researchers and early career practitioners in the field of AI.

⋆ **President - Society for Artificial Intelligence and Deep Learning | WEB** *June 2021 – Present*

- ▷ Organising research, open-source projects, student-run courses and regular reading sessions for a group of talented undergraduates interested in AI

⋆ **Student Coordinator - Electronics and Robotics Club | WEB** *Aug 2020 – July 2021*

- ▷ Organising research projects, funding, work exhibitions and holding regular discussion sessions for a large (100+) group of undergraduates interested in Robotics

⋆ **Instructor for Student Run Courses on Robotics and Deep Learning** *April 2020 – Dec 2020*

⋆ **Committee Member - SandBox Innovation Laboratory | WEB** *Aug 2020 – Aug 2021*

Relevant Coursework

Meta Learning$^{\#*}$, **Machine Learning**, **Artificial Intelligence**, Linguistics, Probability and Statistics, Graphs and Networks, Theory of Computation, Data Structures and Algorithms, Linear Algebra, Calculus, Object Oriented Programming, Computational Physics, Quantum Informatics and Computing

= graduate level, * = ranked as top student