Proposal for Special Session at ICNSC'23

Session Title:

Estimation algorithm for safe and secure coordination of autonomous connected vehicles

Description and Aim:

Most of the current research concerning individual autonomous vehicles aims to provide methods and new tools which enable the autonomous vehicle to operate safely on road. Nowadays it is getting increasingly recognized that multiples situations will require the coordination of vehicles on their activity. The coordination of CAV will become possible thanks to the introduction of the new wireless communication technologies such as 5G and its associated protocols. These new communications devices enable the development of controllers with high performance and reliability for safe and secure coordination of the CAVs. To design such controllers, real-time measurements or estimates of several variables belonging to each vehicle or to the whole CAVs structure are required. Examples of variables that are needed to be estimated include lateral velocities and accelerations, yaw rates, sideslip angles, tire-road friction, inter-vehicles distances. Furthermore, the new communication technologies may induce some additional problems such as data packet loss, time delay in the data transmission, sensors faults , external cyberattacks and Denial Of Service (DOS). To overcome such drawbacks, the development of new and highly sophisticated estimation algorithms to guaranty safe and secure coordination of CAV's applications is an important issue.

In this open invited track session, we expect recent and original proposition in the fields of design estimation algorithms to ensure safe and secure coordination of CAVs.

The potential topics include (but are not limited to):

The session will cover the following range of topics related to:

- Estimation in lateral and longitudinal models
- Estimation of inter-vehicles variables under time-delay and data packet loss constraints.
- Vehicle platooning.
- Deep-Learning and reinforcement learning for enhancing the safety and the security of CAVs applications.
- Faults estimation algorithms that detect problems of safety (including events and faults) in the coordination of multiple vehicles.
- Estimation algorithms for detecting security problems in the communication between vehicles related to potential cyberattacks.
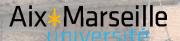- Computer vision based estimation

Expected number of papers: 6-8

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