ANUJSAI SHANKAR NARAIN

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EDUCATION

Master of Science in Mechatronics and Robotics August 2022 – May 2024*
New York University New York, NY
Relevant Courses: Swarm Robotics, Foundation of robotics, Advanced Mechatronics, Robot Perception, Real time Embedded System Design, Simulation tools for Robotics

Bachelor of Technology in Mechatronics August 2016 - May 2020
Manipal Institute of Technology Karnataka, India
Relevant Courses: Artificial Intelligence, Image Processing and Computer Vision, Machine Learning, Robot Dynamics and Control, Robot Path Planning

TECHNICAL SKILLS

Programming Languages and Environment:	Python, C++, Windows, Linux, HPC
Frameworks:	ROS2, TensorFlow, OpenCV, Open3D, NumPy, Scikit-Learn, MATLAB, Simulink
Software tools:	Git, Arduino, Docker, CVAT
Hardware:	Arduino, Raspberry Pi, Parallax Propeller
Simulation and Design tools:	Gazebo, Rviz, Ros2 Navigation, Proteus, SolidWorks, CATIA, AutoCAD
Miscellaneous skills:	3D printing, CNC milling, Soldering, Google Suit, Microsoft tools

EXPERIENCE

Research Assistant, **AI4CE**, Brooklyn, USA October 2023 - Present

- Utilized visual mapping methods, to ensure meticulous delineation of geographical boundaries for accurate representation of sample spaces and locations.
- Disassembled and analyzed Unitree Go1 robotdog components, accelerated understanding of functionality, and subsequently programmed it to execute specified tasks effectively.
- Trained and adeptly implemented SLAM techniques on the robotdog, contributing to the dynamic and real-time update of mapping data while reducing position error estimation by up to 20%.

Robotics Engineer, **Building Diagnostics Robotics, Inc.**, Brooklyn, USA September 2022-July 2023

- Trained a deep-learning AI model to accurately detect multiple defects on sets of roughly 25 datasets of 100 images, including thermal, air leakage, and presence of moisture on building floors using existing colored and its existing thermal images.
- Collaborated with the team 3 to enhance the model's capability in accurately identifying and classifying thermal anomalies and moisture content by integrating relevant datasets and fine-tuning the model architecture.
- Developed a comprehensive catalog detailing visual attributes present in thermal images, thereby establishing a standardized Operating Procedure and reference guide to ensure precise labelling for current and future training procedures.

ACADEMIC PROJECTS

Robotics Engineer, **vSLAM and Object Detection** September 2023-May 2024

- Designed and implemented a robotic system using Gazebo plugins and Xacro files for simulation and physical bot creation in the ROS2 environment.
- Integrated vSLAM algorithms to enable autonomous navigation of the robot through a maze or map, accurately mapping the environment.
- Implemented advanced object detection algorithms for precise object localization in the context of inventory management. Leveraging LLM capabilities to further automate and optimize the process.

Robotics Engineer, **Particle Swarm Optimization on ROS2** March 2023-May 2023

- Designed and developed a network of interconnected nodes in the ROS2 environment, establishing seamless coordination among five robots and enabling effective communication with a central hub.
- Engineered the implementation of the Particle Swarm Optimization (PSO) algorithm, utilizing a parabolic function to calculate the optimal location, thereby shaping an efficient search strategy.
- Illustrated the project's functionality through simulation, integrating Matplotlib for visual representation of the optimization approach.

Control Systems Engineer, **Walking Man Simulation** November 2022-December 2022

- Engineered dynamic control using MATLAB and Linear Inverted Pendulum Model principles for a bipedal robot, enhancing forward locomotion.
- Integrated foot planning techniques to maintain equilibrium between the robot's center of mass (COM) and center of pressure (COP), ensuring exceptional stability during movement.
- Employed Linear Quadratic Regulator (LQR) controllers to develop precise control laws governing the robot's x-direction acceleration while balancing COM and COP.