Automotive

REPORT EXTRACT

The HMI for the Automated Vehicle

Enabling safe interaction with automated vehicles

Harnessing Revenue: Getting the user experience right to ensure brand differentiation and to take advantage of rising opportunities and revenue potential.

Getting It Right: Careful HMI design is key to guaranteeing the safety and trust of operators, passengers and other road users. This report maps out in detail the routes the industry is taking to achieve HMI success.

Paradigm Shift: Hear key insights from 12 industry experts on how the next incremental advancement could lead to a paradigm shift in how we interact with the vehicle and the complexities surrounding this emerging technology.

Case Studies: Gain practical insights on mode transition and vehicle-to-operator takeover.

Overview

The advent of automated vehicles is a tsunami-strength force for change within the automotive industry. Their heralding has already provoked the sudden displacement of automotive technology (Thrun, 2010). The potential impact of fully automated vehicles is now rapidly growing as the wave crosses into shallow waters. It has been boldly predicted that automated vehicles will reduce car crashes by 90 percent, reduce congestion by 90 percent, and reduce vehicle ownership by 90 percent (Thrun, 2011). Furthermore, their disruptive effect is estimated to put 2 trillion dollars in annual revenue up for grabs (Mui, 2013). The success of this technology, however, is contingent upon getting the user experience right.

The Human-Machine Interface (HMI) is the cornerstone of a positive user experience. It has the ability to accelerate comprehension, foster trust, uphold safety, reduce stress, and bring enjoyment when interacting with technology.

Its level of support is so great that without it, users can feel like they are walking in the dark. This report explores the various issues facing those who are designing the automated vehicle HMI and user experience. The report begins with an introduction on the role of the HMI as a unique feature to differentiate automotive brands. It then presents insights into the role of the HMI in addressing automated vehicle safety issues. It explores vehicle-to-operator communication, operator-to-vehicle communication, and user acceptance. The term 'operator' is used here instead of 'driver' because in many upcoming concepts, the automation performs vehicle control while requiring the user to monitor the operation of the vehicle.

This report was prepared after interviewing 12 key automated vehicle experts from the automotive industry and academia. These people are central to the advancement of automated vehicle HMIs in their respective organizations. It was gracious of them to share what they could about their experiences in designing and testing automated vehicle HMIs. We hope that the findings from this report provide a synthesis that supports both a discussion and progression of automated vehicle HMIs.

With sincere encouragement,

Gregory M. Fitch, Ph.D.
Research Scientist | User Experience Group Leader
Center for Automated Vehicle Systems
Virginia Tech Transportation Institute

Your key questions answered

- **Who is using the Automated Vehicle?** A look at risk taking, complacency, distraction, vigilance decrement, and drowsiness as factors that complicate human-machine interaction.
- **Consistent HMI vs. Unique Brand Experience:** Should automated vehicle HMI design be standardized?
- **Operator Engagement:** What are the HMI options being proposed to keep operators engaged in monitoring the roadway, as well as being contextually aware of the automation?
- **Consumer Acceptance:** How can HMI can boost consumers' trust?
- **Market Growth:** What will be next for automated vehicles?

Plus case studies:

- **Case Study 1:** Practical examples of how a staged TOR (Take-Over Request) alert could be used featuring the 2015 Mercedes-Benz Distronic Plus with steering assist and Stop&Go Pilot system and the 2015 Audi Traffic Jam Assist system
- **Case Study 2:** How long does it take to get the driver back in the loop? A practical case study from Technische Universität München.
- **Case Study 3:** How traffic situations and non-driving related tasks affect the take-over. A practical case study from Technische Universität München.
- **Case Study 4:** The AdaptIVe Automated driving project.

Who should buy this report

- OEMs
- Tiers 1

Job Functions that include:

- Autonomous
- ADAS
- HMI R&D
- Product Developers

Purchasers of Previous HMI Reports

Companies that have bought previous editions of this report include:

DAIMLER

LG Electronics

MOBIS driving science

FUJITSU TEN

HONDA

TOYOTA

Automotive

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Methodology

The **HMI for the Automated Vehicle** report provides insight from key industry experts on how to enable safe interaction with automated vehicles, the complexities surrounding this emerging technology and the rising opportunities it will open up with new revenue streams.

Greg Fitch, Research Scientist, Virgina Tech Transportation Institute author of this report is a leading academic in Automated Vehicle Systems. Greg led the User Experience Group in the Center for Automated Vehicle Systems at the Virginia Tech Transportation Institute focusing in on how to apply human factors to the design, testing and evaluation of automated vehicles to help ensure they worked as expected, benefited users, and did not unintentionally jeopardize transportation safety.

Before its publication, this report will have undergone a rigorous four step process:

- Industry research
- Case Studies
- Analysis
- Peer-Reviewing

Industry Research

At the very beginning of the project 25 calls were conducted with experts representing a broad spectrum of the automotive telematics industry in order to identify:

- Key industry trends
- Challenges and opportunities facing executives
- Significant information gaps

Figure 1: Indepth interviews by company type

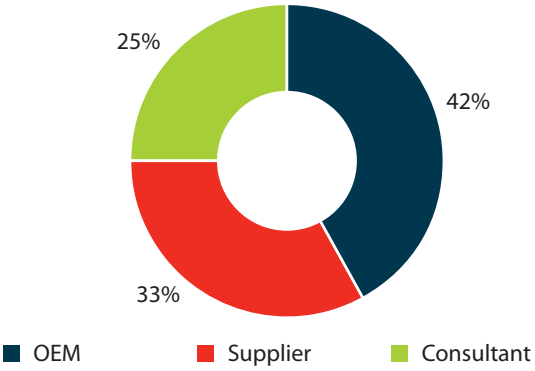
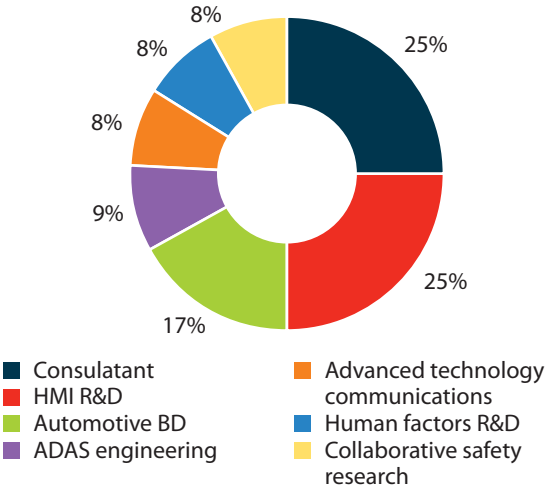


Figure 2: In-depth interviews by job function



Case Studies

This report not only has contributions from leading industry experts including Volkswagon, Toyota, Texas instruments and many more but also we've provided four practical case studies from companies at the forefront of this emerging trend.

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