

# Argus II Retinal Prosthesis System

Vincent Iannaco, *Biomedical Engineering, University of Rhode Island*  
BME 281 First Presentation, March 13, 2013 <vincent21@my.uri.edu>

**Abstract**—A revolutionary breakthrough in prosthetics allows doctors to implant a bionic eye to restore a limited degree of vision to the blind.

## I. INTRODUCTION

ROBOTIC prosthetics is a rapidly developing field and a key interest for many would be biomedical engineers. From replacing an amputee with a robotic arm to touch and feel to a prosthetic leg to allow them to walk, many biomedical engineers are always looking to improve the life of people through combining prosthetics with neurotechnology. Recently scientists have implanted the Argus II Retinal Prosthesis System into patients with degenerative eye problems, such as 73-year-old patient Ron. Ron lost his sight to retinitis pigmentosa, but after being fitted with the Argus II Retinal prosthetic, partially restoring sight to the patient.

## II. METHODS

The procedure of installing the Argus II Retinal Prosthesis System is in two parts. The first involves an operation on the right eye where they implant a chip, measuring 1 mm by 1 mm, with 60 electrodes on the retina. The electrodes are each connected to a wire that runs out the side of your eye where it can't be seen. A 'radio receiver' is planted there and then they create a belt out of donated sclera to hold it in place. The second part of this prosthetic is the



glasses, which contains a camera in the nosepiece. The camera feeds the information it picks up to a small computer that you can wear on one's belt "no bigger than a packet of cigarettes." The information received by the computer is then relayed up an 'induction coil' and is transmitted to the radio receiver attached to the outside of the eye. This is relayed to the 60 electrodes on the retina allowing the patient pick up light.

## III. RESULTS

The results of the Argus II Retinal Prosthesis System have been very promising, allowing sight impaired individuals like Ron to go from being in total darkness to allowing them to pick up enough light to distinguish light from dark. After six months patients still can not depict shapes but are able to notice the difference between white objects and colored objects, allowing them to perform some simple tasks, such as sorting the white socks from the black and gray socks.

## IV. DISCUSSION

As of now the Argus II Retinal Prosthesis System is only FDA approved to those affected with retinitis pigmentosa. As of now only 30 people across the world have been fitted with the artificial eye, but with such results it is quite possible for it to be used with other eye diseases as well, such as macular degeneration. The hope of scientists is that as patients spend more time using the bionic eye, the brain will learn to use the images and light it receives to perhaps make out shapes, and to perhaps achieve the ambition of 73 year old patient Ron of seeing the moon in the night.

As of now the Argus II would cost upwards of \$100,000 dollars, which is very expensive to the average person. There is also a process and criteria to be eligible for the operation: for you need to be within a couple hours of the hospital where they implanted the device, you must be completely blind, you have to be able to discuss what you can and can't see, and your ganglions had to be in order.

The side effects for the surgery consist of the normal risks for eye surgery, as well as many

long-term electrical stimulation risks that are still unknown. There is risk of pain and irritation around the eye, as well as headaches and even decreasing the remaining perception of light

As of now the Argus II is approved for use, but there is still a lot of research and improvements going in to it.

## REFERENCES

- [1] Argus II Retinal Prosthesis System Patient Manual, <http://www.fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/MedicalDevices/MedicalDevicesAdvisoryCommittee/OphthalmicDevicesPanel/UCM320423.pdf>
- [2] FDA Approves First Bionic Eye, <http://www.cnn.com/2013/02/19/health/fda-bionic-eye>
- [3] Second Sight main website, <http://2-sight.eu/en/home-en>
- [4] The Man With The Bionic Eye, interview with patient Ron, [http://www.bbc.co.uk/insideout/content/articles/2009/03/03/london\\_bionic\\_eye\\_s15\\_w8\\_video\\_feature.shtml](http://www.bbc.co.uk/insideout/content/articles/2009/03/03/london_bionic_eye_s15_w8_video_feature.shtml)
- [5] Bionic Eye begins to see real-world results, <http://www.gizmag.com/bionic-eye-argus-ii-retinal-implant/11202/>
- [6] How stuff works, how does a "bionic eye" allow blind people to see?, <http://science.howstuffworks.com/life/human-biology/bionic-eye.htm>

