

uCertify

Course Outline

Hands-On ROS for Robotics Programming



20 May 2026

1. Exercises, Quizzes, Flashcards & Glossary

Number of Questions

2. Expert Instructor-Led Training

3. ADA Compliant & JAWS Compatible Platform

4. State of the Art Educator Tools

5. Award Winning Learning Platform (LMS)

6. Chapter & Lessons

Syllabus

Chapter 1: Preface

Chapter 2: Assembling the Robot

Chapter 3: Unit Testing of GoPiGo3

Chapter 4: Getting Started with ROS

Chapter 5: Creating the Virtual Two-Wheeled ROS Robot

Chapter 6: Simulating Robot Behavior with Gazebo

Chapter 7: Programming in ROS - Commands and Tools

Chapter 8: Robot Control and Simulation

Chapter 9: Virtual SLAM and Navigation Using Gazebo

Chapter 10: SLAM for Robot Navigation

Chapter 11: Applying Machine Learning in Robotics

Chapter 12: Machine Learning with OpenAI Gym

Chapter 13: Achieve a Goal through Reinforcement Learning

Videos and How To

7. Performance Based labs

Lab Tasks

Here's what you get

1.  Exercises

There is no limit to the number of times learners can attempt these. Exercises come with detailed remediation, which ensures that learners are confident on the topic before proceeding.

56
EXERCISES

2. Quiz

Quizzes test your knowledge on the topics of the exam when you go through the course material. There is no limit to the number of times you can attempt it.

120
QUIZ

3. flashcards

Flashcards are effective memory-aiding tools that help you learn complex topics easily. The flashcard will help you in memorizing definitions, terminologies, key concepts, and more. There is no limit to the number of times learners can attempt these. Flashcards help master the key concepts.

95
FLASHCARDS

4. Glossary of terms

uCertify provides detailed explanations of concepts relevant to the course through Glossary. It contains a list of frequently used terminologies along with its detailed explanation. Glossary defines the key terms.



5. Expert Instructor-Led Training

uCertify uses the content from the finest publishers and only the IT industry's finest instructors. They have a minimum of 15 years real-world experience and are subject matter experts in their fields. Unlike a live class, you can study at your own pace. This creates a personal learning experience and gives you all the benefit of hands-on training with the flexibility of doing it around your schedule 24/7.

6. ADA Compliant & JAWS Compatible Platform

uCertify course and labs are ADA (Americans with Disability Act) compliant. It is now more accessible to students with features such as:

- Change the font, size, and color of the content of the course
- Text-to-speech, reads the text into spoken words
- Interactive videos, how-tos videos come with transcripts and voice-over
- Interactive transcripts, each word is clickable. Students can clip a specific part of the video by clicking on a word or a portion of the text.

JAWS (Job Access with Speech) is a computer screen reader program for Microsoft Windows that reads the screen either with a text-to-speech output or by a Refreshable Braille display. Student can easily navigate uCertify course using JAWS shortcut keys.

7. State of the Art Educator Tools

uCertify knows the importance of instructors and provide tools to help them do their job effectively. Instructors are able to clone and customize course. Do ability grouping. Create sections. Design grade scale and grade formula. Create and schedule assessments. Educators can also move a student from self-paced to mentor-guided to instructor-led mode in three clicks.

8. Award Winning Learning Platform (LMS)

uCertify has developed an award winning, highly interactive yet simple to use platform. The SIIA CODiE Awards is the only peer-reviewed program to showcase business and education technology's finest products and services. Since 1986, thousands of products, services and solutions have been recognized for achieving excellence. uCertify has won CODiE awards consecutively for last 7 years:

- **2014**
 1. Best Postsecondary Learning Solution

- **2015**
 1. Best Education Solution
 2. Best Virtual Learning Solution
 3. Best Student Assessment Solution
 4. Best Postsecondary Learning Solution
 5. Best Career and Workforce Readiness Solution
 6. Best Instructional Solution in Other Curriculum Areas
 7. Best Corporate Learning/Workforce Development Solution

- **2016**
 1. Best Virtual Learning Solution
 2. Best Education Cloud-based Solution
 3. Best College and Career Readiness Solution
 4. Best Corporate / Workforce Learning Solution
 5. Best Postsecondary Learning Content Solution

6. Best Postsecondary LMS or Learning Platform
7. Best Learning Relationship Management Solution

- **2017**

1. Best Overall Education Solution
2. Best Student Assessment Solution
3. Best Corporate/Workforce Learning Solution
4. Best Higher Education LMS or Learning Platform

- **2018**

1. Best Higher Education LMS or Learning Platform
2. Best Instructional Solution in Other Curriculum Areas
3. Best Learning Relationship Management Solution

- **2019**

1. Best Virtual Learning Solution
2. Best Content Authoring Development or Curation Solution
3. Best Higher Education Learning Management Solution (LMS)

- **2020**

1. Best College and Career Readiness Solution
2. Best Cross-Curricular Solution
3. Best Virtual Learning Solution

9. Chapter & Lessons

uCertify brings these textbooks to life. It is full of interactive activities that keeps the learner engaged. uCertify brings all available learning resources for a topic in one place so that the learner can efficiently learn without going to multiple places. Challenge questions are also embedded in the chapters so learners can attempt those while they are learning about that particular topic. This helps them grasp the concepts better because they can go over it again right away which improves learning.

Learners can do Flashcards, Exercises, Quizzes and Labs related to each chapter. At the end of every lesson, uCertify courses guide the learners on the path they should follow.

Syllabus

Chapter 1: Preface

- Who this course is for
- What this course covers

Chapter 2: Assembling the Robot

- Understanding the GoPiGo3 robot
- Getting familiar with the embedded hardware
- Deep diving into the electromechanics
- Putting it all together
- Quick hardware test
- Summary

Chapter 3: Unit Testing of GoPiGo3

- Getting started with Python and JupyterLab
- Unit testing of sensors and drives
- Summary

Chapter 4: Getting Started with ROS

- ROS basic concepts
- Configuring your ROS development environment
- Communication between ROS nodes – messages and topics
- Using publicly available packages for ROS
- Summary

Chapter 5: Creating the Virtual Two-Wheeled ROS Robot

- Getting started with RViz for robot visualization
- Building a differential drive robot with URDF
- Inspecting the GoPiGo3 model in ROS with RViz
- Robot frames of reference in the URDF model
- Using RViz to check the model while building
- Summary

Chapter 6: Simulating Robot Behavior with Gazebo

- Getting started with the Gazebo simulator
- Making modifications to the robot URDF

- Verifying a Gazebo model and viewing the URDF
- Moving your model around
- Summary

Chapter 7: Programming in ROS - Commands and Tools

- Setting up a physical robot
- A quick introduction to ROS programming
- Case study 1 – writing a ROS distance-sensor package
- Working with ROS commands
- Creating and running publisher and subscriber nodes
- Automating the execution of nodes using roslaunch
- Case study 2 – ROS GUI development tools – the Pi Camera
- Customizing robot features using ROS parameters
- Summary

Chapter 8: Robot Control and Simulation

- Setting up the GoPiGo3 development environment
- Case study 3 – remote control using the keyboard
- Remote control using ROS topics

- Remotely controlling both physical and virtual robots
- Summary

Chapter 9: Virtual SLAM and Navigation Using Gazebo

- Dynamic simulation using Gazebo
- Components in navigation
- Robot perception and SLAM
- Practising SLAM and navigation with the GoPiGo3
- Summary

Chapter 10: SLAM for Robot Navigation

- Preparing an LDS for your robot
- Creating a navigation application in ROS
- Practicing navigation with GoPiGo3
- Summary

Chapter 11: Applying Machine Learning in Robotics

- Setting up the system for TensorFlow
- ML comes to robotics

- From ML to deep learning
- A methodology to programmatically apply ML in robotics
- Deep learning applied to robotics – computer vision
- Summary

Chapter 12: Machine Learning with OpenAI Gym

- An introduction to OpenAI Gym
- Running an environment
- Configuring the environment file
- Running the simulation and plotting the results
- Summary

Chapter 13: Achieve a Goal through Reinforcement Learning

- Preparing the environment with TensorFlow, Keras, and Anaconda
- Understanding the ROS Machine Learning packages
- Setting the training task parameters
- Training GoPiGo3 to reach a target location while avoiding obstacles
- Summary

Videos and How To

uCertify course includes videos to help understand concepts. It also includes How Tos that help learners in accomplishing certain tasks.

12

VIDEOS

17

MINUTES

10. Performance Based Labs

uCertify's performance-based labs are simulators that provides virtual environment. Labs deliver hands on experience with minimal risk and thus replace expensive physical labs. uCertify Labs are cloud-based, device-enabled and can be easily integrated with an LMS. Features of uCertify labs:

- Provide hands-on experience in a safe, online environment
- Labs simulate real world, hardware, software & CLI environment
- Flexible and inexpensive alternative to physical Labs
- Comes with well-organized component library for every task
- Highly interactive - learn by doing
- Explanations and remediation available
- Videos on how to perform

Lab Tasks

- Configuring GoPiGo3 Hardware Interfaces for ROS Operation
- Setting Up the Raspberry Pi 3B+ for ROS Operation
- Assembling a Raspberry Pi 3B+ with the GoPiGo3
- Using AI Prompts to Explore ROS Messages and Topics

- Prompting AI to Inspect and Understand a Robot Model in RViz
- Simulating and Evaluating Robot Motion in Gazebo
- Exploring ROS Subscriber Behavior and Topic Data Flow
- Controlling Remote Robots Using ROS Topics
- Implementing Robot Perception and SLAM Using a Simulated Laser Distance Sensor
- Practicing Autonomous Navigation with GoPiGo3
- Applying a Methodology for Machine Learning in Robotics
- Exploring OpenAI Gym for Reinforcement Learning
- Training GoPiGo3 to Reach a Target Location While Avoiding Obstacles

Here's what you get

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PERFORMANCE BASED
LAB

3

VIDEO TUTORIALS

01

MINUTES

You can't stay away! Get

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