



# New app shows what bionic vision looks like

Matias Maturana is a student with a vision. Working towards his PhD on Electrical Engineering, he took several twists and turns in his studies before he came to understand he could combine two major loves – engineering and medicine. By Annie Rahilly.

## GRADUATE STUDIES

**M**atias Maturana was born in Chile and escaped to Australia when he was three with his mother and sister as refugees from dictatorship in Chile, and completed his schooling in Australia.

From secondary school, he began an Arts/Science double degree at the University of Melbourne. His majors were in Japanese and applied mathematics. Upon completion of these degrees, he went to work in Japan for two years returning in 2010 to begin a Masters in Engineering.

"I always had a strong interest in medicine. When I was young, I wanted to become a doctor but as I got older, I realised I didn't really have the stomach for it," he says.

"I was fascinated by electricity and

technology. This led me to undertake a Masters in electrical engineering. While I was doing this, I realised I could undertake biomedical subjects, which enabled me to pursue both of my interests."

The bionic eye has been Mr Maturana's great passion since he first viewed a video in 2004 that showed a simulation of what a user of the bionic eye might see. He realised then that working in this field would be a dream job, but was concerned that it was far from his reach.

During his Masters, he was able to pursue contacts with professors working on the project. In 2011, he undertook summer research work with Bionic Vision Australia (BVA) and was given the opportunity to work on the project.

Mr Maturana has been part of BVA for three years now and has recently begun a PhD that examines using feedback to improve vision with the bionic eye.

"My primary research was to model the primary output neurons of the retina. This research was frustrating at times. Detailed modelling requires constraints based on experimental data that are often difficult to obtain," he says.

"I decided to move into in-vitro experiments, where we use live tissue to discover new things about the retina, and develop methods for controlling its activation. My project involves using multi-electrode arrays to record from and stimulate the retina, while using control theory to regulate its response."

Throughout his studies at the University


of Melbourne, he became very interested in programming. He has learned how to program Java (for Android applications) and iOS (for iPhone applications). As a test project, he thought it would be a good idea to develop an app that could simulate bionic vision.


"This would give the public an idea of what might be experienced by someone with a prosthetic vision device. In other words, simply through an app on a mobile phone, people can gain an understanding of what it might be like for vision-impaired people who have devices implanted to help them regain some sight."

The bionic eye is a stimulating retinal implant placed at the back of the retina. An external camera captures the visual scene and is processed before sending data to the implant. A number of electrodes on the implant then stimulate the surviving neurons in the retina, providing a sense of vision.

In his app, Mr Maturana used a spot of light, also known as a phosphene, to describe the vision elicited by the stimulation. The user of the app can select the number and size of phosphenes, to simulate the impact of increasing the number of stimulating electrodes.

Explore the Bionic Eye app at:

 <https://play.google.com/store/apps/details?id=com.bva.BVAApp&hl=en>

 <https://itunes.apple.com/us/app/bionic-eye-app/id654435372?mt=8>