Docket #: S18-495

Metasurface Display for Augmented and Virtual Reality

Researchers at Stanford have developed a near-eye display enabling both Augmented Reality (AR) and Virtual Reality (VR) modes with dynamically controlled contrast. This is enabled by a metasurface featuring a unique non-repeating 2-D pattern that supports high efficiencies and a wide field-of-view. Conventional near-eye displays require a large form-factor and typically suffer from low optical efficiency, limited field-of-view, and maintaining high contrast in bright environments such as outdoors. The Brongersma Lab's innovation can overcome these challenges by introducing a metasurface (enabling a small form-factor low-cost near-eye display with near-unity diffraction efficiency and a large field-of-view) combined with polarization control to provide dynamically controlled dimming of environmental light sources. Furthermore, the ability to convert between AR and VR modes is unique and provides flexibility to meet the users' need to have both an immersive virtual experience and access to see the world around them.

Related Technologies:
Stanford docket S17-078 - **Mechanically Tunable Metasurface for Optical Modulation, Beam Steering**
Describing a metasurface with high reflectance and large phase modulation for use as optical phase modulators or beam steering device (Lidar).

Stanford docket S17-079 - **Multi-Wavelength Laser with Perpendicular Polarization**
Describing a multi-wavelength laser with perpendicular polarization, which supports easy and independent measurement in various optical sensors for improved accuracy and speed.

Stanford docket S17-263 - **Holographic Beam Steering Device**
Describing a highly efficient (>90%) holographic beam steering method for obtaining distance information of objects nearby, with applications from autonomous

vehicles to home appliances.

Stanford docket S17-487 - **Metasurface Micro-Cavity for OLED Color Purity**
Describing a simpler and low-cost micro-cavity design for color tuning of organic light emitting devices (OLEDs) for display applications.

Stanford docket S18-193 - **High-Efficiency Broad-Angle Dielectric Diffraction Grating**
Describing a dielectric diffraction grating that provides high (near-unity) diffraction efficiencies in an ultra-compact volume. With applications in a variety of optical systems such as telescopes and VR.

Applications

- AR and/or VR, light field display, and in folded optical systems

Advantages

- Enables small form-, low-cost display
- Near-unity diffraction efficiency and large field-of-view
- Provides dynamically controlled dimming of environmental light sources
- Novel AR/VR mode conversion

Patents

- Published Application: 20200241353
- Issued: 11,448,918 (USA)

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