

Efficiently Generating a High Quality Patterned-Phase-Only Hologram for Display on a Single Device

Communications & Information

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Digital Broadcasting, Telecommunication and Optoelectronics

Sensors

Others

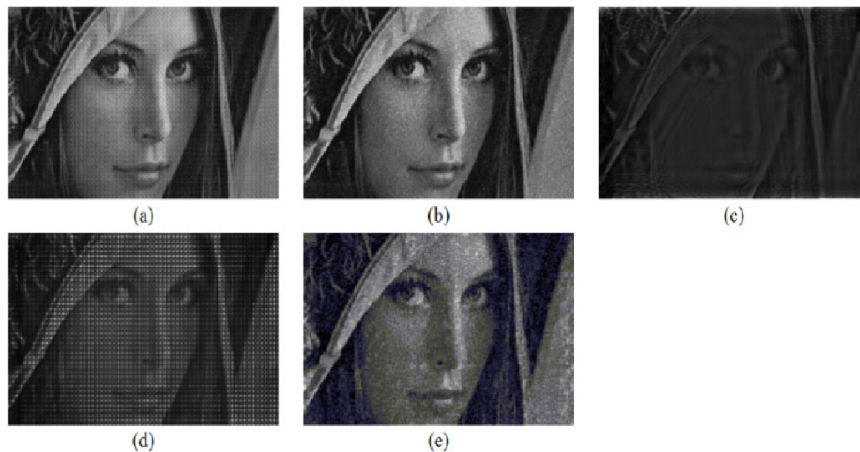


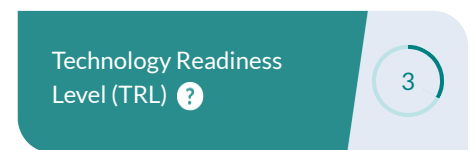
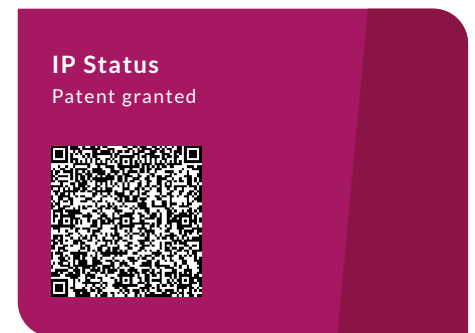
Fig. 4. (a)-(e) reconstructed images of phase-only holograms obtained by the proposed method, noise addition method, magnitude removal method, sampling method, and the GSA, respectively.

Opportunity

Displaying high quality holographic images in an efficient and accurate manner is difficult. For example, complex holograms comprise both amplitude information and phase information in an encoded light field, which are numerically represented by real components and imaginary components, respectively. These holograms, which record the complex wave front of the light field, are capable of reproducing excellent quality 3D holographic images. However, unless expensive and cumbersome steps are taken, available hologram display devices can only reproduce either amplitude information or phase information with a desirable degree of accuracy and efficiency.

Technology

The present technology relates to generating high quality patterned-phase-only hologram (PPOH) in a fast and non-iterative method that can be displayed on a single phase-only display device. A digital image of a holographed subject is measured as a distribution of the intensity of pixels in the image, or as an intensity image, and uniformly partitioned into a plurality of non-overlapping image blocks. Then, a phase mask with a periodic phase

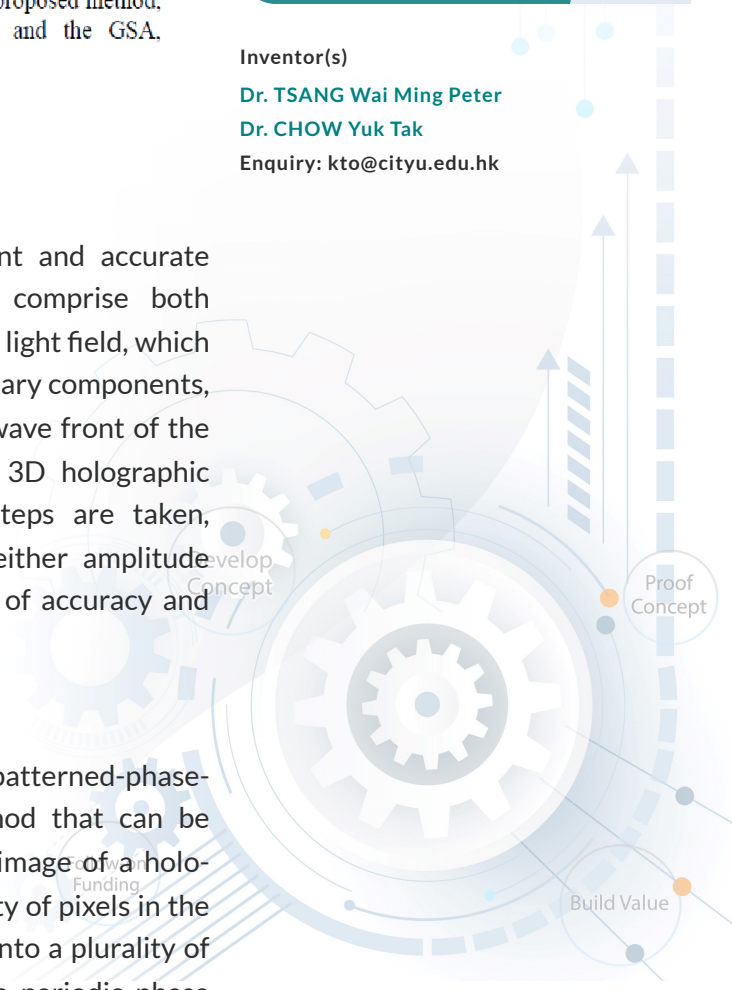


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pattern is added to the source image, and converted in to a hologram. The pixels are modulated with a phase value corresponding to the value applied by the phase mask, creating a modified intensity image. Subsequently, only the phase component is retained as a phase-only hologram that can be displayed to enhance the visual quality of the displayed holographic images.

Advantages

- No multiple rounds of iterations for deriving Patterned Phase-only Hologram (PPOH)
- Not necessarily display 2 or more holograms in rapid succession on the Spatial Light Modulator (SLM)
- Higher visual quality and lesser noisy

Applications

- Generation and processing of digital hologram
- Conversion complex hologram into a Phase-only Hologram (POH)

