# Thanushraam Suresh Kumar

Boulder, Colorado, United States

+1 (720) 351 0516 Portfolio thanushraam.sureshkumar@colorado.edu thanushraam-sureshkumar Tr0612

## Education

**University of Colorado, Boulder** CGPA **3.7/4** **August 2024 – May 2026**

*MS Robotics* *Boulder, Colorado*

- **Relevant Coursework:** Introduction to Robotics, Statistical Estimation of Dynamical System, Advanced Computer Vision, Decision Making Under Uncertainity, Advanced Robotics, Mechatronics

**Sri Ramachandra Institute of Higher Education and Research** CGPA **3.8/4** **October 2020 – July 2024**

*Bachelor of Technology in CSE in Artificial Intelligence and Machine Learning* *Chennai, Tamil Nadu*

## Experience

**Indian Institute of Technology, Bombay**

***Research Intern*** ***February 2024 – June 2024***

- Collaborated with researchers from Indian Oil and PhD students to develop an autonomous robotic arm for automatic fuel pumping using ROS.
- Collected a dataset of 3,000 images and trained custom segmentation models (Faster-RCNN, Mask-RCNN) to detect car parts, achieving over 90% detection accuracy.
- Optimized path planning algorithms for precise robotic arm navigation, enhancing accuracy in automated refueling tasks.

**Sri Ramachandra Institute of Higher Education and Research**

***Research Intern*** ***December 2022 – March 2023***

- Enhanced models (YOLO, DeepSORT) with Extended Kalman Filter for vehicle detection and tracking, achieving 97% accuracy on low-res feeds.
- Built applications to mine vehicle trajectories and analyze traffic patterns using PrefixSpan, achieving 20% efficiency gains.
- Designed LSTM models and interactive dashboards (Plotly, Streamlit, HTML, Folium) for city traffic analysis.

## Projects

**Depth Estimation using Deep Learning** | *Pytorch* **October 2024**

- Architected a deep learning model for depth estimation, achieving a Root Mean Square Error (RMSE) of 0.2, demonstrating high accuracy.
- Implemented convolutional methods to convert standard RGB images to coded representations for enhanced depth perception.
- Leveraged deep learning frameworks to optimize model performance and enhance depth estimation capabilities in challenging scenarios.

**Structure from Motion** | *Python* **November 2024**

- Developed a complete Structure from Motion (SfM) pipeline to reconstruct 3D scenes from 2D images, leveraging SIFT-based feature detection, RANSAC for robust feature matching, and computed Fundamental and Essential matrices to establish geometric relationships across views.
- Implemented camera pose estimation using linear PnP, PnP RANSAC, and non-linear PnP techniques; reconstructed 3D points through linear triangulation, applied the chirality condition, and refined structure using non-linear triangulation for improved spatial accuracy.
- Built a visibility matrix to track feature observations across multiple views and applied Bundle Adjustment to simultaneously refine camera poses and 3D point estimates, leading to a highly accurate and coherent reconstruction.

**Visual-SLAM** | *ROS,Gazebo,SLAM,Linux* **January 2025**

- Designed and implemented a simulation-based SLAM framework integrating Visual SLAM, LiDAR SLAM, depth estimation, and object recognition, enabling robust localization and mapping in dynamic environments using platforms like Gazebo.
- Developed a multi-sensor fusion pipeline, combining RGB camera-based Visual SLAM for localization, LiDAR SLAM for precise geometric mapping, and stereo/monocular depth estimation to generate dense, high-fidelity 3D maps.
- Integrated YOLO-based object detection to classify and localize objects within the SLAM-generated maps, enhancing semantic understanding; optimized system accuracy using pose graph optimization and validated results with RViz and Open3D

## Technical Skills

**Languages**: Python, C/C++, HTML/CSS, JavaScript, SQL, Embedded C,
**Technologies/Frameworks**: Matlab,ROS,Gazebo,Autodesk Fusion 360
**Certifications**: Intermediate Machine Learning Certificate by Kaggle, AWS Academy Cloud Foundations by AWS Academy