Advanced LiDAR Data Processing and Object Detection in Robotics

Dubai (UAE)

1 - 5 December 2024

UK Traininig
PARTNER

Advanced LiDAR Data Processing and Object Detection in Robotics

Code: IT28 From: 1 - 5 December 2024 City: Dubai (UAE) Fees: 4600 Pound

Introduction

The Advanced LiDAR Data Processing and Object Detection in Robotics course is meticulously designed to equip participants with in-depth knowledge and practical skills essential for effectively working with LiDAR technology. This course emphasizes the latest and most advanced techniques, tools, and frameworks available for LiDAR data processing and object detection in three-dimensional 3D environments. Participants will gain insights into LiDAR data processing steps that are crucial for implementing successful robotics applications.

Course Objectives

- Understand LiDAR specifications and spec sheets to make informed sensor choices for specific projects.
- Select the most suitable LiDAR sensor for a given robotics application based on project requirements.
- Grasp the fundamentals of LiDAR technology and its applications.
- Utilize ROS Robot Operating System wrappers to obtain real-time LiDAR data from sensors.
- Save LiDAR data to files for further analysis and processing.
- Analyze LiDAR sensor specifications and performance metrics.
- Develop Python and C++ code using ROS and PCL Point Cloud Library to extract meaningful insights from real-time LiDAR data in a robotics system.
- Conceptualize, develop, and train AI/DNN Artificial Intelligence/Deep Neural Network models for effective object detection and classification in 3D point cloud data.

Course Outlines

Day 1: Introduction to LiDAR Technology

- Overview of LiDAR principles and applications in robotics.
- Types of LiDAR sensors and their specifications.
- LiDAR Sensor Selection: Understanding LiDAR spec sheets and technical specifications, along with factors to consider when choosing a LiDAR sensor for a project.
- Sensor Setup on Linux: Connecting LiDAR sensors to Linux systems, driver installation, and using manufacturer-provided visualization tools.

Day 2: Real-Time Data Acquisition with ROS

- Introduction to ROS and its pivotal role in robotics.
- Setting up a ROS environment for LiDAR data acquisition.
- Configuring ROS wrappers for specific LiDAR sensors to facilitate real-time data processing.
- LiDAR Data Storage: Saving LiDAR data to files, focusing on file formats for storing point cloud data.

Day 3: Data Exploration and Visualization

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- Introduction to Python packages for data exploration and visualization.
- Utilizing web notebooks for interactive data visualization of LiDAR characteristics and properties.

Day 4: Processing LiDAR Data with ROS and PCL

- Introduction to the Point Cloud Library PCL for efficient LiDAR data processing.
- Developing Python and C++ code using ROS and PCL for real-time data analysis, extracting features and information from point cloud data.

Day 5: Object Detection and Classification in 3D

- Introduction to AI/DNN for point cloud data analysis.
- Conceptualizing object detection and classification algorithms for LiDAR data, focusing on sensor fusion techniques.
- Developing, training, and evaluating AI/DNN models for real-time object detection in 3D point clouds, enabling robots to autonomously identify and classify objects.

Conclusion

By the end of this advanced course on LiDAR data processing, participants will have a comprehensive understanding of what LiDAR is, the essential steps involved in LiDAR data processing, and how to implement effective object detection algorithms.

This training will empower participants to leverage LiDAR technology in robotics, ensuring they can apply these skills to real-world scenarios, enhancing their expertise in this rapidly evolving field.

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