Keynote Talk II:

Positioning Integrity for Intelligent Vehicles

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Abstract: Intelligent Vehicles are robotic systems that assist the driver in safe and comfortable operation by providing pertinent information or by controlling the vehicle itself. Real-time and safe perception of the driving environment is one of the key issues. In this perception process, global positioning (also called self-localization) and map-matching are useful for retrieving contextual information stored in geographical databases. This talk first recalls the essential attributes of the quality of service of a positioning system. In particular, we will focus on integrity that is nowadays well standardized in the avionic domain (for safety of life reasons). For robotized land vehicles, integrity is a new concern. The concept of Protection Level will be described. The computation of Uncertainty Levels will then be addressed using robust state observation approaches, in a multi-sensor context, since modern vehicles are often equipped with a GPS receiver, dead-reckoning sensors (such as wheel-speed measurements, easily accessible on a CAN bus), road navigable maps, lidars and cameras. In a second part, we will present how to deal with map-matching integrity using multi-hypothesis road tracking. Experimental results obtained with different vehicles in the framework of the POMA/CVIS European project will be presented.

Speaker Bio-Sketch: Philippe Bonnifait graduated from the Ecole Superieure d'Electronique de l'Ouest, France, in 1992 (French Master of Engineering) and received the Master of Science and PhD degrees in automatic control and computer science from the Ecole Centrale de Nantes, France, in 1997. In December 2005, he obtained the Habilitation à Diriger des Recherches from the Université de Technologie de Compiègne (UTC). He joined the Institut de Recherche en Communications et Cybernétique de Nantes (IRCCyN UMR 6597), France, in 1993. Since September 1998, he is with Heudiasyc UMR 6599, France. He was Maître de Conférences (Assistant and Associate Professor) at the UTC, computer science department, from Sept. 1998 to Aug. 2007. Since Sept. 2007, he is Professeur des Universités (Professor) and head of a research group on Robotics, Automation and Embedded Systems. His current research interests are in Intelligent Vehicles and Advanced Driving Assistance Systems, with particular emphasis on dynamic ego-localisation based on multisensor-fusion and tracking (GNSS, dead-reckoning and GIS). From Febr. 2001 to June 2004, Pr Bonnifait has participated to the FP5 Growth project “Roadsense” dedicated to the evaluation of Advanced Driving Assistance Systems. He has been also involved in the French Project ARCOS (2001-2004) in the areas of GNSS precise positioning and advanced GIS systems. Recently, he was working on intelligent vehicles localisation in urban area for autonomous application in the framework of a French Predit project called MobiVip (2003-2006). Since Feb. 2006, he is also participating to the sub-project POMA (POsitioning, MApping and referencing systems) of an Integrated Project (IST FP6) called CVIS (Cooperative Vehicles Infrastructure Systems). More recently, he is working on pedestrian detection (LOVe project) and 3D localization in urban areas (CityVIP project), both projects sustained by the Predit Research Program.