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International Journal of Engineering and Technology(UAE) [Open Access](#)
Volume 7, Issue 4, 2018, Pages 125-136

Trajectory tracking of quaternion based quadrotor using model predictive control (Article)

Islam, M.^a, Okasha, M.^a, Idres, M.M.^a, Mansor, H.^b

^aDepartment of Mechanical Engineering, International Islamic University Malaysia, Kuala Lumpur, Malaysia

^bDepartment of Electrical and Computer Engineering, International Islamic University Malaysia, Kuala Lumpur, Malaysia

Abstract

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The aim of this paper is to introduce the trajectory tracking with a quaternion based quadrotor operation using model predictive control (MPC). Since the efficacy of MPC on a system under noise and disturbance has been distinguished, it is a fair and successful attempt to apply MPC on the quaternion based quadrotor, which is a quite well-known system with uncertainties during operation. Quaternion approaches singularity-free orientation that is advantageous to design any trajectory for quadrotor wherein roll or pitch angle reaches at 90°. As a quaternion, with its four-tuple characteristics that incorporate vector elements, is different from Eulerangle orientation, a new cost function has been developed for the respective MPC controller. In order to achieve singularity-free orientations and abate the model infidelity of the system, the quaternion and MPC algorithm have been incorporated for quadrotor flight. Simulation based results elucidate the success of trajectory tracking of quaternion based dynamics of quadrotor using MPC approach. © 2018 Authors.

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Topic: Unmanned aerial vehicles (UAV) | Control | quadrotor helicopter

Prominence percentile: 99.419

Author keywords

Cost function MPC Quadrotor Quaternion Tracking

ISSN: 2227524X

Source Type: Journal

Original language: English

DOI: 10.14419/ijet.v7i4.13.21343

Document Type: Article

Publisher: Science Publishing Corporation Inc

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