

EDUCATION

- **Birla Institute of Technology** Ranchi, India
Bachelor of Engineering in Electrical and Electronics; GPA: 8.06 *Aug. 2012 – May. 2016*
- **Atomic Energy Central School, Jaduguda** Jamshedpur, Jharkhand
Senior Secondary; Percentage: 90.8, top 1% rank in AIEEE *April 2010 – May. 2012*

EXPERIENCE

- **Visteon Corporation** Pune, Maharashtra
Embedded Software Engineer *Oct 2018 - Present*
 - **Imaging Radar:** Development of object detection algorithms and C++ implementation for high-resolution imaging radars. This included getting the target (vehicle) positions and their velocity vectors. Also developed the Ethernet interface for the prototype radar hardware.
 - **Online camera extrinsic estimation using CNN and HD Map:** Camera pitch, height and yaw estimation by correlating CNN lane detections with the HD map. Formulated the non-linear least-squares minimization problem and implemented the same using the Ceres-solver library to find a set of extrinsic parameters to align the vision lanes to the HD Map. This was useful for GNSS-Camera cross calibration. The estimated camera pitch and height was useful to nullify the effect of pitch movements which affected the lane geometry.
 - **Lane Fusion KPI generation with HD map as the ground truth:** A C++ node for evaluating the Lane Detection pipeline by using an offline HD map as a ground truth. It calculates the precision, recall and the confusion matrix for lane types and color and the mean absolute error for lane geometries.
 - **Lane Geometry and curvature reconstructor from ADASIS HD map data:** A C++ library that implemented the ADASIS specification, in which a map provider ECU sends out map data as UDP packets. The map information is very sparse, disconnected and covers a large area. The reconstructor parses these packets and caches them into an internal data structure which lets us do fast lookup the relevant map information around the ego-vehicle at regular time intervals.
 - **Variable sized matrix implementation in C:** As a part of a porting effort, I proposed a variable-sized matrix container in C. All the memory for the 2D matrices were allocated on the stack programmatically, without having to use the heap.
- **Grey Orange Robotics Pte Ltd** Gurgaon, Haryana
Firmware Engineer *Jun 2016 - Oct 2018*
 - **Barcode decoding and pose estimation of AGV:** Development of the floor barcode decoding vision system used to estimate the pose of the AGV. It was a multithreaded application running on a Debian system. Keywords: OpenCV, multithreading, TCP/IP sockets.
 - **Development and maintenance of AGV firmware:** Development and maintenance bare metal C code for Navigation control system firmware and bootloaders for the AGV for AM335x TI SoC. Peripherals used: Ethernet (using LwIP) for server commands, quadrature encoders (eQEP) for wheels, UARTs and RS-232 (for wheel motor driver comm), uSD card (FatFS) for storing the firmware and other data.
 - **Localization system using sensor-fusion on ROS:** Development of a localization system by fusing wheel encoders, IMU and floor barcode position updates using the EKF implementation from the robot_localization ROS package.
 - **Development of LIDAR based navigation system prototype:** Used the Cartographer ROS package to get a coarse position update from the SICK LIDAR. Integrated the LIDAR position updates with the localization system mentioned above to get finer position updates. For path-planning, used a Djkskstra global planner to get a global plan to the destination. TEB and pure-pursuit local planners were used to overcome local obstacles.

PROJECTS & CERTIFICATIONS

- **Computer Vision Nanodegree from Udacity:** Facial Key-point recognition, Image captioning and Graph SLAM.
- **CARLA Simulator (Github contribution):** Fixed a major bug in the RADAR module of CARLA Simulator.
- **Real-time shuttle cock trajectory prediction (Undergraduate project):** Won cash prize from Mathworks in 2015 for prototyping a real-time vision system for badminton shuttle tracking and trajectory prediction.
- **Hoverboard prototype (Final year thesis):** An interesting application of the Inverted Pendulum problem - we developed a working prototype for a HoverBoard-like vehicle that could carry a person while actively staying upright on 2 wheels.