Debjoy **Saha**

Aspiring Researcher · Engineering Student

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"Optimism in the face of Uncertainty"

Summary

Engineering Student in his 3rd year at IIT Kharagpur and an Aspiring researcher. A sincere and dedicated student. Super interested in Artificial Intelligence. Past experience working with Natural Language Processing, Computer Vision and Robotics. Currently exploring Reinforcement Learning and Control. Beginner-level grasp over topics in Electronics and Communications.

Education

Indian Institute of Technology, Kharagpur — *Kharagpur, India*

B.Tech+M.Tech(Dual Degree) in Electronics and Electrical Communication with a minor in Computer Science — *Mar. 2018 - Present*

- Cumulative Grade Point- **9.32/10.0** after 5 semesters

Kendriya Vidyalaya — *New Delhi, India*

Higher Secondary — *Mar. 2016 - Mar. 2018*

- Qualified AISSC Examination with a percentage of **97.4%**

Skills

Programming Languages Python, C++, C, MATLAB

Relevant Coursework Natural Language Processing, Image Processing, Algorithms, Reinforcement Learning*, AI for Robotics*

Work Experience

Complex Networks Research Group(CNERG) — *Kharagpur, India*

Research Intern — *Feb. 2020 - Present*

- Worked under Prof. Animesh Mukherjee on a multimodal deep learning project.
- Developed models capable of recognising hateful content in memes, with image and text context.
- Developed UI tools for studying and analyzing hateful content.

Aerial Robotics Laboratory, IIT Kharagpur — *Kharagpur, India*

Software and AI Team Member — *Mar. 2019 - Present*

- Responsible for seamless functioning of the research group under the guidanace of Prof. Somesh Kumar, IIT Kharagpur.
- Developed various image processing tools for object recognition and image understanding using OpenCV.
- Worked on SLAM, Localisation, Path-Planning and State estimation for aerial robots using sensor(LIDAR, camera) data in ROS framework.

Honors & Awards

Competitions

2020	**11th Rank**, out of total 3173 participants, Hateful Memes Detection challenge, NeurIPS	*Vancouver, Canada*
2019	**Winners**, among 14 teams from 11 countries, IMAV-2019 Indoor Competition	*Madrid, Spain*
2020	**Finalist**, Top 3 out of a total 80 Qualifying teams, Flipkart GRID 2.0 Robotics Track Competition	*Bangalore, India*
2019	**Gold Medal**, among total 20 teams, Inter-Hall Data Analytics Competition	*IIT Kharagpur, India*

Academic

2018	**1155th Rank / 2.5L students**, JEE Advanced Examinations	*India*
2018	**983rd Rank / 14L students**, JEE Mains Examinations	*India*
2018	**452nd Rank / 50K students**, KVPY-SX Fellowship Examinations	*IISC, India*
2017	**375th Rank / 50K students**, KVPY-SA Fellowship Examinations	*IISC, India*
2017	**Qualified**, RMO(Regional Mathematics Olympiad)	*New Delhi, India*
2016	**Qualified**, NTSE(National Talent Search Examination)	*NCERT, India*
2016	**24th Rank**, National Science Olympiad	*SOF, India*

Projects and Research

Drone Racing Optimisation
Aerial Robotics Lab, IIT Kharagpur

Researcher — *Jun. 2020 - Present*

- Work done as a part of Drone-Acharya Team, IIT Kharagpur for the Flipkart GRID-2.0 Robotics Track Competition: Autonomous Indoor Drone.
- Working on an Imitation-Learning based algorithm for fast Quadrotor trajectory planning using DAGGER.
- Deployed expert minimum-snap trajectory generation on a custom environment built on Unreal Engine using Microsoft AirSim Simulator.
- Currently, Drone-Acharya is among the top 3 finalists out of total 80 qualifying teams in the ongoing competition.

Detection of Hateful Memes in Social Media
CNERG, IIT Kharagpur

Research Intern — *Feb. 2020 - Present*

- Ranked 11th/3173 participants in NeurIPS-2020 challenge: Hateful Memes Detection, organised by Facebook AI.
- Performed Pretraining and Finetuning of cutting-edge Multimodal Attention-based models like Visual-BERT and Concat-BERT.
- Experimented with different weak-supervised and self-supervised training techniques like negative supervision.
- Performed model calibration using Monte-Carlo Dropout Technique.

Warehouse Inventory Management using UAVs
Aerial Robotics Lab, IIT Kharagpur

Researcher — *Jun. 2019 - Oct. 2019*

- Developed an algorithm for autonomous warehouse inventory management using UAVs for the 11th International Micro Aerial Vehicles competition and conference(IMAV-2019).
- Developed the OCR tools and for accurate detection of alphanumeric codes using google's Tesseract library and QR-codes using Zbar library for inventory management of boxes in a warehouse, obtaining 96% detection.
- Devised a traversal algorithm using coloured frames for localisation on a DJI-Tello microdrone.
- This project won us the first place in IMAV among 14 teams from across 11 countries, which also made us the first team from India to ever win at IMAV. A paper on our text detection algorithm was presented at IMAV-2019 conference.

Detection of Camouflaged Objects using Quadrotor
IIT Kharagpur

Researcher — *Dec. 2019*

- Worked done as part of the IIT Kharagpur Technology team for the 8th Inter-IIT Tech Competition.
- Developed a ROS-integrated camera-based detection module for a search-and-rescue quadrotor.
- Developed an algorithm capable of detection and tracking of camouflaged objects in real-time from heights ranging from 2 to 10 metres.

Publications

Warehouse Management Using Real-Time QR-Code and Text Detection
Madrid, Spain

11th International Micro Aerial Vehicles competition and conference, 2019 — *Oct. 2019*

- Development of the computer vision tools for efficient inventory management of packages in a warehouse.

Talks

Self-Supervised and Weak-Supervised Techniques to improve Hateful Memes Detection
Vancouver, Canada

Hateful Memes Challenge Session, 34th Conference on Neural Information Processing Systems(NeurIPS), 2020 — *Dec. 2020*

- Discussed various techniques to improve classification of memes using multimodal BERT models

Extracurricular Activity

Student Welfare Group
IIT Kharagpur, India

Mentor — *Dec. 2020 - Present*

- Guiding first year students from the dept. of Electronics and ECE through the online semester, and helping them navigate through academics and extra-curriculars at IIT Kharagpur.

Hall Tech Team - Software
Patel Hall, IIT Kharagpur, India

Vice-Captain — *Sept. 2020 - Present*

- Leading hall tech team to winning positions in the General Championships at IIT Kharagpur.

Winter School of AI and Robotics
IIT Kharagpur, India

Mentor — *Dec. 2019*

- Mentored over 50 first and second year students in the Computer Vision workshop under IEEE Winter School of AI and Robotics organized by Technology Robotix Society in association with Centre for Artificial Intelligence, IIT Kharagpur.
- Subjects covered were basic spatial image processing, basics of path planning and blob detection algorithms.

Hall Band
Kharagpur, India

Keyboardist — *Jul. 2018 - Mar. 2019*

- Qualified Trinity College Keyboard grade-2 and grade-4 practical examinations with scores of 84 and 73 respectively.
- Played accompaniment pieces for multiple band performances across different genres.