SAURAV KUMAR

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HIGHLIGHTS:

Masters student in Robotics with academic experience in software development including implementation of controls, perception and path planning algorithms in C++ and Python along with industrial experience in the field of vehicle prototyping, validation & testing

EDUCATION

University of Maryland — **College Park, Maryland**
Master of Engineering in Robotics — GPA 3.88/4.0 — **Expected May 2020**

Udacity
Self-Driving Car Nanodegree — **Expected April 2020**

National Institute of Technology — **Silchar**
Bachelor of Technology in Mechanical Engineering — **May 2013**

KNOWLEDGE, SKILLS AND TRAINING

- C
- C++
- Python
- MATLAB
- ROS
- Boost
- Eigen3
- OpenCV
- TensorFlow1 & 2
- Keras
- CMake
- pytorch
- Visual Basic
- Arduino
- Gazebo
- Carla
- Airsim
- V-rep
- git
- CATIA
- NX
- Solidworks
- AutoCAD
- Simulink

- Hand on experience on data acquisition system using CAN channels and external sensors
- Soft Skills: Project Management, Resource Management, Quality Assurance, Product Engineering, Team Management, 5S, Six Sigma

RELEVANT COURSES

- Machine Learning
- Decision Making for Robotics
- Perception for Autonomous Robots
- Introduction to Robot Modelling Control of Robotic System
- Automobile Engineering
- Deep Learning
- Reinforcement Learning
- Statistical Pattern Recognition
- Planning for Autonomous Robots
- Data Structure and Algorithms
- Theory of mechanisms & machines, Dynamics & Control of Machinery
- Software Development for Robotics
- Artificial Intelligence
- Computer Aided Designing and Manufacturing

TECHNICAL PROJECTS & INTERNSHIP

Sensor Fusion: Extended Kalman Filter — **Jan 2020**
- Implemented Kalman filter to estimate the state of a moving object of interest with noisy lidar and radar measurements

Self-Driving Car Behavioral Cloning — **Dec 2019**

- Trained a network based on End to End Learning for Self-Driving Cars for behavior cloning

German Traffic Sign Recognition using LeNet **Nov 2019**

- Implemented MSER algorithm to detect the traffic signs in a sequence of images and predicted the sign using the trained Convolutional neural networks inspired by LeNet and trained SVM model respectively.

Actor-critic using Deep-RL: continuous mountain car **Oct 2019**

- Trained an RL agent using Actor-Critic algorithm to solve the MountainCarContinuous-v0 Problem from OpenAI gym

SVM, LeNet and ResNet18 Classifier on Fashion-MNIST and German Traffic Signs **Sept 2019**

- Implemented SVM, LeNet and ResNet18 classifier Fashion-MNIST and German Traffic Signs dataset

Q-Learning **Sept 2019**

- Implemented Q-Learning to solve the MountainCar-v0 problem from OpenAI gym

Bayesian and k-Nearest Neighbor Classification on Fashion-MNIST **June 2019**

- Implemented Bayesian and k-Nearest Neighbor classifier Fashion-MNIST dataset after dimensionality reduction using PCA and LDA

K- Traveling Salesperson Problem **June 2019**

- Implemented the Minimum Spanning Tree (MST) based 2–approximation algorithms for solving the metric K-Traveling Salesperson Problem (TSP).

Visual Odometry **April 2019**

- Implemented Sfm approach to update the camera pose from Essential Matrix to map the vehicle motion in 2 D plane.

Lucas Kanade Template Tracker **March 2019**

- Implemented Lucas Kanade Template tracker to iteratively track an object in subsequent frames

Map exploration using RRT* algorithm **March 2019**

- Implemented the global and local RRT approach for the Frontier based exploration on a Turtlebot using ROS in C++

Map exploration using Dijkstra & A* algorithm **Feb 2019**

- Implemented Dijkstra, A* and weighted A* algorithm for map exploration and find the optimal path to reach the goal node from the starting node.

Steering Control Module for an autonomous vehicle based on Adaptive-PID **Dec 2018**

- Implemented steering control system using adaptive PID, where the PID gains keeps on changing so that plant model can mimic the reference model transfer function.

Frontier Exploration with Turtlebot **Nov 2018**

- Implemented frontier exploration algorithm to navigate through unexplored areas and builds the map using gmapping SLAM package on simulated turtlebot platform(gazebo).

Tricept Parallel Drilling Machine design, simulation and validation **Sept 2018**

- Designed and simulated the forward and inverse kinematics of the tricept parallel robot, having three parallel prismatic joints and subsequently three revolute joints in series to form the wrist joint.

Product Training Internship **Bangalore, India**

Escorts Training & Development Centre **June 2012**

- Participated in inspection, overhauling of Engine, Transmission and Rear axle systems and documentation of the functionality of the system components.

WORK EXPERIENCE

Honda R&D (India) Pvt. Ltd. **Gurgaon, India**

Research Engineer **Sept 2017 – June 2018**

- Torque and Power analysis and benchmarking of Honda Engines for upcoming models.
- Design validation and plan development for upcoming BS VI (Euro VI) Honda Engines.
- Reviewing and root cause analysis for field failures and customer complaints

- Vendor evaluation and localization of Engine Parts for ongoing projects
- Evaluation of the powertrain performance of the Honda two wheelers with their Benchmark
- Optimization of the final drive of the new models to meet the Indian market requirement

Daimler India Commercial Vehicle Private Limited **Chennai, India**
Manager **June 2013 - July 2017**
Promoted to L6 'C'

Functional Testing

- Execution of drivetrain performance trials of BharatBenz, Fuso & Mercedes Benz Prototype trucks from scratch to its completion including developing concepts, design validation, vehicle level test & validation planning through testing.
- Automatic Manual Transmission and Automatic Transmission calibration and testing for on road, off road, high altitude applications and as per specific market requirement.
- Thunderbolt: AMT Calibration & Testing for High Altitude application for Latin America Market at Chile, SA with Cross functional team of Daimler AG And Daimler Brazil
- Supervision, evaluation & validation of drivetrain system including Transmission, Propeller Shaft, Rear Axle, PTO and Gear shifting System for functional, durability and rough road testing.
- Bench level testing to simulate market conditions and field failures.
- Reviewing the root cause analysis of non-conformances and customer complaints, audit corrective actions, vendor evaluation and suggesting applicable preventive measure.
- Conducting testing of vehicles including component, system level testing and full vehicle environment testing.

Test Planning

- Design Validation and Plan development of the concurrent ongoing Projects such as Fuso, Thunderbolt (Actros Localization), FI, FJ, 3723R, 2523R, 2523C, 2040S, 4040S, 4040K Models.
- Formulating process/quality plan and reviewing analytical documents, SOP, general test procedures, protocols and their summary reports.
- Managing internal & external analysis to ensure conformance with respect to various parameters.

Project Lead: Fuso Canter & Thunderbolt:

- Entire Vehicle & Powertrain Durability Testing at Abu Dhabi & Dubai for GCC Market
- Established base for testing activities at Abu Dhabi, UAE with the support of Dealer and third parties.
- Driven & Implemented Engine RPM Boost Idling feature for effective AC in LDT for GCC Market.
- Implemented several measures to ensure better product performance such as Powertrain optimization, HVAC improvisation, Gear shifting System enhancement on Fuso Canter.
- Validation Oil Service Life for Fuso Canter and Thunderbolt vehicles for GCC Market.
- Steered the implementation of initiatives such as market requirement of Trailer brakes, Engine high Power and Torque requirement for South American Market
- Supervised inspection of Clutch life, Tire life for Fuso Canter and Thunderbolt to boost the product confidence prior launching

ACTIVITIES AND AFFILIATIONS

Mechatrix 1.0, *Organizer*	2012
SAE INDIA NIT Silchar, *Secretary*	2011-2012
Indian Society for Technical Education (ISTE), NIT Silchar, *Member*	2010-2012
Technoesis, Technical fest of NIT Silchar, *Organizer*	2010 & 2011
SAE (Society of Automotive Engineers), *Member*	2010-2011
National Service Scheme Unit, NIT Silchar, *Member*	2010