Rishabh Ramteke

Email | Linkedin | Github | Webpage

Education	University	Department	Year	GPA
B.Tech	IIT Bombay	Electrical Engineering	2021	8.02/10

Awarded **Undergraduate Research Award** (URA 01) for indigenous MRI contribution *(2019)*

Industrial Research Experience

Computer Vision Research Engineer *Oct 2021 - Present*

Solution System Development Center | **Honda R&D Japan**

- Deployed **RL** algorithm on real setup and 3D semantics-based reward function for autonomous robot and showcasing of the prototype to external evaluators [**Patent applied**]
- Improved Dynamic Objects Segmentation algorithm for Visual SLAM framework in urban environments for robust localization performance in various lighting and seasonal conditions
- Collaborated with **Honda Motors US** for on-field experiments to test **multi-modal SLAM** system. Performed error analysis, conducted benchmarking, simulations and examined UML diagrams
- Working on LiDAR based Self-localization reliability prediction, in collaboration with **HRI-EU**
- Worked in collaborative research with leading start-ups to improve perception for autonomous vehicles

Publications

Improving Single and Multi-View Blockmodelling by Algebraic Simplification [LOR1] [LOR2]
Rishabh Ramteke, Peter Stuckey, Jeffrey Chan, Kotagiri Rao, James Bailey, Christopher Leckie
International Joint Conference on Neural Networks (**IJCNN**) 2020 IEEE WCCI, Glasgow (UK)

- Extended Blockmodelling to incorporate multiple sources of information including multiple edges and node features which improved on the state of the art for various real datasets
- Devised new, efficient approaches to perform **pareto based optimisation** based on idea of homophily, that can find groups of nodes that are highly similar in connections and/or attributes

Academic Research Experience

Practical Transfer Learning for Intelligent Robot Programming [LOR] *Summer 2020*

Guide : Prof. David Touretzky | *Computer Science Department* | ***Carnegie Mellon University***

- Employed transfer learning to allow a mobile robot with a low-resolution camera for object recognition from a small number of samples and guide users to construct effective training sets
- Utilized extensive set of transformations to allow reasonable recognition rates for 2D patterns
- Studied the minimal set and type of training samples necessary to achieve good performance on a highly varied test set with various orientations/viewing angles

Clustering white-matter fiber tracts of diffusion MRI *Winter 2019*

Guide: Prof. Ramamohanarao Kotagiri | *Dept. of Information Technology* | *University of* ***Melbourne***

- Devised a novel algorithm for clustering white-matter fiber tracts of diffusion-weighted MRI to generate computationally efficient realistic fiber models for the human brain
- Improved the gray-matter region connectivity of the fiber trajectories, which were initially disconnected when estimated from tractography and were discarded in brain connectivity analysis

Simulation of transparent objects for estimating 6DOF pose [certificate] *Spring 2021*

Guide: Prof. Markus Vincze | *Automation & Control Institute* | *Technical University of* ***Vienna***

- The project involved the topic of recognising semi-transparent objects where we worked on methods to model these objects, study methods that detect and recognise them, and finally contribute to methods that estimate 6DOF pose of objects for subsequent robotic grasping
- Simulated transparent objects and rendering of realistic scenes to create data for learning Mask R-CNN
- Automated the rendering with a python script in **Blender** and parameter study for depth computation

Technical Activities

Attention based Graph CNN for scene classification *Spring 2019*

Guide: Prof. Biplab Banerjee | *Dept. of Resource Engineering* | *IIT Bombay*

- Classified region adjacency graph representation of images by **spatial graph convolution** networks
- Implemented Attention model in TensorFlow for **better classwise region highlights**
- Obtained **state of the art** results in scene recognition for several aerial datasets

Unsupervised Domain Adaptation with GAN *Autumn 2019*

Guide: Prof. Biplab Banerjee | Dept. of Resource Engineering | IIT Bombay

- Implemented the research paper Unsupervised Pixel–Level Domain Adaptation with Generative Adversarial Networks on PyTorch with CUDA data parallelization
- The proposed method adapts source-domain images to appear as if drawn from the target domain by learning a transformation in pixel space from one domain to other based on GANs
- Outpaced the proposed method's performance by replacing the proposed PixelDA GAN with LS-GAN

Accent recognition *Autumn 2019*

Guide: Prof. Preeti Jyoti | Dept. of Computer Science | IIT Bombay

- Extracted and refined the Long and Short Term features from the audio data using **PCA** and **HLDA**
- Improved the Accent classification by combining phonetic vowels with acoustic features and trained the model using a combination of Deep Neural Networks and Recurrent Neural Networks

Image Reconstruction with MRI technology [LOR] *Spring 2019*

Guide: Prof. V.M.Gadre | Scan Era | Ministry of Communication & Information Technology, India

- Awarded the **Undergraduate Research Award** (URA 01) for this notable contribution
- Implemented a modified version of GRAPPA algorithm on SDK for image reconstruction with parallel MRI technology which would be used in the indigenous state-of-art MRI Machines
- Simulated the algorithm on MATLAB and then implemented it on **Xilinx Zynq-7000 FPGA board**

Image classification with Liquid State Machine for Neuromorphic computing *Autumn 2020*

Guide: Prof. Udayan Ganguly | Department of Electrical Engineering | IIT Bombay

- Implemented multi-class classification with LSM reservoir computational model consisting of leaky-Integrate-and-Fire type spiking neural network to mimic biologically-inspired computing
- Investigated preprocessing methods to represent image as spike-trains and improved computation time

International Aerial Robotics Competition | AUVSI foundation *Sept 2018 - Jan 2019*

Unmesh Mashruwala Innovation Cell | IIT Bombay

- Contributed to control and hardware design of autonomous quadcopters in a **GPS-denied** environment
- Implemented communication between on-board processor Intel i5 NUC, offboard computer and **Pixhawk** for transfer of localization and IMU data using MAVLink communication protocol on ROS
- Utilized **LiDAR** sensors and **Stereo Vision** camera to maintain the current position of the quadcopter
- Investigated optimum PID parameters which enhanced flight stability and performance

Skills

Programming	C++, C, MATLAB, R, Python, JavaScript, ROS
ML Libraries	TensorFlow, Pytorch, CUDA
Other Softwares	AutoCad, SolidWorks, Blender, Arduino, Unity 3D, Spice, LaTeX
Languages	English, Japanese(JLPT N4), German(A1), Spanish(A1), Hindi, Marathi

Key Courses Undertaken

Computer Science	Data Structures and Algorithm, Machine Learning, Image Processing. Automatic Speech Recognition, Medical Imaging Physics, Cryptography
Mathematics	Data Analysis & Interpretation, Probability & Random Processes, Calculus Markov Chain & Queuing Theory, Information Theory & Coding
Electrical Engineering	Signal Processing, Communication, Control Systems, Microprocessors

Extracurriculars

- Secured **Top 5** position in Segreta 2018, a tech cryptic hunt conducted by Techfest, IIT Bombay
- Instructed two teams of four each to successfully complete a **Bluetooth Controlled Bot**
- Completed a year long rigorous training in **Lawn Tennis** under National Sports Organization
- Mentored a group of students for **Machine Learning** as a part of summer of science program
- Part of the **gold** winning hostel team in inter hostel sophomore cross country run GC
- Volunteered in the **World's largest** beach cleanup campaign at Versova by Afroz Shah