CONTROL ALGORITHMS FOR GROUPS OF KINEMATIC UNICYCLE AND SKID-STEERING MOBILE ROBOTS WITH RESTRICTED INPUTS

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Abstract. The paper presents analytical and practical studies concerning the control problems of a group of Wheeled Mobile Robots (WMRs) subject to physical constraints. Firstly, controllers for achieving trajectory tracking for kinematic unicycle-like and skid-steering mobile robots with restricted control inputs are established. Next, the underlying tracking controllers are applied for group control under the condition of actuator constraints. In particular we are developing control strategies for establishing rigid and convoy-like formations for vehicles with bounded inputs. The group control approach is based on the concepts of virtual robot and virtual formation. The proposed controllers employ smooth bounded functions that can easily be realized. The performance of the resulting controllers are demonstrated by means of numerical and simulation results.

Keywords. Unicycle WMR; skid-steering WMR; virtual vehicle; tracking controller; formation control; bounded inputs.

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