Training Opportunity for Belgian National Trainees

Reference	Title	Duty Station
BE-2023-NAV-PHE	**GNSS Evolutions Satellite Navigation R&D Engineering**	**ESTEC**

Overview of the mission:

Many sectors of the European economy rely on precise Positioning, Navigation and Timing (PNT).The market for satellite navigation services is expected to be worth several hundred billion euros annually in the coming years, and a significant part of the EU economy is dependent on the availability of global navigation satellite signals. This includes transport, logistics, telecommunications and energy. Considerable socio-economic benefits are expected to be provided by European Global Navigation Satellite Systems (GNSS), namely Galileo and EGNOS, including direct revenues for the space, receiver, and applications industries, and indirect revenues for society, such as more effective transport systems and rescue operations. These systems also provide technological independence and generate related technological benefits for research, development and innovation.

ESA has been entrusted with the design and development of the new European GNSS systems and the technical development of infrastructure.

The GNSS Evolutions Programme and Strategy Division, in the Directorate of Navigation's Department of Strategy and Programme, is responsible for defining, consolidating and implementing innovative technology and supporting R&D for the next generations of European GNSSs.

You are encouraged to visit the ESA website: http://www.esa.int

Overview of the field of activity proposed:

As a Belgian National Trainee, you will contribute directly to the future of satellite navigation R&D in Europe, through the assessment of innovative technologies for the future of European GNSS/RNSS systems. The activities involved will range from specific technological proof-of-concepts to end-to-end engineering for the specific technologies under assessment, giving you the opportunity to gain insight into specialised topics while maintaining an overall space system perspective.

Topics may involve one of the following:

- Advanced concepts for robust and secure positioning and timing/synchronisation, including hybridisation/integration with other PNT systems (LEO-PNT, terrestrial systems, including 5G network terrestrial technologies, terrestrial beacon systems, sensors, etc.), considering critical applications such as autonomous vehicles, factories of the future, communication networks, energy sector and so on;

- Disruptive concepts for satellite navigation in space, including concepts at different orbits (e.g. Low-Earth Orbit, Highly Elliptical Orbit, Inclined Geosynchronous Orbit, High Altitude Pseudo-Satellite), use of New Space approaches and novel technologies leading to different capabilities (e.g. ranging-only services, message communication services, etc.), use of alternative frequency bands, etc.;
- System engineering for LEO-PNT (requirements management, architecture design with model based systems engineering, feasibility analyses and trade-offs);
- Detection/classification/mitigation and geolocation techniques from single and multiple LEO satellites;
- Quantum technologies for satellite navigation;
- Satellite navigation payload technology and advanced concepts, such as on-board atomic and timing subsystem, signal generation and digital signal processing, RF section (amplification, filtering and antenna), in-orbit flexibility, advanced manufacturing, photonics;
- Search-and-Rescue advanced concepts;
- Novel big-data concepts and methods for advanced exploitation of GNSS science data through e.g. AI and a data-centric approach on a hybrid IT cloud;
- Communications: Tracking Telemetry & Command, ground-to-space links, inter-satellite links, RF and optical links;
- On-board orbit determination and time synchronisation;
- Other instruments/payloads supporting navigation and related scientific use (advanced laser retro-reflectors, VLBI transmitters, radiation and other space environment/space weather instruments, on-board accelerometers);
- Novel user receiver approaches, including SDR, sensor integration and hybridisation, and controlled reception pattern antennas.

Required education and skills:

- You should have just completed or be in the final year of your master's degree in aerospace engineering, telecommunication engineering, electrical engineering, physics or other relevant technical or scientific disciplines.
- Good interpersonal and communication skills
- Ability to work in a multi-cultural environment, both independently and as part of a team
- Fluency in English and/or French, the working languages of the Agency