# Sanjuksha Nirgude

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## INTRODUCTION

Self-driven and ambitious Robotics Engineer working in an interdisciplinary team on real-world robotics applications. Skillfully crafting intricate algorithms and high-quality production code in fast-paced, collaborative environments. Looking forward to working in a role and environment which brings out the best in me.

## TECHNICAL SKILLS

**Languages:** C++, Python, MATLAB, HTML
**Softwares:** ROS, Linux, Git, Gazebo, Rviz, Latex, Doxygen, SolidWorks, MoveIt, LMS
**Libraries & packages:** PyTorch, OpenCV, TensorFlow, Keras, GTest
**Courses & Concepts:** Localization, Path Planning, Perception, Algorithms, Mobile Robotics, Robot Controls & Dynamics, Swarm Intelligence, AI, OOP, SLAM, CARLA, Behavior Trees, Autonomous Driving, Obstacle Avoidance, Navigation, Data Structures, RabbitMQ, Sensor Fusion, State Machines, Triaging, Debugging, PubSub.

## EDUCATION

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|---|---|---|
| **Worcester Polytechnic Institute (WPI)** | | Worcester, MA |
| *Master of Science in Robotics Engineering* | GPA: 4.0/4.0 | May 2019 |
| **University of Pune (UoP)** | | Pune, India |
| *Bachelor of Mechanical Engineering* | Percentage: 71/100 | June 2016 |

## WORK EXPERIENCE

**ClearPath Inc** *Simulation Developer-Robotics*                               Feb 2023 − July 2023
- Developed simulations of robots in Gazebo using AWS EC2 instances for real-world applications.
- Imported robot STL models into gazebo simulation, enabling dynamic parameter changes to modify robot functionality.
- Led the planning and implementation of a new pallet pick-and-place feature for a project.
- Delivered presentations to executives, effectively communicating project progress and feature implementation details.
- Acted as a point of contact and triage person for the team, addressing issues from other teams and stakeholders promptly and creating tickets for further team attention.
- Collaborated with cross-functional teams to troubleshoot and resolve technical challenges, ensuring seamless project execution and delivery.

**Open Robotics** *Software Engineer-Robotics*                               Aug 2022 − Dec, 2022
- Successfully verified and executed build instructions and tutorials for ROS/Gazebo (garden release), demonstrating a deep understanding of Gazebo package architecture.
- Implemented bug fixes in Gazebo rendering packages regarding lens flare from wide-angle camera, as a part of the NASA VIPER team.
- Conducted thorough code reviews and comprehensive testing of contributions from individual open-source contributors to gazebosim, ensuring code quality and reliability.

**Symbotic LLC** *Advanced Controls Engineer*                               Aug 2019 − Aug 2022
- Spearheaded projects for automated mobile robots, specializing in case under pick ability.
- Developed advanced tools for real-time issue diagnosis and troubleshooting by analyzing sensor data from AMR.
- Implemented and tested improvements to existing features, considering future scalability and expansion of robot capabilities.
- Optimized code scalability to handle simulations with over 100 robots simultaneously, addressing robot peculiarities.
- Enhanced robot performance by identifying and resolving limitations in specific scenarios.
- Collaborated with multiple teams to diagnose and solve localization problems, ensuring reliable results.
- Contributed to the development and deployment of pick/place algorithms, utilizing both conventional and AI-based control strategies.
- Collaborated with the test team in a test-driven environment to validate algorithms.
- Programmed, unit tested, debugged, and improved pick/place ability through troubleshooting and optimization.

**Waypoint Robotics Inc** *Robotics Intern* Aug, 2018 − Dec, 2018
- Assembled an Autonomous Mobile Robot (AMR) and programmed its behavior utilizing LIDAR data and digital IO for bystander feedback regarding robot intentions.
- Enhanced the robot's programming environment by implementing sensor fusion and motion planning, introducing novel features to the product's graphical user interface (GUI).
- Integrated a detection deep learning algorithm on live video input from a mobile robot's camera, pioneering a motion algorithm that responds to this input effectively.

**Cere Labs Pvt Ltd** *Machine Learning Intern* March, 2016 − June, 2016
- Applied Reinforcement Learning (RL) techniques, particularly the Q-learning algorithm, to autonomously guide a crawling robot toward a wall using ultrasonic sensor data and Raspberry Pi controller.
- Documented the comprehensive process of constructing the robot and executing the reinforcement learning algorithm, showcasing expertise in technical communication, and published a series of informative blog posts on the company's platform.

## PROJECTS (URL)

**Atlas's Escape** *Humanoid Robotics* Jan − May, 2019
- Developed Atlas humanoid robot's behavior by integrating perception, locomotion, and manipulation to autonomously detect and approach doors in Gazebo using ROS and C++.
- Utilized BGR images and LiDAR point cloud data for accurate door sensing and recognition.

**Automated Cinematography using an UAV** *Motion Planning* Aug − Dec, 2018
- Employed a hector quadrotor to execute a comprehensive 360-degree aerial cinematography view of a human subject within a simulated environment.
- Implemented a ROS-based local RRT* path planner on a quadrotor, ensuring obstacle avoidance, and captured environment images using RViz for precise path validation.

**Facial Key-point Detection** *Computer Vision Nanodegree (Udacity)* May − Aug, 2018
- Designed CNN for precise detection of 68 facial key points, utilizing Haar Cascade for initial face detection and PyTorch for 3-layered feature extraction.

**Fuzzy Logic Controller for Indoor Navigation of Mobile Robots** *Robot Control* Jan − May, 2018
- Designed and implemented fuzzy logic controller (TFLC & OAFLC), utilizing Kinect-generated stereo-vision, point-cloud, and laser-scan data from RViz on the TurtleBot2 platform.
- Employed the Takagi-Sugeno-Kang fuzzy inference technique and Centroid defuzzification methods to realize precise implementation of the controllers, enhancing navigation accuracy and performance.

**Collective transport of Concave objects using a robot swarm** *Swarm Intelligence* Jan − May, 2018
- Devised and executed an innovative occlusion-based collective transport strategy using Khepera IV robots in ARGoS, transforming concave objects to convex by strategic filling in C++.
- Achieved efficient object transport without prior knowledge or explicit inter-robot communication, highlighting the strategy's autonomy and adaptability.

**Detection, Recognition, Pose Estimation of Objects** *Deep Learning for Perception* Aug−Dec, 2017
- Achieved 98% accuracy in object recognition and an average of 85% in angle estimation on the TableTop dataset.
- Successfully processed images from 8 distinct angles and 2 varied heights for comprehensive results.

## VOLUNTEER EXPERIENCE

**Co-Organizer Women in Robotics Boston Chapter** March, 2020 − June, 2022
**Organizer Women in Robotics Bay Area** July, 2023 − Present
- Women in Robotics is a global community to which I contribute as an organizer for community events.
- Organizing events ranging from interviews of inspiring women working in the field to technical events digging to the core of various robotics concepts.

**Robotics Outreach Program** March, 2015 − Dec, 2016
- Organized workshops in over 40 middle schools in India to share knowledge of robotics in order to promote robotics engineering as a career prospect for students.

## ADDITIONAL PROJECTS (TEAM SIZE, FRAMEWORK, LANGUAGES)

**Face Recognition using neural networks** *(3,Keras, Python)* Aug, 2017 − Dec, 2017
**Teleoperation of a robotic arm using IMU** *(5,Arduino, Python)* Aug, 2017 − Dec, 2017
**Robot Learning From Demonstration via MoCap** *(5,Trinia, Python)* Jan, 2018 − March,2018
**Image Captioning using neural networks (Udacity)** *(1, Python)* June, 2018 − Aug,2018
**Landmark detection and Robot Tracking (Udacity)** *(1, Python)* June, 2018 − Aug,2018