# Debjoy Saha

Aspiring AI Researcher · Engineer

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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 Agent Modelling. Beginner grasp over topics in Electronics and Communications. Looking for research internship opportunities in AI for the summer of 2021.


## 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 textual context.
- Debiased model predictions for equitable prediction across different communities.
- Developed UI tools for studying and analyzing hateful content.

### Aerial Robotics Laboratory, IIT Kharagpur

*Kharagpur, India*

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

- Responsible for seamless functioning of the research group within institutional policies.
- Developed various image processing tools for object recognition and image understanding using OpenCV.
- Optimised Optical Character Recognition using Google's Tesseract OCR library for warehouse inventory management using UAVs.
- Worked on SLAM, Localisation, Path-Planning and State estimation for aerial robots using sensor(LIDAR, camera) data in ROS framework.

### IIT Kharagpur Technology Team

*Kharagpur, India*

Support Team Member — *Dec. 2019*

- Part of the technology team from IIT Kharagpur to participate in the 8th Inter-IIT Tech Meet, IIT Roorkee.
- Worked on computer vision tools for quadcopter based search and rescue missions.

### Winter School of AI and Robotics

*Kharagpur, India*

Mentor — *Dec. 2019*

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

## Honors & Awards

### International

| | | |
|---|---|---|
| 2020 | **18th* Rank**, Hateful Memes Detection challenge, NeurIPS | *Vancouver, Canada* |
| 2019 | **Winners**, International Micro Aerial Vehicles(IMAV-2019) Indoor Competition | *Madrid, Spain* |

### Domestic

| | | |
|---|---|---|
| 2020 | **Finalist***, Flipkart GRID 2.0 Robotics Track Competition | *Bangalore, India* |
| 2019 | **Gold Medal**, Inter-Hall Data Analytics Competition | *IIT Kharagpur, India* |

### Academic

| | | |
|---|---|---|
| 2018 | **1155th Rank**, JEE Advanced Examinations | *India* |
| 2018 | **983rd Rank**, JEE Mains Examinations | *India* |
| 2018 | **452nd Rank**, KVPY-SX Fellowship Examinations | *IISC, India* |
| 2017 | **375th Rank**, 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 learning algorithm for fast Quadrotor trajectory planning using DAGGER.
- Fully deployed an expert minimum-snap trajectory generation algorithm on Microsoft AirSim Simulator on a custom warehouse environment built on Unreal Engine.
- Currently, Drone-Acharya among the top 3 finalists in the ongoing competition.

### Detection of Hateful Memes in Social Media
*CNERG, IIT Kharagpur*

Research Intern — *Feb. 2020 - Present*

- Participated in NeurIPS-2020 challenge: Hateful Memes detection, organsed by Facebook.
- Performed Pretraining and Finetuning of cutting-edge Multimodal Attention-based models like Visual-BERT and Concat-BERT.
- Experimented with different dataset augmentations and training techniques like negative supervision.
- Improved model performance across different target communities by adding knowledge embeddings during training.
- Performed model calibration using Monte-Carlo Dropout Technique.

### Warehouse Inventory Management using UAVs
*Aerial Robotics Lab, IIT Kharagpur*

Researcher — *Jun. 2019 - Oct. 2019*

- Developed a algorithm for autonomous warehouse inventory management using UAVs for the 11th International Micro Aerial Vehicles competition and conference(IMAV-2019).
- Developed the OCR tools 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.
- Devised a traversal algorithm using coloured frames for localisation, for performing the complete inventory in minimum time on a DJI-Tello microdrone.
- This project won us the first place in IMAV and a paper on our text detection algorithm was presented at IMAV-2019 conference.

### Detection of Camouflaged Objects using Quadrotor
*IIT Kharagpur*

Researcher — *Dec. 2019*

- Developed 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.
- Used HSV colour space based preprocessing to ensure good performance irrespective of weather conditions.

## 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.
- Modified algorithm implementation deployed in IMAV-2019 Indoor Competition.

## 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- 9.34/10.0 after 4 semesters

### Kendriya Vidyalaya
*New Delhi, India*

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

- Qualified AISSCE Examination with a percentage of 97.4%

## Extracurricular Activity

### Hall Band
*Kharagpur, India*

Keyboardist — *Mar. 2018 - Mar. 2019*

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

### Hall Tech Team
*Kharagpur, India*

Data Analyst — *Mar. 2018 - Mar. 2019*

- Participated and won in Inter-Hall Data-Analytics Competition-2018.
- Did some data visualisations and feature engineering.