

AIDAS - Immersive Interaction within Vehicles

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In this demo we will present AIDAS, An Intelligent Driver Assistive System that we are using as to investigate immersive interaction within vehicles. Under the CESAR project [1] have collected a over 60 hours of in-car human-human interactions, where drivers interact with an expert co-pilot sitting next to them in the vehicle. Based on the insights gained from this data we have developed AIDAS a unique platform for investigating Immersive Interaction within vehicles. The AIDAS platform enables rich, speech-centric interactions with drivers, where the interactions are both context-aware, in terms of the location of the car on a map and driver gaze direction, and are natural, akin to interacting with human assistants.

Developing speech and multimodal interactive systems requires a broad range of expertise, including, computer vision, acoustic processing, speech recognition, natural language understanding, stochastic belief tracking, as well as dialog management. However, the combination of communicative and physical actions, with uncertainties makes the design and deployment of such systems complex. To support the development of such systems in prior work we developed HRItk [w], the “Human Robot Interaction toolkit”, an infrastructure and set of components for developing speech-centric interactive systems within the ROS (Robot Operating System) environment. For AIDAS we extended this earlier work, introducing additional modules for GPS and magnetometer-based localization and developed a basic dialog management system to support immersive interaction within vehicles. With these additional modules we were able to rapidly develop a prototype system simply by replacing models used within the speech recognition, spoken language understanding and belief tracking [2] modules.

At the demonstration we will show videos of AIDAS being used in the real-world and will have a basic driving simulator which will allow user to interact with AIDAS in a simulated environment. Specifically the system will demonstrate:

- Multimodal interaction in in-car environments
- Real-time belief tracking across modalities, contexts, concepts and objects

[1] <http://speech.sv.cmu.edu/cesar>

[2] Ian Lane, Vinay Prasad, Gaurav Sinha, Arlette Umuhzoza, Shangyu Luo, Akshay Chandrashekar and Antoine Raux. 2012. HRItk: The Human-Robot Interaction ToolKit Rapid Development of Speech-Centric Interactive Systems. In Proc ACL-STDS.

[3] Raux, A. and Ma, Y. 2011. Efficient Probabilistic Tracking of User Goal and Dialog History for Spoken Dialog Systems. Proc. Interspeech 2011



Figure 1: A demonstration of AIDAS being used in Santana-Row, San Jose, CA. The driver is referring to a restaurant within his field of view, while uttering, “*Is that place over there any good?*” The belief tracker within AIDAS is able to ground the target of reference to a physical object in the real-world, by combining knowledge of the location of the car, gaze direction, direction of gesture and context from the discourse at that point (is the driver referring to something in his field of view, or a target previously referred to in dialog).

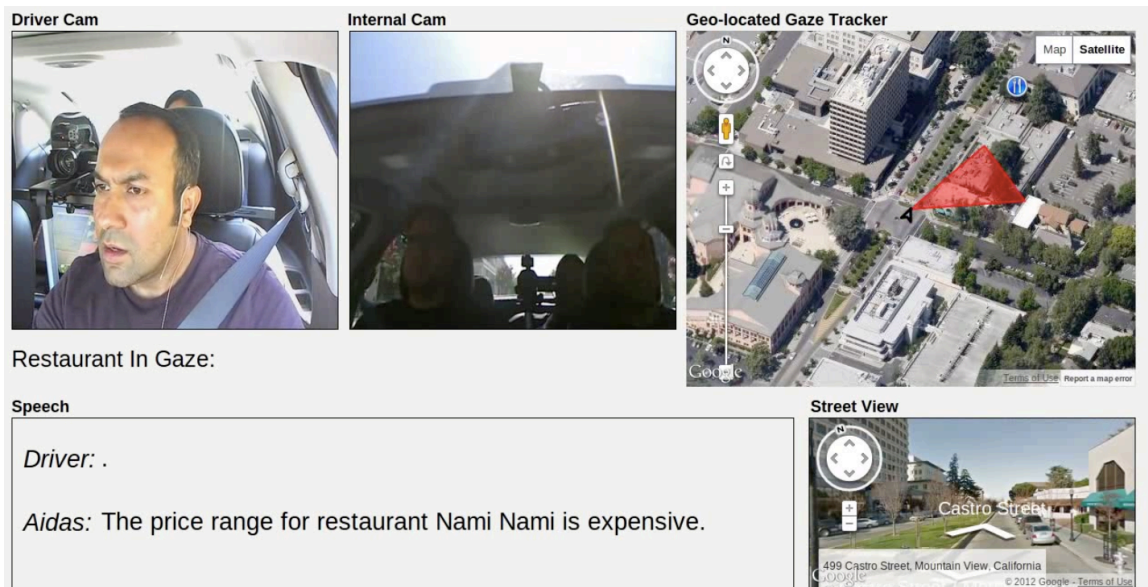


Figure 2: A web-based visualization tool that enables developers to view multi-modal interactions, either at run-time, or offline based on captured data. “The Geo-located Gaze Tracker” window, shows the location and orientation of the car. The red triangle on this map, shows the estimate of field of view of the driver.