UW CENTER FOR PATTERN ANALYSIS AND MACHINE INTELLIGENCE

CPAMI SEMINAR SERIES

Kalman/Particle Filter-Based Position and Orientation Estimation Using A Position Sensor/Inertial Measurement Unit Hybrid System

Speaker: Prof. William Melek

Date: Nov 23, 2011

Time: 4 pm- 5 pm

Place: E5 - 5128 Refreshments will be served

Abstract :

This seminar presents a novel methodology for combined estimation of position and orientation using one position sensor and one inertial measurement unit. The proposed method estimates orientation using a particle filter and estimates position and velocity using a Kalman filter (KF). In addition, an expert system is used to correct the angular velocity measurement errors. The experimental results show that the orientation errors using the proposed method are significantly reduced compared to the orientation errors obtained from an extended Kalman filter (EKF) approach. The improved orientation estimation using the proposed method leads to better position estimation accuracy. The presentation also presents a study of the effects of the number of particles of the proposed filter and position sensor noise on the orientation accuracy. Furthermore, experimental results will be presented to show that the orientation of the proposed method converges to the correct orientation even when the initial orientation is completely unknown.

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