Designing Interior Audio Cues for Hybrid and Electric Vehicles

By: Frankie James
April 12, 2011

Abstract:
The advent of new propulsion technologies (e.g., hybrid, plug-in hybrid, fuel cell, and electric) changes the vehicle noise signature dramatically. Traditional powertrain sounds disappear and new sounds become audible, including those from alternative propulsion systems, power converters, and from the car's structure itself due to road noise, tire sounds, and vibration from the body frame. In the face of such developments, feedback to the driver regarding vehicle state is greatly changed, which may cause confusion and frustration.

This presentation discusses a project conducted at GM's Advanced Technology Silicon Valley Office (ATSVO) to develop sound cues to augment the interior of GM's newest alternative propulsion vehicle, the Chevrolet Volt. Our goal was to increase the driver's aural feedback for states such as "ready to go", "systems off", and "eco alert". We discuss initial designs and evaluation of the Volt's interior audio cues, and relate this to background research in the areas of psychoacoustics, sonic branding, and auditory interfaces. These initial results were transferred to the Volt team designers and production engineers, where they were translated into the sounds that can be heard in the Volt today.

About the Speaker:
Dr. Frankie James is a researcher at the GM Advanced Technology Office in Silicon Valley, where she is focused on identifying new technologies for improving the human-machine interface (HMI) and driver experience of GM’s products. Prior to joining GM, Dr. James was the program manager for Human Computer Interaction (HCI) at SAP Research. Her research there included non-desktop interactions, accessibility, and cross-cultural interaction design. She has also worked for RIACS (the Research Institute for Advanced Computer Science), a NASA contractor, where she developed voice interfaces for semi-autonomous robots.

Dr. James received her Ph.D. in Computer Science from Stanford University in June 1998 for her research on audio HTML interfaces for blind users, and is a member of ACM's Special Interest Group on Computer-Human Interaction (SIGCHI).