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Defence:  
Innovation  
at the  
vanguard



# Robotics for neurorehabilitation

Stroke, traumatic brain injury or spinal cord injury can have large impacts on the ability to move independently. Research focusing on the use of robotics for rehabilitation could hold the key to effective treatments.

In a new laboratory at ECU, Professor Dylan Edwards uses robotic therapy to better understand issues of mobility in people who have suffered a stroke, traumatic brain injury or spinal cord injury.

Robotic therapy, he says, is likely to be an effective treatment in the future.

Professor Edwards is Director of the [NeuroRehabilitation and Robotics Laboratory](#), launched early in 2018.

Located at ECU's Joondalup Campus, the laboratory is home to Australia's first KINARM Exoskeleton.

The KINARM – valued at \$300,000 – combines robotics and virtual reality. The robotic machinery allows researchers to study upper-arm voluntary motor control, and quantify and provide a broad range of hand and joint-based information.

“The KINARM allows us to examine how someone is moving in a much more detailed way, allowing us to design more targeted rehabilitation programs for patients,” Professor Edwards explains.

As part of the research, Professor Edwards seeks to develop the understanding of these conditions, which will lead to the design of new interventions that will aid recovery.

“Giving someone even a small amount of movement back after they have suffered neurological damage can be extremely powerful,” he says.

“Helping someone who has suffered a spinal injury to simply turn the pages of a book may not sound like much, but it can make the world of difference to the individual.”

Professor Edwards and his research team at the laboratory are collaborating with St John of God Midland Hospital and Osborne Park Hospital to follow stroke patients through their admission, treatment and recovery.

“Working with the hospitals provides the research team with a great opportunity to track patients throughout their journey, which will lead to better research outcomes,” Professor Edwards says.

The repetition of exercises is critical for patients to regain movement following stroke or spinal injury. The advantage of using robotics is that the robot can repeatedly perform the same, precise exercises with the patient, without making the patient or therapist tired.

Considering the limited effectiveness of current drugs and available devices, Professor Edwards says

ERA  
2015 RATING  
**5**  
WELL ABOVE  
WORLD STANDARD  
NEUROSCIENCES

the use of robotic therapy will be fundamental to the motor recovery of people affected by stroke, brain injury or spinal cord injury.

The initial goal is to provide the services to the Western Australian community, and then more broadly across Australia. Ultimately, patients would travel to Perth to receive neurorehabilitation not available in their home countries.

“This lab will provide a unique service within Australia and would promote Perth as a destination for Australians and internationally for people with neurological impairment to receive highly specialised and cutting-edge treatment,” Professor Dylan says.

The research aims to develop ECU as a leader in robotic neurorehabilitation.

An overhead photograph of three individuals sitting around a white table in a study or office environment. The person on the left is wearing a bright green safety vest over a blue shirt and is looking at a laptop. The person in the center is wearing a black top and is also looking at a laptop. The person on the right is wearing a maroon shirt and is looking at an open book. The table is cluttered with several open books, two laptops, and a pen. The background is a plain, light-colored wall.

ECU

Professorial

Research

*Fellows*

ECU's Professorial Research Fellows are strengthening the University's dynamic research culture, helping to transform lives and change the world for the better.

Here, they tell us how.





School of Arts and Humanities

## Professor Paul Arthur

Chair in Digital Humanities and Social Sciences  
Director, Edith Cowan Centre for Global Issues

**Research focus:** the transformative impacts of technology in culture and society

*"Digital technologies are fundamentally changing human identity and social behaviours on a global scale, opening new opportunities for advanced research across all disciplines."*



School of Medical and Health Sciences

## Associate Professor Erin Godecke

Clinical Director, Very Early Rehabilitation in SpeEch (VERSE) Trial for Aphasia after Stroke

**Research focus:** very early aphasia recovery; improving outcomes in stroke care; the role of impairment-based aphasia therapy in recovery; complex intervention randomised controlled trials; treatment fidelity

*"My clinical practice inspires all my research. I'm passionate about improving the lives of people with aphasia and teaching allied health professionals that research is within their reach."*



School of Science

## Professor David Broadhurst

Professor of Chemometrics, Machine Learning and Applied Biostatistics  
Director, Centre for Integrative Metabolomics and Computational Biology

**Research focus:** metabolomics and computational systems biology applied to the discovery and monitoring of biochemical mechanisms related to exercise medicine, dietary intervention, sports science and biomarkers of pregnancy and early-life disease progression

*"Our team is eager to make a positive impact on the health and wellbeing of the people of Western Australia, and in global health with our national and international collaborators."*



School of Medical and Health Sciences

## Professor Jonathan Hodgson

Professor of Nutrition and Epidemiology  
NHMRC Senior Research Fellowship to conduct research on dietary approaches to enhance vascular health

**Research focus:** to better understand the impact of particular diets and dietary components on vascular health

*"My research program investigates why and how plant foods provide protection against cardiovascular disease. Outcomes connect several components of fruits and vegetables with better vascular health."*



School of Medical and Health Sciences

## Professor Dylan Edwards

Professor of Neuroscience

**Research focus:** motor rehabilitation after neurological injury (stroke, spinal cord injury and traumatic brain injury)

*"My research uses advanced technologies including robotics and transcranial magnetic stimulation to understand and promote recovery of function after neurological injury such as stroke."*



School of Business and Law

## Professor Sam Huang

Professor of Tourism and Services Marketing

**Research focus:** consumer behaviour in tourism; tour guides and guiding service; China tourism and hospitality issues

*"China is the world's largest international tourism source market. Studying Chinese tourist behaviours will help countries like Australia better harness the benefits of Chinese tourism."*