AIM RESEARCH INTERSECTION – INFRASTRUCTURE FOR RESEARCH OF INTERACTING URBAN TRAFFIC

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The AIM test site (Application Platform for Intelligent Mobility) is a large-scale research infrastructure in the city of Braunschweig, Germany. It is built-up and operated by the Institute of Transportation Systems from German Aerospace Center (DLR). In AIM, an entire city serves as a platform for application-focused research and development in the field of intelligent mobility services. AIM consists of parts for observing and influencing traffic, which are placed on dedicated test tracks, real urban areas, and selected parts of the surrounding regions, supported by simulation toolboxes and simulators, and a powerful back end structure (http://www.dlr.de/ts/aim).

One of the facilities of AIM is the Research Intersection. It is a service platform for real-time detection, prediction, and classification of motorized and non-motorized traffic participants at one of the most complex urban intersections in Braunschweig. The technical set-up comprises different sensor technologies. For example the sub-system for detecting motorized traffic consists of mono-cameras, 24Ghz radar systems and infrared spotlights to enlighten the scene in case of bad illuminations (e.g. at night). Four redundant installations are attached to different poles in the intersection, in order to cover the whole inner area and prevent data loss due to covered scene details. The sub-system for detecting non-motorized participants, like pedestrians and cyclists, uses stereo-camera technology as well and monitors the cross-walks.

The main output of the system is trajectory data of the traffic participants with corresponding scene videos. The trajectories contain the objects' positions in the scene and other relevant state information (e.g. velocity, acceleration or specifications about the objects' length and width). In combination with the given traffic light data, this output allows to receive an overall understanding about the respective traffic situation.

The AIM Research Intersection can be used as basis for an analysis of interaction patterns between differing traffic participants. With this, it can serve as basis for many fields of mobility research. For example current work at DLR brings safety critical situations into focus. The given data allows on-line situation assessment based on time series of safety surrogate measures, e.g. PET (Post-Encroachment-Time) or TTC (Time-To-Collision). These can be used for automatically detecting near-misses or potential safety critical situations. This information can be used to deduce demands for developing advanced driver assistance systems that support drivers appropriately in the given situations. Other works incorporate the Research Intersection as part of infrastructural supported cooperative driver assistance systems. This is done by combining the detection systems with DSRC functionality to bring the situation related information into the vehicles in the vicinity of the intersection. Such communication systems are available in AIM as part of an additional service called AIM Reference Track.

The full manuscript will give a detailed insight view on the named infrastructure and illustrate existing outcomes from current works.