

EMOTIVE DRIVER ADVISORY SYSTEM

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EXTENDED ABSTRACT

In 2007, Ford, in cooperation with Microsoft, introduced an in-car communication and entertainment system, SYNC. This system enables Bluetooth and USB connectivity for consumer phones and MP3 players and allows hands-free voice-activated control of brought-in devices. Since its initial introduction, there has been rapid growth of SYNC-enabled services, such as remote monitoring of vehicle health, personalized traffic reports, weather, news, and turn-by-turn directions utilizing data-over-voice technology. Furthermore, SYNC takes advantage of existing networking capabilities of smart phones/PDAs by providing a SYNC API to mobile application developers.

The Emotive Driver Advisory System (EDAS) is a Ford Research project that fills the technology pipeline for future SYNC versions, exploiting advances in information technology and consumer electronics to enhance the driver's experience. EDAS was inspired by recent developments in affective computing, open mic grammar-based speech recognition, embodied conversational agents, and humanoid robotics focusing on personalization and context-aware adaptive and intelligent behavior. The EDAS concept was revealed at the 2009 Consumer Electronics Show and the 2009 North American International Auto Show as EVA, Emotive Voice Activation.

The core elements of EDAS include an emotive and natural spoken dialogue system and an AVATAR-based visual interface integrated with adaptive vehicle controls and cloud-based infotainment. The system connects the vehicle, the driver, and the environment, while providing the dialogue strategy best suited for the given driving context and emotive status of the driver.

Voice interaction is the prevalent method for the driver to interface with vehicle systems for hands-free, eyes-free communication. The effectiveness of such communication depends on the quality and sophistication of both speech recognition and speech generation. The EDAS spoken dialogue system allows recognition of the driver's commands in an

open mic, natural, non-hierarchical manner. In turn, the system response depends on the driving environment, as well as the driver's status. The responses can be more extensive and engaging in open road conditions, while concise in high traffic situations. The ability to recognize the driver's emotions and generate emotions in response can further improve such communication. The spoken interface is augmented by the AVATAR as a universal intelligent gauge. The AVATAR supplements the emotive intent in delivering system messages, as well as providing non-verbal cues into the status of the active task.

The system leverages cloud-based infotainment, allowing for personalized, context-aware and interactive delivery of infotainment services. The ability to maintain connectivity between vehicle systems and the internet not only gives access to a vast amount of up-to-date information, but also allows outsourcing of computationally intensive tasks to a remote server, tapping into the power of cloud computing. Specifically, we demonstrate how EDAS enhances four most common in-vehicle infotainment activities: points of interest, news radio, music and refueling notification and advice.

BRIEF BIOGRAPHY

Dr. Oleg Gusikhin is a Technical Leader at Ford Manufacturing, Vehicle Design and Safety Research Laboratory. He received his Ph.D. from the St. Petersburg Institute of Informatics and Automation of Russian Academy of Sciences and an MBA from the Ross Business School at the University of Michigan. For over 15 years, he has been working at Ford Motor Company in different functional areas including Information Technology, Advanced Electronics Manufacturing, and Research & Advanced Engineering. During his tenure at Ford, Dr. Gusikhin has been involved in the design and implementation of advanced information technology and intelligent controls for manufacturing and vehicle systems. Dr. Gusikhin is a recipient of 2004 Henry Ford Technology Award and two Ford

Research and Advanced Engineering Technical Achievement Awards. He holds 2 patents and is a co-author of 8 patent applications on advanced vehicle infotainment technology.