

基于 MEMS 传感器的双轨迹融合导航系统

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摘要: 为解决自主式行人导航时各种误差随着时间不断累积, 系统长期精度差的问题, 提出了一种基于 MEMS 传感器的双轨迹融合导航系统. 通过行人左、右脚各绑定一套 MEMS 传感器, 根据零速检测方法检测出零速状态, 再利用卡尔曼滤波进行零速修正, 最后结合行人左右脚最大分离距离作为约束条件, 实现双轨迹融合. 实验表明, 利用所提出的导航系统方案提高了整体导航性能, 位置误差比未融合时降低了 65%.

关键词: 惯性导航; 轨迹融合; 卡尔曼滤波; 零速检测; 零速修正; 约束条件

Double Trajectory Fusion Navigation System Based on MEMS Sensor

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Abstract: In order to solve the problem that various errors are accumulated over time and the long-term accuracy of the system is poor, a dual-track fusion navigation system based on MEMS sensor is proposed to solve the problem of autonomous pedestrian inertial navigation. The zero-speed state is detected according to the zero-velocity detection method, and the zero-velocity updates(ZUPT) correction is carried out by using the Kalman filter. Finally, the maximum separation distance of the pedestrian left and right foot is taken as the constraint condition to realize the double trajectory Fusion. Experiments show that the overall navigation performance is improved by using the proposed navigation system scheme, and the position error is reduced by 65% compared with when not being integrated.

Key words: inertial navigation; trajectory fusion; Kalman filter; zero-velocity detection; zero-velocity update; constraint conditions

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