Nihal Barde

Dubai - UAE
nihalbarde@gmail.com +971 52 530 0289

Scholastic Achievements

- **Bachelor of Technology — Engineering Physics — Indian Institute of Technology Bombay** *2021*
- Awarded **Institute Technical Special Mention** for contribution to technical activities in IITB *2019*

Work Experience

Derq Inc

Software Engineer August 2022 - Present

- Engineered sequence-based models to predict pedestrian behavior near crosswalks, enabling activation of blinking signals on traffic signs. Developed software to control behavior of traffic signs in mesh network
- Transformed software testing and deployment through automation scripts, to minimize manual effort
- Built computer vision algorithms for precise scene analysis, enhancing traffic rule violator detection

Tvarit GmbH

Machine Learning Researcher June 2021 - July 2022

- Spearheaded innovation efforts, developing **scalable AI algorithms** for the product's enhancement
- Engineered robust data-enrichment zones, feature engineering, and predictive and **prescriptive** modules
- Drastically shortened AI module deployment time from 50 to 5 days by creating an automated Framework
- Significantly reduced scrap by 50% for a wheel manufacturing client, resulting in average annual savings of **144k euros**, by deploying a predictive model and prescribing optimize parameters in the casting process
- Developed a novel 'Method to integrate physics-based simulation with Artificial Intelligence model for recommending recipe in die casting process' (Indian provisional patent No. 202241019365 – Mar. 31, 2022)

Product Manager July 2021 - March 2022

- Led in-person user requirement interviews for building a Die-Casting SaaS Product and Analytics dashboard
- Provided tactical user insights through usability tests, enabling the creation of a highly-adaptable MVP
- Expedited UI team to build and refine wireframes and conducted usability tests to improve user experience
- Facilitated in securing contracts worth $\geq$ **€5Mil** by showcasing product to clients from 7+ countries

Machine Learning Projects

Self Driving Car — Team Lead — Innovation Cell

Aims to develop India's first self-driving car January 2018 - April 2021

- Led a team of 25 students from various departments to develop India's first self driving car, which is a **fully autonomous** car customized for the **Indian road conditions** that obey the Indian traffic rules
- Built and administered a **Multi-Class Semantic Segmenter** based on Fully Convolutional Network
- Utilized transfer learning to train precise Traffic Sign and Traffic Light classifiers using **resnet50** and **resnet152**
- Optimized **Keras-RetinaNet** for real-time Traffic Sign/Light, Pedestrian, Vehicle, Speed-bumps detection

LinkNet Semantic Segmentation — Guide: Prof. Biplab Banarjee

Paper Implementation & Deployment February 2019 - April 2019

- Implemented **Linknet** for real-time Road-Lane semantic segmentation for autonomous vehicles
- Designed codebase from scratch for data processing, model training, and live-feed testing purposes
- Integrated Linknet package with Robotic Operating System **ROS** for testing on autonomous vehicles

Traffic Sign Recognition — Inter IIT Technical Meet

Led the team of 10 members — Bronze Medal February 2021 - April 2021

- Developed an intuitive graphical user interface for training, testing and visualising deep learning model
- Trained models ranging from few-layered ConvNets to ResNet on the GTSRB dataset with 5 artificial classes
- Used SMOTE for solving data imbalance, t-SNE plots for visualisation, Grad-CAM & LIME for interpretation

Text to Photo-realistic Image Synthesis with StackGAN — Guide: Prof. Biplab Banerjee

Paper Implementation September 2019 - October 2019

- Implemented **StackGAN** to generate photo-realistic images conditioned on text descriptions
- Worked on implementation of **Conditioning Augmentation technique** to improve the results of the model

Object Detection in Thermal Images — Guide: Prof. Amit Sethi

Research Project — Computer Vision September 2019 - December 2019

- Modified **Keras-Retinanet** for detection of pedestrians and vehicles in images captured by a thermal camera
- Worked on *LSTM* and *Retinanet fusion* to improve the model by taking help of sequential information

Spotify Sequential Skip Prediction Challenge — **Guide: Prof. P Balamurugan**

AIcrowd competition organised by Spotify — October 2019

- Designing a model to predict whether the individual song will be skipped or not using prior information
- Implemented **BiLSTM** based *feature-encoder* and *encoder-decoder* architecture for making predictions

Robotics & Electronics Projects

Student Design Challenge — **ASME 2021**

Led the team of 22 members representing IIT Bombay — November 2020 - April 2021

- Guided the team to build a 800 mAh AAA-battery powered carrier bot capable of navigation in the arena
- Designed a lightweight, differential drive controlled bot, equipped with solar panels and voltage boosters

Terrace Farming Robot — **Inter IIT Technical Meet**

Part of team representing IIT Bombay — October 2019 - December 2019

- Devised a lightweight bot capable of plowing, seeding, watering and harvesting autonomously
- Implemented **PID controller** to control the motion of bot based on reading from ultrasonic sensors
- Developed of reliable navigation plan using **visual odometry** and stepper motor encoders

International Robotics Challenge — **Techfest, IIT Bombay**

Led the software subsystem of the project — September 2017 - December 2017

- Part of a team of 7 members to build an Autonomous bot and a remote-controlled bot
- Devised a program for an Autonomous bot capable of picking up and placing blocks at the desired place
- Implemented D* path planning algorithm and applied a PID for motion control of autonomous bot
- Programmed a Remote Controlled Bot capable of picking up and placing blocks and shooting darts

Quadruped Spiderbot — **Guide: Prof. Pradeep Sarin**

Individually designed — October 2019

- Designed a mini quadruped with 2 degrees of freedom with micro servos in each of 4 legs on Solidworks
- Created an Android app to control the bot and connected it to Arduino using Bluetooth module HC-05

Other Projects

- **Kaggle Competition**: Developed Image classifier with 97.5% test accuracy using **VGG-19 BN** network
- **Single Image Haze Removal**: Engineered a novel image prior - dark channel prior method to remove haze
- **Chain Reaction**: Created a **Pygame GUI** including game mechanics, AI players and animations
- **Gallery Vault**: Made an app using Multi-layer Image Encryption and Text-Encryption for secure login

Position of Responsibility

Self Driving Car — Innovation Cell

Team Lead — April 2020 - April 2021

- Headed technical side of 25 students working on to develop **India's 1st self-driving car**
- Raised **1 million** from the institute and **2.5 million** from Mahindra RISE for technical requirements
- Forged relations with professors, alumni and industry experts to ensure state-of-the-art R&D
- Orchestrated the **two-month-long** recruitment process of **150** aspirants having interviews, training & projects

Manager — April 2019 - April 2020

- Conducted freshmen orientation addressing **300+** freshmen and handled their recruitment process
- Organized **Summer Induction program**, which was attended by **100+** students including topics of *Mechatronics systems*, *Localization*, *Path planning*, *Image processing*, *Sensor fusion* and *Machine learning*

Technical Skills

Programming Language	Python, C/C++, **ROS** (Robot Operating System)
Cloud technologies	AWS CodePipeline, Sagemaker notebooks, EC2, S3, IoT, RDS
ML Modules	Tensorflow, Keras, PyTorch, Pycaret, Scikit-Learn, Tensorboard
Softwares	SolidWorks, AutoCAD, Arduino IDE, Grafana
Courses	Deep learning, Data structure & Algorithms, Image processing
Other	Docker, LaTeX, Unix, Bash

References

- **Prof. Shabbir Merchant**
  Associate Professor
  Department of Electrical Engineering
  Indian Institute of Technology Bombay
  merchant@ee.iitb.ac.in
- **Prof. Amit Sethi**
  Associate Professor
  Department of Electrical Engineering
  Indian Institute of Technology Bombay
  asethi@iitb.ac.in