

# ANIRBAN SANTARA

## Artificial Intelligence Researcher, Ph.D. Student

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## RESEARCH EXPERIENCE

### Google India Ph.D. Fellow

#### Indian Institute of Technology, Kharagpur

July 2015 – Ongoing Kharagpur, India

- Dissertation Topic: Deep Reinforcement Learning for Safe Planning in Autonomous Driving
- Advisors: Prof. Pabitra Mitra, Prof. Balaraman Ravindran
- Sponsor: Google India

### Graduate Research Intern for Autonomous Driving

#### Parallel Computing Lab – Intel Labs

Jan 2017 – Dec 2017 Bangalore, India

- Developed **RAIL**, a framework for risk-averse imitation learning in autonomous agents deployed in risk-sensitive applications: <https://intel.ly/2IDyQ34>
- Achieved upto **89% improvement in Conditional Value-at-Risk** (a measure of tail-risk) over the previous state-of-the-art algorithm with **RAIL** at benchmark continuous control tasks
- Developed **MADRaS**, the world's first open-source fully-customizable **Multi-Agent DRiving Simulator**: <https://intel.ly/2KvB4MX>

### Research Consultant for Deep Learning

#### Indian Institute of Technology, Kharagpur

2015 – 2016 Kharagpur, India

- Developed a novel Deep Neural Network architecture – **BASS-Net** for land-cover classification in hyper-spectral images (HYSI) for **Indian Space Research Organization (ISRO)**. System granted operational clearance for India's first spaceborne HYSI mission in 2019
- Designed a multi-modal Deep Neural Network for predicting mechanical properties of hot-rolled steel for **TATA Steel**
- Designed a state-of-the-art Deep Neural Network ensemble for retinal vessel segmentation in Diabetic Retinopathy diagnosis for **Apollo Gleneagles Hospitals**
- Implemented a Recurrent Neural Network based Automatic Speech Recognition system for **Intel**

### Undergraduate Researcher in Deep Learning

#### Indian Institute of Technology, Kharagpur

2013 – 2015 Kharagpur, India

- Optimization of Deep Learning algorithms on multi-core CPUs
- Deep learning for Diabetic Retinopathy screening

### Project Trainee

#### Texas Instruments

May 2014 – July 2014 Bangalore, India

- Adaptive Grayscale Level Adjustment in DLP Based 3D Scanning System for Improved Reconstruction of Object Shape

## EDUCATION

### Ph.D. in Computer Science and Engineering

#### Indian Institute of Technology, Kharagpur

July 2015 – Ongoing

### B.Tech. in Electronics and Electrical Communication Engineering

#### Indian Institute of Technology, Kharagpur

July 2011 – Apr 2015

**CGPA – 9.30/10**  
Cumulative Grade Point Average

## AREAS OF EXPERTISE

Reinforcement Learning  
Deep Learning & Applications  
Imitation Learning AI Safety

## AWARDS

- Heidelberg Laureate Forum**  
One of 200 students selected for participation in the 6<sup>th</sup> Heidelberg Laureate Forum (2018)
- Indian Ambassador to Russia**  
Represented the AI community of India at the XIX World Festival of Youth and Students in Sochi (2017)
- Google India Ph.D. Fellowship**  
From Google, for leadership in Machine Learning research (2016)
- Rajendra Nath Das MCM Award**  
From IIT Kharagpur, for outstanding academic performance (2014)
- Batch of '85 Scholarship**  
From IIT Kharagpur, for outstanding academic performance (2013)

## PLATFORMS

TensorFlow Theano OpenAI Gym

## INTERESTS

Mathematics Robotics & Automation  
Healthcare Sustainability Travel

## PUBLICATIONS

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### Journal Articles

- Santara, A., Mani, K., Hatwar, P., Singh, A., Garg, A., Padia, K., Mitra, P., (2017). "BASS Net: Band-Adaptive Spectral-Spatial Feature Learning Neural Network for Hyperspectral Image Classification". In: *IEEE Transactions on Geoscience and Remote Sensing* 55.9, pp. 5293–5301.

### Conference Proceedings

- Santara, A., Naik, A., Ravindran, B., Das, D., Mudigere, D., Avancha, S., Kaul, B., (2018). "RAIL: Risk-Averse Imitation Learning". In: *Press for Proceedings of the 17th Conference on Autonomous Agents and MultiAgent Systems (AAMAS)-2018*. arXiv: 1707.06658.
- Santara, A., Maji, D., Tejas, D., Mitra, P., Gupta, A., (2016). "Faster learning of deep stacked autoencoders on multi-core systems using synchronized layer-wise pre-training". In: *PDCKDD 2015 as a part of ECML/PKDD*. arXiv: 1603.02836.
- Maji, D., Santara, A., Ghosh, S., Sheet, D., Mitra, P., (2015). "Deep neural network and random forest hybrid architecture for learning to detect retinal vessels in fundus images". In: *Engineering in Medicine and Biology Society (EMBC), 2015, 37th Annual International Conference of the IEEE*. IEEE, pp. 3029–3032.
- Chowdhury, S., Santara, A., Mukhopadhyay, P., Biswas, D., (2014). "Advanced AlGaIn/GaN Resonant Tunneling Diode on Silicon Substrate for Negligible Scattering and Polarization effects". In: *Physics of Semiconductor Devices*. Springer, pp. 285–288.

### arXiv Preprints

- Lahiri, A., Roy, S., Santara, A., Mitra, P., Biswas, P. K., (2016). *WEPSAM: Weakly Pre-Learnt Saliency Model*. arXiv Preprint, arXiv: 1605.01101.
- Maji, D., Santara, A., Mitra, P., Sheet, D., (2016). *Ensemble of deep convolutional neural networks for learning to detect retinal vessels in fundus images*. arXiv Preprint, arXiv: 1603.04833.
- Paria, B., Santara, A., Mitra, P., (2016). *Visualization Regularizers for Neural Network based Image Recognition*. arXiv Preprint, arXiv: 1604.02646.

## TEACHING EXPERIENCE

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### Online Course

#### NPTEL

 2016

 YouTube: <http://bit.ly/2KjE0QV>

- Taught a class of 4000 students as Joint Instructor and Teaching Assistant for Introduction to Machine Learning MOOC on NPTEL

### Offline Course

#### Indian Institute of Technology, Kharagpur

 2015-2016

 Kharagpur, India

- Taught Deep Learning in three Machine Learning courses as Guest Lecturer
- Mentored more than 500 students working on different Machine Learning/Deep Learning problems

## VOLUNTEERING

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### Intel Student Ambassador for AI

#### Intel AI Academy

 2018–Ongoing  India

- Wrote blogs, delivered blitz talks and tutorials on Deep Learning theory and implementation on Intel hardware and software platforms online and at several Intel AI Academy events around the globe.
- Blog on MADRaS: A Multi Agent DRiving Simulator: <https://intel.ly/2KvB4MX>
- Intel AI Academy Spotlight Video: <https://intel.ly/2IDyQ34>

### Guard Commander

#### 1 Bengal EME COY NCC

 2011–2012

 IIT Kharagpur

- Managed weekly drills and assigned duties of 300 cadets from the Electrical and Mechanical Engineering (EME) branch of the Indian Army
- Received NCC-B certificate

## REFERENCES

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### Prof. Pabitra Mitra

 [pabitra@cse.iitkgp.ernet.in](mailto:pabitra@cse.iitkgp.ernet.in)

- ✉ Department of Computer Science and Engineering  
Indian Institute of Technology Kharagpur,  
Kharagpur, WB, India, ZIP: 721 302

### Prof. Balaraman Ravindran

 [ravi@cse.iitm.ac.in](mailto:ravi@cse.iitm.ac.in)

- ✉ BSB 349, Computer Science and Engineering  
Indian Institute of Technology Madras  
Chennai, TN, India, ZIP: 600 036

### Prof. Sudeshna Sarkar

 [sudeshna@cse.iitkgp.ernet.in](mailto:sudeshna@cse.iitkgp.ernet.in)

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