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ENAC ECOLE NATIONALE DE L'AVIATION CIVILE

Spring School on Location-Based Services

Ecole Nationale de l'Aviation Civile, Toulouse, France
April 13-17, 2015

Detailed Programme:

Day 1 – Monday April 13th, 2015 (Breguet Amphitheatre)

- 13:30 – 14:00: **Welcome**
- 14:00 – 15:30: **Project Management** (Philippe Manon, Safran Engineering)

  Introduction and round table; Presentation of Safran Engineering Services; Project management overview; Scope management; Schedule management; Resource management; Cost management; Risk management; Quality management; Soft skill / communication; Summary
- 16:00 – 17:30: **Challenges of GNSS in Urban/Indoor Environments** (Manuel Toledo, GMV)
  - Identification of the key challenges of urban and indoor environment to GNSS
  - Characterization of measurements and positioning behavior
  - Specialization of GNSS receivers for urban environment
  - Identification of urban and indoor applications and required navigation performances
  - The problem of GNSS navigation integrity in urban and indoor navigation
  - Standardizing applications due to legal, commercial or safety reasons
- 17:30 – 18:00: **Intro to the LBS Spring School Project "Develop your LBS idea"** (Olivier Julien, ENAC)

  The LBS Spring School project aims at making the students think about developing commercial products/services. The students will have to find an innovative idea and work on all the different steps involved in transforming this idea into a commercial product/service.
- 18:00 – 19:30: **Get Together Cocktail**

Day 2 - Tuesday April 14th, 2015 (Bellonte Amphitheatre)

- 09:00-10:30: **Positioning using Signals of Opportunity** (Paul Thevenon, ENAC)
  - Signals of Opportunity: what are they and why use them?
  - Example 1 : positioning using TV signals
  - Example 2 : positioning using 4G signals
  - Example 3 : positioning using WiFi signal
- 11:00-12:30: **Overview of Vision-Based Navigation Solutions** (Simon Lacroix, LAAS/CNRS)
  - Visual odometry
  - Simultaneous localization and mapping (SLAM) using either stereoscopic, monocular or panoramic vision
  - View-based navigation

Lunch break

- 14:00-15:30: **Overview of Navigation Sensors** (Christophe Macabiau, ENAC)
  - Principles of inertial navigation
  - Inertial sensor error models
  - INS mechanization
  - Overview of other sensors: odometers and magnetometers
- 16:00-17:30: **Hybridization Techniques for Navigation** (Christophe Macabiau, ENAC)
  - Kalman Filtering
  - Hybridization for civil aviation
  - Hybridization for terrestrial vehicles
  - Hybridization for pedestrians
  - Hybridization for cyclists

MultiPos Full Partners: Tampere University of Technology, Chalmers University of Technology, Honeywell, University of Nottingham, Ptolemus, (Vreije University) VU-VUMC, ENAC, Universitat Autonoma de Barcelona, Pildo Labs, GMV;

MultiPos Associated Partners: Nokia, Space Systems Finland, SP research laboratories, GEODAN, T6 Ecosystems, AVEA, ITMO

Day 3 - Wednesday April 15th, 2015 (Breguet Amphitheatre)

- 9:00-10:30: **Business in Localization** (Marc Pollina, M3Systems)
  - Overview of GNSS market
  - Value chain in main domains (road, LBS,..)
  - Key players in GNSS technology
  - Discussion on Innovative applications : UAV, autonomous car
- 11:00-12:30**: Key LBS Vertical Markets and Future Trends** (Thomas Hallauer, Ptolemus)
  - The LBS market today in Europe; evolution and future trends
  - Location based services and the Internet of Things
  - Geolocation on mobile devices
  - LBS to save lives
  - How insurance benefits from location data

Lunch Break

- 14:00-15:30: **The HERE LBS Data and Platform Available Solutions** (Pascal Boyeau, HERE)
  - HERE static and dynamic data & content
  - HERE Platform (usage of the HERE data inside cloud applications)
    - Connected Cars applications
    - Indoor applications for pedestrians
    - Mobile applications (on iOS, Android, Tizen, Ubuntu, …)
    - Enterprise applications : Business Intelligence, Mobile Assets Management, Insurance (Pay as you drive), …
    - New usages: LIDAR & Street level images for Smart Cities, Home Land Security, Utilities, etc…
- 16:00-17:30: **LBS Spring School "Develop your LBS idea" – Session 1** (all available instructors)

Day 4 – Thursday April 16th, 2015 (morning: Breguet Amphitheatre; afternoon: F09)

- 9:00-10:30: **Context Modeling for System Analysis** (Ossi Nykänen, TUT)
  - Introduction to semantic modeling
  - Different approaches to modeling context
  - Using context for searching, classification and reasoning
  - Simple application examples
- 11:00-12:30: **Telematic Box for Smart IoT Solutions** (Stéphane Dorbes, ST Microelectronics)
  - Cost-effective Telematic Box architecture
  - GNSS functions overview
  - ST Teseo family of GNSS SoC Microcontrollers
  - Teseo based Telematic products

Lunch Break

- 14:00-14:30: Exam
- 15:00-18:30: **LBS Spring School "Develop your LBS idea" – Session 2** (all available instructors)

Day 5 – Friday April 17th, 2015 (Breguet Amphitheatre)

- 9:00-11:30: **LBS Spring School "Develop your LBS idea" – Presentations from each group** (all available instructors)

  Lunch Break
- 12:30-18:00: **Social Event (Optional)**: Visit of "Cité de l'Espace"

Instructors' Biographies

Pascal Boyeau is Customer and Market Development manager at Here. He graduated as an engineer from "Arts et Métiers" ICAM. He is a specialist of high-tech applications and has spent many years in different international companies: Hewlett Packard, Intergraph Computer System, Motiva. He is now with Here where he is a specialist in cartography and geo-location solutions for professional markets in Southern Europe.

Stephane Dorbes works as GNSS Hardware system application engineer at the STMicroelectronics Grand Ouest (Le Mans, France) in Automotive Product Group. He has more than 15 years of experience in hardware development, in particular in cellular mobile phone platform with an expertise on RF sub-System. Since 2013, his current activities are related to the hardware integration and applications of the GNSS single chip Teseo family able of tracking simultaneously GPS, BeiDou/Glonass, Galileo and QZSS signals.

Thomas Hallauer is the Director of Research and Marketing at PTOLEMUS Consulting Group, an international strategic advisory firm entirely focused on telematics and location-based-services. Thomas has 12 years of experience in the domain, focusing on the automotive, motor insurance, navigation and positioning industries. Thomas co-wrote the Global Electronic Toll Collection Study in 2015, the Usage Based Insurance Global Study in October 2013 and the European Location Study in 2010.

Dr. Simon Lacroix is a research scientist at LAAS/CNRS, where he animates the field robotics activities. He was mainly involved in planetary robotics during the 90's, and has initiated aerial robotics activities in the lab in the beginning of the 2000's. Since then, his research is focused on the deployment of teams of multiple heterogeneous autonomous robots for exploration, surveillance or intervention missions. His main interests originally concerned perception and navigation for autonomous aerial and terrestrial robots (environment perception and modeling, localization, perception control and autonomous navigation strategies), and have evolved towards decisional processes required by the cooperation within multi-robot teams.

Dr. Christophe Macabiau graduated as an electronics engineer in 1992 from the ENAC (Ecole Nationale de l'Aviation Civile) in Toulouse, France. Since 1994, he has been working on the application of satellite navigation techniques to civil aviation. He received his PhD in 1997 and has been in charge of the signal processing lab of ENAC since 2000, where he also started dealing with navigation techniques for urban navigation. He is currently the head of the TELECOM lab of ENAC, which includes research groups on signal processing and navigation, electromagnetics and data communication networks.

Dr. Ossi Nykänen works as a Senior Research Fellow and Adjunct Professor at the Tampere University of Technology, Department of Mathematics. His research interests include semantic computing, information modeling and scientific visualization, applied mathematics and education, and the related, often Webized applications.

Marc Pollina graduated as Telecommunication Engineer in 1982 from French University ENST de Bretagne. He worked from 1985 to 1991 at European Space Agency (ESTEC) in the ERS-1 earth observation satellite project as payload data handling Engineer. In 1991, Marc POLLINA founded ADV Engineering a company focused in the design of integrated digital components (ASICs) for satellite on-board data handling. In the period 2000 to 2003 Marc POLLINA was professor at Toulouse University in the Telecommunication department. He is the founder and president of M3 Systems, an SME located nearby Toulouse, which is focused in Radio-navigation technology (GNSS) for transport, aerospace & defense applications. Marc POLLINA is also founder and president of GUIDE association (www.gnss-guide.org) that operates the French laboratory specialized in GNSS receiver testing since 2010.

Dr. Paul Thevenon graduated as electronic engineer from Ecole Centrale de Lille in 2004 and obtained in 2007 a research master at ISAE in space telecommunications. In 2010, he obtained a PhD degree in the signal processing laboratory of ENAC. From 2010 to 2013, he was employed by CNES to supervise GNSS research activities and measurement campaigns. Since the July 2013, he is employed by ENAC as Assistant Professor. His current activities are GNSS signal processing, GNSS integrity monitoring and hybridization of GNSS with other sensors.

Manuel Toledo holds an MSc in Aeronautical Engineering, from the Polytechnic University of Madrid in 1989 and a MSc in Physics, from the Universidad Nacional de Educación a Distancia, UNED, of Spain in 1996. Since 1992 he is working in GMV in studies and development of applications based on satellite navigation systems. He is currently the Head of the GNSS Application Technologies Division in GMV. His current focus is in navigation integrity and in the hybridization of GNSS with other technologies, in particular for urban and indoor navigation.