SASANK POTLURI

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EDUCATION

Master of Science in Robotics and Automation   **Jan 2022 – May 2024**
Northeastern Khoury college of Computer Science   *3.81/4 GPA*
Relevant Courses: Computer Vision, Factor Graphs, Sensor Fusion, Deep Learning, Reinforcement Learning, Control Systems

Bachelor of Technology in Mechanical Engineering   **Jul 2016 – Jun 2020**
Manipal Institute of Technology   *8.29/10 GPA*
Relevant Courses: Manufacturing Technology, Computer Aided Drawing, Machine Design, Nonlinear Optimization

EXPERIENCE

Autonomy Systems Intern | *C++, Python, PyTorch, Azure, CANalyzer*   **Jan 2023 – Aug 2023**
Danfoss Autonomy   *Minneapolis, Minnesota*

- Adapted LIO-SAM for a 6-axis IMU using additional GPS and conducted system testing to identify off-road failure modes
- Leveraged ROS to test third party SLAM algorithms and LIO-SAM on robot hardware for company specific use cases
- Conducted System Testing along with FMEAs on third party SLAM algorithms and LIO-SAM for company specific use cases
- Developed C++ code to provide ethernet communication between a SLAM controller and Danfoss controller
- Implemented an additional decoder on unimatch network to parallelly compute Optic Flow, Stereo Disparity, and 3D detection
- Achieved a 9.87 AP3D on Object detection task without fine-tuning the encoder of the unimatch network
- Performed 3D-object detection using YOLO-v8 and DBSCAN on the colored pointcloud generated from LiDAR camera fusion
- Leveraged synthetic data from Nvidia-IsaacSim to train YOLO-v8, achieved 0.45 mAP for real-world forklift detection
- Fused a 16-ch 2D LiDAR with camera data using a depth completion network, resulting in an MAE of 0.178 meters

Research Assistant at Hydrodynamics Lab | *Ansys, SolidWorks, Fusion360, Matlab*   **Jan 2020 – Jun 2020**
Manipal Institute of Technology   *Manipal, Karnataka*

- Added additional Pressure sensor to existing test-rig and acquired dynamic pressure and position readings using Matlab
- Used the Data acquisition system to acquire the dynamics and stability of a water-lubricated hydrodynamic bearing
- Created a 3D dynamic CFD model in Ansys and used the data to tune simulation parameters
- Revamped the model to boost dynamic bearing stability, but achieved performance similar to the original design

PROJECTS

Bundle adjustment on Buddha images | *Python, GTSAM, OpenCV*   **Nov 2023**
- Implemented SFM pipeline for sparse 3D reconstruction from images, used SIFT to extract, match and triangulate 3D keypoints
- Solved Bundle Adjustment using GTSAM to get accurate and optimized keypoints with camera poses

3D object tracking using Multi-view Images | *Python, PyTorch, NumPY*   **Nov 2023**
- Achieved an Object tracking accuracy of 15.1% by implementing an Extended Kalman Filter on 3D object-detections
- Implemented PETR-v1 tracking decoder, achieving 20.8% accuracy, and conducted comparative analysis of both approaches

Feature detection and Image mosaic | *Linux, Python, GTSAM*   **Sep 2023**
- Used the Caltech camera calibration toolbox to compute extrinsic and intrinsic parameters and undistort the images
- Applied Superglue and other classical feature detectors to compute image matches in an underwater archaeological site
- Created a mosaic using the matches and optimized the pose graph to obtain better mosaic of the site

Reinforcement Learning on Robotic Arm | *Python, PyTorch*   **Nov 2022**
- Iterated through various continuous control algorithms to train a robotic arm for pick-and-place and reach a point operations
- Re-engineered the reward function to penalize the number of moves improving speed and stability of Robotic Arm

GPS IMU pre-integration and Kalman Filtering | *Python, GTSAM, ROS*   **Dec 2023**
- Implemented IMU pre-integration using GTSAM to get approximate estimate in tunnels and tested it on real IMU-GPS data
- Implemented the same fusion again using Kalman Filter and compared the results from both approaches

Motion Planning and model predictive control | *Python, PyTorch*   **Nov 2022**
- Iterated through various continuous control algorithms to train a robotic arm for pick-and-place and reach a point operations
- Re-engineer

Control system design of Segway | *Matlab, Simulink*   **May 2022**
- Used stability analysis, and root locus design to pick optimum proportional, integral, and derivative values to control a segway
- Further solved the problem by using state space methods and improved segway performance by adding additional compensator

Performance comparision among SLAM algorithms | *ROS, C++, ORB-SLAM3, LeGO-LOAM, Matlab*   **Apr 2022**
- Collected camera, LiDAR, IMU and GPS data of test vehicle driving in urban environment by writing ROS publisher node in c++
- Utilized the collected data to test LeGO-LOAM and ORB-SLAM3 and compared their results and failure cases

Structural design for FSAE racecar(Formula Manipal) | *Ansys, CATIA, SolidWorks, Fusion360*   **Oct 2017 – Feb 2019**
- Lead the composite subsystem of the team to efficiently design and manufacture Composite automotive parts
- 3D-printed, added composite reinforcement to Intake Manifold, achieving 50%+ weight reduction compared to prior versions
- Designed and manufactured Carbon-fiber seat, and aero-package and won second place for design in Formula Bharat 2019

TECHNICAL SKILLS

Languages: Python, C++, C, Matlab
Softwares and Tools: Linux, CATIA, Ansys, Hyperworks, GUIDE, CANalyzer, VS Code, Google Cloud Platform
Libraries and Frameworks: ROS, OpenCV, NumPY, PyTorch, TensorFlow, GitHub, GTSAM, Azure, Matplotlib

ACHIEVEMENTS / EXTRACURRICULAR

- Appeared for GATE 2021 and secured an All-India Rank of 523 out of 120594 (99.566 percentile)
- Secured 3rd place in FSAE Bharat 2019 and 2nd place in the design event of the competition
- Engineered carbon fiber components for FSAE race car, such as intake manifold, sidepods, and seat, achieving a minimum 13% weight reduction compared to previous versions
- Engineered carbon fiber components for FSAE race car achieving a minimum weight reduction of 13% on all parts