



Carl-Cranz-Gesellschaft (Academy)

Carl-Cranz-Academy e.V. (CCG) is one of the leading institutions for postgraduate education and training. It has conducted technical and scientific seminars in Germany and abroad for nearly 50 years. Apart from major enterprises and SMEs, its clients are also German and foreign authorities and increasingly European institutions.

Seminars impart up-to-date, practice-oriented knowledge. Topics offered at these one to five-day events range from introductions to new fields through comprehensive presentations of principles to in-depth treatment of special topics and latest research, development and application results. Seminars are mainly held in German; the English part is increasing. They are conceived for experts and executives, scientists and specialists from industry and research, from authorities and the armed forces.

CCG works closely with research institutions, universities, industry, authorities and the armed forces. Lecturers are leading scientists and experts from Germany and abroad.

Further Information

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Seminar Registration

Up to 14 days before the seminar begins
by telephone, email, fax or via the internet

Special field: Satellite Navigation

Satellite navigation systems are more and more in use in different applications. Daily life in future will be inconceivable without them. The focus is currently on automotive applications, guidance and location based services but their use in industrial applications is now growing too.

Navigation receivers at present are working primarily on the basis of the American GPS system (Global Positioning System). The Europeans are currently realising the Galileo civil satellite navigation system as part of a global satellite navigation system (GNSS).

A new, emerging trend is the use of an integrated complex of navigation, communication and recording of geodata with service-specific satellites to develop innovative applications and services. This is giving rise to some entirely new aspects in the following fields:

- Global influencing systems: universal navigation and positioning for all types of moving objects, traffic monitoring and control, dynamic routing, fleet management
- Regional location based services: local weather forecast, local M-commerce, travel assistance, tourism guidance
- Recording and use of geo data: status monitoring of the Earth's surface, optimisation of agricultural processes, prospection for resources, detection of changes or deposits, planning of traffic routes etc.
- Dealing with dangers and crises: search and rescue operations, global logistics support in crises, safe management of groups of persons, identification and location of dangerous environmental pollution
- Precision location, time dissemination: replacement of classical land surveying, global time dissemination, synchronisation of time multiplex in communications, of processes resp. observations in radio astronomy and geophysics, and of switching operations in the supply of energy.

Carl-Cranz-Academy is staying abreast of these important developments, and has for quite some time incorporated in its programme a series of seminars on this subject area given by international experts under the scientific coordination of Professor Dr.-Ing. Arno Schroth. These seminars deal with theoretical principles, analyse the current status and in particular present trends and developments expected in the future. They provide executives and specialists with an overview of specific fields or in-depth knowledge on special topics.

**Seminars on
Satellite Navigation in 2010**

Scientific Coordination

Prof. Dr.-Ing. Arno Schroth
German Aerospace Center
Institute of Communications and Navigation
Oberpaffenhofen near Munich

Satellite Navigation

Principles of Satellite Navigation and GPS Modernization

Dr. J. Furthner, German Aerospace Center, Oberpfaffenhofen
(scientific coordination) **12.–15.10.2010**

Introduction to the basics of satellite navigation, system overview, navigation solution, orbit description • Systems requirements and their applications • Status and future of current systems • Communication principles of Galileo and GPS, signal representation, spreading code process, correlation and multiple access, channel models for air and sea resp. land traffic • Principle of navigation receivers, signal acquisition and synchronisation via code and carrier phase, market overview of different applications • Concept of integrity, requirements of applications • Antenna design and use in navigation • Disturbances and models of atmospheric propagation effects • Causes and reduction methods for multipath effects • Timekeeping in navigation systems • Local/Global support systems and concepts DGNSS, EGNOS/WAAS • Reference systems and their transformations • Military applications, interference resistance, encryption • Development status and Galileo schedule

Seminar language: German · Location: Oberpfaffenhofen

Galileo

Prof. Dr.-Ing. B. Eissfeller, University of the Armed Forces Munich, Neubiberg (scientific coordination) **13.–15.4.2010**

In the seminar the architecture, design, development and validation status of the European satellite navigation system Galileo ist presented. The presentation includes the programmatic, institutional and technical aspects of Galileo. In particular the service concept, signal and frequency plan, space segment, ground mission segment and user segment are presented in detail. Results from validation activities (GSTB-V1, GSTB-V2, GIOVE-A) will be shown. The concept of integrity, orbit and time determination in system level is outlined. Similarities and differences with respect to the American GPS system are emphasized.

Seminar language: English · Location: Oberpfaffenhofen

Enhanced Solutions for Aircraft and Vehicle Surveillance Applications

Prof. Dr.-Ing. P. Hecker, TU Braunschweig
(scientific coordination) **16.–18.11.2010**

Communication, navigation and surveillance (CNS) are building the backbone of a safe, efficient and eco-friendly air transport system since many decades. In order to ensure a continuously high level of aviation safety advanced surveillance technologies are of specific interest. Future Air Traffic Management

(ATM) Systems will strongly rely on advanced surveillance technologies enabling automated, air / ground consistent situation assessment. In addition the new CNS technologies will provide a basis for new functions like air traffic control in areas without radar coverage, ground based monitoring of the "Airborne Collision Avoidance System" (ACAS-Monitoring) or future "System Wide Information Management" (SWIM) approaches.

After several decades of technology driven bottom-up research and development in the ATM domain now a new top-down approach of defining architectures, processes and technologies is being developed. Main drivers of this process are the „Single European Sky ATM Research Programme“ (SESAR) in Europe as well as the „Next Generation Air Transportation System“ (NextGen) in the USA. Consequently the resulting SESAR ATM Master Plan creates new perspectives and requirements with respect to surveillance systems.

The seminar imparts knowledge regarding future strategies of using surveillance technologies in ATM (SESAR, NextGen). In addition future requirements regarding technologies and operational concepts will be elaborated. Finally most recent research and development activities will be presented and discussed.

Seminar language: German · Location: Braunschweig

Indoor Navigation

Dr.-Ing. G. Heinrichs, IfEN GmbH, Poing
(scientific coordination) **30.11.–2.12.2010**

In the last few years, interest in indoor navigation has expanded significantly. Various emerging applications require positioning of users indoors. One of the most important potential applications of indoor navigation is emergency call location in cellular telephone networks, for which both availability and accuracy are critical. This is particular important in the light of the emergency call regulation E-911 in the U.S.A. and the E-112 directive of the European Commission. Furthermore, the increasing demand for personal navigation and location base services is in addition driving research and development of indoor localization and positioning. Thus, the seminar is focused on the fundamentals related to indoor navigation and on the architecture of state-of-the art and future navigation systems for indoor localization and positioning. In the first part of the course the basic challenges of as well as the key algorithmic technologies for indoor navigation are presented (High-Sensitivity GALILEO/GPS, Assisted GNSS, Cellular and Wireless Network positioning, RFID, Hybrid Positioning). In the second part case studies for future-oriented application fields will be outlined. The course should help to understand the challenges as well as the limitations of indoor navigation systems.

Seminar language: English · Location: Oberpfaffenhofen

Communications and Navigation in Traffic Telematics

Prof. Dr.-Ing. A. Schroth, German Aerospace Center, Oberpfaffenhofen
(scientific coordination) **8.–12.11.2010**

Car (vehicle)–to–X communications use cases • Architectures for car–to–car and car–to–infrastructure communications • Components of communications and navigation Technology • Information Modelling • Cellular vehicle communications • Broadcast based telematics • Introduction on different communications and positioning (navigation) techniques relevant for traffic telematics • Standardisation at ETSI, IEEE and ISO • Description of actual illustrative European projects • Automotive perception sensors • Introduction to sensor fusion • Sensor fusion in vehicles • Integrated simulation models • Introduction to traffic simulation • Test tools and methods for impact assessment • Components and architectures for Rail Navigation • Components and architectures for Rail Communication • New approaches and developments

Seminar language: English · Location: Oberpfaffenhofen

Robustness and Vulnerability of Satellite Navigation

Prof. Dr J. Grosche, Forschungsgesellschaft für Angewandte Naturwissenschaften (FGAN), Wachtberg
(scientific coordination) **26.–29.10.2010**

Introduction to GNSS: Basics of satellite navigation • Overview of current and future GNSS (e.g. GALILEO, modernized GPS) • Vulnerability of GNSS to Interference and Jamming • Detection and Suppression of Multipath • Benefits of integrated Systems/Hybrid-Systems: GPS/GALILEO, GNSS/INS-Integration • Sensor-Fusion • Application examples, e.g. Aviation, Search and Rescue

Seminar language: German · Location: Oberpfaffenhofen

GPS/INS-Integration and Multisensor-Navigation

Prof. Dr.-Ing. B. Eissfeller, University of the Armed Forces Munich, Neubiberg (scientific coordination) **8.–12.11.2010**

Introduction to Inertial and Integrated Navigation • Inertial Sensors (Mechanical, Optical, MEMS) • Strapdown Algorithms • Error Propagation in Inertial Navigation Systems • GNSS Receivers and Errors • Kalman Filter (Theory and Demonstration) • Application dependent GPS/INS Integration • GPS/INS Deep Coupling • Terrain Aided Navigation • Stand-Off Weapons • Map Matching Applications for Public Transport • Rail Navigation Systems • Civil and Military Aviation • Unmanned Aerial Vehicles (UAVs) • Stand-Off Weapons • Inertial Navigation in Commercial Marine Transport • Location Based Services • Space systems • Gravity Field and Airborne Gravimetry • Outlook and Future Trends

Seminar language: English · Location: Oberpfaffenhofen