PIXEL AND ARRAY ARCHITECTURE FOR SPATIAL LIGHT MODULATION

Tech ID: 33056 / UC Case 2023-090-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

Dynamic patterning of light is used in a variety of applications in imaging and projection. This is often done by spatial light modulation, in which a coherent beam of input light is modified at the pixel level to create arbitrary output patterns via later interference. Traditional approaches to spatial light modulation suffer from a fundamental restriction on frame rate which has led manufacturers to seek the diminishing returns of continually increasing pixel number, resulting in impractical device sizes, complexity, and cost, as well as enormous real-time computation requirements. Additionally, these devices inherently produce monochromatic and speckled frames due to the requirement that the input beam be coherent.

To address these problems, researchers at UC Berkeley have developed a device which can perform spatial light modulation with a frame rate ~20 times higher than existing technologies. This allows for a smaller number of pixels to produce high resolution, full color images by interleaving images of different colors and scanning rapidly across a screen in a similar way to the operation of CRT televisions Researchers have also developed an efficient and robust fabrication method, which combined with the smaller pixel number of these devices could cause them to be much more cost effective than existing technologies.

SUGGESTED USES

This invention can be used for any system which requires high-speed spatial light modulation, or “optical sculpting”. Potential applications include holography, augmented or virtual reality, adaptive optical systems in astronomy, biological microscopy, optical trapping of microscopic objects, ophthalmoscopy, and material processing. In the context of virtual reality, this technology could be employed to create full color, high resolution displays inaccessible to other methods, and in optical trapping and biological microscopy it can achieve unprecedented resolution and control.

ADVANTAGES

The high speed and high wavelength range of this technology in comparison with traditional devices allow for the sculpting of light with unprecedented resolution, speed, and control, which would allow, for example, for full-color, high resolution virtual reality displays. Additionally, the smooth topography and high fill factors afforded by this technology result in improved optical efficiency and eliminate optical artifacts present with existing approaches. The unique approach to fabrication presented here helps to prevent undesirable mirror curling while allowing mirror position to be driven by small voltages and for spatial light modulation arrays to be produced in a cost-effective manner.

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Optical sculpting, Virtual reality, Holography, Adaptive optics, Ophthalmoscopy, Microscopy, Augmented reality

CATEGORIZED AS

» **Optics and Photonics**
» All Optics and Photonics
» **Imaging**
» 3D/Immersive
» Medical
» **Sensors & Instrumentation**
» Scientific/Research

RELATED CASES

2023-090-0

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Co-Wiring Method For Primitive Spatial Modulation
- Computation Method For 3D Point-Cloud Holography

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