

GOAL 3 : Intelligent, safe and secure mobility

TASK 3.2 : Intelligent infrastructure and vehicle

SUBTASK 3.2.3 : COLOR Time Reversal techniques and UWB signals for V2V and V2I optimized communications

Post doctorate position

**Communication and localisation railway transportation system
based on UWB-TR techniques**

There has been great interest in Ultra wide band technology in recent years because of its potential and large number of applications. In fact, The Ultra wide band technique operates with a low power spectral density. Such a low power spectral density implies that the UWB signal may be kept near or below the noise floor of hostile detection devices. Moreover, this technique allows a high data rate, and a high precision ranging due to its fine resolution to resolve multipath fading and the presence of lower frequencies in the baseband to penetrate walls. Thanks to these additional capabilities, UWB technology seems well suited to new application areas such as railway transportation systems.

However, the process of collecting energy that is dispersed in rich multipath environments appears to be a very difficult task. It involves the use of complex systems such as RAKE receivers using large number of correlators. To solve this problem other technique can be used such as the Time Reversal (TR). TR is a well known method to achieve spatial and temporal focusing in acoustics and has been used as a signalling method in underwater acoustic communications. Recently, there has been an interest in applying TR as a signalling method for UWB communications.

In this job, it is required to investigate some new techniques, especially, Multi access UWB and Time Reversal (TR). The first results concerning multi-train have shown the effectiveness of this association (TR and UWB) in order to improve the quality of the ground to train communication link and localization performances.

So far, the job include :

- simulation and evaluated the UWB-TR simulation in different environment (tunnel...) and in different scenarios,
- realisation and implementation of UWB-TR system in real time.

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Employment

Gross monthly wages : 2500 €

Duration :12 months

Employer : CNRS France