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DELIVERABLE

SP1 – SAFEPROBE

Data-fusion Specifications

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EXECUTIVE SUMMARY

The aim of this document is to describe the specifications for the data-fusion task, carried out in SAFEPROBE project. Data-fusion algorithms are developed depending not only on the particular goal to reach, but also on several factors, such as: the type of vehicles and equipment considered, the external conditions encountered, the information really available and so on. In this context, it is also important to highlight the importance to transmit together with the object or the road information, also some other specific information, like speed limit for a particular road, the typology of the vehicle (truck, car or motorcycle), etc. This approach sounds quite new respect to the current state of the art. As a good synergy with the IP PREVENT, these data-fusion specifications take into account also the recommendations and the work done in the PReVENT sub-projects “ProFusion1” and “ProFusion2”. The approach is based on the Joint Directors Laboratories (JDL), Data Fusion Model, as it partitions the fusion process into four distinct levels, providing a very structured framework.

This document centres on Object and Situation Refinement, the former combines features, location and object classification to achieve reliable representation of individual objects, whilst the later fuses data to extract relationships, behaviours and trajectories. That is, knowledge of what is around the vehicle, it is also known as Situational Awareness. Each of these modules is made of several sub-modules. Object Refinement includes Sensor Level Fusion for vehicle onboard sensors, Co-operative Pre Data Fusion to facilitate information extraction by the laser scanner, and Central level Fusion, which outputs information on the tracked objects and the results of the distributed data fusion process from information originating in the VANET. Situation Refinement is achieved in two main sub-modules, namely the Ego-Vehicle which estimates the dynamics/kinematics of the ego-vehicle[1] including trajectories, predicted manoeuvres, assessment of the driver intention, etc. It also extracts information on whether the objects are moving or stationary as well as parameters that characterise traffic conditions.

To address this estimation and distributed data fusion problem, the most used and update algorithmic techniques are included, such as Kalman Filtering for tracking and temporal alignment; Evidence and Probability Theory for data fusion and association; Combinatory Rules of Dempster for manoeuvre identification; and so on.

This deliverable illustrates therefore, the main data-fusion topics, developed inside the SAFEPROBE project of the IP-SAFESPOT. In particular the approach, and rationale behind, the algorithms chosen to implement the data-fusion for whole SAFESPOT system.

[1] In this document, with “ego-vehicle” or “ host-vehicle” is intended the prototype vehicle on which the SAFEPROBE system is installed.