

Study and prototyping of GNSS Hybridization method – IMU – Data fusion

End-of-studies internship in the Engineering cycle

Syntony GNSS is a human-sized company with an international dimension, based in Toulouse and with the **FrenchTech label**, specializing in **Global** Navigation Satellite Systems (GNSS).

Our ambition: To provide our customers with relevant, innovative, reliable and robust solutions.

World leaders in radio navigation and embedded systems, we are present in fast-growing markets, such as aeronautics, space, road and rail transport, mining and IoT (Internet of Things). We have developed a range of products (simulators, receivers, indoor/outdoor location systems) that meet the growing needs of these industries.

Keysight, Airbus, Airbus Constellation, Hitachi Rail, Thales Alenia Space, Honeywell, Rockwell, MDA, or the Stockholm, New York and Toronto metros... So many partners who trust us and push us to always go further.

With passion, we constantly evolve our solutions to anticipate their needs and perfect our know-how.

At Syntony, we offer a pleasant and stimulating work environment, where the quality of life at work and the availability of our employees promote fulfillment and collaboration. Intellectual stimulation is omnipresent through innovative and varied projects.

We work on a variety of subjects, ranging from aeronautics to space, transport, mining and the environment.

Thus, Syntony vibrates around three fundamental values:

Benevolence:

Together, we cultivate listening, respect and empathy in our interactions, while also valuing the multiculturalism that enriches our exchanges.

We contribute to a positive environment where everyone feels valued and supported. We enrich each other by building strong relationships, both internally and externally.

Excellence:

Together, we strive for excellence in everything we do. Through our commitment, our high standards and our sense of responsibility, we guarantee quality, efficiency and performance. It is through our collective rigour that we meet challenges and provide sustainable solutions.

Adaptability:

Together, we are flexible in the face of the changes around us.

By combining creativity, collaboration and resilience, we find innovative solutions and move forward efficiently. Our agility allows us to evolve in line with our environment.

From students to qualified professionals, help develop future navigation solutions in partnership with our team of experts. Evolve in a caring environment where your ideas take flight and your contributions strengthen the synergy of the company.

Internationally, we meet the challenges of today and tomorrow, supporting our customers throughout the entire process: from the initial vision to development, to delivery and the collection of their satisfaction.

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.

The implementation of the multi-sensor hybridization strategy (INS/GNSS) 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

The proposed internship subject will be the theme of carrying out studies and prototyping algorithms allowing the hybridization of GNSS/INS navigation algorithms with other sensors (magnetometer, odometer, barometer) or information from mapping (map-matching).

The objective is to measure the contribution of fusion algorithms for the improvement of positioning performance, particularly in terms of integrity and accuracy, as well as in a disturbed environment (urban or semi-urban, in the presence of multi-paths, etc.) as encountered in railway applications.

To do this, various studies were carried out within Syntony's R&D innovation division. In addition, Syntony has several datasets collected in railway applications, as well as advanced simulation resources (CONSTELLATOR GNSS signal simulator and IMU sensor simulation tool). They will be used for the development of the algorithms and their validation.

Data collection is also to be expected if necessary, and the use of location data from an Android smartphone is also possible. Indeed, the use of such a platform on Android will make it possible to use different Syntony algorithms within a test environment including a large number of sensors synchronized with each other (GNSS raw data, accelerometer, gyroscope, magnetometer, etc.).

The internship subject will be part of several GNSS receiver products under development based on tight GNSS/INS hybridization algorithms and dedicated to railway applications. However, priority will be given to the integration of odometric data into the GNSS/INS fusion algorithms already existing at Syntony, as well as their implementation and evaluation on real (data collection) and synthetic (ometer simulation) data.

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
- Signal processing / estimation method (Kalman filter, least square)
- Knowledge of Navigation, GNSS System (GNSS receiver, positioning, orbitography, ...) is a plus
- Matlab / Octave / Python (optional)
- 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 Engineering cycle or the end of a University Master's degree, with a good foundation in mathematics and/or a specialization in space systems, GNSS, signal processing, telecommunications, etc., you are looking for a 6-month internship at the end of your studies. A strong appetite for theoretical studies with experimental application is also sought.



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

Ready to get on board with us? 🚀 ✨

Send us your CV under the reference ENG-653-EN: jobs@syntony.fr.