

Exploring Virtual Depth for Automotive Instrument Cluster Concepts

Abstract. This paper compares the user experience of three novel concept designs for 3D-based car dashboards. Our work is motivated by the fact that analogue dashboards are currently being replaced by their digital counterparts. At the same time, auto-stereoscopic displays enter the market, allowing the quality of novel dashboards to be increased, both with regard to the perceived quality and in supporting the driving task. Since no guidelines or principles exist for the design of digital 3D dashboards, we take an initial step in designing and evaluating such interfaces.

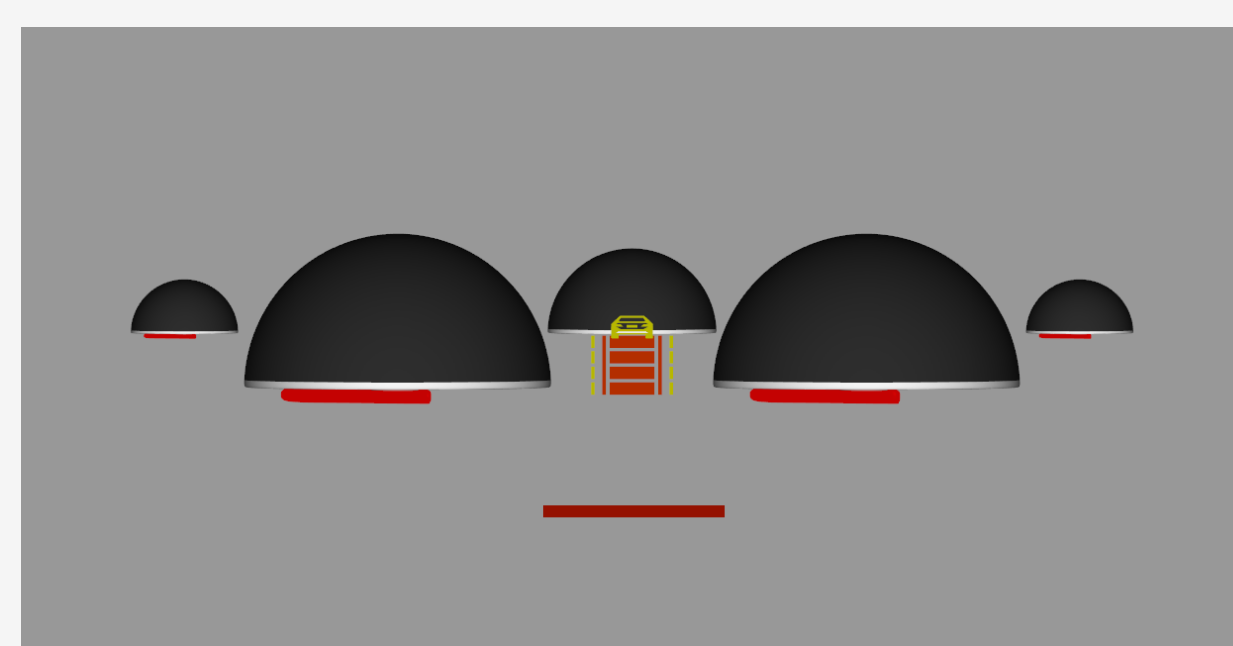
In a study with 12 participants we were able to show that stereoscopic 3D increases the perceived quality of the display while motion parallax leads to a rather disturbing experience.

Using stereoscopy and motion parallax



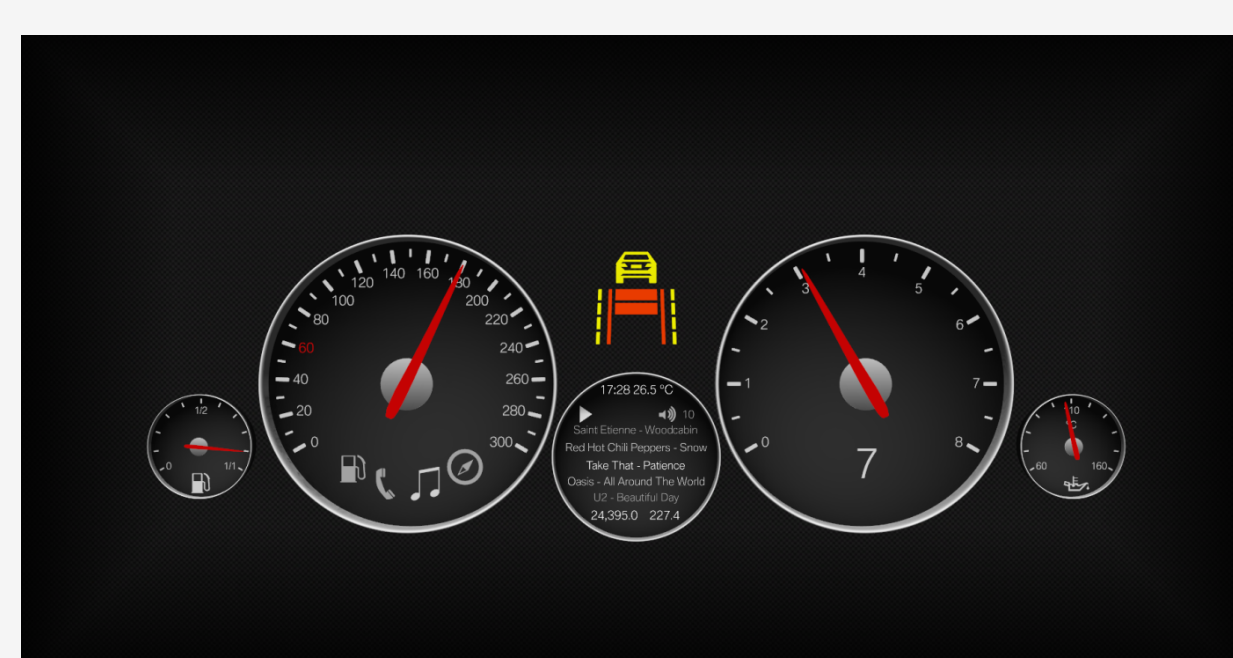
A participant in full gear: Shutter glasses for stereoscopic display and a target cap, enabling head tracking

Layers of information



Spatial separation of displayed elements based on their current importance

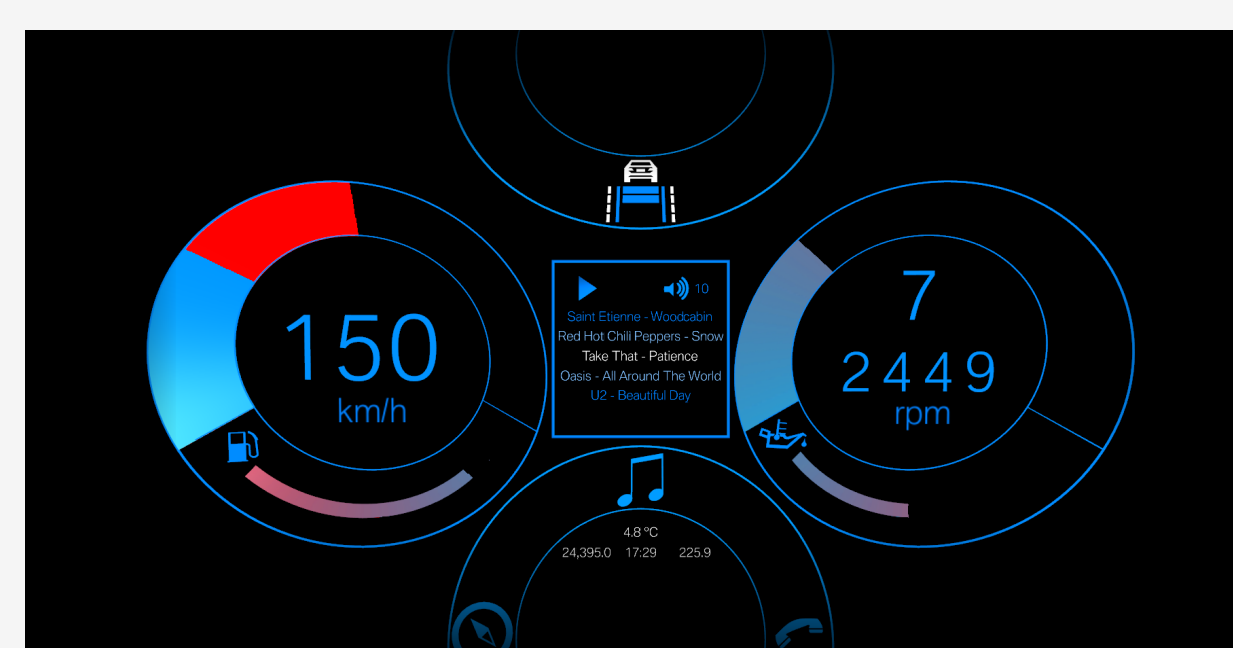
Classic design



Mimicking analogue gauges and real-world materials such as chrome and carbon fiber

AttrakDiff: 4.77 / 7

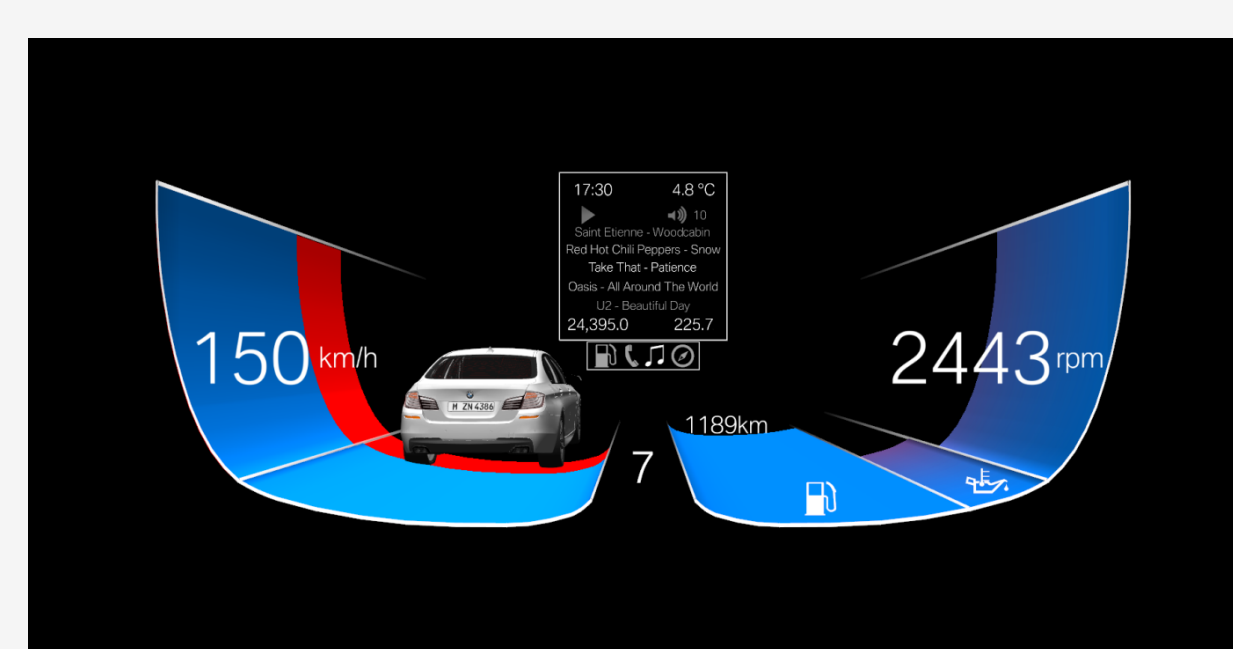
Circles design



Translating the analogue circular motion into a blue wireframe model

AttrakDiff: 4.81 / 7

Lines design



A new interpretation of scales, using spatial depth to emphasize low values

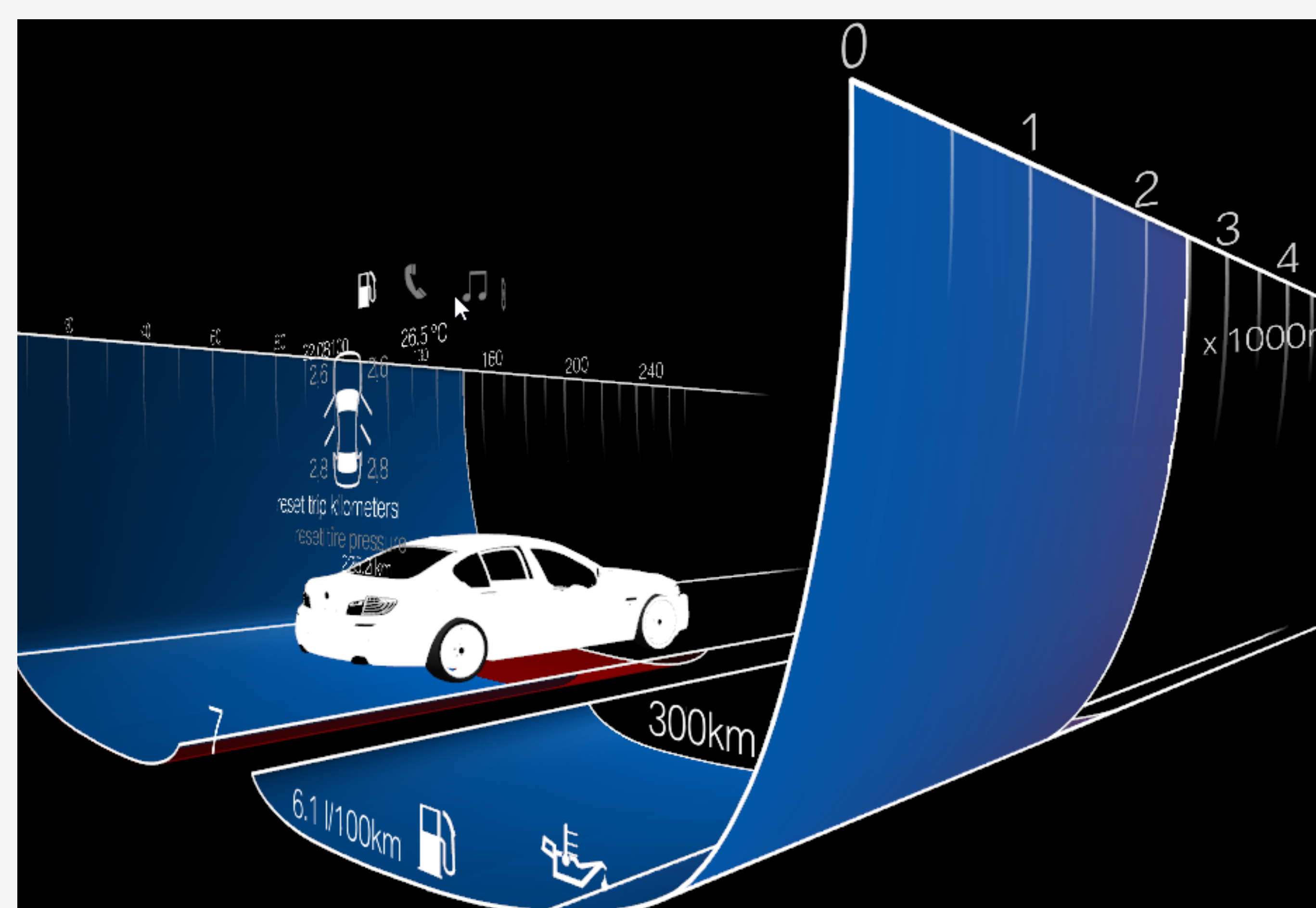
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User Study

- 12 participants aged 22 to 32 ($M = 25.0$, $SD = 3.1$)
- Three designs
- Four depth cues: 2D and stereoscopic 3D, each with and without motion parallax
- Simple tasks, no driving scene
- Evaluation using AttrakDiff, rankings, and free comments

Results

- Motion parallax is regarded as too busy and nervous
- Stereoscopy increases user experience as well as the perceived quality pertaining readability, and usefulness
- The innovative, futuristic *Lines* design bests the other two both in aesthetic aspects
- Yet the *Classic* one is regarded to be better readable than the other designs



A later version of Lines design, incorporating findings from the study

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