Sasank Potluri

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EDUCATION

Master of Science in Robotics and Automation **Jan 2022 – Apr 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

EVIDENCE OF EXCELLENCE

- Used Unimatch as a Foundation model and built 3D-object detection module over it achieving 9.87 AP3D without finetuning
- Pruned YOLO-v7 model to make it lighter and deployed on Adlink camera to detect Fruits, Trees and People in a farm
- Secured 3rd place in FSAE Bharat 2019 and 2nd place in the design event of the competition

EXPERIENCE

Autonomy Integration and Machine Learning Co-op | *C++, ROS, Python, PyTorch* **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
- Performed system integration and testing along with FMEAs on third party SLAM companies for our specific off-road applications
- 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
- Pruned YOLO-v7 model and deployed on Adlink camera to detect Fruits, Trees and People in real-time on a farm

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 optimized it for stability using the collected bearing data

Design and Manufacturing Engineer | *Ansys, CATIA, SolidWorks, Fusion360, Matlab* **Jan 2017 – Apr 2019**
Formula Manipal *Manipal, Karnataka*
- Performed dynamic simulation of a racecar on track in Matlab and used the data to design Suspension-links and Rims of the car
- 3D-printed and 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

RELEVANT PROJECTS

Guided research on Visual-inertial navigation | *C++, ROS, Python* **Nov 2023 – Mar 2024**
- Computed depth and pose estimates in sparse environments by computing Optic flow and minimizing Photogramteric loss
- Implemented a factor graph to dynamically adjust the extrinsics of multi camera system by computing odometry from each camera
- Performed IMU pre-integration for a mulit-camera system to obtain real-time Visual-Inertial Odometry

Ball Catching Robotic Arm | *Python, C++, ROS* **Mar 2024**
- Trained YOLO-v8 model to segment a ball and determined its 3D location through a monocular camera for trajectory prediction
- Tuned control gain values of ReactorX-200 arm for swift positioning, currently working on an RL agent to improve its response

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
- Applied bundle adjustment on calculated keypoints and poses using GTSAM to get an overall optimized pose estimates

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 a tracking decoder on PETR-v1 model, achieved an accuracy of 20.8%, and conducted comparative analysis

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

Performance comparision among SLAM algorithms | *ROS, C++, ORB-SLAM3, LeGO-LOAM, Matlab* **May 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

TECHNICAL SKILLS

Languages: C++, C, Python, Matlab, Java
Softwares and Tools: Linux, CATIA, Ansys, SQL, Docker, Azure, CANalyzer, Google Cloud Platform, Gazebo, Nvidia IsaacSim
Libraries and Frameworks: ROS, OpenCV, NumPY, PyTorch, TensorFlow, TensorRT, ONNX, GitHub, GTSAM, Matplotlib