

# Motion Tracker Based Wheeled Mobile Robot System Identification and Controller Design



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**Abstract** This project deals with the mathematical modelling and controller design for autonomous Wheeled Mobile Robot (WMR) by using motion tracking system. The mobile robot vehicle has two driving wheels and the angular speed of the two wheels is the controlled variable. Three reflected markers are attached on a robot to form a 3D rigid body. Motion tracker will track the 3D rigid body in terms of  $x$ ,  $y$  position and orientation  $\theta$ . Mathematical modelling which is a set of Multi Input Single Output model is done by using System Identification Toolbox in Matlab. Three different controller namely Proportional (P), Proportional Differential (PD) and Proportional Integral Differential (PID) controller are designed for this WMR. The mathematical model obtained from the System Identification has about 95% accuracy. In controller performance, the result shows that P, PD and PID controller have no overshoot for the forward movement. However, the percent overshoot of P, PD and PID controller when the robot is turning on side direction are around 51%, 63% and 48%, respectively. Additionally, the steady state error for all controllers is 0%.

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