Post Doc - 3D occupancy grid analysis with a deep learning approach

- **Deadline**: May 1, 2018
- **Career levels**: PostDoc
- **Keywords**: Embedded / Cyber-Physical Systems, GPUs / Heterogeneous systems, Machine Learning / AI

The context of this subject is the development of autonomous vehicles / drones / robots. The vehicle environment is represented by a 3D occupancy grid, in which each cell contains the probability of presence of an object. This grid is refreshed over time, thanks to sensor data (Lidar, Radar, Camera). Higher-level algorithms, like path planning or collision avoidance, think in terms of objects described by their path, speed, and nature. It is thus mandatory to get these objects from individual grid cells, with clustering, classification, and tracking. Many previous publications on this topic come from the context of vision processing, many of them using deep learning. They show a big computational complexity, and do not benefit from occupancy grids specific characteristics (lack of textures, a priori knowledge of areas of interest...). We want to explore new techniques, tailored to occupation grids, and more compatible with embedded and low cost implementation. The objective of the subject is to determine, from a series of 3D occupation grids, the number and the nature of the different objects, their position and velocity vector, exploiting the recent advances of deep learning on unstructured 3D data.