Academic GNSS R&D and curricula in the EU

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GNSS academic research and development in the European Union involves different universities and institutes across several countries.

The universities and institutes cooperate with a number of objectives:

— Bringing together providers of GNSS university education to facilitate the development of joint educational programmes;

— Increasing co-operation between partners and industry and between national and European organisations like the European GNSS Agency, the European Commission and the European Space Agency;

— Identifying the needs of GNSS education and improving its process and curricula;

— Developing strategies for the current network of GNSS universities exploring new educational programmes and methods.

Aalborg Universitet (Denmark)

Aalborg University conducts research on the applications of GNSS in surveying and mapping.

École Nationale de L'Aviation Civile (ENAC) (France)

French Civil Aviation University's research activities on navigation and positioning focus on such critical transport applications as aviation, road and rail. It encompasses GNSS integrity monitoring, receiver signal processing, multi-sensor navigation and precise positioning.

- **Hochschule für Angewandte Wisenschaften München (Germany)**

    Research at the Faculty of Geoinformatics at the Munich University of Applied Sciences comprises of UAV-Photogrammetry, Remote Sensing, Computer Vision, Navigation and Machine Learning. In particular, research is focused on object-based segmentation and classification for 3D Vegetation Mapping.

- **Institut supérieur de l'Aaéronautique et de l'Espace (ISAE) (France)**

    GNSS education is part of the graduate and postgraduate programmes at ISAE's Aerospace Electronics & Communications Programmes. Short courses are organised for professional training. PhD and research activities focus on improving the performance of positioning systems in adverse environment (e.g. cities) via low-cost sensors fusion (e.g. MEMS), antenna processing, multi-constellation receivers, etc. ISAE is one of the founding members of the GNSS Test Laboratory GUIDE.

Istituto Superiore Mario Boella (ISMB) (Italy)

The Navigation Technologies Research Area at ISMB focuses on GNSS software receiver technologies and algorithms. It co-organises the Specialising Master on Navigation and Related Applications with the Polytechnic University of Turin.

Politecnico di Torino (POLITO) (Italy)

The Polytechnic University of Turin is involved in GNSS activities through the Department of Electronics and Telecommunications   Engineering, where it is developing advanced signal processing algorithms for receivers, and through the Department of Environment, and and Infrastructure Engineering where it is studying geomatics applications. Teaching of specific GNSS courses at the University is implemented at MSc level and at specialising masters level.

- **Sveučilište u Rijeci (Croatia)**

     University of Rijeka, Faculty of Maritime Studies (Navigational GNSS and Space Weather Laboratory), operates multi-GNSS performance and ionospheric dynamics observatories in Rijeka and Baška, and develops a regional space weather impact model and GNSS SDR applications.

- **Tampereen Teknillinen Yliopisto (Finland)**

     Tampere University of Technology focuses on signal processing for GNSS receivers, modulation design in GNSS transmitters, GNSS channel modelling, orbit predictions, implementation and simulation issues on GNSS receiver prototyping, and hybrid localisation solutions involving GNSS and non-GNSS.

Technische Universität Graz (Austria)

The GNSS research at Graz University of Technology mainly focuses on GNSS-based trajectory determination (PPP, RTK), fusion of GNSS and INS, together with filtering (Kalman filter, particle filter).

Università degli Studi di Padova (Italy)

University of Padova specialises in regional GNSS permanent networks for application to geodesy, mapping, deformation monitoring in seismic areas and research on multi-GNSS interoperability and receiver calibration. It is a regional provider of RTCM/RTK correction signals.

Università di Bologna (Italy)

GNSS-related research at the University of Bologna focuses mainly on code acquisition subsystems; GNSS interference detection, localisation, and mitigation; cooperative algorithms; and integration between GNSS and inertial navigation systems.

Universität der Bundeswehr München (Germany)

Activities at the Institute of Space Technology and Space Applications (ISTA) at the Federal Armed Forces University of Munich focuses on teaching and research in the areas of navigation, signal processing, satellite methodologies, satellite communication, geophysics and geodynamic. The university also has expertise and experience in GNSS and integration with INS.

Universitat Politécnica de Catalunya (UPC) (Spain)

The GNSS-related activity of Research group of Astronomy and GEomatics (gAGE) at Polytechnic University of Catalonia includes new algorithms for Wide Area navigation and Fast Precise Point Positioning at the centimetre-level of accuracy using GPS/Galileo signals, SBAS and GBAS studies, and precise ionospheric and tropospheric sounding.

University of Nottingham (UK)

Nottingham Geospatial Institute (NGI) is a cross-disciplinary research and postgraduate teaching institute at the University of Nottingham. Fields of specialisation include satellite navigation and positioning systems, remote sensing photogrammetry, sensor integration, geospatial information science and location based services.

- Non-exhausitive list: other universities are active in GNSS, e.g. Univrsities of Darmstadt and Stuttgart.

- GNSS-related cooperation among universities via SUN network, no longer operational.

- Plan for new call for proposals for GNSS collaborative research on GNSS in universities, to be launched in 2020 under new EU RTD Framework Programme Horizon Europe.

Thank you

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