Dynamic based control of a skid steering mobile robot./ Osama Elshazly, Hossam S. Abbas, Zakarya Zyada

Osama Elshazly, author

Abstrak

In this paper, development of a reduced order, augmented dynamics-drive model that combines both the dynamics and drive subsystems of the skid steering mobile robot (SSMR) is presented. A Linear Quadratic Regulator (LQR) control algorithm with feed-forward compensation of the disturbances part included in the reduced order augmented dynamics-drive model is designed. The proposed controller has many advantages such as its simplicity in terms of design and implementation in comparison with complex nonlinear control schemes that are usually designed for this system. Moreover, the good performance is also provided by the controller for the SSMR comparable with a nonlinear controller based on the inverse dynamics which depends on the availability of an accurate model describing the system. Simulation results illustrate the effectiveness and enhancement provided by the proposed controller.

Dalam paper ini, pengembangan reduced order, augmented model dynamics-drive yang mengga-bungkan kedua dinamika dan subsistem drive dari skid steering mobile robot (SSMR) ditampilkan. Sebuah algoritma kontrol Linear Quadratic Regulator (LQR) dengan kompensasi feed-forward dari disturbances part termasuk dalam reduced order augmented model dynamics-drive dirancang. Pengen-dali yang diusulkan memiliki banyak keuntungan seperti kesederhanaan dalam hal desain dan imple-mentasi dibandingkan dengan skema kontrol nonlinear kompleks yang biasanya dirancang untuk sistem ini. Selain itu, kinerja yang baik juga disediakan oleh pengendali untuk SSMR sebanding dengan pe-ngendali nonlinear berdasarkan dinamika inverse yang tergantung pada ketersediaan dari model yang akurat yang menggambarkan sistem. Hasil simulasi menggambarkan efektivitas dan peningkatan oleh pengendali yang diusulkan.