

SAQIB AZIM

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PUBLICATION & PATENT

- Saqib Azim, T. Nito and K. Nakamura, "Visual Localization in Dynamic Environments with Targeted-Inference SLAM", *Japan Patent Application, filed Aug '21 (pending)*
- P. Sankhe, Saqib Azim, S. Goyal, T. Choudhary, K. Appaiah and S. Srikant, "Indoor Distance Estimation using LSTMs over WLAN Network", *IEEE Workshop on Positioning, Navigation and Communications 2019 & Indian Patent Application, filed Dec '18*

INDUSTRY EXPERIENCE

Hitachi R&D Japan

Oct '19 - Sep '21

Assistant Researcher, Intelligent Vision Research Group

Tokyo, Japan

- Developed a **visual-inertial localization** system using SLAM and deep learning.
- Implemented feature-based camera tracking, mapping, trajectory optimization in **C++**.
- Proposed a time-efficient targeted inference segmentation network to detect dynamic scenes which reduces computation time by **5x** leading to **patent submission** in Japan.
- Achieved **47% reduction** in dynamic localization error over real-time SOTA methods.
- Deployed the visual navigation on Android devices, leading to **Hitachi product impact**.
- Fine-tuned **detectron2** segmentation model and built a vision-based 3D positioning system to detect hazardous activity. Showcased prototype at a **Railway Factory**.
- Trained a **SSD-UNet CNN** model to segment hands using egocentric images.
- Deployed **TFLite** model on iPhone to identify hand-pointed items with **94%** accuracy.

Samsung R&D Institute

May '18 - Jul '18

Machine Learning Intern

Bengaluru, India

- Prototyped a **handwritten text recognition** system using Samsung smartwatch.
- Devised a novel data-collection framework, trained pipelined SVM + LSTM to learn relation between wrist movement and characters, achieving **95% test accuracy**.

SELECTED PROJECTS

Inverse Reinforcement Learning for Robot Manipulation

Dec '22 - Ongoing

Graduate Research Assistant at [Existential Robotics Lab](#)

- Developing and improving Deep RL models for manipulation tasks in Mujoco simulator.
- Employed autoencoder-based **Soft Actor-Critic** and expert demonstrations to learn the latent state and action spaces from images for **Robosuite** and **DeepMind** tasks.
- Successfully transferred learned policies to a real-world Panda robot arm (**Sim2Real**).

6D Pose Estimation and Neural Radiance Field (NeRF)

Fall '22

- Utilized **U-Net** for object semantic segmentation, **Iterative Closest Point** algorithm for estimating 6D pose of segmented objects with **96% test accuracy**.
- Implemented **NeRF** to fit and generate photo-realistic novel views of a scene.

Autonomous Vehicle Localization and Mapping

Winter '23

- Implemented **Particle-Filter SLAM** for robot localization using IMU and LIDAR data.
- Implemented visual-inertial SLAM for pose estimation of an autonomous vehicle using an **Extended Kalman Filter (EKF)** and estimated 3D landmarks using stereo camera.

Optimal Multiagent Pursuer-Evader Problem [\[thesis\]](#)

Aug '18 - Jul '19

- Designed a novel control algorithm to drive a multi-evader system to destination.
- Utilized iterative **search algorithms** to estimate optimal paths in diverse conditions.
- Trained an **attention-LSTM** to learn to predict optimal agent trajectories.

Vision Team Member, Autonomous Self-Driving Car

2017 - 18

- Proposed compute-efficient algorithm to mitigate effects of varying lighting on roads.
- **Managed** the collection and annotation of autonomous driving dataset and trained the **YOLO** framework for road and obstacle detection.

EDUCATION

UC San Diego

Sep '21 - Ongoing

- MS in Machine Learning, Robotics, Computer Vision (**GPA: 3.91/4**)

Indian Institute of Technology Bombay

Mumbai, India

2015 - 2019

- Bachelor of Technology in Electrical Engineering with minor in Computer Science
- **Undergraduate Research Award** for excellent research contribution to the project "Indoor Positioning Systems"

TECHNICAL SKILLS

- **Programming** - Python, C/C++, MATLAB, Bash, HTML, CSS, LaTeX
- **ML Frameworks** - Tensorflow, PyTorch, MLOps, OpenCV, Scikit-Learn, NumPy, Pandas
- **Dev Tools** - Git, Github, Docker, Android Studio, Unity3D engine, Jupyter, VS Code, Linux
- **Deep Learning** - CNNs, LSTMs, Transformers, GANs, Variational Autoencoders, UNet, etc.
- **Vision & Robotics** - Object detection, segmentation, Structure from Motion, Optical Flow, Robosuite, MuJoCo, NeRF, SLAM, etc.

RELEVANT COURSES

- Deep Generative Models
- Deep Learning for 3D data
- Advanced Machine Learning
- Deep Reinforcement Learning
- Sensing and Estimation in Robotics
- Mathematics for Robotics
- Statistical Learning
- Advanced Computer Vision
- Convex Optimization and Applications
- Advanced Image Processing
- Statistical Signal Processing
- Data Structures and Algorithms

ACHIEVEMENT & ROLES

- Secured rank of **1133 (out of 1.5 million)** in IIT-JEE (India's toughest entrance exam).
- **Teaching Assistant** at UC San Diego -
 - Probabilistic Modeling & Machine Learning
 - Probability & Statistics for Data Science
 - Engineering Probability & Statistics
 - Image Processing
 - Linear Signals & Systems
- Taught underprivileged NGO students under [Education Outreach program](#) for 1 year.
- **Mentored** 8 students at IIT Bombay's [Summer of Science](#) program in '19 and '20.
- **Open-source** contribution to [Kivy](#), [KivEnt](#).