Vishal Jadhav

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Education

- **Clemson University – International Center for Automotive Research** — Greenville, USA
  Master of Science - Automotive Engineering — *August 2021 - August 2023*
- **SDGCT's Sanjay Ghodawat Group of Institution** — Kolhapur, India
  Bachelor of Engineering - Mechanical Engineering — *July 2014 - June 2018*

Skills Summary

- **Languages**: C, C++, Python, MATLAB, HTML
- **Frameworks**: TensorFlow, PyTorch, NumPy, OpenCV, Multitasking, CUDA, Pandas, Open3D, SQL, TensorRT
- **Tools**: Docker, Singularity, Git, CATIA, PLM, Teamcenter, Simulink, Vim, Bash, CAN, HIL
- **Platforms**: Linux, Windows, Robot Operating System (ROS), Arduino, Raspberry Pi, Nvidia Jetson
- **DL Algorithms**: Deep Neural Networks, Convolutional Neural Networks (CNNs), Transformer, RNN
- **Simulator**: Gazebo, Rviz, CoppeliaSim, Foxglove
- **Management**: JIRA, Confluence, Atlassian

Experience

- **ABB Inc.** — San Jose, CA
  Robotics R&D Intern — *Jan 2023 - April 2023*
  - **Nvidia Jetson**: Deploy and test the present ABB robotics item picker vision software on embedded systems like Nvidia AGX Orin. A detailed study about inference time and result of DL model on Orin and ABB vision box using TensorRT.
  - **Deep Learning**: Training and testing a transformer-based deep learning model for 3D semantic and instance segmentation on point cloud data involves: data collection using an RGBD camera, dataset creation, labeling, training, and evaluation. The research process includes exploring and selecting DL algorithms for vision and iterating on them.
  - **3D Vision**: To enhance 3D perception technology, develop robotics manipulation algorithms for structure identification and classification during pick-and-place tasks. Write preprocessing and post-processing code for the DL pipeline, including multi-processing for PCD generation from RGB and depth images. Detailed technical report to provide a procedure and results of DL pipeline in order to ensure traceability and effective knowledge sharing.
- **Vimaan Robotics** — Greenville, SC
  Field Robotics Intern — *Aug 2022 - Dec 2022*
  - **Localization**: Bringing up new systems involves testing the localization system, which utilizes a camera to track the precise location of a forklift within a warehouse automation system. The process includes acquiring data from IMU and camera sensors in a ROS-based system and conducting detailed data analysis for reliable system performance.
  - **ROS-Python**: In the field of robotics, collaborate with cross-functional teams, including firmware, hardware, computer vision, and software experts, to troubleshoot field issues. Integration of new systems and execute system test to evaluate mechanical, electrical, and system functionality. Develop test plans and define test requirements for systems. Monitoring field systems from development into production.
  - **Test Automation**: Technical debugging of communication network and camera module issues. Using bash and python, write test automation scripts. Conducted root cause analysis on technical issues, documenting all findings using JIRA and Confluence to facilitate comprehensive issue tracking and resolution.
- **Automation, Robotics, and Mechatronics Lab (ARM Lab)** — CUICAR, Greenville
  Research Assistant — *Oct 2021 - July 2022*
  - **Reinforcement Learning AWS**: Build an AWS DeepRacer model for participation in the DeepRacer League. Generate a training job with a reward function, optimization algorithm, environment, and hyperparameters to train reinforcement learning models. Implement the Pure Pursuit and Stanley controllers to define the reward function. Fine-tune the hyperparameters for optimal performance in competitive timings.
  - **ROS-MATLAB**: On a physical TurtleBot 3, utilize MATLAB-ROS toolboxes for tasks such as object tracking, object following, SLAM, obstacle avoidance, and wall following. Document the implementation and execution of these tasks.
  - **High-Performance Computing - Docker**: Build and deploy ROS-based Docker images for a TurtleBot in an HPC environment, use Singularity containers for computation and simulation visualization. Train deep learning models on a computing cluster, such as the Palmetto Cluster.
- **Tata AutoComp Systems Ltd. (IPD)** — Pune, India
  Associate Engineer – SQA — *June 2020 – Dec 2020*
  - **Quality PPAP & Performance Review**: Conduct periodic supplier performance reviews and make recommendations for reevaluating supplier status. Manage Supplier Production Part Approval (SPPAP) documents and Design Failure Mode and Effects Analysis (DFMEA) to ensure efficient and effective review and disposition of supplier submittals.
- **Tata Technologies Ltd.** — Pune, India
  Graduate Engineering Trainee (Engineering Research & Development) — *Feb 2019 – Feb 2020*
  - **Passenger Vehicle CAD**: 3D CAD wiring harness routing and packaging for passenger CNG and Electric vehicles using CATIA V5 - Engine WH, Cockpit WH, Console WH, Main, Battery, Doors WH. Projects: Tiago CNG, Tigor EV.
  - **Electrical Schematics**: Design electrical schematics of wiring harness using Capital Harness XC. Defining electrical and electronics hardware properties. Draft Info Fitment Drawings (IFD) for the assembly production line worker.
  - **Product Lifecycle Management**: Professional Teamcenter for vehicle assembly visualization. Use of product lifecycle management tools for design release, engineering change requests, and data management.

Projects

- **Sensor Fusion for 3D Object Tracking**: Detect objects in an image using the YOLO deep-learning framework. Associate regions in a camera image with LiDAR points in 3D space. Track 3D bounding boxes and compute refined time to collision for collision avoidance system. Tech: C++, YOLO, PCL (June 2023)
- **Data Analysis of PMSM Motor** : Conduct data analysis on parameters such as current, voltage, speed, and torque of a Permanent Magnet Synchronous Motor to assess its performance characteristics and efficiency. Utilize Plotly and Dash libraries for data analysis & visualization, specifically for visualizing time-series data. Tech: Python, Plotly, Dash, EDA (April 2023)
- **Autonomous Navigation using F1/10th Vehicle** : Utilize cameras to implement MATLAB-based Autonomous Lane-keeping, Road sign detection, and speed control tasks on an F1/10th vehicle. Camera calibration to find intrinsic & extrinsic parameters. Track the lane using the first camera and recognize road signs with the second camera. PID controller for Steering and Speed control and a deep learning (R-CNN) technique for road sign detection. Established UDP communication protocol between two machines. Tech: ADAS, MATLAB, Deep Learning (CNN), Arduino, Camera (Mar 2022 - May 2022)
- **Multi-Task Learning of Deep Neural Networks in Vehicle Perception**: The deep learning model proposed enables multi-task learning in vehicle perception, specifically real-time joint semantic segmentation and depth estimation using asymmetric annotations. The model can perform these two tasks on the KITTI and NYUD datasets. Its application extends to autonomous vehicles and mobile robotics. Tech: PyTorch, Convolution Neural Network, Encoder-Decoder Architecture, Light-Weight RefineNet, MobileNet-v2 (April 2022 - May 2022)
- **Autonomous Maneuver using the TurtleBot 3 Burger**: ROS-based TurtleBot 3 autonomously navigates and completes tasks through the Gazebo and real-world environments using LiDAR and a camera as perception sensors. Develop and test different algorithms which use LiDAR and camera data to achieve given tasks. Hardware-software integration in TurtleBot 3. Tech: Python, Raspberry Pi, Robot Operating System (ROS), Deep Learning & OpenCV, LiDAR (Mar 2022 - April 2022)
- **Behavioural Cloning: End to End Learning for Self-driving Cars**: The project's goal was to train an end-to-end deep learning model capable of enabling a car to navigate a track in a driving simulator. The process involved data collection, data processing, and data augmentation to prepare the dataset for training a convolutional neural network (CNN). The project was based on Nvidia's end-to-end learning technique for autonomous vehicles. Tech: Tensorflow (Dec 2021)
- **Adaptive Cruise Control and Autonomous Lane-keeping with RC Vehicle**: An ultrasonic sensor is utilized to ensure a safe distance from the front vehicle. A Kalman filter is implemented to improve the accuracy of distance measurements from the sensor. Steering control and electronic speed control are achieved through the use of a PID controller. The microcontroller is programmed in C++ using Arduino for executing these functionalities. Tech: ADAS, AV, C++, Kalman Filter, Ultrasonic, Arduino (Oct 2021 - Dec 2021)
- **System-Level Design of Two-seater Battery Electric Vehicle (Roadster)**: To meet system level requirements, break them down into subsystem requirements. Utilize MATLAB and Simulink to design the powertrain subsystem, taking into account design variables such as battery capacity, cost, top speed, and range estimation. Evaluate design options and integrate six distinct subsystems: Structures, Packaging, Vehicle Dynamics, Powertrain, Human Factors, and System Integration. Tech: MATLAB, Simulink (Oct 2021 - Dec 2021)
- **Sensor Fusion and Calibration**: The calibration process involves fine-tuning the HC-SR04 ultrasonic sensor to improve its accuracy and reliability. A least squares approach can be used to sensor fusion of multiple ultrasonic sensors. Additionally, implementing a Kalman filter can help converge the sensor fusion output in less than 3 seconds with an accuracy of 2 mm. This combined approach enhances the overall performance and precision of the ultrasonic sensing system. Tech: C++, Arduino, Kalman Filter (Oct 2021)
- **Design and Build an Electric Cart for campus purpose**: Designing the drivetrain for a cart with a range of 100 km and a top speed of 40 km/h involves selecting appropriate components and optimizing their configuration. Responsible for planning and scheduling objectives for the cart. This includes creating agenda and setting deadlines to ensure the timely completion of tasks. (Jan 2018 - April 2018)

Certifications

- Udacity Nanodegree - Sensor Fusion
- Six Sigma Green Belt Certifications, June 23
- Machine Learning - Coursera (Stanford Online)
- AWS Machine Learning – Coursera (AWS)
- Fundamentals of Deep Learning – Nvidia DLI
- Self-Driving Car Applied Deep Learning - Udemy
- Road Dynamics Simulation Modeling – Dorle Controls LLC
- Electric and Hybrid Electric Vehicles – Devise Electronics