

VIGNESH RAJAGOPAL

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Education

- University of Maryland** Jan 2023 - Dec 2024*
Masters of Engineering - Robotics
College Park, USA
Courses: Robotics Learning, Artificial Intelligence in Planning, Robotics Programming, Robotics Perception
- Rajalakshmi Institute of Technology** Jul 2017 - Apr 2021
Bachelor of Technology - Mechanical Engineering
Tamilnadu, India
Courses: Machine Design, Manufacturing Automation, Finite element analysis and Object Oriented Programming, Additive Manufacturing

Research Experience

- Research Assistant - Integration of exteroception with proprioception for Legged Robots** Jan 2024 - Present
Improved terrain analysis by categorizing difficulties and fine-tuning Ga-Nav model. University of Maryland, College Park
Enhanced a ResNet50 model for better assessment of RGB image quality using a unique outdoor dataset, boosting robotic sensory reliability. Working on a paper for the IROS 2024, Integration of Proprioception and Exteroception.
- Research Assistant - Automated crab meat picking machine.** Oct 2023 - Jan 2024
Enhanced depth estimation and object recognition through triangulation. University of Maryland, College Park
Collected and analyzed datasets, improving segmentation efficiency by 50% with the SAM framework.

Work Experience

- Robotics Engineer** Jun 2022 - Dec 2022, May 2023 - Aug 2023
Indian Institute of Technology Chennai, India
 - Perception:** Upgraded bike perception using ZED stereo cameras for real-time decision-making.
 - Localization:** Integrated LiDAR and ORB-SLAM with ROS, resulting in a 14% improvement in environmental mapping precision.
 - Optimization:** Streamlined Self-Balancing bike's obstacle avoidance incorporating version control, enhancing code reusability and software development efficiency.
- Design Engineer** Sep 2021 - Jun 2022
Indian Institute of Technology Chennai, India
 - Development:** Engineered and deployed a cutting-edge sensor monitoring infrastructure to enable real-time data collection and analysis; improved air quality monitoring accuracy by 20% in challenging environments of the Indian subcontinent.
 - Material Selection:** Conducted Computational Fluid Dynamics (CFD) analysis, improving sensor airflow efficiency by 12%. Achieved an increase in sensor durability and enhancement in IoT device resilience.

Skills

- Frameworks:** ROS1, ROS2, OpenCV, Pandas, Tensorflow, Pytorch, Scikit-learn, Tableau, shell scripting
- Languages:** Python, MATLAB, HTML
- Tools:** Gazebo, RVIZ, Solid Works, Labview, Git, Visual Studio, Ansys, Abaqus, Auto-desk, AutoCAD
- Platforms:** Linux, Windows, Arduino, Raspberry Pi, MacOSX

Projects

- Picky:: Pick and Place Robot:** Created a pick and place robot modeled in SolidWorks and implemented in Gazebo using ROS 2, for enhanced object manipulation accuracy. **Tech:** SolidWorks, Gazebo, ROS 2, Rviz2, Python, Motion Planning Algorithms, Simulation Testing, Control Systems, OpenCV.
- Self-Docking Robot:: Automated Navigation and Precision Docking System:** Engineered a sophisticated self-docking robot, incorporating YOLO v5 for instantaneous object recognition, with cutting-edge lane detection techniques. **Tech:** Python, Camera, TensorFlow, YOLO v5, OpenCV, Raspberry Pi 3B.
- Robotics Navigation :: Advanced RRT* Surgical Path Planning:** Developed custom versions of popular planning algorithms using ROS and Gazebo platforms, enhancing surgical path planning. This approach allowed to achieve precise and accurate navigation, improve surgical outcomes, and reduce errors by 40%. **Tech:** Dijkstra's, A*, RRT*, ROS, Gazebo.
- ROS Automation :: Agile Robotic Manufacturing System:** Designed a robot control architecture to tackle the agility challenges in the simulated robotic manufacturing reusing the environment of ARIAC 2022 **Tech:** ROS, Python, gazebo, Rviz, Ros Services.
- Self-Balancing Bike: Optimized Perception and Stability with 3D Mapping:** Innovated in 3D mapping and object detection using ZED stereo cameras. Propelled automated mobility research with advanced stability systems. **Tech:** ROS, Python, gazebo, Rviz, Zed Stereo Camera, Point Cloud Library (PCL), OpenCV, YOLO, ORB-SLAM.
- Sketcher Robot::** Developed an innovative robot capable of drawing any given sketch, enhancing artistic capabilities and precision. **Tech:** Raspberry Pi 4, Servo Motors, Python, OpenCV, Custom Algorithms, G-code, CNC Shield, GRBL.

Publications

- Effect of hydrothermal ageing on the compressive behavior of glass fiber reinforced IPN composite pipes. Presented at Rajalakshmi Institute of Technology, Chennai.
- A study of delamination characteristics on carbon fiber reinforced IPN composites during drilling using design experiments. Presented at International Conference on Recent Developments in Material Science and Applications, Chennai, India.