

COMPUTATION METHOD FOR 3D POINT-CLOUD HOLOGRAPHY

Tech ID: 33133 / UC Case 2023-122-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

The dynamic patterning of 3D optical point clouds has emerged as a key enabling technology in volumetric processing across a number of applications. In the context of biological microscopy, 3D point cloud patterning is employed for non-invasive all-optical interfacing with cell ensembles. In augmented and virtual reality (AR/VR), near-eye display systems can incorporate virtual 3D point cloud-based objects into real-world scenes, and in the realm of material processing, point cloud patterning can be mobilized for 3D nanofabrication via multiphoton or ultraviolet lithography. Volumetric point cloud patterning with spatial light modulators (SLMs) is therefore widely employed across these and other fields. However, existing hologram computation methods, such as iterative, look-up table-based and deep learning approaches, remain exceedingly slow and/or burdensome. Many require hardware-intensive resources and sacrifices to volume quality.

To address this problem, UC Berkeley researchers have developed a new, non-iterative point cloud holography algorithm that employs fast deterministic calculations. Compared against existing iterative approaches, the algorithm's relative speed advantage increases with SLM format, reaching >100,000' for formats as low as 512x512, and optimally mobilizes time multiplexing to increase targeting throughput.

SUGGESTED USES

- » Dynamic patterning of 3D optical point clouds in volumetric processing
- » Biological microscopy, augmented and virtual reality (AR/VR), material processing
- » Any fields needing 3D light intensity distributions

ADVANTAGES

- » Fast, deterministic approach, with speed advantage that increases with SLM format (e.g., >100,000' for formats as low as 512x512)

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INVENTORS

- » Muller, Rikky

OTHER INFORMATION

CATEGORIZED AS

- » **Optics and Photonics**
 - » All Optics and Photonics
- » **Imaging**
 - » 3D/Immersive
 - » Medical
 - » Molecular
 - » Other
 - » Remote Sensing
 - » Security
- » **Security and Defense**
 - » Screening/Imaging
- » **Semiconductors**
 - » Other
 - » Processing and Production
 - » Testing
- » **Sensors & Instrumentation**
 - » Other
 - » Physical Measurement
 - » Position sensors
 - » Scientific/Research

- » Fewer hardware-intensive requirements than existing approaches
- » Optimal mobilization of time multiplexing for high throughput

» **Transportation**

» Aerospace

» Automotive

» Other

RELATED MATERIALS

RELATED CASES

2023-122-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Co-Wiring Method For Primitive Spatial Modulation](#)
- ▶ [Pixel And Array Architecture For Spatial Light Modulation](#)



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