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Device for optical imaging of biological tissues with application to robotic manipulator

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We offer a device for straight forward optical transmission imaging of biological tissues, which may be set on the robotic manipulator. The idea of our technology (product) is optical screening and imaging of highly scattering and/or absorbing thick media, including biological objects such as human palm and wrist, with spatial resolution and contrast adequate for imaging the bone and vascular structure, showing simple fractures, etc. We propose also the robot control algorithm, based on sliding mode strategy, which implemented in Lab View programming environment. The idea is to keep the trajectory of the system on a particular surface in the phase space. This will allow ensuring patient safety during procedure.

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Path tracking of autonomous ground vehicle based on fractional order pid controller optimized by PSO

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An optimal control technique is proposed to address the problem of path tracking of an autonomous ground vehicle. This technique utilizes a Fractional Order Proportional Integral Derivative (FOPID) controller to control a non-holonomicautonomous ground vehicle to track the behavior of the provided reference path. Two FOPID controllers are designed to control the vehicle's inputs. These inputs represent the torques that is used in order to manipulate the implemented model of the vehicle to obtain the actual path. The implemented model of the non-holonomic autonomous ground vehicle takes into consideration both of the kinematic model, the dynamic characteristics and the actuating system. In additional, a Particle Swarm Optimization (PSO) algorithm is used to optimize the FOPID controllers' parameters. These optimal tuned parameters of FOPID controllers minimize the cost function used in the algorithm. The effectiveness and validation of the proposed method have been verified through different patterns of reference paths using MATLAB-SIMULINK software package. Finally, the obtained results of FOPID controller are compared with a conventional PID controller to show the advantage and the performance of the technique in terms of minimizing path tracking error and the complement of the path following. The new results show and establish the desirability of the research.

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