

# MARC

Simultaneous Localization and Mapping using LiDAR

SEP 783 – Sensors & Actuators

*Adam Sokacz*

*Dr. Moein Mehrtash, LEL*

Group #:

First name, Last name, Student #

First name, Last name, Student #

First name, Last name, Student #

First name, Last name, Student #

Date:

## Objective

Learn about how ROS is used to make robots work. This lab will demonstrate how to install and configure ROS packages in order to control the differential drive MacBot using an algorithm that parses LiDAR input.

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## Pre-Lab Questions

## Post-Lab Questions

Q1- What is *CAN*? Briefly describe how it works.

*(Suggested: Short Paragraph)*

Q2 - What is *Git*? How can Git be used to *clone* remote repositories?

*(Suggested: Short Paragraph)*

Q3 - What is *differential drive* in the context of robotics? Briefly describe how it functions in controlling direction and speed.

*(Suggested: Short Paragraph)*

Q4 - Which 2 *files* must be *sourced* in order for ROS to be able to access the *version* you want to use and the *workspace* you want to use.

*(Suggested: 2 sentences)*

Q5 - The MacBot uses a *Jetson Nano* to control itself. Compare and contrast a Jetson Nano to a Raspberry Pi 4 B+.

*(Suggested: Table)*

Q6 - Define the word *odometry* in the context of robotics.

*(Suggested: Short Paragraph)*

Q7 - In your own words, compare and contrast *global* vs *local* path planning algorithms.

*(Suggested: Short Paragraph)*

Q8 - Generate an *RQT graph* for the MacBot performing SLAM. Take a screenshot and include it with your report.

*(Suggested: Screenshot)*

Q9 - List 3 *industry applications* of *SLAM*. What advantages does SLAM have over GPS?

*(Suggested: Short Paragraph)*

Q11 – Write a brief LinkedIn post about key concepts that were learned in this lab.

*(Suggested: Short Paragraph)*

## Optional Assignment

Follow the following tutorial to install, build, and run TurtleSim. Take a screenshot to demonstrate that you can control it using your keyboard.

Wiki: <http://wiki.ros.org/turtlesim>

## Feedback

Q1 - What would you rate the difficulty of this lab?

*(1 = easy, 5 = difficult)*

**1**

**2**

**3**

**4**

**5**

Comments about the difficulty of the lab:

Q2 - Did you have enough time to complete the lab within the designated lab time?

**YES**

**NO**

Q3 - How easy were the lab instructions to understand?

*(1 = easy, 5 = unclear)*

**1**

**2**

**3**

**4**

**5**

List any unclear steps:

Q4 - Could you see yourself using the skills learned in this lab to tackle future engineering challenges?

*(1 = no, 5 = yes)*

**1**

**2**

**3**

**4**

**5**

