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Tiny infrared LEDs from Osram allow for eye contact with virtual reality

FOVE partners with Osram Opto Semiconductors to make eye tracking virtual reality headset

The Japanese start-up company FOVE offers users a virtual reality headset that integrates eye tracking as a novel means of interaction. Tiny ChipLEDs from Osram Opto Semiconductors provide the infrared illumination to track the user's direction of gaze and eye movements.

FOVE is a high-end virtual reality (VR) system that allows users to completely immerse themselves in another world, with enclosed headsets shutting them out from their real surroundings. To provide an authentic virtual experience, sensors keep track of users and integrate their position and movements into the virtual action.

Now eye tracking provides another, novel and highly intuitive way of interacting with virtual reality. Users can select or move an object by just looking at it. They can establish eye contact with virtual characters or trigger actions by focusing their gaze at a certain spot.

Moreover, the technology allows for "foveated rendering", a novel technique which significantly reduces demands on computing power and graphic cards. Based on the information about the user's point of gaze, VR systems can adjust the resolution and render areas in the direct field of vision in high resolution while allowing for lower resolution in the periphery.

"We chose Osram IR LEDs because they are high-quality products. They meet all our specifications. One of our main deciding factors was that only very little light lies outside

the central emission spectrum and is therefore lost, which meant we could streamline our optical filter design process and maximize our sensor performance," said Lochlainn Wilson from FOVE.

Eye tracking systems illuminate the user's eyes with infrared light, register the reflections with an IR sensitive camera sensor and employ special algorithms to determine the user's direction of gaze and eye movements. To realize the function inside a headset, several infrared LEDs are mounted around the two lenses. FOVE uses SFH 4053 ChipLEDs from Osram Opto Semiconductors, which are only 0.5 mm x 1.0 mm x 0.45 mm in size. Their emission wavelength of 850 nm matches the spectral sensitivity of the camera sensor and their beam angle of +- 70° ensures an even illumination of the eyes. "Through collaboration with FOVE, we are the first supplier to provide an eye tracking solution for a VR headset," said Hiroshi Okuma, Marketing Manager for ELS (Emitter, Laser, Sensors) at Osram Opto Semiconductors. "With its high efficiency and compact package, the SFH 4053 is ideal for this application."

Infrared LED for position sensing

FOVE also uses infrared sensor technology to track the user's position and movements in order to integrate these into the VR action. Several SFH 4253 TOPLEDs from Osram are mounted around the headset. They create a pattern of infrared light dots which are registered and tracked by a camera to determine the user's movements. At 850 nm, the emission wavelength of the SFH 4253 matches the spectral sensitivity of the photo sensor. The radiation characteristics and package geometry of the emitter also fit the requirements for the application.

Osram Opto Semiconductors has a unique position in the field of virtual and augmented reality, as it covers a wide product range – from visible LEDs and lasers for the display to photo detectors, infrared LEDs and lasers for the sensing systems. The company has supported the development of VR and AR systems for years and is continually expanding its portfolio for this field of application.

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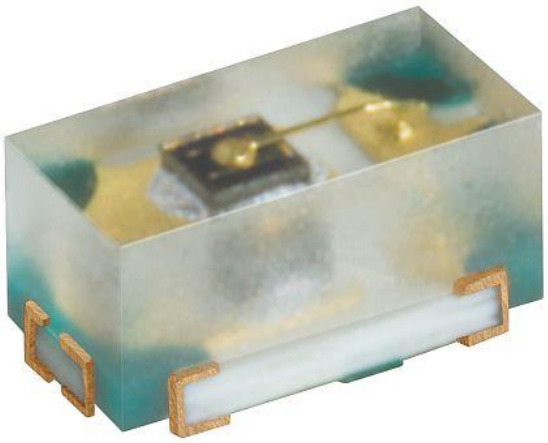

The tiny ChipLED SFH 4053 provides infrared light for the eye tracking system integrated in a virtual reality headset.
Picture: Osram

Keeping track of the user: The TOPLED SFH 4253 generates the light pattern for the infrared position sensor that comes with the FOVE virtual reality headset.
Picture: Osram

ABOUT OSRAM
OSRAM, based in Munich, is a globally leading lighting manufacturer with a history dating back about 100 years. The product portfolio includes high-tech applications based on semiconductor technology such as infrared or laser lighting. The products are used in highly diverse applications ranging from virtual reality, autonomous driving or mobile phones to smart and connected lighting solutions in buildings and cities. In automotive lighting, the company is the global market and technology leader. Based on continuing operations (excluding Ledvance), OSRAM had around 24,600 employees worldwide at the end of fiscal 2016 (September 30) and generated revenue of almost €3.8 billion in that fiscal year. The company is listed on the stock exchanges in Frankfurt and Munich (ISIN: DE000LED4000; WKN: LED 400; trading symbol: OSR). Additional information can be found at www.osram.com.