

# Atharv Sonwane

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## RESEARCH INTERESTS

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★ Reinforcement Learning ★ Causality ★ Geometric and Structured DL ★ Robotics ★ Autonomous Navigation  
★ Cognitive Science ★ Meta Learning ★ Machine Perception ★ Hierarchical Learning ★ Distributed Systems

## EDUCATION

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

## TECHNICAL SKILLS

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

## EXPERIENCE

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- ★ **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

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- ★ **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 using RPC
- ★ **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

- ★ **GenNav | Python library for Robotics Navigation** *March 2020 – Present*  
*Electronics and Robotics Club, BITS Goa (ERC) | [CODE](#)*
  - ▷ Co-author and Lead Maintainer working with a team of 10+ student contributors
  - ▷ Modular collection of navigation algorithms and broad range utilities commonly used in Robotics with unified API
  - ▷ Developing a ROS wrapper to enable easy integration into real world robotics systems
- ★ **Causality in Reinforcement Learning | [CODE](#)** *July 2020 – September 2020*  
 ▷ Experimentation with integrating causal factors in RL algorithms for better performance in medical settings.
- ★ **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

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- ★ **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 (100+) group of undergraduates interested in Robotics. Organising research projects, funding, work exhibitions 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 for Student Run Courses** *April 2020 – Dec 2020*  
*Center for Technical Education + Quark Summer Technical Project*
  - ▷ Mentored and created reference material for introductory courses in Robotics and Deep Learning
- ★ **Core Member** *Aug 2020 – Present*  
*SandBox Innovation Laboratory ([Link](#))*

## RELEVANT COURSES

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**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** <sup>†</sup> (Stanford CS231n), **Deep Reinforcement Learning** <sup>†</sup> (UC Berkeley CS285)

<sup>†</sup> = online