

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

Software Engineering Intern

Google Brain Robotics

Nov 2018 – Mar 2019 Mountain View, CA, USA

- Developed a pipeline for **data efficient learning of high-dimensional long-horizon continuous control tasks** that involve a hierarchy of goals at different time scales.
- The pipeline comprises **unsupervised learning** of human motion primitives, **supervised learning** of fine grained motor control and **reinforcement learning** of a high-level policy.
- The pipeline achieves **superior sample efficiency** and **human-like motion** than any single learning paradigm.

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://github.com/madras-simulator>

Research Consultant for Deep Learning

Indian Institute of Technology, Kharagpur

2015 – 2016 Kharagpur, India

- Developed a novel Deep Neural Network architecture – **BASS-Net** and information retrieval framework – **PUNCH** for land-cover classification in hyper-spectral images (HSI) for **Indian Space Research Organization (ISRO)**. Received operational clearance for Mission HysIS (<https://www.isro.gov.in/Spacecraft/hysis>).
- 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**

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 6th 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

RESEARCH EXPERIENCE

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

PUBLICATIONS

📄 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: *Proceedings of the 17th International Conference on Autonomous Agents and MultiAgent Systems*. International Foundation for Autonomous Agents and Multiagent Systems, pp. 2062–2063.
- 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.

📄 arXiv Preprints

- Santara, A., Datta, J., Sarkar, S., Garg, A., Padia, K., Mitra, P., (2019). *PUNCH: Positive UNlabelled Classification based information retrieval in Hyperspectral images*. (Under Review), arXiv: 1904.04547.
- 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.

VOLUNTEERING

Program Chair

up.AI Summit 2018 at IIT Kharagpur

📅 2018–2019 📍 India

- Ideated and Organized IIT Kharagpur's first Artificial Intelligence Summit
- Event witnessed record turnover of 1000+ students and got covered by national media: <http://bit.ly/2OIBVTg>, <http://bit.ly/2ukVNFN>, <http://bit.ly/2HNfuow>

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

Prof. Pabitra Mitra

@ 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

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