

## Head-up Displays (HUD) for Automobiles

*This valuable report on a new optical technology has been finished recently. It contains useful information for automotive companies, for systems suppliers and for component suppliers, including micro-optical and optical components, for wind shield suppliers and for display makers, and more.*

Head-up displays are common in airplane cockpits. This mature display technology is now entering automotive applications. The benefits of head-up display for the driver consists in keeping his attention on the traffic scene ahead while reading important operation parameters in the same line of sight. No need to look down to the dashboard or elsewhere, hence there is no focal adjustment of the eye required. Behavioural studies have shown that about 0,4 sec can be gained in recognizing a potentially dangerous traffic situation which translates into 12 m driving distance when running at 100km/hr. Safety is the most significant gain in using HUD.

The Technology Watch investigative report concentrates on present state of the art and the development of future technologies for projecting traffic relevant images or information onto the windshield. The technologies analysed are:

- LCD image generation and projection onto the windshield
- Laser scanning of an image with micromirrors on the windshield
- Holographic image combiners
- Light out-coupling from a wave-guide co-laminated into the windshield
- OLEDs incorporated into the windshield.

In each case a lot of highly sophisticate micro-optics is needed, ranging from micromirrors and mirror arrays to HOE for folding the optical path and for correction of manufacturing tolerances.



**From left to right: HUD from Siemens-VDO incorporated in a BMW, laser scanning HUD from Microvision and a holographic image combiner from Delco Data Vision**

Market forecast are presented and critical reviewed, which indicate a gradual acceptance by the average driver. This confirms the fact that most car drivers are not professionals like aircraft pilots which use HUD since more than 2 decades.

*More information and the Table of Content of this useful 100 page report can be obtained from **sgt Sensor Consulting Dr. Guido Tschulena**, who has written the report together with Felix Trojer from Netlab GmbH in Düsseldorf. Tel: + 49 6081 56 168, Fax: + 49 6081 57 222, Mail: [info@tschulena.de](mailto:info@tschulena.de)*

# Head-Up-Displays

## Technology Watch on Products, Prototypes, Technologies, Industrial Players, and Markets

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