Visual Prostheses
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Abstract—The purpose of this study is to find a way to help individuals who are effected by blindness. Recently there have been advances in the field which have provided several ways to help restore vision to the blind.

I. INTRODUCTION

Blindness is a medical problem that affects over forty million people throughout the world. Individuals affected by blindness are forced to be dependent on others because they are unable to see and do tasks as efficiently as a person with twenty-twenty vision. Many diseases cause blindness which creates problems when trying to provide a solution for blindness. Age related macular degeneration and retinitis pigmentosa are only some diseases that cause blindness. The hope for blind people to acquire their sight again is not lost. In the mid part of the eighteenth century it was first discovered that when an electrical charge was delivered to a blind man’s eye, it produced a sensation of light. Since then new technologies have been discovered to enable the blind to see. The vision is not as sophisticated as a person with normal vision, but the person can still make out images and they can see a small portion of the area that is in front of them in gray scale images. Though the technology has not advanced enough yet to have completely restored vision, advances have been made so that blind patients can see restrictively.

II. METHODS

Recent advances in this field have produced three types of implants that help to produce vision. The first is the retinal implant. This implant uses an electrode array that is implanted under or below the retina by surgery which is linked wirelessly to a pair of glasses which has a camera with a laser receptor. When an image is caught by the camera the image gets sent by laser to the electrode array on the retina. Then the electrode array produces an electrical pulse in the retina which causes the individual to see several phosphenes, which are sensations of light, that come together to form a rough image of what was received by the camera.

The optic nerve and cortical implants are similar to the retinal implant, but they are implanted in different areas. These implants also use neurostimulators and signal processors in order to decipher the images captured by the camera. The light is picked up by the camera, sent to the neurostimulator that sends the signal to the electrode which then stimulates the eye to form and image. The electrode array in the eye and the camera and processor produce vision just as the lenses and cones of the eye produce vision in a healthy eye.

III. RESULTS

These devices have started a new chapter in prosthetic technology. Enabling the blind to see even slightly is a huge advancement in a solution to blindness. The patients that have used these implants are able to see in gray scale and very effectively see the outline of objects just like the picture below.

IV. DISCUSSION

In total this technology is a valuable resource that humans will be able to use in generations to come. The main flaw with this technology however, is the need to surgically implant the devises. Even though the surgery is dangerous and could cause damage to the brain, the use of this technology is ethical and helps those who are disables to experience life in a new light. The device also does not last forever and the images that are seen by the blind patient fade over time so it is not the best in sustainability.

The ability to use an electrode array and us electrical pulses to stimulate the brain and produce a sensation of light is incredible and revolutionary. This technology regardless of limitations is a stepping stone into a new era of biomedical engineering.

REFERENCES