

Education

- 2023– Present **Carnegie Mellon University, Pittsburgh, PA.**
Masters of Science in Robotics (MSR)
Relevant Courses: Computer Vision, Math Fundamental For Robotics
Research Assistant: Working on Neuro-Symbolic Reasoning for Computer Vision with Prof. Katia Sycara
- 2019–2023 **Delhi Technological University, New Delhi, India**, CGPA 9.55/10, **Rank 2.**
Bachelor of Technology (B.Tech.) in Electronics And Communication Engineering
Minor in Computer Science and Machine Learning
Relevant Courses: Data Structures, Machine Learning, Algorithm Design and Analysis, Signals and Systems, Control Systems, Operating Systems, Database Management Systems, Data Analytics

Research Experience

- May 2022 – Present **Robotics Institute Summer Scholarship, CMU, Pittsburgh, USA** ([Video-link](#)).
AirLoc: Object based Indoor relocalization
◦ Developed AirLoc, a simple yet effective indoor relocalization approach that utilizes both geometric and semantic information of a scene by using objects to perform relocalization.
◦ AirLoc gives reliable results and outperforms the state-of-the-art methods in room-level relocalization.
Supervisor: **Prof. Sebastian Scherer** ([Personal Webpage](#)), **Prof. Chen Wang** ([Personal Webpage](#))
- Dec 2021– May 2022 **Carnegie Mellon University, Pittsburgh, USA** ([Github](#)).
PyPose : A library to connect classical learning with modern learning methods
◦ Worked on developing a first of its kind differentiable IMU preintegrator
◦ Added bias correction and covariance propagation to the base IMU preintegrator
Supervisor: **Prof. Sebastian Scherer** ([Personal Webpage](#))
- May 2021– Dec 2021 **International Institute of Information Technology, Hyderabad, India.**
Visual Place Reorganisation Over Scene Graphs
◦ Worked on a novel approach for Place-Recognition (Room Level Localisation and Metric Level Localisation) using Scene-Graphs and Various Deep-Learning Techniques.
◦ Extracted baseline accuracy from existing techniques such as NetVlad, Scan Matching, DeLG, etc.
Supervisor: **Dr. K. Madhava Krishna** ([Personal Webpage](#))
- May 2021– Present **Samsung Digital Academy Research Lab, Delhi Technological University, New Delhi, India.**
Stress Prediction Based on Electrocardiogram (ECG) and Heart Rate Variability data
◦ Determined optimal heart-rate-variability Features for Cumulative stress-monitoring using ECG data.
◦ Tested various machine learning and deep learning algorithms to improve accuracy over baselines.
Supervisor: **Dr. Divyashikha Sethia** ([Personal Webpage](#))

Publications

- Aryan, Bowen Li, Sebastian Scherer and Chen Wang**, "AirLoc: Object Based Indoor Relocalization", Submitted to *IEEE Robotics and Automation Letters* (Under Review) .
- Chen Wang, Dasong Gao, Kuan Xu, Junyi Geng, Yaoyu Hu, Yuheng Qiu, Bowen Li, Fan Yang, Brady Moon, Abhinav Pandey, Aryan and others**, "PyPose: A Library for Robot Learning with Physics-based Optimization", Submitted to *IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR)* (Under Review) ([Link](#)) .

Aryan, Dheeraj Vattikonda, Erqun Dong, Sabyasachi Sahoo, "Grad-Lidar-SLAM: Fully Differentiable Global SLAM for Lidar with Pose-Graph Optimization", In *IROS 2022 Workshop Probabilistic Robotics in the Age of Deep Learning* [\(\(Link\)](#) .

Sikha, Aryan, Lovish Arya and Divyasikha Sethia, "HRV and GSR as Viable Physiological Markers for Mental Health Recognition", In 2022 14th *International Conference on Communication Systems and Networks (COMSNETS)* [\(\(Link\)](#) .

Aryan and Poornima Mittal, "Realization of Low-Cost Footwear Integrated Step-Counting Device for Health Monitoring System", *Journal of Physics: Conference Series* (ISSN: 1742-6596), [\(\(Link\)](#).

Kshitij Tripathi ,Aryan, Aakash Ghosh, Mini Sreejeth and S. Indu, "Thermal Study of MOS-FET heat sinks for Motor Controller in Neighborhood Electric Vehicles(NEV)", (under review).

Academic Projects

- August 2021 - Present **Self-Supervised flare removal from Images using Deep Convolutional Generative Adversial Networks, DTU, B.Tech Capstone Project.**
- Worked on a framework that can train a flare removal network using random flare and flare-free images extracted from internet without any need for labels.
 - Work on synthetic data generation required to train the algorithm
- August 2019 - **Griffin- Unmanned Ground Vehicle (Team Project)**, [\(Drive-link\)](#).
- August 2021 - Autonomous Ground Vehicle Development to represent Delhi Technological University in the **Intelligent Ground Vehicle Competition**, Oakland University, Rochester, Michigan
- Engineered Navigation Stack of Self Driving Rover using Robot Operating System (Lane detection and obstacle avoidance) and used the ROS packages such as Slam_gmapping, Move_base, Costmap, etc.
 - Synchronised navigation stack with actual world using sensor fusion and Implemented various sensors including IMU, GPS, Lidar , Odometers ; Micro-controllers and Actuators.
- Supervisor: **Dr.S. Indu** [\(\(Personal Webpage\)](#)
- Jan 2021 - **Study of Neural Network Implementation on Field Programmable Gate Arrays..**
- May 2021 ◦ Compared different methods to implement Neural-networks on FPGAs and finally determined the best implementation method for early prototyping using high-level languages like python.
- December 2020 **Micro-mouse Challenge, TechFest(IIT, Bombay)**, [\(Drive-link\)](#).
- Maze Solving Micro-Mouse Simulation Using Robot Operating System and Gazebo.
- Used Backtracking Algorithm for maze exploration, successfully explored and created the map using Slam_gmapping package
- April 2021 - **Line Follower Minidrone, MATLAB Minidrone Competition**, [\(Github\)](#).
- June 2021 Developed a Line follower algorithm built on model based design using support packages for parrot minidrones in MATLAB and SIMULINK
- April 2021- **Localization Package for Unmanned Aerial Vehicle**, India.
- July 2021 UAV Development For Dim-Light and GPS Denied environments with Octobotics Tech Private Limited
- Developed localisation Package for UAV on Robot Operating System (ROS)
- Jan 2021- **Ministry of Electronics and Information Technology sponsored R&D Project.**
- July 2021 Development and Deployment of motor controller for low and medium Power Electric Vehicles
- Reduced the average temperature of MOSFETs by 10 degrees using Optimal Heat-sink Design

Awards and Achievements

- 2022 **International research internships** .
- **Robotics Institute Summer Scholar**(Carnegie Mellon University) : One of the **5 students from India**
 - One of the **80 students from India** to get selected for **DAAD WISE** Internship (Germany) March' 22
 - One of the **117 student from India** to get selected for **Mitacs Globalink Internship (Canada)**
- 2021 **MATLAB Minidrone Competition.**
- Qualified for the International Finale in MATLAB Minidrone Competition. Our team was **one of the top 8 teams** from all over Europe, Middle East and Asia for Line Following Minidrone.

- 2020 **Class Of 1959 Scholarship & Fidelity Charitable Scholarship.**
One of the two students from the university (approx. 14000 students) to be awarded with scholarship on the basis of **Merit and Leadership in Science And Technology.**
- 2019 **99.54 Percentile (Rank 5491)** in Joint Entrance Examination Mains 2019 amongst 1.2 million.
- 2019 **95.5 Percentile(Rank 7071)** Joint Entrance Examination Advanced 2019 with self-study.
- 2019 Secured District **2nd Rank** in “PCP Talent Reward Examination 2018-2019” in Class XII.

Position Of Responsibility

- Apr'21 - **Vice Captain**, *Unmanned Ground Vehicle Team-Delhi Technological University.*
- Present Unmanned Ground Vehicle-DTU is a student based technical team specializing in UGV prototypes
- o Coordinating the tasks of the various departments of the team, motivating the team members, project planning and review, managing routine tasks and ensuring that innovative ideas are implemented and also managing the team finances

Teaching

- March 21 - **Teaching Volunteer**, *TopTrove Foundation.*
- May 21 TopTrove Foundation works to educate students from every street of India and abroad
- o Mentored 60+ students for Machine Learning and Python programming and so far for free.
 - o Conducted "Basics of Python" Classes for a batch of 60 students. ([Link](#))

Skills

- Languages Python , C , C++ , Embedded C
- Frameworks Tensorflow, Keras, Pytorch, Numpy, Pandas
- Softwares ROS, MATLAB, Octave, Gazebo, Rviz ,Habitat-Sim, Orcad Pspice, Proteus, Multisim
- Others Deep Learning, Machine Learning, Linux , Data Structures in C++