

Visteon introduces 3-D cluster prototype with switchable lens

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The increasingly complex demands automakers are placing on having a more advanced user experience has augmented the popularity and industry requests to incorporate 3-D graphics in the hybrid cluster space. Utilizing cutting-edge graphics, 3-D objects and exploiting hardware GPU, suppliers are now working to produce an ever-more sophisticated look for the latest digital clusters that demonstrates flexible design and caters to a wide range of styling preferences from the customer.

As cockpit technology continues to develop with technical advancements, global automaker human-machine interaction (HMI) designers are very keen to find ways to give a perception of depth in order to highlight critical information – particularly in an instrument cluster. This can be achieved by using stereoscopic techniques, where two slightly different views are generated for each of the viewer’s eyes, which are interpreted by the viewer as coming from a 3-D object. While stereoscopic effects are achieved in cinemas using special 3-D glasses, it is not acceptable to use such glasses in an automotive environment - so “auto-stereoscopic” techniques are required.

Previous auto-stereoscopic 3-D technologies, based on LCD barriers, were evaluated in the past but not followed up because they lacked the optical characteristics – such as resolution and transmittance – to achieve high perceived quality at acceptable backlight power levels.

Visteon is now working on the next generation of 3-D solutions based on lenticular array technology – a combination of miniature lenses placed in front of the thin-film transistor (TFT) and precisely aligned with the TFT pixels. The blending of the micro-lens array and some sophisticated video processing produces the 3-D effect for the viewer. The video processing algorithms generate left eye and right eye views and the micro-lens array directs

each view toward the corresponding driver's eye.

There are two main implementations of the lenticular array technology - multi-view 3-D and eye-tracking enhanced 3-D. Multi-view 3-D allows a 3-D effect of limited depth of field to be seen from any angle, but suffers from a perceived reduction in resolution. The eye-tracking-enhanced 3-D system uses a camera to monitor the driver and dynamically processes the video signal in real time to adjust to the driver's eye position. This leads to the perception of a significantly increased 3-D depth effect and considerably higher resolution than the multi-view system.

Visteon has chosen to focus on eye-tracking enhanced 3-D - firstly because of the high perceived quality; secondly, Visteon considers that in the near future, semi-autonomous vehicles will already integrate cameras to monitor the driver's attention and state. Therefore, eye position information will be readily available for the 3-D viewing system, at no additional system cost.

Visteon already has a prototype 3-D cluster with switchable 3-D lens that is available for demonstrations to key customers and a Visteon team is currently in the process of developing a new property to demonstrate at CES® 2019 next January.