**Assessment:** You have been assigned the task of developing a simple controller for a planar four-wheeled mobile robot that would enable it to autonomously navigate around its environment. In order to accomplish the forenamed objective, the following constituent sub-tasks have been assigned:

1. Derive the system’s configuration kinematic model assuming that the robot’s centre of mass coincides with its axis of symmetry.
2. Formulate an expression for the wheel motor input commands, based on the configuration kinematic model that was previously computed, assuming that the robot is controlled in velocity mode.
3. Implement the velocity controller by means of a PWM function.
4. Provide a snippet of code enabling the use of a simple ROS-based mapping system.
5. Demonstrate via ROS libraries and C++ code, how the outputs of the mapping system could be broadcasted and subsequently utilised to navigate the robot to desired locations in Cartesian/world coordinates.
6. Append a button/checkbox to a custom ROS-based graphical user interface, whose toggling/checking activates the previously-designed controller (C++ code).