P Sai Ramana Kiran

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Domain skills: Computer Vision, Deep Learning, Robot Perception, Sensor Fusion, Localization, Mapping, Motion Planning

EDUCATION

Worcester Polytechnic Institute *Aug 2022 - Present*

M.Sc. Robotics, **CGPA: 4.0/4.0** | *Courses:* ***Deep Learning***, *Roles:* ***Teaching Assistant*** *for RBE549:* ***Computer Vision***

Indian Institute of Technology Madras *Jul 2013 - Jun 2018*

(**B.Tech** + **M.Tech**), Aerospace Engineering, ***CGPA:* 8.41/10** | *Courses:* ***GPU Programming using CUDA***

SKILLS

Programming Languages : C++(11/14/17/20), Rust, Python, JavaScript, BASH

Softwares and Frameworks : GDB, Valgrind, Pytorch, TensorFlow, CUDA, ROS, Git, Gazebo, OpenCV, MMCV, Docker, Google Tests

Deep Learning Architectures : VGG16, ResNet, DenseNet, NeRF, RAFT, Transformers, VectorMapNet, DETR

WORK EXPERIENCE

Torc Robotics - Road and Lane Team | ***Computer Vision and Deep Learning Co-op*** *Aug 2023 - Present*

Baseline Shared Encoder Design

- Investigating and Implementing shared encoder designs to unify road segmentation and laneline keypoint detection for optimized resource allocation on Orin AGX

Nokia Bell Labs | ***Perception and Localization Intern*** *May 2023 - Aug 2023*

Structure Aided Visual Localization

- Engineered an **end-to-end** localization **drift correction pipeline** in a warehouse environment using structural elements as cues.
- Investigated **custom** depth correction algorithms using Passive **Stereo** and **ToF** sensors for textureless, repetitive environment
- Created an **automated annotation** pipeline for **fine-tuning** YOLOv8 network using Segment Anything Model (**SAM**) and **DINOv2**

Perception and Autonomous Robotics (PeAR) | ***Research Assistant*** *Jan 2023 - Present*

EdgeFlowNet: 100FPS High Speed Optical Flow For Autonomous Drone Navigation | Guide Dr. Nitin Sanket

- Designed a **quantization** aware **multi scale optical flow** network which gives inferences at **100FPS** with **3px EPE**
- Demonstrated the effectiveness of speed ups in autonomous drone navigation in static, dynamic and flying through gap scenarios

Quantitative Brokers LLC | ***Senior C++ Software Developer*** *Jul 2020 - Aug 2022*

Profiling and Instrumentation

- Created a compile time controlled **latency profiler tool** using **shared ring buffer** to benchmark the C++ program scopes
- Developed a **Pollable-SHM** transport mechanism for freeing up busy-wait processes using **unix socket handle sharing**

Messaging Service

- Designed a light-weight **multi-threaded** message oriented **middleware** based on **publish-subscribe** model
- Built a template driven **code generator** for **(de)serialization** of nested messaging structures across JSON, C++ and K objects
- Developed **language neutral messaging protocols** using google protobuf for integrating statistical and visualization services

Quantitative Brokers LLC | ***C++ Software Developer*** *Jul 2018 - Jul 2020*

EuroNext Market Data Handler

- Developed a **low-latency** single threaded C++ handler to fetch, parse and publish from **UDP** packets to messages
- Built a **ring buffer** to handle out of sequence packets and transport **C**entral **L**imit **O**rder **B**ook using **shared memory** IPC methods
- Created **shared libraries** and **plugins** to transform messages from C++ to K structures and store in KDB

Honeywell Technology Solutions - Advanced Technology Group | ***Research Intern*** *May 2017 - Jul 2017*

Green House Inspection - Sensor Fusion Localization Package - GitHub

- Developed sensor fusion module for heterogeneous **proprioceptive** asynchronous sensor sources using **sequential EKF**

RELEVANT PROJECTS

Structure From Motion (SfM) - Simultaneously reconstructed 3D scene (**M**apping) and extracted camera pose (**L**ocalization) from given camera correspondences using (Non)Linear **triangulation**, (Non)Linear **PnP** and Bundle Adjustment (**BA**) pipeline - *GitHub*

Stereo Visual Inertial Odometry (VIO) - Implemented process model and measurement model components in **M**ulti **S**tate **C**onstrained **K**alman **F**ilter (MSCKF) based stereo visual inertial odometry - *GitHub*

Auto Pano - Created a **panorama** by stitching images using homography estimated from traditional (**ANMS**, **RANSAC** feature points) and Deep learning (Supervised and Unsupervised **HomographyNet**) methods - *GitHub*

Auto Calib - Implemented Zhang's camera calibration by **nonlinear optimization** of intrinsics and extrinsics - *GitHub*

Parallelizing RRT using CUDA - Parallelized collision checker module of RRT path planner and demonstrated 10x speedup - *GitLab*

Multi Agent Collaborative Navigation - *Master's Thesis Project* | ***ICC Conference Paper*** | *GitLab Flight Stack* | *GitLab_Ground_stack*

- Designed software pipeline for collaborative navigation of **aerial-ground robotic system**

Autonomous Ground Vehicle - *Intelligent Ground Vehicle Competition 2017, Michigan - GitLab Technical Report*

- Engineered AGV which can **detect lanes**, **avoid obstacles** using **bezier pure pursuit controller** whilst following GPS waypoints