VTADS
Vehicle Tracking and Accident Diagnostic System

LASSENA
LABORATORY OF SPACE TECHNOLOGIES, EMBEDDED SYSTEM, NAVIGATION AND AVIONIC

ÉTS
Le génie pour l'industrie
40 ans

# Vehicle Tracking and Accident Diagnostic System (VTADS)

## *NSERC CRD Project*

## Abstract


- Establishment of new design methods and advanced sensor fusion techniques for efficient automotive navigation and optimal vehicle fleet management in harsh environments
- Development of innovative metrics for real-time analysis of dangerous driving behavior and robust score driver qualifications
- Investigation of new usage-based automotive insurance premiums according to pay-as-you-drive (PAYD) and pay-how-you-drive (PHYD) concepts
- Development of novel methods for real-time analysis and diagnosis of car accidents
- Demonstration of the benefits of green ICT in efforts to improve energy efficiency and reduce GHG emissions of automotive vehicles
- Development of an advanced laboratory test-bench/simulator for automotive scenarios
- **Project duration:** 4 years (2013 to 2017) **Budget:** 2.5M$


## Objectives

- Improve the accuracy and robustness of actual location-based services for automotive vehicles in harsh environments
- Improve current vehicle fleet monitoring and management systems
- Optimize and reduce the time to first fix during vehicle startup
- Reduce the environmental footprint of motor vehicles
- Optimize the energy consumption of embedded vehicle navigators
- Provide methods to quantify systematic events and dangerous driving behavior leading to car accidents
- Provide tools to simulate automotive vehicle dynamics and corresponding realistic sensor measurements
- Provide tools for testing and validation of the developed navigation algorithms and analysis metrics
- Virtually reproduce car accidents based on recorded sensor measurements

## Technological Benefits


### *For Environment*

This project facilitates the implementation of insurance premiums based on car usage and driving behavior that will help raise awareness among Canadians concerning the ecological footprint of automotive vehicles. This objective agrees with actual environmental needs of Canadian industry in regards to the design of ICT to improve energy efficiency and reduce GHG emissions.

### *For Canadian Industry*

The development of a robust hybrid vehicle navigation system for harsh environments based on the use of very low cost sensors will allow Canadian navigation industry to take an important lead over its direct competitors worldwide.

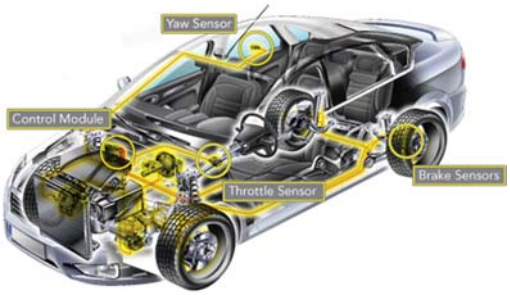
### *For Driver Safety*

This research will open the doors to prevention of car accidents by providing robust tools for detecting dangerous driving behavior. In addition, this project will enable real-time analysis and diagnosis of car accidents thus improving response time of rescue and allowing prediction of specific needs on an accident scene.

## Scope of the Project

### *Advanced Multi-Sensor Data Fusion*

This research proposes to combine measurements from a high sensitivity global navigation satellite systems (GNSS) receiver (HSGNSS) with independent data observed from a self-contained inertial navigation system (INS) and redundant measurements from other complementary autonomous sensors such as an odometer and magnetometers processed within an advanced nonlinear adaptive fusion algorithm in order to allow for better positioning accuracy in harsh environments.




### *Real-Time Analysis Metrics*

The proposed multi-sensor architecture enables monitoring vehicle dynamics such as sudden changes in position, speed, acceleration and orientation of the vehicle, which can commonly occur during road incidents or accidents. Thus, data from embedded sensors strategically mounted on the vehicle's frame will be used to monitor dangerous driving behavior and to analyse and diagnose car accidents.


### *Laboratory Test Bench*

Modeling navigation algorithms and analysis metrics requires massive recording of vehicle dynamics in various scenarios which is difficult and costly. Hence, this project aims to develop a complete simulation platform capable of generating realistic measurements in any possible automotive scenario, including harsh environments, dangerous driving behaviors and accident situations.

### *Data Post-Processing and Event Reconstruction*

In case of an accident, the embedded sensor unit will transmits the recorded vehicle dynamics to a central station in order to quantify the event, to extract the parameters that led to the accident and to reproduce the crash virtually. This procedure will help better understand the origins of the accident and its actual consequences on the passengers.

## Institutional Partners

ÉTS Le génie pour l'industrie

UNIVERSITÉ DE SHERBROOKE

## Industrial Partners

iMETRIK™

FUTURE ELECTRONICS

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**More Info**

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