VIRTUAL RETINAL DISPLAY

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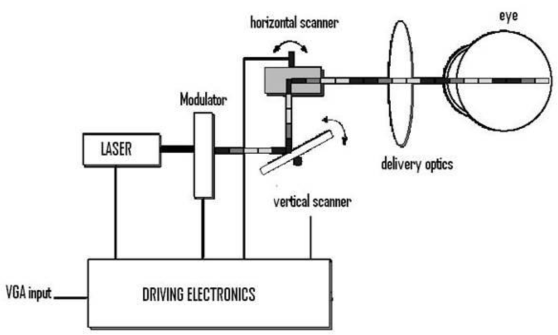
ABSTRACT- **The Virtual Retinal Display (VRD) is a new technology for creating visual images. It was developed at the Human Interface Technology Laboratory (HIT Lab) by Dr. Thomas A. Furness III. The VRD creates images by scanning low power laser light directly onto the retina. This special method results in images that are bright, high contrast and high resolution. In this paper, we describe how the VRD functions, the special consequences of its mechanism of action and potential medical applications of the VRD, including surgical displays and displays for people with low vision. A description of its safety analysis will also be included. In one set of tests we had a number of patients with partial loss of vision view images with the VRD. There were two groups of subjects: patients with macular degeneration, a degenerative disease of the retina and patients with keratoconus. Typical VRD images are on the order of 300 nanowatts. VRD images are also readily viewed superimposed on ambient room light. In our low vision test subjects, 5 out of 8 subjects with macular degeneration felt the VRD images were better and brighter than the CRT or paper images and they were able to reach the same or better level of resolution. All patients with Keratoconus were able to resolve lines of test several lines smaller with the VRD than with their own correction. Further, they all felt that the VRD images were sharper and easier to view. The VRD is a safe new display technology. The power levels recorded from the system are several orders below the power levels prescribed by the American National Standard. The VRD readily creates images that can be easily seen in ambient room light and it can create images that can be seen in ambient daylight. The combination of high brightness and contrast and high resolution make the VRD an ideal candidate for use in a surgical display. Further, tests show strong potential for the VRD to be a display technology for patients with low vision.**

I. INTRODUCTION

The Virtual Retinal Display (VRD) is a new technology for creating visual images. It was developed at the Human Interface Technology Laboratory (HIT Lab) by Dr. Thomas A. Furness III. The VRD creates images by scanning low power laser light directly onto the retina. This special method results in images that are bright, high contrast and high resolution. Current prototypes of the system produce full colour images at a true 640 by 480 resolution. The technologies of virtual reality (VR) and augmented reality (AR) are the new paradigm for visual interaction with graphical environments. The features of VR are interactivity and immersion. To achieve these features, a visual display that is high resolution and wide field of view is necessary. For AR a visual display that allows ready viewing of the real world, with superimposition of the computer graphics is necessary. Current display technologies require compromises that prevent full implementation of VR and AR. A new display technology called the Virtual Retinal Display (VRD) has been created. The VRD has features that can be optimized for the human computer interfaces.

The VRD is a visual display device that uses scanned light beams. Instead of viewing a screen, the user has the image scanned directly into the eye. A very small spot is focused onto the retina and is swept over it in a raster pattern. The VRD uses very low power and yet can be very bright. The technology has been developed such that the scanning element will cost only a few dollars in mass production. Low cost light sources, optics and controllers will make up the rest of the system. Ultimately, the overall device should be very inexpensive yet it will be small enough to mount on a spectacle frameFigure 1 is a block diagram of the VRD. Laser sources are introduced into a fibre optic strand which brings light to the Mechanical Resonance Scanner (MRS) (patent pending). The MRS is the heart of the system. It is a lightweight device approximately 2 cm X 1 cm X 1cm in size and consists of a polished mirror on a mount. The mirror oscillates in response to pulsed magnetic fields produced by coils on the system mounting. It oscillates at 15 KHz and rotates through an angle of 12 degrees. The high frequency of scanning allows the fine resolution in the images produced. As the MRS mirror moves, the light is scanned in the horizontal direction. Because the mirror of the MRS oscillates sinusoidally, the scanning in the horizontal direction has been arranged for both the forward and reverse direction of the oscillation. The scanned light is then passed to a mirror galvanometer or second MRS which then scans the light in the vertical direction. The horizontally and vertically scanned light is then introduced to the eye. The light can be sent through a mirror/combiner to allow the user to view the scanned image superimposed on the real world.



II. Methods

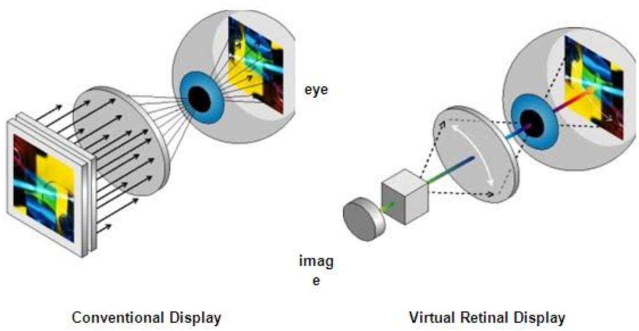
For our safety analysis, we measured the light power output of the VRD when it was creating images. We had subjects adjust the brightness of the VRD images in a see through configuration that allowed them to see an image on a conventional CRT screen. The VRD image brightness was adjusted so that it appeared equal to the brightness of the CRT images. The tables below show the results of some trial tests of low vision subjects with the VRD. In these tests subjects were brought in and gave informed consent. They were shown a series of vision test images on paper, a computer screen and with the VRD. Their visual acuity was tested with a standard office vision chart. For each display they were then shown test images to determine their resolving ability (acuity) and if any distortions were present (astigmatism or linear distortions on an Amsler grid) the performance on each medium was recorded and the subject's subjective impression of the visual image was also determined. The prototype VRD system was used for these tests. In our pilot study we did a straightforward comparison of image quality of images from the VRD and a CRT and a images on paper. We controlled angular size of the images to be able to compare best visual acuity. Image intensity was not controlled. Acuity measures: Landolt C's. Image distortion Measures: Astigmatism stars and Amsler grids. Subjective impressions of the images. Subjects: Normal, Macular Degeneration, Keratoconus.

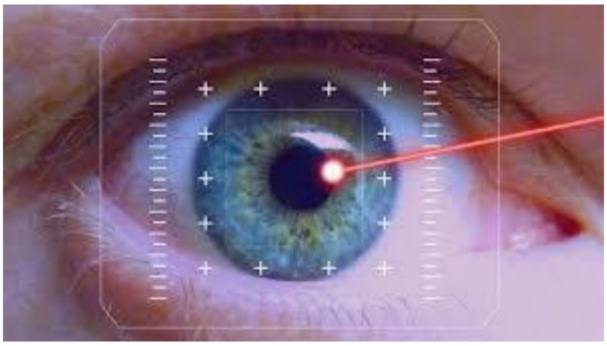
III. Results

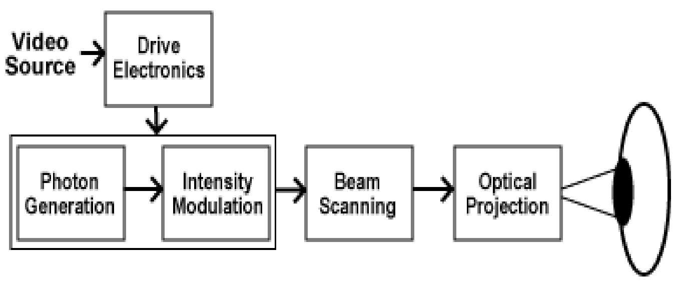
In our security analysis, the theme has been activated to easily match the image of the Viardi Lighting Control. The output power of the VRD is from 50 nm to 1200 nm. Specific Viardi images by ordering 300 Nanovats. Typical VRD images are clearly visible under ambient light. The general subject can clearly see the VRD image. All 8 people were able to achieve the goals of CRT or Viardi paper goals in the ongoing testing. Four people can solve the goal with the same clarity. Viardi Image 5 to 8 normal elements are faster or faster than CRT or paper targets. No distortion found in astigmatic stars or Emmeler networks. MD patients refer to macular degeneration and general Viardi CRT goals, objective and objective paper. The Macian Dianejereshn rewrites the visual receiver in the central part, which reduces the reading of objects such as faces or detections. In some cases, the

Viarda fault fault refractive effect Viardi field effect is less difficult to locate some holes. The subject of Keratokonas is the distortion of the keratoconus cornea. In the anti-focus colouring of all the Keratoscons, they reported that they see Viardi images for any other visible target, more severe than any observation condition: no improvement, improvement of the glasses or contact lens correction (which in such a normal term is equivalent to the target With a high visual acuity Viardi, but the contact lens is permeable, because the best of all people (NTE time).

RELATED DIAGRAM







IV. Augmented Reality: -

One of the main applications for VRD will increase the vision and reality. Due to bright images that can be produced by VRD, it can be used in situations that are bright as daylight. No technology on the current screen can create a brilliant portable image. In real-time applications, real-world images overlay on the screen to improve functions. In extended terms, the images are moved with the subject's header. In Extended Reality, the images are stored in real-world registers when the actual movements are made. For example, in the Extended Reality app, a worker can display suggestions or diagrams for use that the repairing part is upgraded. Other uses are for people who work in the atmosphere with poor lighting conditions. The real world image can be improved electronically and can be presented for a better view with VRD. In the old darkness of the optical media, the glare in the eyes, which is open in the sunlight or in light conditions at night, increases glare. The VRD can be used to retrieve images of the world and then to be displayed without blind. It is crucial for these applications to understand how this application affects the actual sensor search. Beam Characterization will be ideal for examining the increased reality of experimental configurations for study and colour opinion studies. In these tests, VRD will produce images covering textures and backgrounds in the real world under different light conditions. While looking at pictures with different backgrounds, the picture evaluates the quality of sharpness, contrast, colour and discrimination. Beam intensity is based on the subject so that the quality of viewing can be maximized. Beam and colour resources will be reconfigured to colour contrast with real objects and to increase tone matching.

V. Conclusions

VRD is a new technology display. The level of signal recorded by the program is more than the power level set by the United States law. VRD easily creates photos that can easily be found in the room light and can be created on the day's pictures. A combination of light and great destruction and advanced will make you the best VRD Gradin to use the active display. In addition, the device has shown a large potential for the VRD viewpoint for patients with disorder.

Our future work is:

1.) Be aware of the proven proven act that advises you to get pictures from laser lights, including high, different and colorful ideas.
2.) Understand VDR images of real life with photos of real life to bring yourself to the technical applications.
3.) Looking for some users to look at the VDD images.
4.) As opposed to negative appearance, create an image of light VRD flames.
5. Identification of texts, pictures and art galleries for less detailed designers, and identifying the fact and those representatives are few people in the Seattle.

VI. Acknowledgements

The development work for the VRD was funded by Micro vision Inc. of Seattle. WA. Virtual Retinal Display and VRD are registered trademarks of Micro vision. Perceptual research funding is being provided by the National Science Foundation Grant # IRI-9703598.

References

[1] R. Robinson, J. Deutsch, H. S. Jones, S. Young son Reilly, D. M. Hamlin, L. Dhurjon, and A. R. Fielder, "Unrecognized and unregistered visual impairment," Br J Ophthalmol, vol. 78, pp. 736-40, 1994.

[2] M. Yap and J. Wetherill, "Causes of blindness and partial sight in the Bradford Metropolitan District from 1980 to 1985," Ophthalmic Physiol Opt, vol. 9, pp. 289-92, 1989.

[3] J. M. Gibson, J. R. Lavery, and A. R. Rosenthal, "Blindness and partial sight in an elderly population," Br J Ophthalmol, vol. 70, pp. 700-5, 1986.

[4] J. Brabyn, "Problems to be overcome in high-tech devices for the visually impaired," Optom Vis Sci, vol. 69, pp. 42-45, 1992.

[5] B. Collins and J. Silver, "Recent experiences in the management of visual impairment in albinism," Ophthalmic Paediatr Genet, vol. 11, pp. 225-8, 1990

[6] . C. C. Krischer, M. Stein Arsic, R. Meissen, and J. Zihl, "Visual performance and reading capacity of partially sighted persons in a rehabilitation center," Am J Optom Physiol Opt, vol. 62, pp. 52-8, 1985.

[7] A. G. Mathur, I. N. Raizada, R. Maini, and A. K. Maini, "Partially sighted--their management with low vision aids," Indian J Ophthalmol, vol. 34, pp. 350-2, 1986.

[8] O. Over bury, W. B. Jackson, and C. Hagen son, "Factors affecting the successful use of low-vision aids," Can J Ophthalmol, vol. 22, pp. 205-7, 1987.