



基于WT-UKF 的PDR/GPS 组合定位算法

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Research on integrated positioning of PDR and GPS based WT-UKF

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摘要

针对行人航迹推算(PDR)与全球定位系统(GPS)组合定位问题,提出一种基于小波变换(WT)的无迹卡尔曼滤波(UKF)改进算法,对PDR和GPS定位结果进行数据融合.建立PDR/GPS组合定位系统数学模型,采用小波变换对运动加速度信号噪声特性进行在线估计,以更新UKF的协方差矩阵.所提出的WT-UKF滤波算法弥补了传统UKF算法因人为假定信号噪声为高斯白噪声而影响滤波效果和精度的缺陷.实验结果表明,使用WT-UKF滤波算法对PDR/GPS进行数据融合时稳定性更强,精度更高.

关键词 : 小波变换, 无迹卡尔曼滤波, 行人航迹推算, 全球定位系统, 组合定位

Abstract :

Aiming at the integrated positioning problem which combines pedestrian dead reckoning(PDR) and global position system(GPS), a wavelet transform-based unscented Kalman filter(UKF) which is used for data fusion is proposed for positioning results from PDR and GPS. Firstly, the PDR/GPS integrated positioning system mathematical model is established. The wavelet transform is adopted to on-line estimation of motion acceleration noise characteristics, and to update the covariance matrix of UKF. The proposed WT-UKF method makes up the traditional UKF's defects that the filtering effect and accuracy are affected because the signal noise is assumed as Gaussian white noise. Experimental results show that PDR/GPS data fusion with better stability and higher precision are obtained by using the WT-UKF method.

Key words : wavelet transform unscented Kalman filter pedestrian dead reckoning global position system Integrated positioning

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