User Manual: NexBot Vision Training Course 913-003 - Level I

SKU: NXB-TRN-913-003 | Version: 1.0 | Brand: NexBot Robotics

Table of Contents

1. Safety Information

READ ALL SAFETY INSTRUCTIONS BEFORE OPERATION. Failure to follow safety procedures may result in serious injury or equipment damage.

DANGER: Never attempt to replicate unsafe programming practices from simulations on physical robot hardware without performing a full risk assessment. Bypassing virtual safety limits in a lab can build dangerous habits.

WARNING: Do not share your training portal login credentials or course materials. Unauthorized distribution is a violation of the NexBot Robotics terms of service and may result in termination of access without a refund.

CAUTION: The remote lab environment is a shared resource. Always close your session properly when finished to release the resources for other students. Failure to do so may result in temporary suspension of lab access.

NOTICE: All course content, including videos, workbooks, and lab files, is the intellectual property of NexBot Robotics. Content is provided for educational purposes only and may not be reproduced or used for commercial purposes.

NOTICE: The training course and its materials are based on specific software versions. Features and interfaces in newer software releases may differ. This course, SKU NXB-TRN-913-003, does not automatically update with new software releases.

2. Product Overview

The NexBot Vision Training Course 913-003 provides programmers and technicians with the essential skills to deploy, program, and maintain 2D vision systems for NexBot robots. This course is designed for engineers and integrators who need to implement vision-guided robotics for applications such as part location, inspection, and metrology. By covering both fundamental concepts and practical applications, attendees will gain the confidence to successfully integrate vision into their automated systems. The curriculum is structured as a 3-day intensive program, combining classroom theory with extensive hands-on lab exercises using dedicated training stations. Key topics include vision system hardware and software setup, camera calibration techniques, 2D pattern matching, blob analysis for object identification, and communicating vision results to the robot program. The course emphasizes practical problem-solving, with over 10 hands-on lab exercises designed to simulate real-world industrial challenges. With a small class size limited to a maximum of 8 students, each participant receives personalized attention and ample time with the equipment. Upon completion of this training course, students will be able to: create a complete vision process from start to finish, calibrate a camera to a robot's user frame, use pattern matching tools to locate parts with high precision, and troubleshoot common vision application issues. This skill set is directly applicable to tasks in industries such as electronics assembly, automotive manufacturing, and consumer goods packaging. The course provides a solid foundation for anyone looking to leverage the power of machine vision to enhance the capability and flexibility of their NexBot robotic systems.

3. Getting Started

1. Course Objectives

Welcome to the NexBot Vision Training Course 913-003 - Level I. Upon completion, you will be able to set up a 2D vision system, calibrate a camera, create vision processes to find and inspect parts, and integrate vision data with robot motion programs.

2. Navigating the Learner Dashboard

Your learner dashboard is the central hub for all course activities. Use the left-hand navigation pane to access modules, view your grades, participate in forums, and access the resource library. Your overall progress is displayed at the top of the page.

3. Using the Virtual Robotics Lab

This course uses a high-fidelity simulation of a NexBot robot cell. You will connect to this environment to complete all lab exercises. The lab interface allows you to write and execute code, jog the robot, and interact with the vision system as if you were in front of the real hardware.

4. How to Receive Support

If you have questions about course content, post them in the module-specific discussion forums for assistance from instructors and peers. For technical issues with the portal or lab environment, use the 'Help' link to submit a support ticket.

4. Operation

Module 1: Vision System Hardware and Lighting

This section covers the fundamental components of a 2D vision system, including camera selection, lens optics, and illumination techniques. Proper lighting is critical for a robust vision application, and this module explores various strategies for different materials and environments.

> **Tip:** Always attempt to solve a vision problem with better lighting before resorting to complex software filters. A high-contrast image is the foundation of a reliable system.

Module 2: Camera Calibration

Learn the process of calibrating a camera to the robot's coordinate system. This essential step translates pixel coordinates from the camera image into real-world units, allowing the robot to accurately pick up parts identified by the vision system.

Module 3: Finding Parts with Pattern Matching

Explore the use of NexBot's powerful pattern-matching tools to locate parts that may vary in position and orientation. This module covers training a model, setting search parameters, and interpreting match scores and results.

> **Tip:** When training a pattern, select a region with unique, high-contrast geometric features. Avoid regions with uniform texture or reflective glare.

Module 4: Part Inspection with Measurement Tools

This section introduces tools for quality control and inspection. Learn to use blob analysis to count features, edge detection to measure dimensions, and pixel-counting tools to check for the presence or absence of components.

Module 5: Integrating Vision and Robot Motion

Learn how to write robot program logic that calls a vision process, retrieves the results, and dynamically adjusts the robot's path. This

capstone module involves creating a complete program to find, pick up, and sort objects.

> **Tip:** Always include error-handling in your code. Your program should be able to react gracefully if the vision system fails to find a part or returns a low confidence score.

5. Maintenance Schedule

Interval	Task	Notes
Upon Course Completion	Download and save your official Certificate of Completion. Also, download the final versions of your lab projects and the course workbook for future reference.	Course access is limited to a set period after enrollment. Ensure you save all materials before access expires.
Quarterly	Review key concepts from the course workbook, especially those related to camera calibration and lighting. This helps retain foundational knowledge.	Re-run some of your saved lab exercises in SimSuite to refresh your programming skills.
Annually	Check the NexBot Training website for any new advanced courses or supplemental workshops related to machine vision.	This course is Level I. The Level II course (914-001) covers advanced topics and is a recommended next step.
As Needed	Revisit the course forums to review discussions and solutions to common problems that other users have faced.	The forums often contain practical, real-world advice that goes beyond the core curriculum.
Every 2 Years	Consider re-enrolling in the course if you have not actively used the skills. Software and best practices evolve over time.	Contact NexBot sales for information on discounts for returning students.

6. Troubleshooting

Symptom	Possible Cause	Solution
Cannot log in to the training portal.	Incorrect credentials, expired access	Use the 'Forgot Password' link to reset your credentials. Verify your course access period has not expired. Contact your

Symptom	Possible Cause	Solution
	period, or network firewall.	IT department to ensure '*.nexbot-robotics.com' is whitelisted.
Video lectures are constantly buffering or will not play.	Insufficient internet bandwidth or browser issue.	Lower the video quality setting (e.g., from 1080p to 720p). Clear your browser's cache and cookies. Try using a different web browser or a wired network connection.
NexBot SimSuite software displays a 'License Expired' error.	The temporary training license has expired or was entered incorrectly.	Verify the license key was copied and pasted correctly from the training portal. The training license is time-limited; if your course access period has ended, the license will be invalid.
The virtual lab connection is failing or is extremely slow.	Local network issue, high server load, or scheduled maintenance.	Check the portal's main page for any posted maintenance notices. Run a network speed test to check your connection. If the issue persists for more than an hour, file a support ticket.
My lab exercise file does not work as described in the workbook.	Incorrect software version, missed step in the instructions, or a corrupted file.	Confirm your version of SimSuite matches the one specified in the course requirements. Carefully re-read the instructions for the lab. Re-download a fresh copy of the lab file from the portal.
A module quiz will not submit or show a grade.	Browser pop-up blocker or temporary platform glitch.	Disable your browser's pop-up blocker for the training portal site. Refresh the page and try submitting again. Wait 30 minutes and check again before contacting support.
Certificate of Completion is not available after finishing the final exam.	Not all required modules are marked 'Complete', or final grade requires instructor review.	Go through each course section and ensure every lesson, topic, and quiz has a completion checkmark. Please allow up to 48 hours for the instructor to review and finalize exam scores.

7. Technical Specifications

Parameter	Value	Unit
Country of Origin	KR	