Department of Electronic, Optronic and Signal (DEOS)  
Supervisors: Gaël PAGES  
Jordi VILÀ-VALLS  
Location: Toulouse, campus SUPAERO  
Tel.: 05 61 33 87 25  
E-mail.: gael.pages@isae-supraero.fr

**INTERNSHIP DESCRIPTION**

**Domain:** Signal processing applied to navigation  
**Title:** ROBUST NAVIGATION ALGORITHMS BASED ON ULTRA-WIDE BAND SIGNALS

Integrated to the Electronic, Optronic and Signal (DEOS) Department of ISAE-SUPAERO, you are part of the Navigation team. You participate in the study of functions designed to improve the estimation in position and speed of a navigation system, for indoor navigation applications.

Among the different alternatives for autonomous indoor localization and navigation, ultra-wide band (UWB) ranging is a promising solution to achieve high positioning accuracy. The accuracy of the localization solution mainly depends on the quality of range measurements, the geometry of the network, and the performance of the positioning algorithm.

Within this framework, you will realize the study of the state-of-the-art on the use of the UWB signals for navigation, and on robust navigation algorithms. You will then apply your acquired knowledge in a simulator using simulated and real data.

You will be entrusted with the following missions:

- Improvement of the existing UWB navigation algorithms.
  - Impact of network’s geometry on the navigation solution
  - Study on the contribution of dynamic bias in the observation model
  - Add robust navigation features.
- Validation of the algorithms throughout simulations, then with real measurements obtained on a mobile platform in order to prove the efficiency and robustness of the developed algorithms.

Depending on the work done, it will be possible to publish the obtained results in an international conference or journal article.

**Duration of the internship: 5 to 6 months**

<table>
<thead>
<tr>
<th>10% Theoretical Research</th>
<th>50% Applied Research</th>
<th>40% Experimental Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possibility to go on a Ph.D.:</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

**APPLICANT PROFILE**

Knowledge and required level:
Student in last year of engineering school or M2 equivalent  
Knowledge of estimation methods (Kalman filters) and navigation algorithms  
Good knowledge of Matlab  
Rigorous and autonomous  
Editorial qualities  
Good level in English

*Applications should be sent by e-mail to the supervisor.*