Hybrid Vehicular Communications Optimization For Cooperative Intelligent Transport Systems

Mouna Karoui: First year PhD student
Supervisors: Michel Misson, Gérard Chalhoub
Co-Supervisor: Antonio Freitas

University of Clermont Auvergne

Introduction

• The goal of this PhD topic is to propose hybrid network architecture for C-ITS, that combines standards used for vehicular networks such as IEEE 802.11p/ETSI ITS-G5 and a cellular technology. Then a performance study of the proposed architecture will be done.

• We started by studying ETSI ITS-G5 European standardization dedicated for vehicular communications.

• We are focusing on Green Light Optimal Speed Advisory (GLOSA) application as a particular ITS service.

• We proposed an algorithm for GLOSA after studying several limitations in related work.

Speed Advisory Estimation

• We consider uniformly varied motion and Uniform straight movement.

• We consider both acceleration and deceleration cases as shown in the figure below.

Equation (1) is obtained after resolving a system of equations. The below conditions should be verified.

\[ v_{\text{max}}(t) = a \cdot (t - \sqrt{\frac{t^2}{2} - \frac{2(d-v_0)t}{a}}) + v_0 \]

Future Work

• The proposed Algorithm "SABIN" for GLOSA will be tested for various scenarios and use cases in order to validate our implementation.

• Second, we will evaluate ITS-G5 network performance of ITS services (GLOSA, CAM, DENM etc.).

• We will study ETSI ITS-G5 limitations and then we will propose hybrid network architecture that combines ETSI ITS-G5 and a cellular technology.

Results

The results below are obtained using V1 as speed advisory. Fuel consumption and speed comparison between GLOSA and non-GLOSA systems are presented.

Contact Information

• Email: mouna.karoui@uca.fr