CRPA Engineering internship

Reconstruction of Controlled Radiation Pattern from GNSS signals

Syntony GNSS (Toulouse, France)
Engineering internship, 6 months from February/March 2024

Key word: *CRPA, GNSS, Antenna array, Signal processing, Direction finding.*

Introduction

Recognized worldwide, Syntony GNSS is a Toulouse-based company with the FrenchTech label, focusing on technological innovation in the GNSS field.

Specialized in radionavigation and embedded systems, we are world leaders in our field.

Our simulators, receivers and indoor/outdoor location systems answer to the growing needs of the aeronautics and space industries, as well as those of the public transport sector, railways and mining or even the IoT field.

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

The heart of our activity is articulated around 3 fundamental pillars:

- Innovation: by conceiving tomorrow's products and tools that are matching with our customers' real needs
- Dynamism: focus on our strengths and talents to deliver high quality products and solutions
- Open-mindedness: we maintain a respectful relationship with our customers, partners, and employees, and promote Humanism and the richness of multiculturalism.

Context of the mission

SYNTONY is developing a multi-antenna GNSS receiver capable of detecting, localizing and mitigating interferences of various natures. The system is based on the joint exploitation of the outputs of an antenna array, and its performance depends on the quality of the antenna array as well as on the knowledge and consideration of the array characteristics.

The aim of this internship is to define, prototype and validate on real signals, a method for estimating the radiation patterns of an antenna array and characterizing the array's phase center.

Goals

Working in the Innovation and Expertise section of the R&D department, you will be involved in the design, prototyping and experimental validation of the treatments envisaged.

Taking into account existing tools and libraries, you will :

- o State-of-the-art angle-of-arrival estimation algorithms
- o Design, prototype and validate a solution using numerical simulations,
- o Evaluation of performance under real-life conditions: Participation in real signal recording campaigns
- Post-processing of recorded signals
- Analysis of performance and potential causes of error
- Suggest ways of improving the implemented solution

Technical skills

- Signal treatment / estimation methods (Kalman filter, least square)

- Antenna treatment

- Knowledge in Navigation, GNSS system (receiver, positioning, orbitography, etc.)

- Programming in C, Matlab / Octave

- Technical curiosity, desire to learn, team spirit.

- Fluency in technical English and good writing skills in English

- A taste for experimentation and analysis of real data is a plus (critical thinking, autonomy, rigor).

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