

{Learn, Create, Innovate};

Robot Modelling

Mini challenge 1





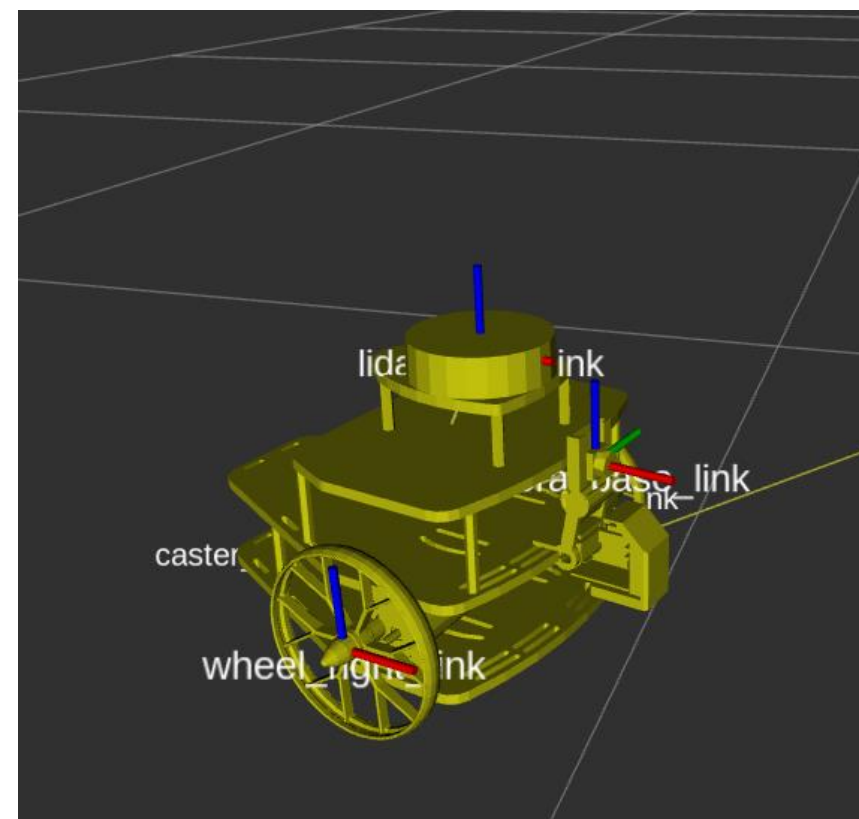
Introduction



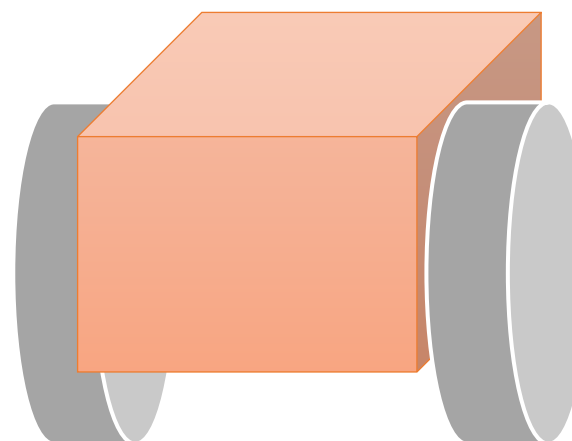
Introduction

This mini challenge is intended for the student to review the concepts introduced in the previous sessions.

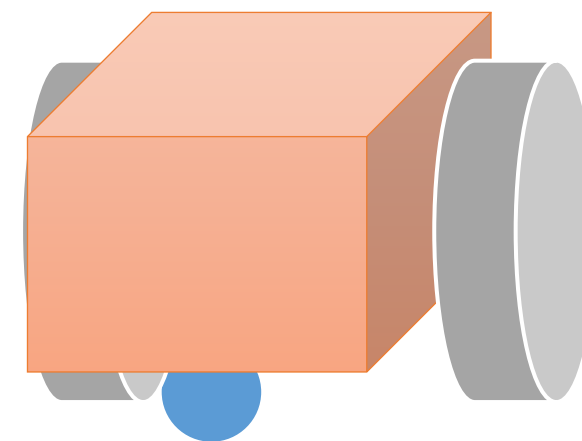
- The activity consists of modelling a differential drive robot in RVIZ.
- The robot must be modelled using ROS markers or URDF format.
- The robot must use the tf2 library of ROS.



- Make a new package called “puzzlebot_sim”, with the following packages
 - std_msgs, sensor_msgs, geometry_msgs, roslaunch, tf2_ros_py, python3-numpy, python3-transforms3d, rclpy, robot_state_publisher, joint_state_publisher_gui
- Use transformations and different markers (with meshes) or a URDF description file to build a simple mobile robot (differential drive).
 - The robot must contain a chassis, two wheels and a caster ball.
 - The student can use some basic shapes to test the robot and then replace them with the provided .stl files.

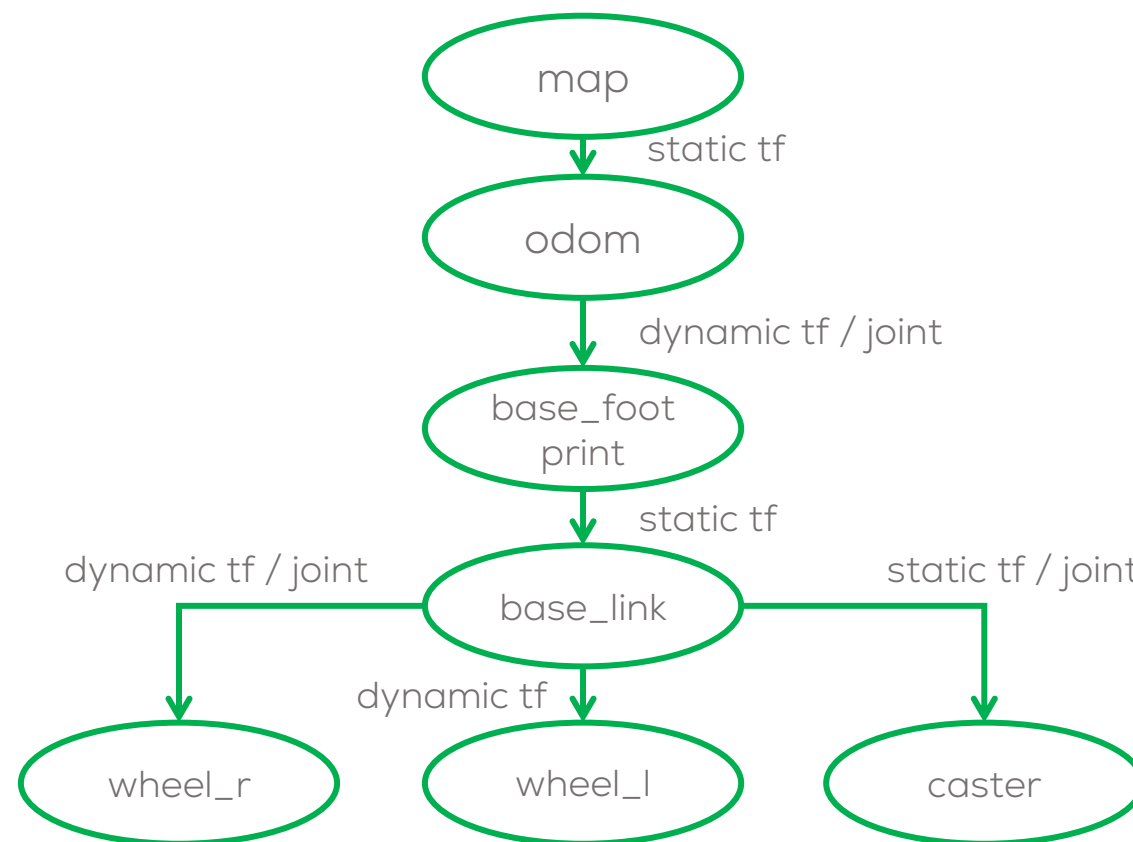


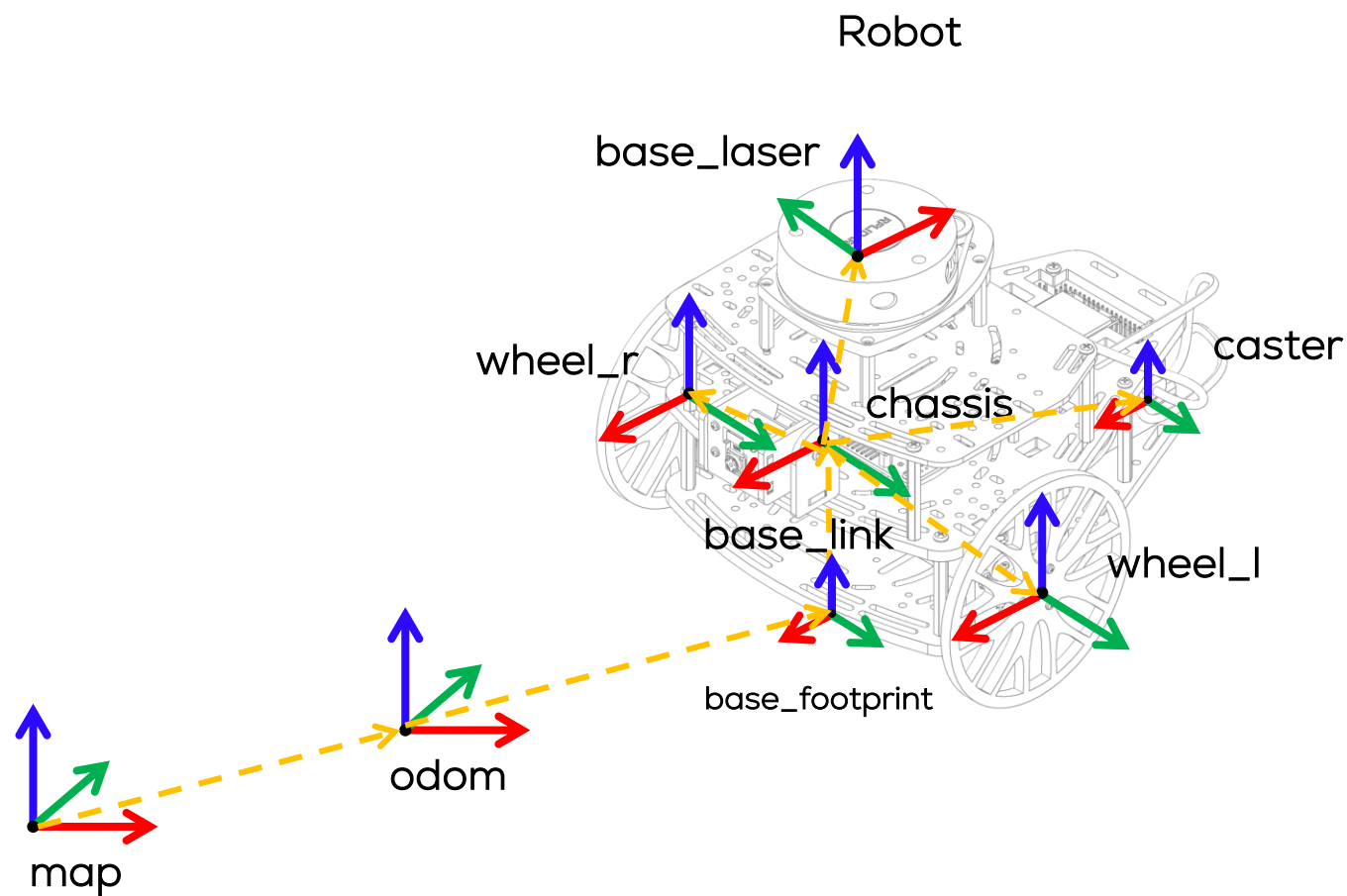
Front View



Back View

- The expected transformations are represented on the right diagram.
- map: fixed frame
- base_footprint: robot pose representation in the 2D (x,y plane).
- base_link: base link representing the robot's centre.
- wheel_r, wheel_l: wheel link
- caster: caster ball link.







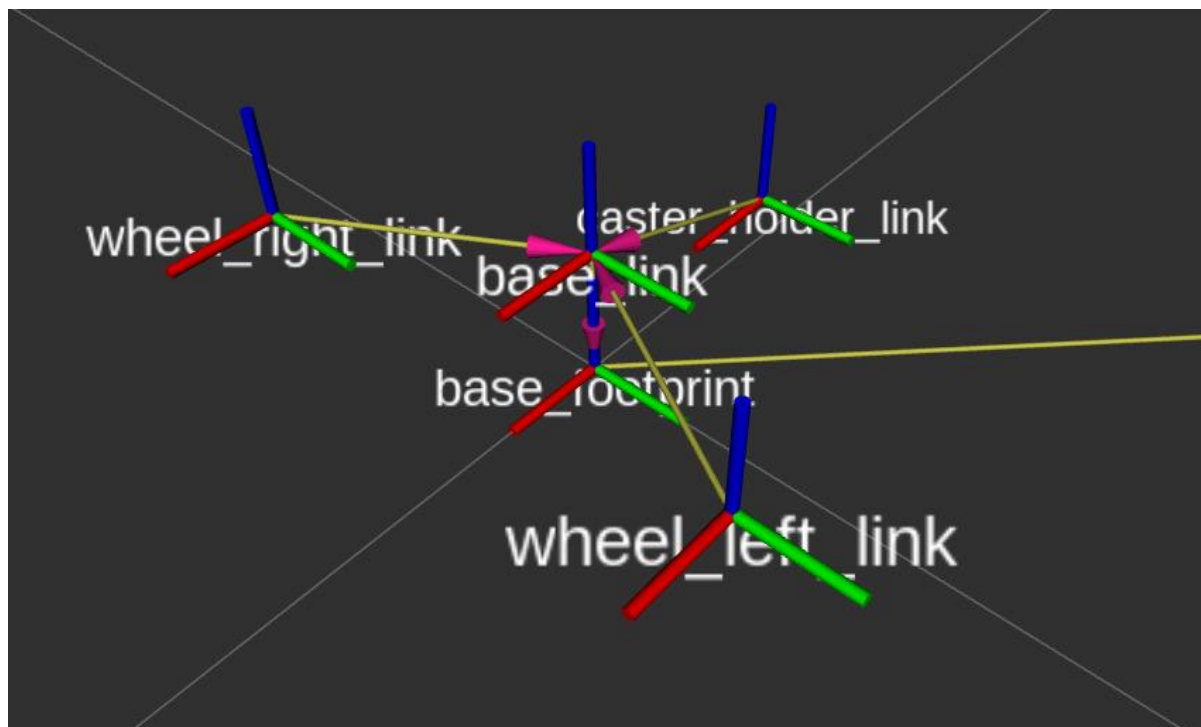
Robot Modelling



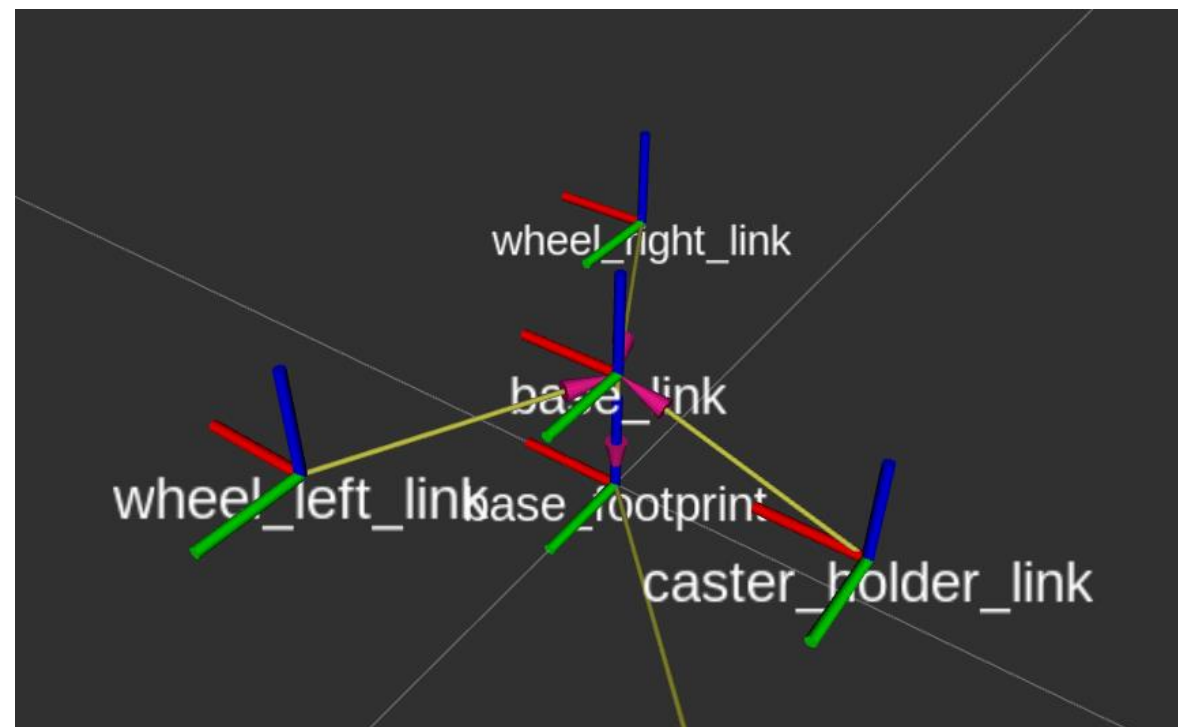
Joint / TF	Parent Link	Child Link	Translation	Rotation
base_link_joint	base_footprint	base_link	x= 0.0 y = 0.0 z = 0.05	r = 0.0 p = 0.0 y = 0.0
wheel_r_joint	base_link	wheel_r_link	x= 0.052 y = -0.095 z = -0.0025	r = 0.0 p = 0.0 y = 0.0
wheel_l_joint	base_link	wheel_l_link	x= 0.052 y = 0.095 z = -0.0025	r = 0.0 p = 0.0 y = 0.0
caster_joint	base_link	caster_link	x= -0.095 y = 0.0 z = -0.03	r = 0.0 p = 0.0 y = 0.0



Robot Modelling



Front View



Back View



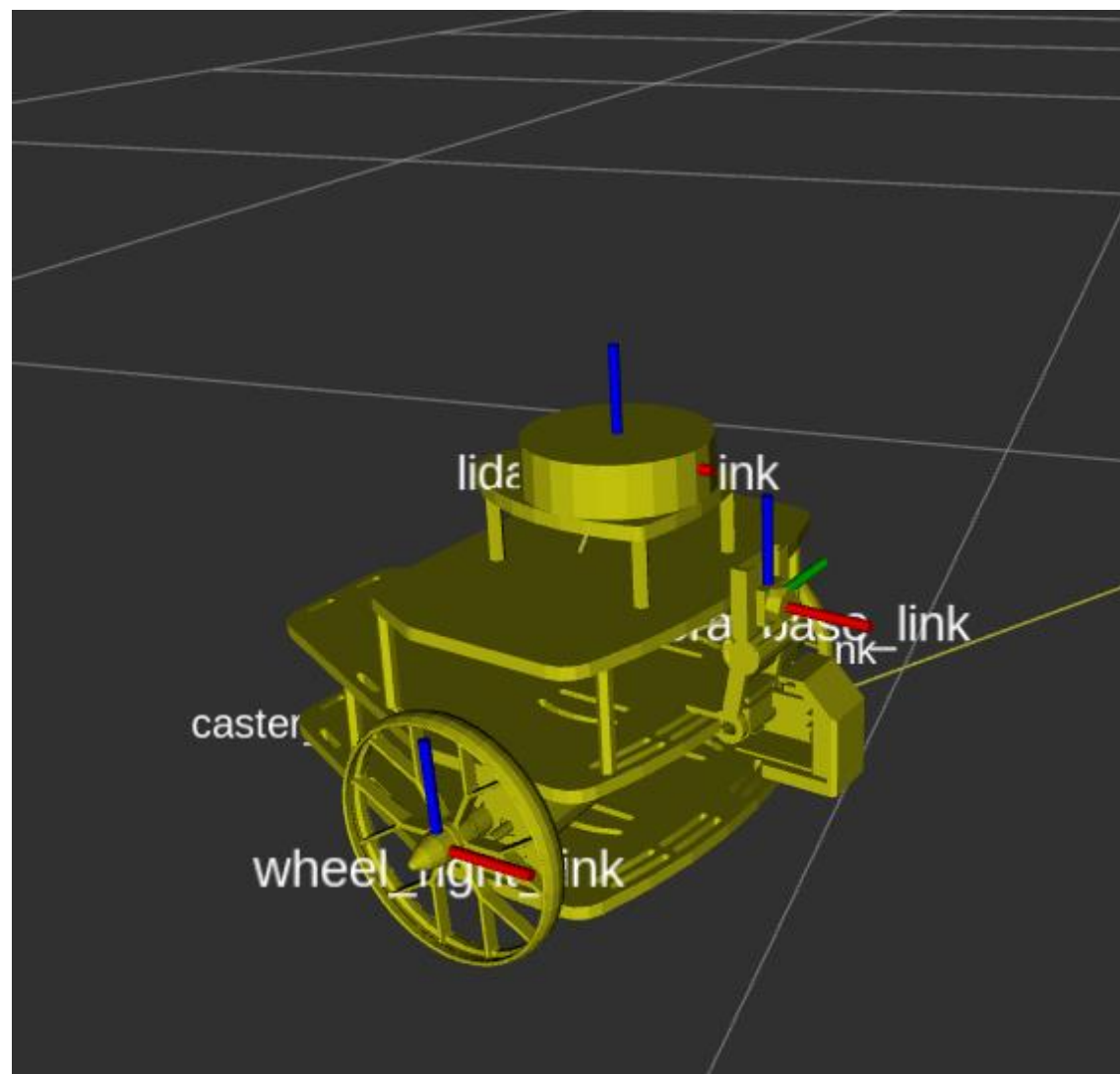
Robot modelling



- Use the .stl files provided to make the robot look like the Puzzlebot.
 - MCR2_puzzlebot_jetson_lidar_base.stl
 - MCR2_wheel.stl
 - MCR2_caster_wheel.stl
- The .stl files are off-centre and some rotated, use any CAD software to verify the distances to the centre of the figure.
- Please be aware that these measurements are when the links are defined by default.

Link/Frame	.stl file
base_link	Puzzlebot_Jetson_Li dar_Edition_Base.stl
wheel_l_link	Puzzlebot_Wheel.stl
wheel_r_link	Puzzlebot_Wheel.stl
caster_link	Puzzlebot_Caster_ Wheel.stl

Robot modelling





Expected results



- The robot should spawn in the RVIZ world.
- The robot should be able to move around a central position.
- If possible, move the wheels!.

