Jasleen Dhanoa

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Education

- **University of Pennsylvania** — Philadelphia, PA
  M.S.E. Robotics (GPA: 3.97)- ***Outstanding Academic Award, Outstanding Service Award*** — *Aug 2021 - May 2023*
  Courses: Machine Learning, Advanced Computer Vision, Advanced Robotics, OS
- **Punjab Engineering College** — Chandigarh, India
  B.Tech. Electronics and Communication Engineering (CGPA: 9.5/10.0) — *Aug 2016 - May 2020*

Skills

- **Languages**: Python, C++, C, CUDA, SQL
- **Tools and Libraries**: Linux, ROS/ROS2, PyTorch, Git, Docker, Shell scripting, Gazebo, RViz, OpenCV, PCL, Eigen, GTSAM

Work Experience

- **Research Assistant (ScalAR Lab)** — Philadelphia, PA
  PI: Dr. M. Ani Hsieh — *January 2022 - Present*
  - **Learning Non-Linear Dynamics using Neural ODEs** :
    - Developed learning-based dynamics model of ocean flow using Neural ODEs for efficient path planning and navigation.
    - Created synthetic dataset by simulating particle trajectories to learn the model of the underlying non-linear dynamics.
    - Improved scalability and generalizability of the model by incorporating partial knowledge of the underlying dynamics.
  - **Development and field deployment of Autonomous Surface Vehicle (ASV) in Schuylkill River**:
    - Developed a ROS Driver for integrating the turbidity sensor with the autonomy stack of the ASV.
    - Integrated GPS, IMU, and range sensors for measuring depth, pH, turbidity, and chlorophyll with the ASV using ROS.
    - Developed path planning algorithm to autonomously collect data to perform reconstruction of riverbed and sensor maps.
    - Analyzed the autonomously collected sensor data to establish water quality levels and perform reconstruction of riverbed.
- **Business Technology Analyst** — Gurgaon, India
  ZS Associates — *June 2020 - April 2021*
  - **Development and deployment of ETL pipeline for a major pharmaceutical company**:
    - Developed an ETL pipeline using Informatica Cloud and Reltio MDM for data ingestion for the client.
    - Performed data analysis to develop Data Quality Checks and designed Match and Merge Rules.
    - Lead the testing and deployment of the solution through SIT, QA, and Production.

Projects

- **Mask RCNN**:
  - Implemented and trained deep learning-based instance segmentation method Mask-RCNN from scratch.
  - Trained region proposal networks, classifier head, and mask head on a subset of COCO dataset.
  - Utilized Feature Pyramid Network with Resnet Backbone to share feature maps across different scales while training.
  - Achieved a mean average precision (mAP) score of 0.9 on unseen data.
- **Visual Inertial Odometry for Autonomous Flight for Quadrotor**:
  - Developed Visual Inertial Odometry using Error State Kalman Filter for state estimation in autonomous quadrotor flight.
  - Fused IMU and stereo camera data to estimate pose accurately.
  - Utilized A* for path planning, minimum jerk trajectory generator, and geometric controller to execute agile flight.
  - Integrated state estimation, planning, and control modules, and validated performance through extensive simulation testing.
- **3D Pose Estimation from monocular images**:
  - Designed and implemented a GAN-based algorithm to estimate 3D pose from monocular images.
  - Obtained 2D Pose estimates using OpenPose which is fed to the generator to estimate 3D Pose.
  - Refined estimates from the generator by adding a heuristic loss term to penalize incorrect poses.
  - Tested the method on MPII Human Pose dataset and achieved a mean joint error of 180.8mm
- **PennOS**:
  - Implemented a self-contained OS comprising a kernel, a FAT file system, and a user-friendly shell.
  - Developed the OS kernel, which efficiently manages system resources, schedules processes, and handles signals and interrupts.
  - Leveraged multi-threading techniques to ensure optimal system performance and responsiveness.
  - Integrated the FAT file system into the OS, offering an efficient method for storing, managing, and retrieving files.
- **Other Computer Vision projects**:
  - Object detection: YOLO Instance Segmentation: SOLO, RCNN ∘ VAE ∘ Bicycle GANs ∘ NeRF
  - Depth from stereo vision ∘ 3D Reconstruction using Multi-View Stereo ∘ Structure from Motion ∘ Vision Transformer

Achievements

- **Third prize** in **SICK LiDAR Challenge(2022-23)**: Predictive Maintenance of Electric Grid using Drone and LiDAR
- Publication in **IROS 2023**: On Collaborative Robot Teams for Environmental Monitoring: A Macroscopic Ensemble Approach
  V. Edwards, T. C. Silva, B. Mehta, ***J. Dhanoa****, M. A. Hsieh*
- Lead UPenn GRASP Lab demo at **ICRA 2022**: Demonstrated manipulation and stacking of blocks using Franka robot arm