CN463 Applications of Strapdown Inertial Navigation II – Integrated
September 21, 2010, 1:30 pm-5:00 pm, CEU: 3.0
GNSS Solutions® Tutorials prior to ION GNSS 2010, September 20-21, 2010
Oregon Convention Center, Portland, Oregon, USA

Instructor: Dr. Andrey Soloviev, Research Assistant Professor, University of Florida

Prerequisite: Some knowledge of mathematics, computer science, and Kalman Filtering will be useful. Additional benefit will be obtained with knowledge of strapdown inertial navigation systems (e.g., CN460/461 Introduction to Strapdown INS I/II or CN480/481 Fund of Kalman Filtering for GPS/INS I/II, or CN462 Applications of Strapdown Inertial Navigation I).

Intended Audience: Engineers, scientists, and managers interested in the application areas of strapdown inertial navigation systems. The course details various stand-alone and integrated applications of strapdown inertial navigation systems.

Notes Provided: Slides presented will be professionally spiral bound, with clear plastic cover, including color to add clarity where needed.

Reference List: A reference list will be provided as part of the note package for completeness and to allow the interested attendee to obtain additional information.

Course Overview: This course considers the use of inertial navigation system (INS) for multi-sensor integrated applications. The emphasis is on the integration of INS with GNSS-alternative navigation aids such as video cameras and laser radars. The course introduces a generic approach for multi-sensor fusion that uses INS as a core navigation sensor. Types of the integrated solution are discussed and specific integration examples are provided. As a particular case study, the multi-sensor fusion approach is applied to integrate the INS with laser radar (ladar) for navigation in GNSS-denied environments.

Course Content: The main topics to be covered by this course are:
- Generic approach for INS-based multi-sensor navigation
- Review of Kalman filter principles
- Types of the multi-sensor integrated solution
  - Loose integration
  - Tight integration
  - Deep Integration
- Range domain formulation of the INS-based multi-sensor fusion
- Case study: Ladar/INS integration for GNSS-denied navigation
  - Introduction to ladar-based navigation
  - Two-dimensional INS/ladar mechanization
  - Extension into a three-dimensional case
  - Performance demonstration with actual data

Course Outcomes: At the completion of this course, the attendee should have a good understand of various integrated applications of strapdown inertial navigation systems, as well as, the common error that affect them.