

Ashwin Shenai

Education

- Present **M. Sc. Computer Science** | *ETH Zürich*
Sep 2023 MAJOR: Machine Intelligence, MINOR: Information Security
- May 2022 **B. Tech. Electrical Engineering** | *IIT Kanpur* **CPI: 9.7/10**
- Jul 2018 MINORS: Machine Learning & Applications · Algorithms · Computer Systems
Key Courses: Probability and Statistics, Linear Algebra, Introduction to Machine Learning, Optimization for Big Data, Reinforcement Learning, Design and Analysis of Algorithms, Randomized Algorithms, Control Systems Analysis, Operating Systems, Embedded and Cyber-Physical Systems, Digital Signal Processing

Publications

- 2023 **Proximal Algorithms for Smoothed Online Convex Optimization with Predictions**
arXiv *Spandan Senapati, Ashwin Shenai, Ketan Rajawat* | IEEE Transactions on Signal Processing
Devised proximal gradient algorithms to solve both differential and non-differential convex optimization problems involving stage costs, switching costs and a finite lookahead window of predictions. The proposed algorithms provably demonstrate better performance over existing algorithms applied on tasks such as smoothed regression and dynamic trajectory tracking at comparable computational cost.

Work Experience

- Aug 2023 **Data & Applied Scientist** | *Microsoft India (R&D) Pvt. Ltd.*
- Jul 2022 Ads Relevance and Revenue (for International Markets)
Focused on bringing state-of-the-art dense information retrieval techniques into production. Revamped, restored and extended offline retrieval pipelines to operate with billions of user queries and serve advertiser demand across 100+ countries and 14+ languages, providing 8% revenue gains across the year. Orchestrated an offline evaluation suite covering all major languages and markets from scratch, vastly improving the iteration time for online retriever improvements and reducing A/B testing load. Trained a new multilingual dense retriever that demonstrated significant performance gains, culminating in the deprecation of an ensemble of dense & sparse retrievers in production without any revenue losses.
- Mar 2023 **Autonomy Intern** | *CDSpace Robotics Pvt. Ltd.*
- Oct 2022 Helped develop learning-based computer vision algorithms to impart target identification, image stabilization and state-of-the-art object tracking capabilities for VTOL aircraft.

Awards

- 2022 **Proficiency Prize** | *Department. of Electrical Engineering, IIT Kanpur*
For the best undergraduate project work amongst all graduating students.
- 2022 **Science and Technology Excellence Award** | *Students' Gymkhana, IIT Kanpur*
For exceptional performance in technical extracurricular activities pursued through the Gymkhana.
- 2022, **Academic Excellence Award** | *IIT Kanpur*
- 2019, 2020 Awarded to the top 10% students every academic year.
- 2021 **Gold Medal, BOSCH's Traffic Sign Recognition Challenge** | *9th Inter IIT Tech Meet*
- 2019 **Gold Medal, DRDO SASE's UAV Fleet Challenge** | *8th Inter IIT Tech Meet*
- 2016 **Kishore Vaigyanik Protsahan Yagna Fellowship (KVPY)** | *DST, Govt. of India*
Awarded to 847 students to encourage a research career in science.

Selected Projects

- 2022 **RL-based Congestion Control** | *Course Project, RL for Communication Networks*
📄 Slides Extensively surveyed literature covering state-of-the-art approaches to Internet Congestion Control. Implemented Aurora, an RL-based congestion control algorithm and comparatively studied its performance of with different RL algorithms and reward functions.
- 2021 **StackExchange Miner** | *Course Project, Data Mining*
📄 Slides Built a framework to analyse, derive and present insights from the data dumps of any StackExchange forum. Analysed temporal trends in site activity using event log data, used MapReduce to summarize text data, built a tag prediction engine to predict and classify new questions using supervised learning.
- 2021 **BOSCH's Traffic Sign Recognition Challenge** | *9th Inter IIT Tech Meet, IIT Guwahati*
📄 Slides Developed the backend ML framework for a dataset augmentation and model improvement UI. Trained a highly compact DeepCNN model (MicronNET) on the GTSRB benchmark, then implemented incremental learning to incorporate new classes. Experimented with XAI techniques to visualize and interpret model failures.
- 2020 **Wind Farm Layout Optimization** | *Shell.ai Hackathon*
🐙 GitHub Implemented Particle Swarm Optimization and Simulated Annealing with provided wind pattern data. Placed in the Top 5% of over 1500 teams in determining optimal placement of wind turbines in a field.
- 2020 **SDF Planning Library** | *Aerial Robotics IITK*
🐙 GitHub Implemented an A* planner on the sparse graph generated from ESDFs for real-time path planning in a known environment. Explored frontier-based navigation for autonomous exploration of unknown environments using TSDFs.
- 2019 **DRDO SASE's UAV Fleet Challenge** | *8th Inter IIT Tech Meet, IIT Roorkee*
📄 Slides Engineered a fleet of MAVs capable of collaboratively surveying a 1600 sq.m. grass field to locate green boxes. Won the sole Gold Medal amongst 20 participant teams, achieving a perfect score (400/400) and a special mention.
- 2019 **International Micro Aerial Vehicle Challenge 2019** | *Madrid, Spain*
📄 Report Implemented a floodfill-based vision algorithm for the detection of multiple differently coloured mailboxes within a drone camera frame, and then applied visual servoing for the delivery of packages into the detected mailboxes. Amongst the top 15 student teams internationally to qualify for the competition, only student team from India.

Extracurriculars

- 2022 **Associate Head (Technical)** | *Science & Technology Council, IIT Kanpur*
Led a 3-tier team of 600+ students, supervising the technical activities of all the clubs and societies under the council, spanning varied domains.
- 2022 **Contingent Leader, IIT Kanpur** | *10th Inter IIT Tech Meet*
Led the participation for the Institute in the annual tech meet, overseeing 100+ participants in solving problems posed by corporations across varied technical areas. Second place finish.
- 2021 **Students' Senate Nominee** | *EE Departmental Undergraduate Committee*
Representing the opinions of 500+ students on resolutions proposed by the committee to solve students' issues & advising students on the curriculum.
- 2020 **Team Head** | *Aerial Robotics IITK*
As a leader of the Institute student team for Aerial Robotics, participated in international aerial robotics competitions, IMAV 2019 & IARC 2021 with a team of 15 members.
- 2019 **Secretary** | *Robotics Club IITK*
Designed and delivered a workshop and lecture series on ROS to a cohort of complete beginners. Organized various events, workshops, and competitions for robotics enthusiasts in the university.