The Current

Bionics Institute Newsletter

AUTUMN 2022

Tinnitus: Detecting an invisible condition

Data science and medical devices

Join our upcoming events

Bionics Institute

A word from our CEO

Innovation – the drive to uncover new ways of doing things - lies at the heart of the Bionics Institute.

Our talented researchers and engineers are hard-wired to find new ways to diagnose and treat the world's most challenging medical conditions. Bionics Institute achievements are derived from their innovation.

This includes, among many others, a novel system to enhance deep brain stimulation for Parkinson's disease; a vagus nerve stimulation device to reduce inflammation in Crohn's disease; new techniques to diagnose previously undiagnosed deafness in infants; and novel therapies to give back hearing in those who have lost it due to age and/or noise exposure.

In this newsletter, we hear from Dr Mehrnaz Shoushtarian who has developed a new way to use near-infrared spectroscopy to provide a much-needed objective measure of tinnitus.

We also take a deep dive with our data analytics lead Dr Gautam Balasubramanian, who is developing new machine learning and signal processing algorithms for software used in devices, such as the EarGenie™ infant hearing diagnostic tool.

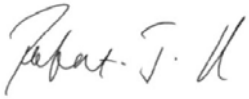
In a recent survey, 87% of our staff said they rate the Bionics Institute as exceptional in its support for innovation.

One element of this support is the Bionics Incubator Fund, which provides seed funding to researchers who pitch a great idea.

One fabulous idea is the adaption of our vagus nerve stimulation device to treat rheumatoid arthritis, which is progressing well towards clinical trials.

Your support for early-stage research at the Bionics Institute is vital to translate amazing ideas like these into new diagnostic tools and life-changing treatments.

"We hope you will continue to support Innovation for Life at the Bionics Institute."



Mr Robert Klupacs
CEO

Leadership and impact

In December, we welcomed Professor Field Rickards to our end of year celebration. He presented the inaugural Field Rickards Annual Awards for Leadership and Impact at the Bionics Institute.

Awards were presented to: Dr Sophie Payne for Best Researcher 2021; Elise Ajay for Best Student 2021; and our pre-clinical research group for Best Research Team 2021.

Professor Rickards started his career as a PhD student with Professor Graeme Clark in the Bionic Ear program, and was a member of the Institute's Board of Directors between 1998 and 2020. He has made a substantial contribution to hearing research during his career and we were delighted to offer the awards in recognition of his long service to the Bionics Institute.

Exceptional contribution to health and medical science

Bionics Institute's Professor Colette McKay has been elected by her peers as a Fellow of the Australian Academy of Health and Medical Sciences.

Professor McKay leads translational hearing research at the Bionics Institute. She is an internationally recognised and distinguished auditory science researcher, lauded for her research into improving speech understanding in cochlear implant users.

More recently, she has led research into a new hearing test for babies called EarGenie™, which uses a brain imaging method to see how a baby's brain responds to sounds.

Professor McKay said: 'I am honoured indeed to be elected to such a prestigious academy, and it is a great satisfaction for me to be able to succeed in improving the lives of people with hearing impairment, even in the smallest way.'

Tinnitus: detecting an invisible condition

Tinnitus is the experience of sounds in one or both ears that originate in the brain and can't be heard by others – making it an invisible condition. Despite it being unseen, its effect on people's lives is very much tangible and can be debilitating. Tinnitus can affect people's ability to work or cope with everyday life.

Conducting research into an invisible condition like this is difficult and takes a great deal of creativity.

Bionics Institute researcher Dr Mehrnaz Shoushtarian is undertaking this difficult task by drawing on her background in biomedical engineering to develop an objective test for tinnitus. The test will be the first step towards accurately diagnosing the condition so that future treatments can be developed.

She explains: 'My research career has focused on using different techniques to record physiological signals and brain activity. We can use these recordings to gain information on how the brain works or why it's not working in a certain situation.'

Mehrnaz and her team have developed a method of using an existing brain imaging technique called functional near-infrared spectroscopy, to record and show differences in brain activity between people with and without tinnitus, as well as individuals experiencing tinnitus at different severity levels. This will be used to develop a definitive test of the presence and severity of tinnitus to aid diagnosis.

Mehrnaz says: 'I became interested in medical research as I wanted to apply learnings from my engineering degree to address health issues and improve patients' lives.'

'My future goal is to see our work on objective measurement of tinnitus improve treatments for this debilitating condition and be accessible to all patients.'

Find out more about this research in our Recent Events section below.

Upcoming Events

We look forward to seeing you at one of our upcoming free events. You can register by clicking on the link or opening the page on your phone using the QR code.

Bionics Institute 2022 Graeme Clark Oration

Engineering your heart's health

The Bionics Institute 2022 Graeme Clark Oration is back!

When: 6pm | Tuesday 12 July 2022
Where: Melbourne Convention and Exhibition Centre
Orator: Dr Natalia Trayanova, the Murray B. Sachs Professor of Biomedical Engineering at the Johns Hopkins University (USA).

Join us at Australia's premier free public science event to learn how cardiac arrest can be predicted in advance and treatments tailored to individuals.

Register to attend

Bionics Institute 2022 Innovation lecture

Building Australia from Innovation

Join us at our inaugural Innovation Lecture event to hear from leaders in medical technology about building Australia from innovation.

When: 6pm | Thursday 8 September 2022
Where: Melbourne Museum
Keynote speaker: Andrew Nash, Chief Scientific Officer, CSL

Following the lecture refreshments will be served, providing the opportunity to meet our innovative researchers and fellow guests.

Register to attend

Please note: events will adhere to Victorian Government coronavirus restrictions and guidelines.

Recent Events

If you missed any of our recent events, you can view a recording by clicking on the link or opening the page on your phone using the QR code.

Rethinking rheumatoid arthritis

Hear how a new nerve treatment invented by Melbourne researchers at the Bionics Institute is bringing hope to people with rheumatoid arthritis.

View event

The Australian Bionic Eye: the people behind the technology

Hear how Bionics Institute researchers are working with an interdisciplinary team in Melbourne that is leading the way in the global challenge to restore functional vision for the blind.

View event

Tinnitus: detecting an invisible condition

Hear how Bionics Institute researchers have developed a new way of measuring tinnitus by recording brain activity, and how this could help people with tinnitus in the future.

View event

Bionics takes on Bogong!

On the 4 December 2021, 36 Bionics Institute staff, family and friends got together to hike 1,986m to the top of Mt Bogong, raising over $10,000 towards life-changing medical device research.

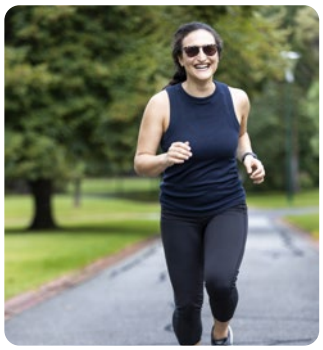
Victoria's highest peak was a challenge via the Staircase Spur but the group was rewarded with amazing views and great memories!

Going the extra mile!

Inspired by taking part in the Bionics takes on Bogong event and seeing first-hand the difference community funding can make, Bionics Institute's Mica Haneman will be taking part in a triathlon later this year to raise money towards our cochlear implant research.

Mica, an audiology graduate and research assistant with the Bionics Institute's hearing team explains: 'I have the privilege of working with cochlear implant recipients to investigate ways of improving how cochlear implants are programmed. Some people with a cochlear implant still experience many challenges with how sounds and speech are heard. The work the Bionics Institute teams are doing to try and resolve this is so important.

'I'm always looking for a new challenge, so I'm really excited to be working towards a new goal, whilst also raising money towards such a worthwhile cause'.



We'd love to hear your fundraising ideas!

If you're thinking about setting up a fundraiser for Bionics Institute research, or have any questions about how you can do this, please contact Lucy Hooper at:

philanthropy@bionicsinstitute.org

Donation Form

I would like to make a ***monthly**** gift of:

$50 ☐ $100 ☐ $250 ☐ $500 ☐

My choice ☐ $ _____

**Your gift will be deducted on the 20th of each month and will continue unless you notify us to stop it.*

I would like to make a ***single*** gift of:

$50 ☐ $100 ☐ $250 ☐ $500 ☐ $1000 ☐

My choice ☐ $ _____

My Details

Name

Street address

Suburb

State Postcode

Email

Mobile

My Donation Details

Please debit my Visa ☐ MasterCard ☐ AMEX ☐

Card no.

Expiry date M M Y Y

Cardholder name

Signature

All donations of $2 or more are tax deductible. The Bionics Institute is compliant with Australian Privacy Principles and our Privacy Policy can be viewed at: www.bionicsinstitute.org/privacy-statement

☐ I have made a bank transfer to NAB
BSB: **083-170** Account: **54-537-7254**

☐ Enclosed is my cheque made payable to the Bionics Institute of Australia

☐ I would like to receive information about making a gift in my Will

You are welcome to call and give us your credit card details over the phone: 03 9667 7500, or donate online at www.bionicsinstitute.org

Thank you for supporting the Bionics Institute
384—388 Albert Street, East Melbourne VIC 3002
Email: philanthropy@bionicsinstitute.org

Philanthropy Update

I hope that you were able to join us for our tinnitus webinar during this year's Hearing Awareness Week, when we discussed the difficulties faced by people living with this debilitating condition.

Led by Dr Mehrnaz Shoushtarian, our researchers are developing a new objective test for tinnitus, which could pave the way for determining the severity of the disease and developing new potential treatments. To accelerate this innovative research and to move the test into the clinic, we need your support.

Philanthropic support enables us to secure and establish our research through to clinical stage. We can then attract additional sources of funding and commercialise our products. Ensuring our pioneering research reaches the clinic and enables us to transform the lives of patients far into the future.

I would like to introduce the rest of our philanthropy team; Melissa McShane, who has joined us as Development Manager, working with our major donors, and Lucy Hooper, our External Relations Coordinator, with a focus on community fundraising.

We are looking forward to getting to know our supporters better and you will be hearing from us over the next couple of months, as we aim to find out more about your specific areas of interest at the Bionics Institute. We look forward to updating you on the great progress we are making with our different areas of research.

"We are most grateful for your continued support; every gift, no matter how large or small, is put to effective use and makes a real difference to our work. Thank you."

Ann Fazakerley

Ann Fazakerley
Head of Philanthropy

In the News

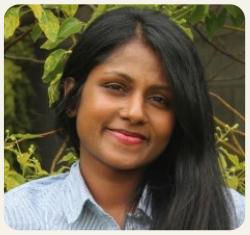
Here's a roundup of our news stories over the past six months.

Inspiring women to pursue careers in STEM

In 2021, leading female researchers at the Bionics Institute mentored eight students from Ivanhoe Girls Grammar on a six-month program designed to inspire young women to pursue careers in STEM.

New drug treatment hope for hearing loss

A breakthrough using nanotechnology is allowing Bionics Institute researchers to explore a world-first drug treatment for hearing loss.



Prestigious scholarship awarded for tinnitus research

Research assistant, Shreyasi Datta has been awarded the Len Stevens Scholarship by the University of Melbourne to further Bionics Institute's tinnitus research.

Developing the researchers of tomorrow

Jessica Gonzalez has completed a student placement at the Bionics Institute as part of the Amgen Scholars Program, an initiative with links to Harvard.

Read more about these stories and latest news here

Read more

Why is data science needed to develop medical devices?

Data science is playing an increasingly important role in fostering innovation within medical research.

This is because many medical treatments and diagnostic tools are being developed using a combination of technology and computer systems.

One example of this is the EarGenie™ infant hearing diagnostic tool, currently under development at the Bionics Institute.

EarGenie™ uses a band wrapped around the baby's head to measure changes in brain oxygen level that occur when sound is heard and processed.

The band contains small light sources and detectors which are used to make these measurements.

The light signal from the brain is processed by the specialised EarGenie™ software and its data analysis algorithm automatically interprets the results.

Using the algorithm EarGenie™ can indicate whether or not the baby has heard the sound, and also whether the baby can tell the difference between two different sounds, known as discrimination.

Eventually this technology will allow audiologists to tune hearing devices accurately from the very start, allowing babies to hear vital sounds and give them the best start in life.

Combining medical device research and data science

Bionics Institute's Senior Data Scientist Gautam Balasubramanian joined the Institute in May 2021.

His primary role is to develop machine learning and signal processing algorithms for Bionics Institute research teams.

For EarGenie, he is developing detection algorithms for the software system, which provides clinicians with an assessment of the baby's hearing. That work can then be extended and adapted to apply to other projects.

By applying robust, sophisticated & cutting edge analytics techniques, we can efficiently analyse and extract meaningful outputs from the huge amounts of data collected by our researchers.

'By developing a similar genre of statistical models we can gradually improve algorithms across many projects. For example, we can apply similar techniques from EarGenie to other projects which capture changes in brain activity.'

One of these projects includes tinnitus. Bionics Institute researchers are using the same technology as EarGenie to look at how the brain responds to sounds, to develop an objective test for tinnitus.

The new test will aid the diagnosis and development of potential treatments.

Future-proofing the Bionics Institute

Gautam also plays a key role in helping the Institute prepare for the future.

By using the latest data science practices learned from his previous roles in the high-tech telecommunications, defence and finance sectors, he is aiming to find common transferable techniques, as well as uniform ways of developing and running analytics projects.

He hopes these could be used to solve problems across various research areas, fostering greater collaboration between teams and enabling faster progression of scientific research, to speed up treatments from the lab to the bedside.

Describing his journey from business to the Bionics Institute, he says that medical research is an area where he can be creative and exercise all aspects of his personality.

He enjoys looking at existing projects and bringing in cutting-edge knowledge from computer science to help advance treatment options available.

He says: 'I always had a keen interest in health sciences, and even though I may not be a medical professional, I always thought there must be a way I can use my skillset to work on something that can ultimately help people.

'It's very fulfilling to work somewhere that focuses on taking new ideas and bringing expertise together, to translate them into something effective and useful that will have a positive impact on someone's life,' he concludes.

The Current is published by the **Bionics Institute**

For the Bionics Institute's latest research news, visit www.bionicsinstitute.org
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