Proceedings volume 11246, Single Molecule Spectroscopy and Superresolution Imaging XIII, SPIE BIOS, San Francisco, California, United States, 1-6 February 2020

Surface enhanced raman spectroscopy on polymer-graphene oxide scaffolds for drug screening applications

Matebese, Belinda T[1,] Withey, Daniel J[1,] Mapundi K. Banda[2]

[1] Council for Scientific and Industrial Research, Pretoria, South Africa

[2] Department of Mathematics and Applied Mathematics, University of Pretoria, Pretoria, South Africa

https://dl.acm.org/doi/proceedings/10.1145/3415088

Abstract

The motion planning for a mobile, autonomous system is solved using the Leapfrog algorithm from optimal control. Numerical optimal control has some advantages for motion planning. Differential constraints can be included in the problem formulation, and it is relatively simple to change the performance index and the nonlinear system model. The proposed algorithm finds a collision-free path for a cost functional under nonlinear differential constraints. Numerical case studies are done to show the effectiveness and efficiency of the Leapfrog algorithm and are compared with the kinodynamic-RRT* algorithm, in which optimal control is also used, but employed in a piecewise manner, between randomly-selected nodes. Path cost and execution time are used for performance comparison. The simulation results show that the Leapfrog method produces less jagged and shorter paths with smaller path cost and lower execution time compared to kinodynamic-RRT*, indicating suitability of the Leapfrog algorithm for motion planning in mobile, autonomous systems.