Jinesh Rajasekhar

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EDUCATION

M.S. in Robotics Engineering, Worcester Polytechnic Institute, Massachusetts **Aug. '22 - May '24**
Courses: Deep Learning, Machine Learning, Computer Vision, Biomedical Robotics *GPA : 3.66/4*

B.Tech in Electrical Engineering, National Institute of Technology Tiruchirappalli **July '17 - May '21**
Courses: Artificial Neural Networks, Data Structure and Algorithms, Modern Control Systems *GPA : 7.64/10*

EXPERIENCE

PneuHOPE Hand Exoskeleton **Worcester, MA**
Research Assistant at PracticePoint *Dec. '23 - Feb. '24*
- Integrated position and velocity control systems into the PneuHOPE Hand Exoskeleton, elevating its functionality for more precise movement assistance in patients with upper motor neuron injuries.

Research Assistant **Worcester, MA**
Prof Ziming Zhang; Vision, Intelligence and Systems Lab *Jan. '23 - May '23*
- Introduced a Transformer-based fusion approach for camera and LiDAR features, which, when integrated into the PENet depth completion model, reduced the RMSE by 0.6% to achieve 772 RMSE on the KITTI test set.

Spine Surgery Robot **Chennai, India**
Software Engineer at Healthcare Technology Innovation Center *May. '22 - July '22*
- Built a graphical user interface for the doctors to perform clinical trials using the 6-DOF Image-guided Surgical Robot, and the interactions were made to simulate live in Pybullet engine.
- Designed the framework on PyQT, establishes the communication between GUI and Pybullet using XML-RPC protocol.

Detection of Varus Thrust in Knee Osteoarthritis **Chennai, India**
Research Engineer at Kriya NeuroTechnologies *May '19 - July '19*
- Designed a wearable device using CAD and 3D printing techniques to monitor gait movements in older adults vulnerable to Knee Varus Thrust, using ATSAMD21 microcontroller and MPU-9250 IMU sensor.
- Implemented signal processing techniques to minimize noise in IMU and leveraged Pygame for real-time prediction.

PROJECTS

Visual Odometery for Monocular Camera Jan. '23 - Feb. '24
- Implemented ORB feature detection, FLANN-based matching for precise pose estimation of moving camera.
- Validated on KITTI dataset, accurately mapping & estimating camera trajectory with 94% accuracy within 1.5 meters.

Auto-Calibration for Camera June. '23 - July '23
- Utilized OpenCV for precise corner detection, laying the groundwork for estimating camera matrix and pose.
- Executed Zhang's camera calibration method, optimizing both intrinsic & extrinsic parameters by nonlinear techniques.

3D Semantic Segmentation for Autonomous Driving Feb. '23 - April '23
- Designed an Attention-based Fusion module to use RGB images in the RangeNet segmentation architecture.
- Trained the model on Semantic KITTI dataset and achieved a 9.1 % mIoU increase on small object classes.

Image Classification of Stroke Blood Clot Origin Sept. '22 - Dec. '22
- Leveraged DenseNet architecture with transfer learning for classifying blood clot etiology in pathology images into cardiac (CE) or arterial (LAA) categories, achieving classification accuracy of 72.4% and F1 score of 0.701.

Object Detection using YOLOv5 Dec. '22 - Jan. '23
- Incorporated YOLOv5 object detection algorithm with pre-trained weights for accurately and efficiently detecting various objects in real-world images, demonstrating expertise in CNN, anchor boxes, and non-max suppression.

SPEAR: Soft Robotic EMG Assisted Rehabilitation Sept. '18 - Mar. '19
- Prototyped a bio-inspired solution for foot rehabilitation of stroke with temporary foot paralysis.
- Designed a control system that gets EMG signals of calf muscles & actuates pneumatic air muscles with solenoid valves.

Object Tracing Parallel Manipulator Aug. '18 - Sept. '18
- Fabricated a 5-bar parallel manipulator, integrated with OpenCV for real-time camera-based object tracking, and employed inverse kinematics with a microcontroller for precise servo motor angle control.

SKILLS

Programming Languages: Python, C/C++, Embedded C, MATLAB, LaTeX
Frameworks & Packages: PyTorch, OpenCV, Git version control, PyQT TensorFlow, ROS
Microprocessors/controllers used: ATSAMD21, Arduino
Software & Tools: Simulink, Solidworks, Creo, V-Rep, CARLA, Linux