

SHUBHAM SONAWANI, PH.D.

Robotics Research Scientist

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PROFESSIONAL SUMMARY

Robotics researcher focused on turning perception and learning methods into systems that work outside the lab. Experience spans autonomous manipulation for medical applications, vision-guided navigation across solar arrays, pose estimation for NASA's Mars Sample Return program, and human-robot interaction. Ph.D. in Electrical Engineering with hands-on expertise in Python, C++, PyTorch, ROS 2, TensorFlow, and OpenCV, and a publication record of 17 journal, conference, and workshop papers across ICRA, IROS, CoRL, AIAA, and CCTA.

TECHNICAL SKILLS

Programming: Python, C++, C, C#, Java, R, JavaScript

Machine Learning and Computer Vision: PyTorch, TensorFlow, OpenCV; deep learning, semantic segmentation, lane detection, object detection and tracking, pose estimation, imitation learning

Robotics and Autonomy: ROS, ROS 2; autonomous manipulation, robot perception, robot navigation, SLAM, localization, docking, teleoperation

Simulation and Tools: Isaac Sim, Gazebo, MuJoCo, Unity, Docker

PROFESSIONAL EXPERIENCE

Research Scientist | Apricity Robotics | March 2025 - Present

- Research and develop autonomous robotic manipulation capabilities for medical applications using PyTorch, ROS 2, OpenCV, Python, and C++.
- Advance robot perception and manipulation pipelines supporting medical robotics research and development.

Robotics Vision R&D Scientist | Erthos | August 2024 - February 2025

- Researched and developed deep learning-based semantic segmentation and lane detection techniques for robotic traversal on solar panels.
- Built computer vision components with PyTorch, ROS 2, OpenCV, Python, and C++ to support autonomous navigation on earth-mounted solar arrays.

R&D Intern, AI and Robotics | Erthos | June 2023 - August 2023

- Implemented a production-level robot docking method combining computer vision and GPS.
- Developed and tested the ROS/ROS 2 docking workflow in Gazebo using PyTorch, OpenCV, Python, C++, and C#.

Visiting Student Researcher | NASA Jet Propulsion Laboratory | August 2020 - December 2020

- Investigated and developed pose estimation methods for Mars Sample Return Tubes.
- Created robot-perception experiments using ROS, Gazebo, TensorFlow, OpenCV, C++, and Python.

RESEARCH EXPERIENCE

Research Associate, Earth-Mounted Solar Robotics | ASU and Erthos | August 2021 - July 2024

- Developed a ROS-Gazebo simulation environment for testing and verification of robotic systems.
- Implemented semantic segmentation and lane detection models to improve the robot navigation stack.

Research Assistant, Autonomous In-Space Assembly | ASU and NASA JPL | January 2019 - December 2019

- Implemented an optimized monocular vision tracking algorithm for object detection and tracking.
- Demonstrated a successful real-world assembly task using the developed robotic system.

Research Assistant, Robotic Inventory Systems | ASU and Intel | July 2018 - December 2018

- Developed a software stack enabling communication between a custom robotic arm and the Clearpath Jackal mobile robot.
- Improved simultaneous localization and mapping (SLAM) algorithm accuracy for robotic inventory applications.

EDUCATION

Ph.D. in Electrical Engineering | Arizona State University | July 2024

Thesis: Intelligent Visual Signaling for Mixed Reality-Based Human-Robot Interaction

M.S. in Electrical Engineering | Arizona State University | May 2019

Thesis: Towards Next-Generation Mobile Manipulation and Grasping

B.Tech. in Electrical Engineering | Veermata Jijabai Technological Institute | May 2016

Thesis: Passive Localization and Path Planning for an Ackermann-Drive Robot

SELECTED PUBLICATIONS

- Open X-Embodiment: Robotic Learning Datasets and RT-X Models. ICRA, 2024.
- SiSCo: Signal Synthesis for Effective Human-Robot Communication via Large Language Models. IROS, 2024.
- Diff-Control: A Stateful Diffusion-Based Policy for Imitation Learning. IROS, 2024.
- iRoCo: Intuitive Robot Control from Anywhere Using a Smartwatch. ICRA, 2024.
- Learning Modular Language-Conditioned Robot Policies Through Attention. Autonomous Robots, 2023.
- Modularity Through Attention: Efficient Training and Transfer of Language-Conditioned Policies for Robot Manipulation. CoRL, 2022.
- Assistive Relative Pose Estimation for On-Orbit Assembly Using Convolutional Neural Networks. AIAA, 2020.

Publication list: 7 selected of 17 total; complete list at www.sdsonawani.com

AWARDS AND PROFESSIONAL SERVICE

- Best RoboCup Paper Award Finalist, IROS 2023.
- Best Poster Award, IROS 2023 XR-ROB Workshop.
- Best Poster Award, ICRA 2020 Space Robotics Workshop.
- Keen Research Grant.

Service: Reviewer for an ICRA 2024 workshop proposal and an IROS 2022 conference paper; student organizer for the ICRA 2021 Curiosity in Robots workshop.