# Sai Bhargav AVULA

## Computer Vision and Perception Engineer | Technology Innovation Institute

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I am currently working as a Computer Vision and Perception Engineer at Technology Innovation Institute(TII), Abu Dhabi where I am developing and deploying state-of-the-art Computer Vision algorithms in the context of semantic segmentation and tracking both in Visible and Thermal Domain.

Prior to this I worked at Qualcomm and MathWorks where I had an amazing time solving several Computer Vision problems. My research interests solving real-world problems in robotics, and computer vision intertwining with Deep Learning. When I am not working on Computer Vision problems, I read, watch and write.

## EXPERIENCE

**September 2022 – Present** | **Computer Vision and Perception Engineer, TECHNOLOGY INNOVATION INSTITUTE, Abu Dhabi, U.A.E.**

- Developing and deploying state-of-the-art Computer Vision algorithms in the context of semantic segmentation and tracking both in Visible and Thermal Domain.

C++ | Python | ROS | PyTorch | TensorFlow | Docker | CUDA | TensorRT | MATLAB | GIT

**June 2022 – September 2022** | **Senior Machine Learning Engineer, QUALCOMM, Hyderabad, India**

- Worked on the SNPE framework to enable Qualcomm SOCs to inference various deep neural networks.

C++ | SNPE | PyTorch | TensorFlow | GIT

**June 2020 – April 2022** | **Deep Learning Software Engineer, MATHWORKS, Hyderabad, India**

- Developed Deep Learning features for Automated Driving Toolbox, Computer Vision Toolbox, Lidar toolbox and Deep Learning Toolbox.
- Developed deep learning layers for MATLAB.
- Provided code generation support for both CPU and GPU targets to the functions developed.
- Developed Deep Learning workflows as MATLAB Examples.

MATLAB | C++ | PyTorch | TensorFlow | GIT

**June 2019 – June 2022** | **Engineer in EDG, MATHWORKS, Hyderabad, India**

- Developed domain adaptation workflows to address data scarcity and labeling problem of real world data, majorly in the context of semantic segmentation.
- Solved several customer workflow related issues.

MATLAB | C++ | PyTorch | TensorFlow | GIT

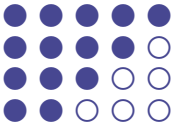
**October 2018 – May 2019** | **Motion Planning Intern, MATHWORKS, Hyderabad, India**

- Developed a Traffic simulator for testing MATLAB's Navigation and ADAS toolbox features. This project is the extension to my Master's thesis work for Multi Agent systems

MATLAB | C++ | PyTorch | TensorFlow | GIT

## KEY SKILLS AND COMPETENCIES

C++, Python, MATLAB, Pytorch, Linux, GIT, Deep/Machine Learning, Computer Vision
ROS (Robot Operating System), Docker, TensorFlow, Optimization
BASH
CUDA, ROS2



## Education

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|---|---|---|
| 2016-2019 | **MS by research in Robotics**, International Institute of Information Technology, Hyderabad, India | **GPA : 9.00/10.00** |
| 2012-2016 | **B.Tech in Electronics Design and Manufacturing**, Indian Institute of Information Technology, Design and Manufacturing | **GPA : 8.36/10.00** |

## Journal Publications

**Reactive Navigation under Uncertainty through Hilbert Space Embedding of Probabilistic Velocity Obstacles** — RAL-ICRA 2020
Jyotish, Bharath Gopalakrishnan, **Bhargav**, Arun Kumar Singh, K.Madhava Krishna and Dinesh Manocha [Project-Page] [Video]

## Conference Publications

**SROM : Simple Real-time Odometry and Mapping using LiDAR data for Autonomous Vehicles** — IV 2020
Nivedita Rufus, Unni Krishnan R. Nair, **A. V. S. Sai Bhargav Kumar**, Vashist Madiraju, K. Madhava Krishna [Project-Page]

**PIVO : Probabilistic Inverse Velocity Obstacle for Navigation under Uncertainty** — ROMAN 2019
Jyotish, Yash Goel, **A. V. S. Sai Bhargav Kumar**, K. Madhava Krishna [Project-Page]

**IVO : Inverse Velocity Obstacles for Real Time Navigation** — AIR 2019
Jyotish, Yash Goel, **A. V. S. Sai Bhargav Kumar**, K. Madhava Krishna [Project-Page]

**Gradient Aware - Shrinking Domain based Control Design for Reactive Planning Frameworks used in Autonomous Vehicles** — AIR 2019
Adarsh Modh, Siddharth Singh, **A. V. S. Sai Bhargav Kumar**, Sriram N. N., K. Madhava Krishna [Project-Page]

**Motion Planning Framework for Autonomous Vehicles : A Time Scaled Collision Cone Interleaved Model Predictive Control Approach** — IV 2019
Raghu Ram Theerthala, **A.V.S. Sai Bhargav Kumar**, Mithun Babu, K. Madhava Krishna [Project-Page]

**Novel Lane Merging Framework with Probabilistic Risk based Lane Selection using Time Scaled Collision Cone** — IV 2018
**A. V. S. Sai Bhargav Kumar**, Adarsh Modh, Mithun Babu, Bharath Gopalakrishnan, K. Madhava Krishna [Project-Page]

## Professional Services

2020 : Reviewer, IV(IEEE Intelligent Vehicles Symposium).
2019 : Program Committee, ROBIO(International Conference on Robotics and Biomimetics)
2019 : Reviewer, CASE(International Conference on Automation Science and Engineering)

## Honors and Awards

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|---|---|
| 2016-2019 | **IIIT Hyderabad research fellowship**, Awarded a fellowship to cover tuition and living expenses during my Masters, Total value (approx.) : INR 350000. |
| 2012-2016 | **Merit Cum Means Scholarship**, Awarded a scholarship to cover tuition during my Bachelors, Total value (approx.) : INR 200000. |

## Languages

English ●●●●●
Telugu ●●●●●
Hindi ●●●○○
Tamil ●●○○○

## Interests

- Driving
- Reading
- Writing
- Watching

## Projects

### Self Driving Car - Mahindra Rise Challenge
2016 - 2019

tinyurl.com/selfdriveMRC tinyurl.com/selfdriveMRC2

- Developed the Motion Planning and Localization pipeline.
- Implemented and Integrated the Sensor Fusion stack.
- Developed the cross-sensor calibration package for Camera and LiDAR.
- Integrated the other pipelines and deployed the code base.
- Led to publications in IV (Intelligent Vehicle Symposium-18) and AIR (Advances in Robotics-19)

C++ Python ROS PyTorch MATLAB

### Investigation of non-parametric uncertainty in Motion planning
2019-2020

tinyurl.com/nonparam

- Developed efficient algorithm for solving a class of chance-constrained op- optimization by representing the non-parametric uncertainty as functions in Reproducing Kernel Hilbert Space(RKHS).
- Developed computationally efficient implementation of the proposed idea in C++ and its deployment on Bebop drone to conduct real-time experiments.
- The efforts for this work got published in RA-L with ICRA 2020.

C++ Python ROS MATLAB

### Multi Agent Systems
2017 - 2019

tinyurl.com/IVOCC

- Developed both deterministic and stochastic variants of the egocentric version of the famous velocity obstacle(VO).
- Reformulated the velocity obstacle to adapt to an egocentric framework and deployed the real-time experiments on the Bebop drone.
- Led to publications in AIR (Advances in Robotics-19) and ROMAN(International Conference on Robot and Human Interactive Communication 2019).

C++ ROS MATLAB

### Risk Aware Merging
2017 - 2018

tinyurl.com/RiskAwareMerge

- Developed a risk-aware merging behavior, for a traffic-like scenario.
- Developed a framework that has a two-layer structure that ensures generating a collision-free merge maneuvers even in a dense traffic scenarios
- The efforts for this work got published in IV(Intelligent Vehicle Symposium-18,19).

C++ ROS MATLAB

### Localisation and Navigation in GPS Denied Environment.
2016 - 2017

tinyurl.com/GPSDenied

- Developed an algorithm that fuses the sensor data from a visual sensor and an IMU to estimate the robot's current location and navigate the robot to its destination with obstacle avoidance in GPS denied environment.
- The planning stack was implemented using the RRT planner from the MRPT toolkit in Tory Parameter (TP) space, was deployed on Clearpath A200 mobile robot, and tested for its efficacy.

C++ ROS Python