ARUN MADHUSUDHANAN

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Availability: Summer Internship 2024

EDUCATION

Master of Science in Robotics, Northeastern University — Expected Dec, 2024
Relevant Coursework: Computer Vision, Robotics Sensing and Navigation, Robot Mechanics and Control
GPA: 4.0/4.0

Bachelor of Technology in Mechanical Engineering, National Institute of Technology, Calicut, India — 2014 - 2018
GPA: 8.89/10.0

SKILLS

Programming Skills	Python, C++
Software tools	PyTorch, TensorFlow, MATLAB,ROS, OpenCV, Git, Ubuntu, OriginPro, Solidworks
Hardware	ZED Stereo Camera, Arduino, ZED-F9P (RTK-GPS), VN-100 IMU

EXPERIENCE

Machine Learning Engineer Co-op | Festo, Boston, MA — Jul 2023 - Dec 2023

- Developed a robust machine learning pipeline for predicting the system behavior of a liquid dosing sensing unit
- Experimented with deep learning methods (LSTM, TCN, FCN) and traditional algorithms (Decision Trees, Random Forest, Adaboost, Gradient Boosting) to identify the optimal models for the system behavior prediction task
- Orchestrated the collection and curation of a comprehensive dataset, ensuring high data quality and relevance to real-world scenarios.
- Achieved a remarkable reduction in prediction error, with the final error between predicted system behavior and actual system parameters consistently maintained at less than 2.5%.

Wells Engineer | ExxonMobil,India — July 2018 – July 2022

- Supported business divisions across the world by delivering fit for purpose and cost effective tubular designs
- Stewarded and improved the tubular connection workflow for business divisions across the world in accordance with API 5C5, resulting in $100k immediate savings and long-term synergistic benefits
- Led a study that resulted in an organizational change to the tubular design process resulting in $130k immediate savings and considerable synergistic savings through process simplification, greater standardization, and inventory transferability

PROJECTS

3D Object Classification from Partial Point Clouds | Northeastern University | [Code] [Report] — Mar - Apr 2023

- Developed a 3D object classification system utilizing deep learning methods to classify objects from partial point clouds.
- Utilized the GRNet neural network architecture to complete the partial point clouds, which are then processed by PointNet neural network architecture for object classification.
- Conducted performance evaluation and comparison between the proposed method and PointNet++ on the ShapeNet Dataset, demonstrating the superiority of our system with an accuracy of 93.8% compared to PointNet++'s 70%.

Optical Flow Estimation and Facial motion tracking | Northeastern University | [Code] [Report] — Mar - Apr 2023

- Implemented Farneback and FlowNet 2.0 methods to estimate dense optical flow using classical computer vision and deep learning approaches, respectively.
- Evaluated the performance of these methods using L1 error, average endpoint error, and average angular error metrics.
- Conducted a comparative analysis of Farneback and FlowNet 2.0 in facial motion tracking by measuring the percentage overlap of predicted bounding boxes using optical flow and Harr-Cascade classifier method.

Robust Sensor Fusion System for State Estimation | Northeastern University | [Code] [Report] — Nov - Dec 2022

- Implemented a RTK-GPS system using ROS and an NTRIP Client to improve accuracy of global positioning.
- Coupled an IMU with a ZED camera to implement ORB SLAM3, a state-of-the-art visual-inertial SLAM, and analyzed its performance in various environments including outdoors, indoors, and semi-outdoors.
- Compared the performance of RTK-GPS trajectory, Visual Inertial (VI) odometery and GPS coupled VI SLAM during indoor-outdoor transitions on MATLAB.

PUBLICATIONS

Meby Mathew, **M Arun**, Rodrigues Neil Francis and A.P. Sudheer, "*Exoskeletal Development of a Hand Complex for Rehabilitation Activities*," in IEEE 2021 International Conference on Intelligent Technologies (CONIT). [Paper]

Neil Rodrigues Francis, **Arun M**, and A.P. Sudheer, "*Design, modelling and fabrication of railway track cleaning bot*," in International Conference on Robotics and Smart Manufacturing (RoSMa2018). [Paper]