# Rishabh Ramteke

Email | Linkedin | Github | Webpage

## Summary

Result-oriented Machine learning & Computer Vision Engineer/Researcher with Patent-worthy innovation and Research award, determined to develop Deep learning algorithms and deploy them over cloud/real hardware which leverage my expertise in advanced ML algorithms and competence in Python and C++. With meticulous interpersonal and multicultural communication, can confidently engage in constructive dialogues to overcome challenges and achieve team goals in a fast-paced environment.

## Industrial Experience

**Computer Vision Researcher** *Oct 2021 - Present*
**Honda R&D Japan** *(Solution System Development Center)*

- Developed end-to-end **3D Perception** Deep Learning pipeline incorporating **sensor fusion** for free-space detection & deployed multi-container application using **Docker** on real Hardware setup
- Deployed **RL** algorithm on real HW setup, utilizing Docker containers & devised 3D semantics-based reward function for autonomous robot. The technology developed led to **patent** application.
- Improved Dynamic Objects **Segmentation** algorithm for Visual SLAM framework in urban environments for robust localization performance by **13%** in various lighting and seasonal conditions
- Collaborated with Honda Motors US for on-field experiments to test **multi-modal SLAM** systems. Devised error analysis metrics, conducted benchmarking, simulations and examined UML diagrams
- Implemented LiDAR based Self-localization reliability prediction, in collaboration with HRI-EU

## Academic Research Experience

**Practical Transfer Learning for Intelligent Robot Programming** *Summer 2020*
*Guide : Prof. David Touretzky | Computer Science Department |* ***Carnegie Mellon University***

- Employed transfer learning with **CNN** to allow a mobile robot with a low-resolution camera for **object classification** from a small number of samples and guide users to construct effective training sets
- Analysed the minimal set & utilized transformations to allow reasonable rates for **pattern recognition**

**Clustering white-matter fiber tracts of diffusion MRI** *Winter 2019*
*Guide: Prof. Ramamohanarao Kotagiri | Dept. of Information Technology | University of* ***Melbourne***

- Devised a novel unsupervised learning 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 by **147%**, which were initially disconnected when estimated from tractography and were discarded in brain connectivity analysis

**Simulation of transparent objects for estimating 6DOF pose** *Spring 2021*
*Guide: Prof. Markus Vincze | Automation & Control Institute | Technical University of* ***Vienna***

- Simulated transparent objects and rendering of realistic scenes to create data for training Mask R-CNN
- Automated the rendering with a python script in **Blender** and parameter study for depth computation

## Education

**Indian Institute of Technology, Bombay** *July 2017- June 2021*
*Bachelors of Technology, Department of Electrical Engineering* *GPA 8.02/10*
Awarded Undergraduate Research Award (URA 01)

**Key Courses** Advanced Machine Learning, Deep Learning, Image Processing, Data Structures & Algorithms, Automatic Speech Recognition, Data Analysis & Interpretation, Markov Chains, Signal Processing, Medical Imaging Physics, 2D/3D Geometry

## Publications

**Improving Single and Multi-View Blockmodelling by Algebraic Simplification**
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

## 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 neural** networks
- Implemented Attention model in TensorFlow for **better classwise region highlights**
- Obtained **state of the art** results in scene recognition for several aerial datasets

**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** *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 pipelines 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

**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

## Skills

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|---|---|
| **Programming** | C++, C, MATLAB, R, Python, JavaScript, ROS, Linux, CMake |
| **ML Libraries** | TensorFlow, Pytorch, OpenCV, Numpy, Pandas, Scikit-learn, matplolib |
| **Others** | CUDA, AWS, S3, Docker, Git, JIRA, AutoCad, Blender, SolidWorks |
| **Soft Skills** | Problem Solving, Teamwork, Communication, Quick Learner |
| **Languages** | English(C2), Japanese(N4), German(A1), Spanish(A1), Hindi, Marathi |

## 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