

Lab Preparation Document

Course: 2IRR10

Group Name: Q3 Survivors

Lab Session Number: 7

Date: 18. 6. 2025

What are the specific objectives of this lab session?

(Describe what your group aims to accomplish in this session. Be specific about tasks such as setting up hardware, testing communication protocols, or implementing a feature like obstacle avoidance.)

Last lab session we made some great progress, because we managed to get the Lidar subscriber finally working as well as the first draft of our PoC. This lab session is officially the last one therefore it will be mostly used to test the final final implementation of the PoC and film the video for it.

To be more specific we will be doing 7 overall tests, which are split across different functionalities. The last couple of tests will be basically all of the components working together.

Tests 1 (SCAN environment), Test 2 (Dynamic physical obstacles), Test 3 (Recompute route based on the obstacle), Test 4 (Passenger rerouting), Test 5 (Autonomous navigation without obstacles), Test 6 (Rerouting mid way), Test 7 (Run for 5 minutes)

What steps will your group take to achieve these objectives?

(Outline the key steps you plan to follow in the lab, including any setup, coding, testing, or debugging activities.)

Similarly as previously the first thing we will do is ensure the robot is properly shutdown and rebooted. Once that is done we will start going through all of the test cases briefly described above. We have also prepared a relatively thorough documentation (READMEs) for each of the individual tests where we list all of the extra scripts/components needed and commands to be executed (it would not fit here so we can show that separately).

Overall we hope to mostly just be importing scripts into the project on the uni laptop and recording the test results, but if any complications arise we will face them head on.

What potential challenges or risks do you anticipate in this session, and how will you address them?

(Identify possible technical difficulties, hardware limitations, or software bugs that might arise, and propose strategies to manage them.)

The biggest risk currently is the communication and synchronization between the digital twin and the turtlebot, because we have managed to get everything working inside of the slam simulation, so now it is just a question of if we can translate it to the real world which could be tricky.

The mitigation of this is not very easy, as any sort of preparation would require the actual bot, as otherwise most of the stuff just works. What we can and did do was prepare multiple options for some actions so that if one does not work well we can hastily switch to a different one and not lose the precious time.

What tools, resources, or prior knowledge will you need for this lab session?

(List any specific software, hardware components, ROS packages, or documentation you will use. Also, mention if you need to review any concepts beforehand.)

We will be heavily relying on the navigation2 stack, because that is where we get most of the publishers/subscribers. Otherwise the usual suspects and at this point a lot of our work as well which we have on our github repo.

Also not only the documentation/scripts we have written but also the experience and bug fixes we have discovered through the learning process of our course.

Some more useful links:

<https://github.com/Unity-Technologies/Robotics-Nav2-SLAM-Example/tree/main>

<https://emanual.robotis.com/docs/en/platform/turtlebot3/navigation/#run-navigation-nodes>

How does this lab session contribute to the overall progress of your project?

(Explain how the work in this session connects to previous work and supports the final implementation of the twin system.)

It is supposed to be the final testing of our PoC so also the final implementation. This means that all our progress so far is obviously strongly connected to this moment as those are the foundations we are building on.