Krishna **Varadarajan**

ROBOTICIST · ALGORITHMS, SOFTWARE

[redacted] | krishna2014vit@gmail.com | iamvarada | kvarada

"The bird is powered by its own life and by its motivation." — Dr. A.P.J. Abdul Kalam

Education

The Pennsylvania State University
University Park, USA

M.S. in Mechcnical Engineering — *Aug. 2016 - May 2019*

- GPA: 3.96/4.00
- Focus areas: Robotics, Control Systems, State Estimation
- 100% financial support through a combination of TAs and RAs

VIT University (Vellore Institute of Technology Technology)
Vellore, India

B.Tech. in Mechanical Engineering — *July 2010 - May 2014*

- GPA: 9.20/10.00
- Focus areas: Design, Dynamics
- Top 2% of the program throughout

IIT Madras (Indian Institute of Technology)
Chennai, India

Summer Research Fellowship, Department of Mechanical Engineering — *May 2013 - July 2013*

- One of 20 students from throughout the country to be selected for the fellowship

Work Experience

Rivian Automotive LLC.
San Jose, USA

Perception Engineer, Self-Driving — *Sep. 2019 - Present*

- *Lane Confidence Estimation* : Developed algorithm to estimate confidence of lane coefficients from HD Map, front camera, and wing camera
- *Overpass/bridge detection* : Developed algorithm to detect overpasses using HD Maps and RADAR data
- *Regression Testing Framework* : Developing a platform-agnostic regression testing framework to evaluate and enhance self-driving algorithms capable of running on cloud, and integrated with SIL, and HIL systems
- *Camera Out-of-Focus Detection* : Developed a fail-safe algorithm to detect when the vehicle-mounted camera goes out-of-focus

NIO USA, Inc.
San Jose, USA

Perception Engineer, Autonomous Driving — *Nov. 2018 - Sep. 2019*

- *Multi-Object Tracking and Data Association* : Developed multi-object tracking and data-association algorithms for L4 autonomous driving perception stack using RADAR, LiDAR, and vision sensors
- *Regression Testing* : Developed the KPI (Key Performance Indicators) pipeline for testing, and tuning the sensor fusion algorithms; KPIs being used for regression testing
- *Multiple Hypothesis Tracking* : Developed track-to-track association logic (track labeling) across hypotheses for MHT-based object fusion
- *Code Computation Time Optimization* : Implemented code computation time optimizations for the object fusion stack
- *DNN based combined detection & tracking* : Led the sensor fusion team's efforts on using low-level features from DNN object detection model to perform data association and object tracking
- *Additional contributions:* : Robust, time and space-optimized Intersection Over Union (IOU) algorithm; Parser for KITTI and Scale AI annotation datasets; Sim environment development for tracker validation

Volvo Group
Hagerstown, USA

Advanced Technology and Research Co-Op, Connected Vehicles — *Aug. 2017 - Dec. 2017*

- *Algorithm Design* : Developed algorithms to calculate trip parameters, driving behavior, hotel mode, and stop-start analysis parameters for Volvo customer trucks for energy management operations with teams in Greensboro, and Lyon, France
- *App Development* : Developed an application in C# for engine dynamometer test cell to run vehicle duty-cycles through a Simulink model
- *Road Topology Estimation* : Developed an algorithm to estimate the road topology distribution of a route using log-vehicle data, and simulation data

Department of Mechanical Engineering, Penn State
University Park, USA

Graduate Teaching Assistant — *Aug. 2016 - May 2018*

- *Classes Assisted/Taught* : Vehicle Road Dynamics (senior-year class), ME Design Methodology (junior-year class), Introduction to Thermal Sciences (inter-department class)
- *Highlight* : Mentored 8 project teams to deliver industry-sponsored semester-long design projects as part of the junior-year design class

Intelligent Vehicles and Systems Group, Penn State *University Park, USA*

Graduate Student Researcher, Connected Vehicles *Jan. 2017 - Nov. 2018*

- *Hardware Instrumentation* : Instrumented an experimental truck with ADAS sensors for HIL, SIL, and on-road testing
- *On-Road Data Collection* : Collected test data on the experimental truck on multiple routes in the states of PA and MD
- *Traffic Modeling and Simulation* : Set-up traffic modeling and simulation capabilities in the research lab, and performed microscopic traffic simulations on AIMSUN
- *Traffic Estimation Algorithm* : Developed a traffic estimation algorithm to visualize traffic captured using one front-facing RADAR on a mobile truck
- *Free Space Estimation* : Developed algorithm to measure the available free space in ego-vehicle's lane by fusing lane map with front-facing RADAR and camera

Indian Institute of Science *Bengaluru, India*

Junior Research Fellow *July 2014 - June 2016*

- *Smart-Manufacturing Lab* : Designed, and established India's first smart manufacturing laboratory, funded by Boeing R&T
- *Patient Transfer Device* : Led a research team of four research fellows to design, and develop an assistive device to transfer patients from one bed to another. The work was filed for an Indian patent in June 2015.

Publications and Patents

Publications:

- **Krishna Varadarajan, et al.** (2019) (*Accepted in invited session*) "Analyzing the Effects of Geometric Lane Constraints on RADAR-based Sensing of Available Vehicle Headway using Mapped Lane Geometry and Camera Registration of Lane Position" *In:* ASME Dynamic Systems and Control Conference (DSCC) [Link]
- **V.S.Krishna Prasad, et al.** (2013) "Simulation and Modeling of Performance Characteristic of Wire Cut EDM on Inconel825 using Multiple Regression and ANN" *In:* International Conference on Mathematical Computer Engineering - ICMCE. pp. 157-165

Patent:

- **"Subject Transfer Apparatus"** - Application No.: 2972/CHE/2015 (*Status: Pending*)
  /brief: Assistive device to transfer patients with limited mobility from one platform to another

Milestones & Awards

2016	**Graduate Assistantship,** Department of Mechanical Engineering, Penn State University	*University Park, USA*
2013	**Healthcare Innovation Workshop,** Selected to present to the former President of India, Dr. APJ Abdul Kalam	*Hyderabad, India*
2013	**Research Workshop,** Selected as one of 30 students from India by Camera Culture Group, MIT Media Lab	*Hyderabad, India*
2013	**Runner-Up,** Medical hackathon by CAMTech, Massachusetts General Hospital	*Cambridge, USA*
2012	**Winner,** Medical hackathon by CAMTech, Massachusetts General Hospital	*Vellore, India*
2011	**Formula SAE Italy,** Represented VIT University at the annual Formula SAE event at the Ricardo Paletti Circuit	*Varano, Italy*
2011	**Undergraduate Merit Award,** VIT University	*Vellore, India*

Skills

- ✓ **Languages ,** C++, Python, MATLAB, R, HTML/CSS
- ✓ **Meta(OS) ,** LINUX, MacOS, ROS, RTI-DDS
- ✓ **Build Systems ,** CMake, waf
- ✓ **Miscellaneous ,** GDB, Google Test, Git, JIRA, JAMA

Selected Projects

Autonomous Systems:

- **Autonomous Search-and-Rescue Robot :** Designed the finite state machine for a robot capable of identifying, and picking-up tennis balls while solving any given maze simultaneously using the bug (reactive navigation) automata
- **Autonomous Object-Picking Arm :** A 2-link robotic arm capable of detecting desired objects in its range, and placing them at a desired location using a camera, and inverse kinematics algorithms

Control Systems:

- **LQG Controller with Kalman Filter :** Implemented a LQG controller with current and delayed Kalman estimators for 6 states of a 3-disk rotor system
- **Near-Minimum Time Controller:** Implemented the continuous-time analogous of a deadbeat controller to drive the states of 3-disk rotor system from 30° to 0°