PINLIGHT DISPLAYS: WIDE FIELD OF VIEW AUGMENTED REALITY EYEGLASSES USING DEFOCUSED POINT SOURCES

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We present a novel design for an optical see-through augmented reality display that offers a wide field of view and supports a compact form factor approaching ordinary eyeglasses. Instead of conventional optics, our design uses only two simple hardware components: an LCD panel and an array of point light sources (implemented as an edge-lit, etched acrylic sheet) placed directly in front of the eye, out of focus.



Figure 1: An near- eye image is formed by projecting light from an array of point sources into the eye while modulating it with an LCD.



Figure 2: The array of point light sources are created by edgeilluminating an etched plastic sheet with one or more LEDs.

We code the point light sources through the LCD to form miniature see-through projectors. A virtual aperture encoded on the LCD allows the projectors to be tiled, creating an arbitrarily wide field of view. Software rearranges the target augmented image into tiled sub-images sent to the display, which appear as the correct image when observed out of the viewer's accommodation range.





Figure 3: The pattern displayed on the LCD panel is the desired image projected through each of the point light sources.

Figure 4: An photo taken through glasses using a human eye-like camera. The view of view is over 100° diagonal.

We demonstrate feasibility with a real-time prototype display that offers a 100° diagonal field of view in the form factor of large glasses.



Figure 5: Prototype glasses offering a field of view of 100° diagonal in a package resembling eyeglasses.



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