

# Abhiroop Ajith

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## EDUCATION

### Worcester Polytechnic Institute

*Master of Science in Robotics, GPA: 3.9/4.0*

Worcester, MA

*May 2023*

### PSG College of Technology

*Bachelor of Technology in Robotics and Automation Engineering*

Coimbatore, India

*Sep 2020*

## RESEARCH EXPERIENCE

### Research Intern - Advanced Robotics and AI

May 2022 - Present

*Siemens, Berkeley, CA*

#### ARM Visual Tactile Robotic Surface Inspections:

[Project Information](#) | [IROS 2023](#)

- Developed an algorithm for real-time accurate estimation of surface normals from 3D point cloud data of curved Boeing airplane parts.
- Implemented Tactile Guided Motion Control using **Gelsight Technology** and a Human-In-The-Loop Interface for feature detection, achieving repeatability of  $\pm 1\text{mm}$  per defect and enhancing efficiency by **5x** compared to manual inspection methods.

#### ARM 3D Sewing for Robotic Jean Manufacturing:

- Engineered a Trajectory Generation module for autonomous generation of sewing seams from DXF files, reducing manual intervention and enhancing automation efficiency.
- Developed a real-time edge tracking algorithm using Holistically-Nested Edge Detection(HED) Model to maintain high-precision distance measurement between the sewing needle and garment edge, ensuring consistent sewing quality.
- Implemented a Visual Servoing-Based Control using **MoveIt Servo**, achieving system performance within **3mm sewing tolerance** and demonstrating commercial scalability.

#### Rapid-Response Automated PPE Production in Shipping Containers:

- Implemented a Vision Transformer(ViT) for segmentation tasks for picking and visual feedback-based placing of mask cases into large cartons

### Graduate Student Researcher

Jan 2022 - May 2022

*Manipulation and Environmental Lab, WPI*

- Developed a vision-based water filtration system using deep learning, establishing a high-performance baseline with EfficientDet, YoloV5, and R-MASKCNN in **PyTorch** for accurate small particle identification.
- Improved **mAP** by **6%** by using synthetic images generated from GANs.

### Research Intern

Feb 2020 - Aug 2020

*Westfälische Hochschule, Germany*

- Generated a Synthetic Dataset using AutoCAD for a Robot Picking and Place application.
- Trained a Deep Convolutional Neural Network in Tensorflow for the application.

## PUBLICATIONS & PATENTS

- A. Ajith et al. "Robotic Automation in Apparel Manufacturing: A Novel Approach to Fabric Handling and Sewing".**
- A. Agarwal, A. Ajith et al. "Robotic Defect Inspection with Visual and Tactile Perception for Large-scale Components".** IEEE International Conference on Intelligent Robots and Systems (IROS 2023)
- Robotic Visual Inspection System - Application No: 63/487,623 (*Patent Filed*)

## TECHNICAL SKILLS

**Languages:** Python, C++

**Frameworks:** ROS, ROS2, Gazebo, MATLAB, MoveIt, Docker

**Libraries:** NumPy, Tensorflow, PyTorch, OpenCV, Pandas, Keras, Open3D, PCL, Scikit-learn