

Virtual Retinal Display

Valerie Fortin, *Biomedical Engineering, University of Rhode Island*
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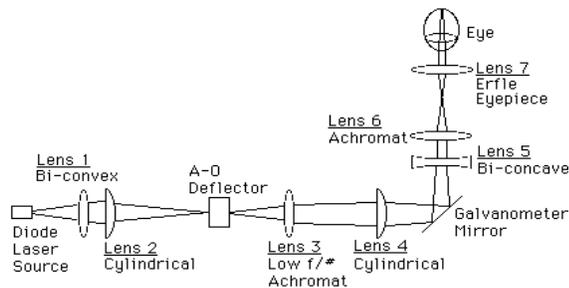
A virtual retinal display is a small mobile device which, when mounted on eyeglasses or similar headgear, would project an image directly onto the retina of a viewer's eye. This would bypass the issues from poor visual quality of the environment or even some damages to the viewer's eye.

I. INTRODUCTION

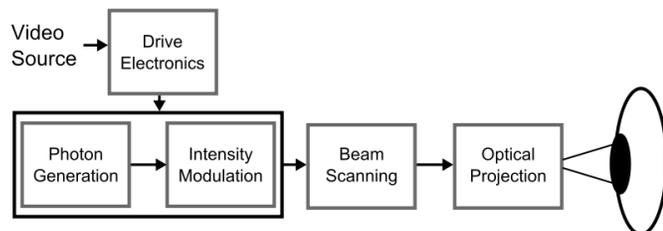
THE Virtual Retinal Display is a headgear-mounted device which can project a screenless image directly into the retina of the viewer. In order to project this image, the device generates a beam of light from a coherent photon source. This beam is then intensity modulated to match the image being produced, then scanned for placement onto the retina. Finally, the beam is projected into the eye by the VRD, at which point its exit pupil should be coplanar with the entrance pupil of the recipient's eye.

II. METHODS

After the first prototype of a VRD was developed by Dr. Tom Furness, Joel Kollin, and Bob Burnstein, development began in the Human Interface Technology Laboratory in 1993 to create a commercially viable product.



The initial prototype, shown above, was clunky, low-resolution, and colorless due to its limited development and hardware limitations. The second prototype used a mechanical resonant scanner instead of an acousto-optical scanner, allowing the device to produce sharp and stable images at a reasonable price. The third prototype used multiple light sources and allowed a color image to be displayed, as well as modifying the eyewear to be see-through.



III. RESULTS

A VRD model out now, the Brother AirScouter, is designed for industrial users for purposes such as overlaying complicated instructions directly onto their field of view. Optimal for easy hands-free communication, the device is currently only available in Japan to commercial entities.



IV. DISCUSSION

A Virtual Retinal Display, while not currently available for a widespread market, has potential applications in a wide variety of situations, both recreational and industrial. In a medical setting such as a surgery or radiology procedure, the device can allow the doctor to monitor vital statistics without taking their eyes off of the patient; likewise, in a manufacturing environment, the device can be used to track important parts and display plans and blueprints for easy reference. The device facilitates communication with its light, compact nature, and has obvious potential uses in the field of virtual reality. A VRD offers competition to existing head-mounted displays in its small, light nature, affordable cost, high resolution and field of view, adjustable brightness, and low power consumption. While the system is still in development and it could be some time before it becomes commonplace or practical, additional development and research offer significant hope for the device's future.

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