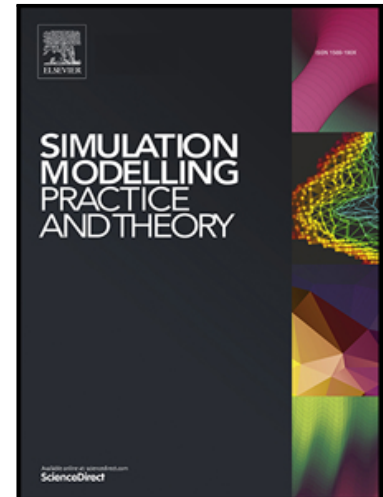


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Modelling and Simulation of a Non-Holonomic Omnidirectional Mobile Robot for Offline Programming and System Performance Analysis

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Abstract

This paper presents 3D modelling and simulation of a non-holonomic omnidirectional mobile robot, MARIO – Mobile Autonomous Rover for Intelligent Operations, using the Gazebo simulator and Robot Operating System (ROS), aiming for offline programming and system performance analysis. For this purpose, MARIO as a four wheel active driving/steering (4WD4S) platform has been modelled and simulated based on the physical developed model. Gazebo enables simulation of the world environment, physical model, sensors and control system through the Unified Robot Description Format (URDF) file. ROS is interfaced with Gazebo which allows utilization and implementation of different robotic software and tools on the simulated robot. This presented approach allows development, testing and validation of MARIO and required software before implementation on the real system. The presented approach also provides the essential theory and practice for robotic system specialists in modelling and simulation of ground mobile robotic systems using Gazebo simulator and ROS.

Keywords: Gazebo simulator, ROS, Wheeled mobile robot, 3D simulation,

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