

## Tutorial Lecture 9

**Title: Inertial System and Global Positioning System Technology Trends**

**Instructor: Prof. George T. Schmidt, Massachusetts Institute of Technology**

### **Abstract:**

This presentation gives a roadmap for the development of inertial sensors, the Global Positioning System (GPS), and integrated inertial navigation system (INS)/GPS technology. This roadmap will lead to better than 1-m accuracy, low-cost, moving platform navigation in the near future. Such accuracy will enable military and civilian applications which were previously unthought-of a few years ago. After a historical perspective, a vision of the inertial sensor instrument field and inertial systems for the future is given. Accuracy and other planned improvements for GPS are explained. The trend from loosely-coupled to tightly-coupled INS/GPS systems to deeply-integrated INS/GPS is described, and the synergistic benefits are explored. Some examples of the effects of GPS interference and jamming are illustrated. Expected technology improvements to system robustness are also described. Applications that will be made possible by this new technology include personal navigation systems, robotic navigation, and autonomous systems with unprecedented low-cost and accuracy.

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### **Biography of Instructor:**

George T. Schmidt is a Distinguished Lecturer for the Institute of Electrical and Electronic Engineers (IEEE) Aerospace and Electronic Systems Society. He is Editor-in-Chief of the American Institute of Aeronautics and Astronautics (AIAA) *Journal of Guidance, Control, and Dynamics*. He is also a Lecturer in Aeronautics and Astronautics at the Massachusetts Institute of Technology (MIT) and an industry consultant in guidance, navigation, and control. He is currently Director of the NATO Research and Technology Agency (RTO) Lecture Series on Low Cost Navigation Sensors and Integration Technology. He is an AIAA Fellow, an IEEE Life Fellow, and he is an elected member of the Russian Federation, Academy of Navigation and Motion Control. Until 2007 he was the Director of Education at the Charles Stark Draper Laboratory, Cambridge, Massachusetts. Prior to that position, he was the Leader of the Guidance and Navigation Division and Director of the Draper

Guidance Technology Center. His major technical activities have been in control system design for missiles, aircraft, and manned spacecraft; Kalman filtering applications; and integration techniques for high-resolution synthetic aperture radars, satellite navigation systems, and inertial sensors. He has served the NATO RTO (formerly AGARD) in many positions since 1968, including as a U.S. member of the Guidance and Control Panel. He has received several awards including the AIAA International Cooperation Award in 2001 and the NATO RTO highest technical award, the von Kármán Medal in 2005. He is author or contributing author of more than 80 technical papers, reports, encyclopedia articles, and books. He received his S.B. and S.M. degrees in Aeronautics and Astronautics from MIT and his Sc.D. in Instrumentation from MIT.

**Dr. George T. Schmidt**

Massachusetts Institute of Technology,  
10 Goffe Road, Lexington, MA, USA 02421

[gtschmidt@alum.mit.edu](mailto:gtschmidt@alum.mit.edu)