SUSHRUTH NAGESH

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EDUCATION

Master of Science, University of California, San Diego — 2019 - 2021
Major - Intelligent Systems, Robotics and Control. — GPA - 3.86/4
Dept - Electrical and Computer Engineering

Bachelor of Engineering, Sri Jayachamarajendra College of Engineering — 2014 - 2018
Major - Electrical and Computer Engineering — GPA - 9.44/10
Class Rank - 10 out of 150

SKILLS

Programming Languages	Python, C++, Java
Python Libraries	NumPy, OpenCV, matplotlib, SciPy, Pandas, Scikit-learn
Tools	Git, AWS, Linux, Jupyter, PyCharm, Eclipse
Deep Learning frameworks	Pytorch, Tensorflow

EXPERIENCE

Perception Research Engineer — July 2021 - present
Ford Motor Company — *Palo Alto, CA*

- Researched and developed point cloud-based 3D LIDAR object detection model for Ford autonomous shuttle. Optimization of the model using tensorrt and custom CUDA kernels.
- Implemented data augmentation for images using NeRF based scene rendering and sparse depth map.
- Developed multi-modal lane detection network using spatial pyramid networks and MLP based BEV transformation
- Designed and developed Bayesian filtering based object tracking and sensor fusion algorithm for automatic vehicle marshalling system to be deployed at Ford manufacturing plants.
- Developed multi camera end-to-end vehicle pose estimation from keypoints using non-linear optimization to improve auto labeling capability for vehicle marshalling system.

AI Intern — Jun 2020 – Sept 2020, Mar 2021 – Jun 2021
Jabra (Altia Systems Inc) — *Cupertino, CA*

- Researched and developed a real-time SSD based body and face detection model to run on Jabra PanaCast 180° camera system. Over 25 % speed improvement and around 4 points mAP improvement was obtained.
- Auto mixed precision training and optimization including filter pruning and quantization were investigated.
- Designed and wrote a benchmarking and quality measurement tool to be used company-wide to measure performance and inference statistics of a given object detection model on different target devices.
- Built a binary whiteboard segmentation model to be deployed on Jabra Panacast 50 camera system. Wrote a tool to render synthetic meeting room images dataset using API's from a third-party vendor.

Systems Software Engineer & Intern — Jan 2018 - Jun 2019
Hewlett Packard Enterprise — *Bengaluru, India*

- Wrote an open source python package which automated the process of downloading, verifying and uploading CRL's through REST API's to HPE OneView resulting in reduction of time from hours to seconds. (Link)
- Worked on SSL certificate-based authentication of connections and secure data exchange between different resource modules, network and storage managers which maintain a datacenter.

- Designed and developed a web application using Django framework for developers to request and get assigned virtual machines on demand. In the background a pool of VM's are maintained and synched to the network using API calls to VMware vSphere client.

Computer Vision Intern * Sept 2017 - Dec 2017
Vigyan Labs Innovation Pvt Ltd *Mysuru, India*

- Automated energy meter reading system using edge, line and contour detection algorithms for analog meters and ResNet-50 based learning model for digit detector was developed. 97.3 % classification accuracy for digits and 90 % accuracy for analog meters was obtained. [* *Undergrad thesis project*] (Link)

PUBLICATIONS

- **S Nagesh***, S Mishra*, S Manglani, G Mills, P Chakravarty, and G Pandey. Look both ways: Bidirectional visual sensing for automatic multi-camera registration. (Link) (Submitted to **ICRA 2023**. * Equal Contribution) - *Calibration of environment cameras using a calibration robot to perform Visual Odometry, scale estimation, ArUco pose prediction, bidirectional sensing and re-projection.*
- G Kouros, S Shrivastava, C Picron, **S Nagesh**, T Tuytelaars. Category-Level Pose Retrieval with Contrastive Features Learnt with Occlusion Augmentation. (Link) (**BMVC 2022**) - *Learning pose embedding space using contrastive loss based metric learning and discrete inference time pose estimation using real time retrival scheme.*
- **S Nagesh**, S Rajesh, A Baig, S Srinivasan. Domain Adaptation for Object Detection using SE Adaptors and Center Loss. 2021. (Link) - *Unsupervised domain adaptation using adversarial approach with Universal SE adaptors and Center loss for source and target domains.*
- **S Nagesh**, A Baig, S Srinivasan, A Rangesh, M Trivedi. Structure Aware and Class Balanced 3D Object Detection on nuScenes Dataset. 2020. (Link) - *Point level supervision to recover spatial accuracy in 3D backbone and duplicate sampling strategy to address nuScenes dataset class imbalance.*

PATENTS FILED

- **S Nagesh**, S Shrivastava, P Chakravarty. Multi camera end-to-end vehicle pose estimation using non-linear optimization. 2021. (Filed, Appl No: 17/745920) - *Vehicle pose estimation using 2d key-points and CAD model across distributed network of cameras using LM optimization.*
- S Mishra, **S Nagesh**, P Chakravarty. Extrinsic Calibration of distributed cameras using Monocular Visual Odometry. 2022. (Filed, Appl No: 17/815252)

PROJECTS

Unsupervised subspace clustering of human faces UC San Diego
Guide: Prof An Cheolhong
Developed an auto encoder-based model to mimic the self-expressive property of face subspaces. Used spectral clustering to group faces. High 80 % clustering accuracy on UC San Diego ORL dataset was achieved.

Visual Inertial SLAM UC San Diego
Guide: Prof Nikolay Atanasov
Built a 2D map of the environment and trajectory of the car using Extended Kalman Filter based visual and inertial measurement sensor fusion. Camera perspective projection based EKF update and IMU kinematics based EKF predict steps were used.(Link)

Image Captioning UC San Diego
Developed a CNN encoder and LSTM decoder-based sequence model to generate image captions. Experiments based on optimizers, word embeddings and different type of RNN's were carried out.(Link)

Modernization and GDP UC San Diego
Team Lead
Analyzed GDP as an indicator of socio-economic factors of a country. Data analysis and visualization through scatter, bubble and box plots using Pandas, matplotlib was carried out.(Link)

VM Rental System Hewlett Packard Enterprise

As part of a hackathon at HPE, designed a Web application using Django framework for developers to request and immediately get VM's on demand. In the background a pool of VM's are maintained and monitored using API calls to VMware vSphere client.

RECOGNITION

- Employee of the month - Ford Motor Company (Nov 2021)
- Letter of Excellence - Hewlett Packard Enterprise (Jan 2019)
- Finalist - Texas Instruments India Innovation Challenge (2017-18) (Link)

RESEARCH LAB

Graduate Student Researcher UC San Diego CHEI Lab

3D reconstruction of historical monuments using Structure from motion techniques at UC San Diego Culture and Heritage Initiative (CHEI) Lab. Explored 3 point absolute pose estimation for robust reconstruction.

TEACHING

Graduate Teaching Assistant UC San Diego

- MATH 10A - Basic Calculus under Prof Benson Au in winter 2021
- CSE 151B - Deep learning under Prof Gary Cotrell in Fall 2020
- PHYS 1CL - Modern Physics Lab under Prof Phil Tsai in Spring 2020
- MATH 11 - Introduction to Probability & Statistics for Data Science under Prof F. Hammock in winter 2020

MISCELLANEOUS

- Primary Investigator - Deep Sensor Fusion for adverse conditions. *Ford-Caltech University alliance project with Prof. Soon-Jo Chung*
- Secondary Investigator - Improving neural radiance field rendering for real world vehicles. *Ford - KU Leuven University alliance project with Prof. Tinne Tuytelaars*
- Session Chair - *Ford AI/ML conference 2023*