

Field Robotics Center Seminar Series

Tuesday, Nov 30, 2010 GHC 2109 11am - noon

Pizza will be served



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On-line Mobile Robot Model Identification using Integrated Perturbative Dynamics

Abstract

We present an approach to the problem of real-time identification of vehicle motion models based on fitting, on a continuous basis, parametrized slip models to observed behavior. Our approach is unique in that we generate parametric models capturing the dynamics of systematic error (i.e. slip) and then predict trajectories for arbitrary inputs on arbitrary terrain. The integrated error dynamics are linearized with respect to the unknown parameters to produce an observer relating errors in predicted slip to errors in the parameters. An Extended Kalman filter is used to identify this model on-line. The filter forms innovations based on residual differences between the motion originally predicted using the present model and the motion ultimately experienced by the vehicle. Our results show that the models converge in a few seconds and they reduce prediction error by at least an order of magnitude for even benign maneuvers where errors might be expected to be small already. Results are presented for both a skid-steered and an Ackerman steer vehicle.

Speaker Bio

Forrest is a Robotics Engineer at NREC working on on-line vehicle model identification, pose estimation, and perception algorithm development. He received his Masters from the Robotics Institute last May, under Alonzo Kelly, and has a B.S. in Aerospace Engineering from Washington University in St. Louis. In his free time, he dances swing, blues, and tango.



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