

FRAUNHOFER INSTITUTE FOR PHOTONIC MICROSYSTEMS IPMS

PRESS RELEASE

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Fraunhofer IPMS presents its photonic systems at Photonix Japan

Light modulation of the future

With its spatial light modulators, Fraunhofer IPMS offers photonic systems including matching control electronics and software that enable precise control, high modulation frequencies and high image quality. They facilitate new and improved applications in industry as well as in automotive, astronomy and medical sectors.

Controlling and modifying photons, tiny particles of light, is useful for a wide range of technological applications in medicine, industry and entertainment. The Fraunhofer Institute for Photonic Microsystems IPMS is developing spatial light modulators consisting of several million mirrors on a semiconductor chip. The tiny mirrors of a "micro-mirror array" (MMA) can each be tilted in one or two dimensions or lowered individually. The institute is regarded as a world leader in the development of these customer-specific systems.

An application-specific integrated circuit (ASIC) controls the movement of the individual micromirrors. In order to facilitate the technology transfer of the systems into the application, the institute offers its customers evaluation kits with 64k (256x256) mirrors, which contain either tilting or piston mirror arrays. In addition to the micromirror chip itself, the set also includes the complete control electronics developed by Fraunhofer IPMS, as well as software and support. It is suitable for modulating light in a broad spectral application range, from UV to the visible range and into the near infrared.

Precise light redirection and high light yield using 2-axis tilting mirrors

The newly developed, high-performance 2-axis tilting mirrors from Fraunhofer IPMS break up the incident light into a large number of beamlets and enable a 2-dimensional control of their directions. They achieve very high modulation frequencies up to the kilohertz range. In addition, instead of masking, the light is completely redistributed, which minimizes any loss of light. Tilting mirrors are therefore suitable for applications where high light intensity is required, for example for material processing such as laser ablation, engraving or laser cutting.

3D-holograms adaptable in real time

Fraunhofer IPMS's piston mirror arrays, which consist of 4000 x 2048 individual mirrors (each 4x6µm²), form the core component of 3D displays. These enable genuine holography with realistic images. An initial application scenario for such 3D

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modulations are head-up displays in the automotive sector. The special piston mirror arrays make it possible to not only project the holograms to a fixed position at the edge of the field of vision, but also to modulate the 3D images or shapes in real time and in motion. In this way, the driver's focus is actively directed to the current events in traffic and the projection merges with the environment in a more realistic way.

"For other areas of application our piston mirror arrays are also able to correct wavefront interference in wide spectral ranges, thereby improving image quality," says Dr. Michael Wagner, head of the Spatial Light Modulators business unit at Fraunhofer IPMS. The capabilities of the components are therefore of particular interest in the fields of astronomy and microscopy as well as in spatial and temporal laser beam shaping and pulse shaping.

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Broad portfolio presented at Photonix Japan

At the Photonix exhibition in Tokyo from October 29 to 31, 2024, interested parties can find out about the latest developments at Fraunhofer IPMS, view macro models and exhibits and exchange ideas with the experts on site. In addition to the spatial light modulators and associated test kits, the institute will also be presenting a portfolio of its microscanners and microdisplays at the trade fair.

The Fraunhofer IPMS booth is located in the Makuhari Messe (Chiba, Greater Tokyo area) in Hall 1, booth #4-12. Personal meetings with the developers and scientists be arranged in advance via the Fraunhofer IPMS website (<https://www.ipms.fraunhofer.de/en/events/2024/Photonix.html>).

About Fraunhofer IPMS

The Fraunhofer Institute for Photonic Microsystems IPMS a leading provider for applied research and development in the fields of photonics, microelectronics and microsystems technology, which are relevant for intelligent industrial solutions, medical technology and mobility. Research focuses on customer-specific miniaturized sensors and actuators, MEMS systems, microdisplays and integrated circuits as well as wireless and wired data communication. The institute develops systems and components on 200 and 300 mm wafers in their state-of-the-art clean rooms. Services range from consulting and design to process development and pilot series production.

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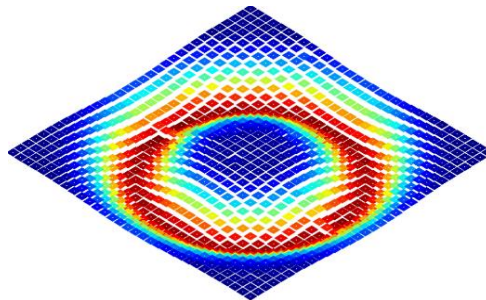
Images

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Micromirror array and matching control electronics. © Fraunhofer IPMS



Still shot animation of piston mirror array.
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Holographic 3D projections of head-up-display while driving. © Fraunhofer IPMS