

Atharv Sonwane

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RESEARCH INTERESTS

★ Reinforcement Learning ★ Causality ★ Geometric and Structured DL ★ Robotics ★ Autonomous Navigation
★ Computational Cognition ★ Meta Learning ★ Machine Perception ★ Hierarchical Learning

EDUCATION

★ **Birla Institute of Technology and Science, Pilani** Aug. 2018 - Present
Bachelor in Engineering (Hons.), Computer Science. CGPA = 8.86 / 10
Goa, India

EXPERIENCE

- ★ **Research Intern - Reinforcement Learning for Robotics** *Summer 2020*
Centre of Robotics and Machine Intelligence, IIIT Allahabad | Advisor: **Prof G.C. Nandi**
- ▷ Explored how Deep Reinforcement Learning algorithms can be used for robotics in a simulated setting
 - ▷ Implemented and tested performance of various algorithms from scratch in PyTorch
- ★ **Research Intern - Reinforcement Learning for Drone Automation** *Summer 2020*
CSIR - CEERI | Advisors: **Samarth Singh** and **Dr. Rakesh Warier** | **CODE**
- ▷ Applied Deep Q learning to navigation of autonomous quadcopters. A live depth-map feed was taken as input to generate movement commands for the drone
 - ▷ Built a controller on top of the MAVROS framework and simulated the learning process using PX4 and PX4 SITL.
- ★ **Prediction of Ionospheric Scintillation** *Jan 2020 – May 2020*
Digital Communications Lab, BITS Goa | Advisors: **Abhijit Dey** and **Dr. Nitin Sharma**
- ▷ Analysis and forecasting of GNSS (Global Navigation Satellite System) signals to learn more about disturbances due to ionospheric activity using Deep Learning
 - ▷ Implemented LSTM based models in tensorflow for both prediction and classification of ionospheric time series data

PROJECTS

- ★ **GenRL | PyTorch Reinforcement Learning Library** *June 2020 – Present*
Society for Artificial Intelligence and Deep Learning (SAiDL) | **CODE**
- ▷ Collection of SOTA algorithms in Deep and Classical RL along with various utilities
 - ▷ Contributed implementations of various Deep Contextual Bandits
 - ▷ Core Maintainer and currently working on implementation of distributed RL
- ★ **Structure and Inductive Biases in Reinforcement Learning** | **CODE** *July 2020 – Present*
- ▷ Investigating how inductive biases are incorporated in various ML algorithms
 - ▷ Implemented methods which used graph representations in RL to explore structural inductive bias
- ★ **Causality in Reinforcement Learning** | **CODE** *July 2020 – September 2020*
- ▷ Experimentation with integrating causal factors in RL algorithms for better performance in medical settings.
- ★ **GenNav | Python library for Robotics Navigation** *March 2020 – Present*
Electronics and Robotics Club, BITS Goa (ERC) | **CODE**
- ▷ Co-author and Lead Maintainer
 - ▷ Collection of navigation algorithms and utilities commonly used in Robotics
 - ▷ The library aims to be completely modular and have a unified API so that it is use-able in a broad range of applications and easily extensible to new robotics domains

- ★ **Oneshot Classification using Transfer Learning** | **CODE** Aug 2019
 - ▷ Used transfer learning techniques to improve performance of a Siamese network for one shot learning on the Omniglot dataset.
- ★ **Deep Q Learning for Atari Environments** | **CODE** Aug 2019
 - ▷ Experimented with using Double DQN algorithm to play Pong and Pacman gym environments.
- ★ **Spoken Digit Classification** | **CODE** Dec 2019
 - ▷ Trained a CNN to classify audio clips of spoken digits encoded with a Short Time Fourier transform.
- ★ **Robotic Sketcher** | **WEB** Jan 2020
 - ▷ Created an automated sketching machine to produce visually appealing sketches from images as a display.
- ★ **Trotbot** | *Autonomous Delivery Robot* Sep 2018 – Present
Electronics and Robotics Club, BITS Goa (ERC) | **CODE**
 - ▷ 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

MENTORING AND LEADERSHIP ROLES

- ★ **Teaching Assistant - Discrete Maths for Computer Science** Aug 2020 – Present
Dept. CS and IS, BITS Pilani, Goa
 - ▷ Mentor undergraduate students in weekly problem solving sessions for course taught by Prof AB Matthews
- ★ **Chief Coordinator** Aug 2020 – Present
Electronics and Robotics Club, BITS Goa (ERC)
 - ▷ Leading a large group of undergraduates interested in Robotics
 - ▷ Organising research projects, displays, funding and holding regular discussion sessions
- ★ **Core Member** Aug 2020 – Present
Society for Artificial Intelligence and Deep Learning (SAiDL)
 - ▷ Involved in research projects, teaching introductory courses, and discussion sessions on AI and deep learning
- ★ **Instructor - Deep Learning** Aug 2020 – Present
Center for Technical Education (CTE)
 - ▷ Instructing and mentoring undergraduate students in an introductory and implementation oriented course on Deep Learning
- ★ **Instructor - Robotics and Automation** April 2020 – Present
Center for Technical Education + Quark Summer Technical Project | **MATERIAL**
 - ▷ Mentored and created reference material for over 100 undergraduate students in introductory ROS, Control Theory, Motion Planning and how to use them in Robotics Automation

TECHNICAL SKILLS

Programming	Python, Java, C++, C, MATLAB, Rust, Bash
Tools	Git, L ^A T _E X, Unix, TravisCI, Vim, AutoCAD, Qiskit
Deep Learning	PyTorch, Tensorflow, Keras, NumPy, pandas, Matplotlib
Robotics	Robot Operating System (ROS), rViz, Gazebo, MAVROS, PX4, Raspberry Pi

RELEVANT COURSES

Machine Learning^{*}, Graphs and Networks, Probability and Statistics, Linear Algebra, Data Structures and Algorithms, Computational Physics, Object Oriented Programming, Quantum Informatics and Computing, Digital Design, Calculus, **Convolutional Neural Networks for Visual Recognition**[†] (Stanford CS231n), **Deep Reinforcement Learning**[†] (UC Berkley CS285)

* = ongoing, † = online