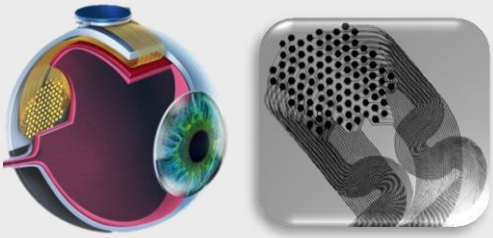
UNSW SYDNEY | Australia's Global University

Developing appropriate technology for next generation implantable bionics

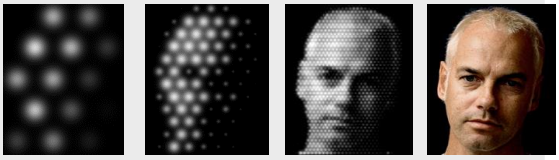
Applying engineering tools and approaches to address problems in medicine and biology

Work spans from basic science, to applied R&D, product design, clinical trials and evaluation

Experience also in translation, commercialisation and device regulatory approvals (TGA/FDA/CE)



Bionic eye device: Model eye with 100-channel stimulating electrode array



16 channels 100 channels 1000 channels Future

Improve quality of life by increasing the number of **FUNCTIONAL** channels

More information

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Next Generation Neural Interfaces

Graduate School of Biomedical Engineering

Competitive advantage

Bionic Eye

- Advanced technique and resource for designing and fabricating of implantable bionics
- Stimulation strategy resembling natural physiological neural encoding

Next Generation Neural Interfaces

Optrode Array

- Liquid crystals replace traditional metal electrodes
- Light waveguides pave the way to higher channel density recording arrays

Bionic Array–Driven Gene Electrotransfer (BADGE)

- New gene therapy technique to greatly improve implant-nerve connections
- Currently being tested in cochlear implants and deep brain stimulation

Living Electrodes

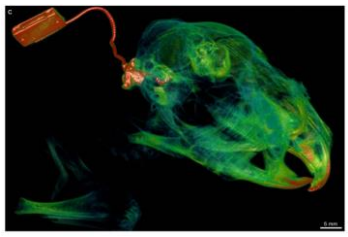
- Soft, compliant coatings improve neural connectivity
- Cells embedded in conductive hydrogels form living functional interfaces

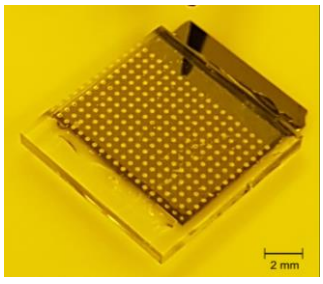
Recent research projects

- Design of an optrode for next generation brain-machine interfaces
- ARC Linkage with Cochlear Limited: Electric field effects on cochlear tissues
- Closing the neural gap in the bionic ear,
- Clinical trial of a visual prosthesis for the profoundly vision impaired
- Optimizing the performance of retinal neuroprostheses

Facilities and infrastructure

- An ISO13485 compliant Quality Management System and clean room for design and manufacture of medical devices including wearable and implantable bionics
- A laser micromachining, microelectronics and 3D printing facility for electronics and mechanical design and prototyping
- An *in vitro* laboratory for multiple fundamental neurophysiology studies
- Animal housing and full surgical suite for acute and chronic *in vivo* experiments





Left: A implant electrode array in the left cochlea of a guinea pig using BADGE technique. Right : A fabricated optrode sensor array prototype, with 13 × 18 optrodes.

Our experts

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