

Internship study and prototyping of GNSS-Mapping Hybridization method

Syntony GNSS (Toulouse, France)

Engineering internship, 3 to 6 months

Key word: GNSS simulation, Software Defined Radio Architecture, GNSS receiver, Cartography, Hybridation.

1 Introduction

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

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

Our simulators, receivers and indoor/outdoor positioning systems meet the growing needs of the aeronautics and space industries, as well as those of public transport, rail and mining as well as IoT

With a portfolio of prestigious customers (Airbus, OneWeb, Airbus Safran Launchers, Thales Alenia Space, Honeywell, Rockwell, Key Sight, Stockholm, New York, Munich metros, and many others), we are constantly innovating to anticipate their future needs, strengthen our leadership, and conquer new markets.

The core of our business revolves around 3 fundamental pillars:

- Innovation, to design the products and tools of tomorrow, in line with the real needs of our customers;
- Dynamism, to adapt our strengths and talent to the quality of our products and solutions;
- Open-mindedness, to remain attentive to our customers and partners while respecting our employees, with the aim of promoting Humanism and the richness of multiculturalism.

2 – Context and subject of the internship

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

The subject of the internship proposed by SYNTONY consists of the realization of studies and prototyping of algorithms allowing the hybridization of GNSS data with those from mapping.

The objective is to measure the contribution of such hybridization 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 multipaths, etc.) such as that

encountered in railway applications. SYNTONY has several datasets collected in railway applications. They will be used for the development of the algorithms and their validation.

Several hybridization approaches can be considered:

- Map matching,
- Map constraint positioning,
- Virtual tags

3 – Skills and qualities required

The profile required corresponds to an end-of-study internship for a student leaving engineering school or at the end of a university Master's degree, with a good foundation in mathematics and a strong appetite for theoretical studies with experimental application may also correspond.

Required Skills:

- Data analysis
- Signal Processing / Estimation Method (Kalman Filter, Least Square)
- Knowledge of Navigation, GNSS System (GNSS receiver, positioning, orbitography, etc.) is a plus
- Matlab / Octave (optional)
- 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).