



**UNSW**  
SYDNEY



## Between Brain and Machine

**The development of the optrode array chip: a stepping stone towards the next generation of high-density, implantable brain/machine interface.**

### Competitive advantage

- Passively transducing the neural signals into the optical domain bypasses the problem of signal degradation and provides a scalable solution that could disrupt the way science thinks about brain/machine interfaces
- Unprecedented resolution, coverage and throughput
- Step-change in both clinical and research environments

### Impact

- The best approach to brain/machine interfaces suffers from serious limitations, in that their signal/noise degrades as the density of electrodes increases. An embeddable, conformal optics chip will provide a step-change in both clinical and research environments and enable the control of machines through the brain or the enhancement of human abilities.

### Successful outcomes

- Short-term: multi-optrode arrays (250 connections)
- Mid-term: prosthesis control (5000-10,000 connections)
- Long-term: machine control (1 million connections)

### Capabilities and facilities

- Access to exhaustive nano-fabrication facilities at the Australian National Fabrication Facility (ANFF)
- Full 3D finite-elements model of all opto-electronics aspects completed
- Research team comprising 5 senior academics and a number of doctoral students

### Our partners

- Zedelef Pty Ltd
- Preclinical testing facilities

### More Information

Professor François Ladouceur

School of Electrical Engineering and Telecommunications

T: +61 (0) 408 476 460  
E: [f.ladouceur@unsw.edu.au](mailto:f.ladouceur@unsw.edu.au)

Dr Leonardo Silvestri

School of Electrical Engineering and Telecommunications

T: +61 2 9385 6573  
E: [l.silvestri@unsw.edu.au](mailto:l.silvestri@unsw.edu.au)

Scientia Professor Nigel Lovell

Graduate School of Biomedical Engineering

T: +61 2 9385 3922  
E: [n.lovell@unsw.edu.au](mailto:n.lovell@unsw.edu.au)

UNSW Knowledge Exchange

[knowledge.exchange@unsw.edu.au](mailto:knowledge.exchange@unsw.edu.au)

[www.capabilities.unsw.edu.au](http://www.capabilities.unsw.edu.au)

+61(2) 9385 5008