Intern Engineer Studies and Prototyping of Method for the Identification and Mitigation of Multi-path Neural Networks

End-of-studies internship in the Engineering cycle

Recognized throughout the world, Syntony GNSS is a Toulouse-based brand, labeled FrenchTech, focused on technological innovation in the field of GNSS.

Our goal? Pushing the limits!

Specialising in radio navigation and embedded systems, we are the world leaders in our field and present in many high-growth markets.

We have developed a range of products (simulators, receivers and indoor/outdoor location systems) that meet the growing needs of the aeronautics and space industries, but also those of public transport, rail and mining or the rise of IoT (Internet Of Things).

Our customer base is made up of industry leaders (such as Airbus, OneWeb, Airbus Safran Launchers, Thales Alenia Space, Honeywell, Rockwell, Stockholm, New York, Toronto metros and many others...). Our solutions are constantly evolving in order to anticipate their future needs but also to strengthen our leadership and meet new challenges.

Thus, Syntony GNSS vibrates around three fundamental values:

- **Innovation as a guide**, to design the products and tools of tomorrow, in line with the real and evolving needs of our customers
- **The dynamism of our teams**, to adapt our strengths and talent to the quality of our solutions
- **Open-mindedness and inclusion**, to remain attentive to our customers, partners and collaborators, with the aim of promoting Humanism, equality and the richness of multiculturalism.

From students to qualifié.es professionals, help shape the future of boating with us. Work with experts, in a caring environment where your ideas can fly and your contributions fuel the synergy of the company.

In an international dimension, you participate in the challenges of today and tomorrow.

The Context

As part of several of these products, Syntony has developed various GNSS receivers, as well as a GNSS signal simulator, based on an SDR (Software Defined Radio) architecture.

One of the predominant areas of error on the quality of the GNSS receiver navigation solution is the presence of multipaths corrupting the raw measurements. Consequently, the implementation of a strategy for the identification and/or mitigation of multipaths is part of the medium- and short-term development objectives for several ranges of Syntony GNSS receiver products (whether they are dedicated to outdoor and/or indoor positioning).

What you'll accomplish with Syntony GNSS

You will join the R&D Innovation team and your internship topic will be the realization of studies and prototyping of neural networks aimed at identifying and/or mitigating multi-paths corrupting raw pseudo-distance measurements of the receiver.

The objective being to measure the contribution of Artificial Intelligence (AI) to process multi-paths and therefore the improvement of positioning performance, particularly in terms of integrity and accuracy, the activities envisaged are:

1. Identify existing multipath mitigation techniques and quantify their performance
2. Develop a neural network that extracts information on the presence or absence of multipaths
3. Identify needs
4. Improve the neural network in order to add the estimation of the delay induced by the presence of the multipath
5. Test the proposed neural networks on real data in order to estimate the improvement on the navigation solution

To do this, Syntony has several datasets collected in railway applications, antenna signal capture means, as well as advanced simulation means (CONSTELLATOR GNSS signal simulator and IMU sensor simulation tool). In addition, it will be possible to rely on the automatic generation of correlator outputs in the training phase of neural networks. These resources will be used for the development of the algorithms and their validation.

Data collection is also to be expected if necessary.

The internship topic will be part of several Receiver products dedicated to railway applications.

The subject of the internship may evolve according to the themes depending on the candidate and the duration of the internship.

The technical skills we are looking for:

- Data analysis
- Knowledge of neural network implementation and frameworks (PyTorch, TensorFlow...)
- Knowledge of Navigation, GNSS System (GNSS receiver, positioning, orbitography, ...) is a plus
- Knowledge of Python
- Technical curiosity, desire to learn, team spirit.
- Fluency in technical English and good writing skills English / French
- A taste for experimentation and analysis of real data is a plus (critical thinking, autonomy, writing).

About you

Currently in the last year of the Aeronautics, Space, Embedded Systems Engineering... or at the end of a Master's degree (with a specialization in space systems, GNSS, satellites, signal

processing, etc.), you are looking for an end-of-studies internship in the field of radionavigation and embedded systems.

You have a solid foundation in mathematics and a strong appetite for theoretical studies with experimental application as well as Artificial Intelligence technologies.

Your technical curiosity, your desire to learn and your team spirit will be the assets necessary for the success of your mission.

Are you interested in this topic? Apply and join a company that promotes innovation in the development of its unique products to design the products of tomorrow, dynamism and open-mindedness in listening to and respecting its customers and employees.

Address to apply under reference ENG-637 jobs@syntony.fr

Or on The career page of Our site Shaping the future of Navigation - Syntony GNSS