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| Task. No.: | 5 | Points: | 5 | Localization via LiDAR |

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| Objectives:  1. Using ROS. 2. Performing manual driving. 3. Working with LIDAR. 4. Generating map of the environment. 5. Finding the location of robot in the environment. |

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| Description: The aim of this exercise is to use SLAM packages, gamepad control node and QCar control node. Occupancy grid map generation can be viewed in RViz by replaying the saved ROS bag. |

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| Step | Action |
| 1 | Copy the file called *slam.sh* into the ros1 directory found inside the QCar. Use winscp tool for this purpose. |
| 2 | Use a session of PuTTY. Within PuTTY you will need to configure the Logitech gamepad. |
| 3 | Identify the device ID for the logitech gamepad. Once you have the gamepad device ID please go to the following directory: **~/ros1/src/qcar/src** and modify the file **commandnode.py**. You will need to edit the following line:  self.gpad =| gamepadViaTarget (<LOGITECH_GAMEPAD_ID>) |
| 4 | Navigate back to the **~/ros1** directory and with super user authority run the slam.sh script using the following line:  sudo ./slam.sh |
| 5 | Controll the QCar:  ● Use the LB button on the Logitech gamepad to enable motor commands,  ● Use the RT to accelerate forwards and use the left joystick to steer.  ● To move in reverse hold the LB and A buttons while using the RT to control acceleration. |
| 6 | Stop the exercise with the **ctrl+C** keyboard interrupt to terminate the ROS application.  To stop the hardware on the QCar run the **HardwareStop.py** script using super user authority.  The saved *rosbag* can be found in the **~/ros1/src/qcar/bagfiles** directory. |
| 7 | Open Rviz and load the saved the RViz configuration which is available in the directory **~/ros1/src/qcar/launch/slam.rviz**. |
| 8 | Use *rosbag play* command to show the map in Rviz.  Example of a map in Rviz |

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