

SI682 Team 5 (Visteon)

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Executive Summary

A competitive analysis was conducted as part of redesign of dashboard display for Visteon Corporation, a Michigan-based automotive supplier that offers innovative user interface design to major automakers across the globe. The goals of this analysis were to examine the dashboard display designs and functionalities by competing auto-suppliers and conceptual project to determine dashboard features and functionalities that can be incorporated into or removed from our redesign. By understanding the features that are now available in the automobile market, we are able to extrapolate the general trend that dashboard display designers are moving towards, and determine what functionalities we want to incorporate into our designs.

The competitors examined are:

- 1) Delphi Automotive LLP (regional competitor)
- 2) Johnson Controls Inc. (national competitor)
- 3) Continental Automotive System US (national competitor)
- 4) Audi and MIT (national competitor)

After analyzing the dashboard displays offered by the above competitors, the three key features that we have determined to incorporate into our designs are:

- 1) Customization functionality on digital dashboard display
- 2) Head-up display to present information that will assist the driver
- 3) Navigation system to be included in the dashboard and the head-up display

Competitor 1: Delphi Automotive LLP

(<http://delphi.com/manufacturers/auto/controls/displays/>)

Delphi's dashboard display offers three main features: 1) hybrid instrument cluster that combines traditional cluster design (gauges and meters) with 2) reconfigurable digital displays, and 3) head-up display that employs laser-based technology to present driver information on the windshield.

Delphi's digital dashboard display is designed to enable maximum flexibility for styling, functionality and information that are tailored according to drivers' need. Its head-up display uses holographic laser technology to present color-rich virtual image that adjusts automatically during day and night time. There are monochrome and multi-color display options on the head-up display for visual appeal to the drivers.



Delphi's Dashboard with Laser-based Head-up Display

a) Hybrid Cluster



Features:

- Multi-level gauge placement for the speedometer and the tachometer
- Navigation information is located on the dashboard's central screen in front of the driver

- LED color backlighting to enhance display in low-light conditions

b) Reconfigurable Dashboard Displays



Features:

- Reconfigurable digital display enables brand differentiation in the marketplace with personalized content based on driver preferences and demographics
- Support vehicle information updates
- Customizable with downloadable graphic display skins



Personalization with Graphic Skins

c) Laser Head-up Display



Features:

- Laser-based head-up display provides drivers with key vehicle information while keeping their eyes on the road
- Colored, high-contrast virtual images with automatic daytime and nighttime adjustments
- Key data to be displayed are collision warning, tachometer, current speed limit
- Head-up display customization capability that allow drivers to display a wider variety of information such as navigation

Competitor 2: Johnson Controls Inc.

(http://www.johnsoncontrols.com/publish/us/en/products/automotive_experience/electronics/driver-information.html)

Johnson Controls eliminated the center stack in its re3 concept car and reduces the number of switches to free up dashboard space. It then integrates its Mobil Device Gateway and Mobile Commerce into an “extended cluster.” The extended cluster enables drives to personalize and regulate electronic information. The touchscreen to the right of the cluster pair provides a menu for item selection. This information transfers to the digital cluster on the left to reprioritize information based on the drivers’ hierarchy of needs.



Johnson Controls' re3 Dashboard Display with Extend Cluster

Features:

- Reconfigurable dashboard display enables cluster customization
- Extended cluster eliminates the need for center stack

Competitor 3: Continental Automotive System USA

(http://www.conti-online.com/generator/www/de/en/continental/automotive/themes/passenger_cars/interior/instrumentation_displays/ov1_instrumentation_en.html)

Similarly to Delphi, Continental offers instrument clusters that are digital and reconfigurable, as well as head-up display to assist drivers. The reconfigurable displays enable the drivers to modify the display content according to their needs and preferences, and allow the dashboard to present new information such as from the driver assistance systems. Flexible presentation of information in the drivers' direct viewing area reduces sight distraction. The head-up display generates a virtual image using an optical system in front of the windshield as an overlay to the street, and it is only visible to the driver.

a) Advanced Instrument Cluster



Features:

- Automotive telltales are placed on the mechanical speedometer and the tachometer
- Additional information presented on the center screen such as radio, navigation, the Internet, driver assistance systems such as night vision

b) Reconfigurable Instrument Cluster



Reconfigurable Instrument Cluster with several display options

Features:

- Drivers can select the dashboard display to present only some of the vehicle information such as the speedometer, tachometer, fuel level, oil temperature, tell-tale warnings
- Additional information that can be personalized are navigation, Internet services, rear/front view camera and audio
- Enables cross-fading effects, animations, and 3-D effects such as light effects and shadows

c) Head-up Display



Continental's Head-up Display Information

Features:

- Display key information that requires immediate reaction: speed, general warning telltales, driver assistance system (adaptive cruise control, traffic sign recognition), and navigation (turn-by-turn, distance to junction)
- Delivers important driving-related information to the driver's direct field of vision
- Multicolor display is easy to spot and allows drivers to differentiate each type of information
- Maintains driver's view on the road

Competitor 4: Audi and Massachusetts Institute of Technology

(<http://senseable.mit.edu/aida2/>)

Audi and MIT collaborated to create the AIDA 2.0 project (Affective Intelligent Driving Agent), an intelligent platform that presents 3D navigation map on the head-up display. As the navigation system becomes familiar with both driver and the city, it analyzes the driver's behavior to estimate the likely destination, determine routes to a specified waypoint and identify the set of goals that the driver would like to achieve. This is the only conceptual project among the four competitors that were analyzed, and we predict that providing GPS navigation service to drivers will be an important functionalities that auto-supplier will focus on in near future.



Aida 2.0 Head-up Display 3D Navigation Map

Features:

- Analyses driver's collective mobility patterns in the city and individual information such as past riding behavior and online calendar entries
- Filter the relevant information to predict the driver's likely destination
- Virtual augmented map provides a 3D simulation of the city, and enables the driver to interact with the map as a navigation system