

Mathew Legg

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Professional positions held

Department of Mechanical and Electrical Engineering, Massey University <i>Senior Lecturer</i>	Auckland, New Zealand 2020–Present
Massey University <i>Lecturer</i>	Auckland, New Zealand 2017–2020
Department of Physics, University of Auckland <i>Postdoctoral Research Fellow</i>	Auckland, New Zealand 2014–2017
Brunel Innovation Centre, Brunel University <i>Research Fellow</i>	Cambridge, UK 2013–2014
Department of Physics, University of Auckland <i>Professional Teaching Fellow</i>	Auckland, New Zealand 2012

Academic qualifications

University of Auckland <i>PhD – Physics</i>	Auckland, New Zealand 2007–2012
<i>MSc – Physics, First Class Honours</i>	2006–2007
<i>PGDipSci – Physics</i>	2003–2004
<i>BSc – Physics and Geophysics</i>	1999–2003

Scholarships

University of Auckland <i>University of Auckland Doctoral Scholarship</i>	Auckland, New Zealand 2008–2011
<i>UniServices Acoustics Scholarship</i>	2010
<i>Department of Physics Sagar Geophysics Prize</i>	2006
<i>Faculty of Science Fees Bursary</i>	2003
<i>Faculty of Science Senior Prize in Physics</i>	2002

Citizenship

Citizen of New Zealand, Ireland and Australia.

Teaching / supervision experience

Teaching experience.....

Mechanical and Electrical Engineering, Massey University **Auckland, New Zealand**
Senior Lecturer *2017–Present*

281.272 : Signals and System	Lecture 25% of course, Auckland coordinator.
281.353 : Control Engineering	Lecture 50% of course, course coordinator.
281.385 : Advanced Electronics	Lecture 33% of course, course coordinator. (Did not teach/coordinate course in 2023.)
281.755 : Digital Signal Processing	Lecture 33% of course, course coordinator.
282.758 : Simulation, Modelling and Optimisation	Lecture 25% of course.
282.772 : Industrial Systems Design and Integration	Lecture 50% of course.

Most of the course material for the above courses was redeveloped. This included writing new course books (combined page count of about 250 pages), lecture slides, and tutorial materials. Four of these courses are taught simultaneously across two campuses.

Project Based Learning Courses

228.212 : Engineering Practice 4	Lecture 17% of course. PCB design using Altium.
228.311 : Design with Constraints	Lecture and supervisor of student groups, course coordinator (about 75% of workload).
228.711 : Engineering Practice 6	Supervision of 4 th year capstone project group research.
228.797 : Research Methods	Supervision of MEng Studies students.
228.798 : Individual Research Project	Supervision of 4 th year student research.

Lightboard Digital Learning

An advanced live streaming lightboard system was developed for improved online/digital teaching and in response to concerns for student wellbeing due to COVID lockdowns, etc. [5]. This allows the lecturer to write equations, draw diagrams, and overlay dynamic content in an augmented reality manner, while still being able to be seen full screen by students and maintain student privacy in recordings of lecturers, refer to this [link](#).

Department of Physics, University of Auckland **Auckland, New Zealand**
Professional Teaching Fellow *2012*

PHYSICS 340 : Electronics and Signal Processing	Lectured 50% of course. This involved preparing lecture slides, handout material, assignments and an exam. Course booklet that I developed continued to be used in subsequent years.
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Department of Physics, University of Auckland
Graduate Teaching Assistant

Auckland, New Zealand
2007–2011

Tutorials for a first-year physics course and supervision of 1st – 3rd year physics labs.

Department of Physics, University of Auckland
Web Page Development Responsibility

Auckland, New Zealand
2007–2009

Developed part of the website for a first-year physics course. Code was written in Python to automate the process of creating web pages.

Supervision.....

Mechanical and Electrical Engineering, Massey University, Auckland, New Zealand
Senior Lecturer 2017–Present

PhD: Main supervisor of two PhD students performing research on “Automated Grape Yield Estimation” [9, 15, 36, 60, 61] and “Development of Improved Acoustic Non-destructive Testing Tools for Wood” [7, 8, 11, 31–33]. Co-supervisor of 6 PhD students (2 completed).

MEng Studies: Supervision of 10 MEng Studies students (9 complete, 1 current) performing research on developing acoustic non-destructive tools for characterising the properties of wood, localisation using ultrasound, dolphin detection, etc.

BEng (Hon): Supervision of the research of over 50 fourth year BEng(Hon) students on topics ranging from 3D acoustic camera development to wood property NDT research and development of an advanced hydrophone system for Maui and Hector dolphin detection.

Department of Physics, University of Auckland
Postdoctoral Research Fellow

Auckland, New Zealand
2014–2017 and 2012

Co-supervised two Bachelor of Technology – Medical Physics and Imaging Technology students on projects related to acoustic imaging of sound emitted from wind turbines and acoustic (ultrasonic) tomography. Also provided general team support for PhD and undergrad students working in our group.

Brunel Innovation Centre, Brunel University
Research Fellow

Cambridge, UK
2013–2014

Acted as an “Industrial PhD Supervisor” for a PhD student performing research on non-destructive testing of high voltage power lines using ultrasonic guided waves. This involved the day-to-day research supervision of the student with visits from Prof. Wamadeva Balachandran (academic supervisor) every month/fortnight. I continued to help this student output publications (total of four journals) after I left [22, 25–27, 54]. Was also involved in helping Prof Balachandran with other PhD students. Supervised four engineering students undertaking one-year industrial placements at Brunel Innovation Centre.

Research experience

Mechanical and Electrical Engineering, Massey University **Auckland, New Zealand**

Senior Lecturer

2017–Present

My research has been mainly related to acoustics, ultrasonics, non-destructive testing, material characterisation, proximal sensing, 3D imaging, and advanced lightboard digital teaching systems. This has included the development of novel acoustic and ultrasonic measurement systems, techniques, and signal processing and imaging algorithms. Much of this has focused on developing solutions to increase the productivity of New Zealand's primary industries. This has included research related to ultrasonic pasture biomass estimation, acoustic non-destructive testing of wood, grape yield estimation, and an advanced passive acoustic detection of Maui and Hector's dolphins (endemic to New Zealand and endangered).

Project title: [Precision Acoustic Sensors for Pastoral and Arable Farming](#) (2019)

Project funding: \$40,000 NZD

Project type: MBIE subcontract from University of Auckland. Industry partners: [Gallagher Group](#).

Description: Development of an ultrasonic system for pasture biomass measurement for the farming sector [[3](#), [4](#), [19](#), [20](#), [41](#), [42](#), [45](#), [46](#)].

Role: Development of the novel ultrasonic hardware for pasture biomass estimation. Performed farm bike field trials with AgResearch, developed signal processing algorithms and analysed results. This project required close interaction with Gallagher. This is a continuation of the work performed as a postdoc - see below.

Project title: An Automated Grape Yield Estimation System (March 2018 – Feb. 2021)

Project funding: \$120,000 NZD

Project type: New Zealand Wine Growers Research Project.

Description: Development of an automated grape yield estimation technique using 3D depth cameras and ultrasonic techniques [[9](#), [15](#), [36](#), [60](#), [61](#)].

Role: Wrote the grant application which obtained the funding and main supervisor of a PhD student .

Department of Physics, University of Auckland

Auckland, New Zealand

Postdoctoral Research Fellow

2014–2017 and 2012

Research was performed on MBIE projects developing an ultrasonic sensor for measuring pasture biomass and developing acoustic tools and techniques for measuring the stiffness of wood. A proof of concept study funded by [SWI](#) had also been performed investigating automatic detection of knots in logs for an industrial timber processing plant using acoustic cameras [[28](#)]. Also, general team support was provided for the range of projects being undertaken by the team, including turbine noise studies [[47](#), [48](#)] and pollination of kiwifruit.

Project title: Precision Acoustic Sensors for Pastoral and Arable Farming (Oct 2015 – April. 2019)

Project funding: \$1,380,000 NZD

Project type: Ministry of Business, Innovation and Employment (MBIE).

Description: Development of a smart ultrasonic sensor to measure pasture dry matter or crop growth [3, 4, 19, 20, 41, 42, 45, 46]. Research team: The University of Auckland (lead), [AgResearch](#), and [Gallagher](#).

Role: Postdoc - Development and evaluation of ultrasonic sensor hardware and algorithms.

Project title: Acoustic Non-destructive Evaluation of Wood Properties in Standing Trees and Felled Stems (May 2014 – Apr. 2016)

Project funding: \$20,250,000 NZD with our subcontract being \$398,356.

Project type: Subcontracted to UniServices by SCION from Ministry of Business, Innovation and Employment (MBIE). Part of [Growing Confidence in Forestry Future](#).

Description: Developed novel acoustic/ultrasonic tools for measuring the internal stiffness of trees. Lab and field trial measurements and theory [23, 28, 49–51].

Role: Postdoc performing the research described above.

Brunel Innovation Centre, UK

Cambridge, UK

[Brunel Innovation Centre \(BIC\)](#) is a research centre of the School of Engineering and Design, Brunel University and is located at [TWI](#) (The Welding Institute) in Cambridge, UK. BIC works closely with TWI in performing research on industrial EU and UK projects mostly related to non-destructive testing and ultrasound cleaning/inhibition of fouling.

Research Fellow

2013–2014

Research was performed on three European Union projects relating to the use of ultrasonic guided waves for biofouling control on ship hulls and non-destructive testing of high voltage power transmission lines and aircraft cables.

Project title: [CleanShip – Prevention and Detection of Fouling on Ship Hulls](#) (2013–2014)

Project funding: €1,358,557

Project type: Collaborative European Union 7th Framework Program project

Description: Development of a guided wave ultrasonic antifouling system for ships. Performed lab and sea trials [24, 27, 55, 56, 62]. Consortium members included Lloyd's Register, UK.

Role: Project coordinator on behalf of Prof. Tat-Hean Gan and project leader for Brunel.

Project title: [Chaplin: High Power Transmission Line Cable Inspection](#) (2013–2014)

Project funding: €1,181,714

Project type: Collaborative European Union 7th Framework Program project.

Description: Development of ultrasound guided wave inspection system hardware and signal processing software for defect detection on high voltage power lines. Related publications are [[22](#), [25](#), [26](#), [54](#)].

Role: Project leader and supervised the research of a PhD student.

Project title: [Safewire: Long Range Ultrasonic Inspection of Aircraft Wiring](#) (2013–2014)

Project funding: €1,387,460

Project type: Collaborative European Union 7th Framework Program project.

Description: Development of ultrasonic guided wave system for detection of defects in the insulation of aircraft wires [[53](#)].

Role: Experimental measurement of ultrasonic guided wave dispersion curves for comparison with modelling.

PhD Research.....

Department of Physics, University of Auckland

Auckland, New Zealand

PhD Research

2008–2012

Thesis title: Microphone Phased Array 3D Beamforming and Deconvolution

Supervisor: Prof. Stuart Bradley

Research related to development of image sharpening (deconvolution) of 3D acoustic maps generated using microphone arrays (acoustic cameras), beamforming algorithms, and computer vision techniques. Developed a 72 channel microphone phased array including hardware, data acquisition, software, signal processing algorithms, and computer vision scanning system. First to perform 3D deconvolution of beamforming maps generated using the 3D surface of an object scanned using computer vision techniques [[1](#), [29](#), [30](#), [44](#), [57–59](#)].

I also have assisted with the development of a large aperture microphone array for imaging wind turbine noise [[47](#), [48](#)].

MSc Research.....

Department of Physics, University of Auckland

Auckland, New Zealand

MSc Research

2006–2007

Thesis title: Multi-frequency Clutter-rejection Algorithms for Acoustic Radars

Supervisor: Prof. Stuart Bradley

Acoustic radar for measuring wind profiles and rain drop size distribution. Development of acoustic radar hardware, data acquisition software, and signal processing algorithms. Related publications are [[2](#), [63](#)].

Administration

Mechanical and Electrical Engineering, Massey University **Auckland, New Zealand**

Senior Lecturer

2017–Present

External Academic Service

- Chair of the IEEE [NZ Signal Processing Society](#) and representative on the IEEE North Section board from 2022.
- Committee board member of the [Acoustics Society of New Zealand](#) (2018-present).
- Conference organisation committees member for the Acoustical Society of NZ's 2021 and 2022 conferences.
- [Topic editor](#) for MDPI Remote Sensing and asked to lead special issues.
- External examiner for Master of Engineering students for the University of Auckland (2 students) and University of Canterbury (1 student). PhD Examiner for Deakin University, Australia (1 student) and Thapar Institute of Engineering & Technology (India).

Internal Academic Service

- Board member on Massey's Teaching Space Technologies Project.
- Involved in Massey's promotional activities such "Open Days".
- Internal PhD examiner for two students. PhD conformation examiner and convener for several students.

External Funding

Project title: [Precision Acoustic Sensors for Pastoral and Arable Farming](#) (2019)

Project funding: \$40,000 NZD

Funding body: MBIE subcontract from University of Auckland. Industry partners: [Gallagher Group](#).

Project title: An Automated Grape Yield Estimation System (March 2018 – Feb. 2021)

Project funding: \$120,000 NZD

Funding body: New Zealand Wine Growers Research Project.

Also involved in a range of other grant applications. Examples of these are:

- MBIE Smart Ideas application with Massey Vet School in 2024 related to an agricultural application.
- MBIE Smart Ideas application with AgResearch in 2022 & 2023 related to an agricultural application (NDA).
- MBIE grant applications with Auckland University in 2020 & 2021 related to robotic fruit picking and ripeness detection. This went to the second round.
- MPI Tender related to technologies to mitigate the risk of dolphin capture in inshore trawl fisheries. I led the application.
- Marsden application with the University of Wellington and Cawthron Institute 2021 related to dolphin acoustic detection. I organised and led the application.
- SfTI application with AgResearch in 2020 related to honey property measurement.

Also, provided mentorship to an early career staff member to assist generate grant applications.

Department of Physics, University of Auckland

Postdoctoral Research Fellow

Auckland, New Zealand

2014–2017 and 2012

Assisted Prof. Stuart Bradley with managing the Precision Acoustics group. Provided general team support for the range of projects being undertaken by the team, including turbine noise studies and pollination of kiwifruit using pollen in solution. Central role in setting up the Department of Physics Precision Acoustics Lab. Proof of concept studies that assisted in gaining external funding.

Brunel Innovation Centre, Brunel University

Research Fellow

Cambridge, UK

2013–2014

Acted as group leader for the High Power Ultrasonics Group. Assisted with work required for European Union FP7 project negotiations. This included helping draft two Descriptions of Work (DOW) grant application documents and led a EU FP7 project negotiation grant application meeting in Brussels. Attended consortium meetings throughout Europe and the UK for different EU FP7 and UK TSB projects. Performed project coordinator work on behalf of Prof. Tat-Hean Gan for the Cleanship project with advice from my managers. This involved frequent correspondence with the eight research and industry consortium members, including Lloyd's Register who were the "End Users". The duties included arranging and leading consortium meetings, ensuring deliverables were submitted on time, and ensuring that the research was appropriate and in-line with the Description of Work (DOW).

Reviewer for journals and conferences

I have performed reviews for a range of journals related to acoustics, ultrasonics, non-destructive testing, ultrasonic guided wave testing, wood acoustics, acoustic cameras, smart agriculture, etc. Refer to my Web of Science peer review profile [link](#). Within the past year, I have performed about 13 reviews for journals and 3 reviews for international conferences. Examples of the journals I have performed reviews for include [Computers and Electronics in Agriculture](#); [Mechanical Systems and Signal Processing](#); [Applied Acoustics](#); [Sensors and Actuators A: Physical](#) [The Journal of the Acoustical Society of America](#); [Sensors](#); [Journal of Nondestructive Evaluation, Diagnostics and Prognostics of Engineering Systems](#); [Wood and Fiber Science](#); [Drones](#); and [IET Generation, Transmission & Distribution](#).

Workshops

University of Auckland

Acoustic Camera Workshop

30 Nov.–1 Dec. 2015 and 7–8 Nov. 2016

Co-organised and run a workshop in Auckland and Brisbane on acoustics cameras with GFaI Tech, Berlin, Germany, who are manufacturers of acoustic cameras. Presentations provided included microphone array design, signal processing, 2D/3D acoustic imaging, and industrial applications.

Collaborators

University of Auckland, University of Wellington, University of Salford, Brunel University, Sunway University, Cawthron Institute, AgResearch, Scion, TWI, GfAI.

Additional Information

Software proficiencies:

- Computer languages: Very experienced in Matlab and have some experience in C/C++ and Python.
- Word processing: Latex, Microsoft Word, etc.
- CAD design: Autodesk Inventor and SolidWorks.
- Printed circuit board design: Altium and Labcenter Proteus.

Interests: Cycling, walking, restoration of old houses, cars, and boats.

Publications

Thesis

- [1] M. **Legg**, *Microphone phased array 3D beamforming and deconvolution*. PhD thesis, University of Auckland, New Zealand, 2012. (<https://researchspace.auckland.ac.nz/handle/2292/17820>).
- [2] M. **Legg**, *Multi-frequency clutter-rejection algorithms for acoustic radars*. PhD thesis, University of Auckland, New Zealand, 2007. ([dio:10.13140/RG.2.1.4757.7449](https://doi.org/10.13140/RG.2.1.4757.7449)).

Patents

- [3] S. Bradley and M. **Legg**, "Systems, apparatus and methods for vegetation measurement," September 2019. No.753949, Nationality: New Zealand, Status: Granted, Applicant: Gallagher Group Limited.
- [4] S. Bradley and M. **Legg**, "Vegetation measurement apparatus, systems, and methods," September 2019. No.2019201425, Nationality: Australia, Status: Granted, Applicant: Gallagher Group Limited.

Book chapters

- [5] J. Scott, M. **Legg**, and D. Konings, "Lightboard streaming technology for teaching and learning: Responding to student wellbeing and enhancing online learning," in *Academic voices: A conversation on new approaches to teaching and learning in the post-COVID world* (U. Singh, C. Sid Nair, C. Blewett, and T. Shea, eds.), pp. 29–41, Chandos Publishing, 2022. ([dio:10.1016/B978-0-323-91185-6.00020-33](https://doi.org/10.1016/B978-0-323-91185-6.00020-33)).

Research journals

- [6] B. Parr, M. **Legg**, and F. Alam, "Grape yield estimation with a smartphones colour and depth cameras using machine learning and computer vision techniques," *Computers and Electronics in Agriculture*, vol. 213, p. 108174, 2023. ([dio:10.1016/j.compag.2023.108174](https://doi.org/10.1016/j.compag.2023.108174))[Q1].
- [7] A. Bakar, M. **Legg**, D. Konings, and F. Alam, "The effects of dispersion on time-of-flight acoustic velocity measurements in a wooden rod," *Ultrasonics*, vol. 129, p. 106912, 2023. ([dio:10.1016/j.ultras.2022.106912](https://doi.org/10.1016/j.ultras.2022.106912))[Q1].
- [8] A. Bakar, M. **Legg**, D. Konings, and F. Alam, "Estimation of the rod velocity in wood using multi-frequency guided wave measurements," *Applied Acoustics*, vol. 202, p. 109108, 2023. ([dio:10.1016/j.apacoust.2022.109108](https://doi.org/10.1016/j.apacoust.2022.109108))[Q1].
- [9] B. Parr, M. **Legg**, and F. Alam, "Analysis of depth cameras for proximal sensing of grapes," *Sensors*, vol. 22, no. 11, 2022. ([dio:10.3390/s22114179](https://doi.org/10.3390/s22114179))[Q1].
- [10] N. Faulkner, D. Konings, M. Alam, F. **Legg**, and S. Demidenko, "Machine learning techniques for device-free localization using low-resolution thermopiles," *IEEE Internet of Things Journal*, 2022. ([dio:10.1109/JIOT.2022.3161646](https://doi.org/10.1109/JIOT.2022.3161646))[Q1].
- [11] A. Bakar, M. **Legg**, D. Konings, and F. Alam, "Ultrasonic guided wave measurement in a wooden rod using shear transducer arrays," *Ultrasonics*, vol. 119, 2022. ([dio:10.1016/j.ultras.2021.106583](https://doi.org/10.1016/j.ultras.2021.106583))[Q1].
- [12] M. Chew, F. Alam, **Legg**, M., and G. Sen Gupta, "Accurate ultrasound indoor localization using spring-relaxation technique," *Electronics*, vol. 10, no. 11, 2021. ([doi:10.3390/electronics10111290](https://doi.org/10.3390/electronics10111290))[Q2].
- [13] N. Faulkner, F. Alam, M. **Legg**, and S. Demidenko, "Device-free localization using privacy-preserving infrared signatures acquired from thermopiles and machine learning," *IEEE Access*, vol. 9, pp. 81786–81797, 2021. ([doi:10.1109/ACCESS.2021.3086431](https://doi.org/10.1109/ACCESS.2021.3086431))[Q1].
- [14] T. Glass, F. Alam, M. **Legg**, and F. Noble, "Autonomous fingerprinting and large experimental data set for visible light positioning," *Sensors*, vol. 21, 2021. ([doi:10.3390/s21093256](https://doi.org/10.3390/s21093256)) [Q1].
- [15] B. Parr, M. **Legg**, S. Bradley, and F. Alam, "Occluded grape cluster detection and vine canopy visualisation using an ultrasonic phased array," *Sensors*, vol. 21, no. 6, 2021. ([doi:10.3390/s21062182](https://doi.org/10.3390/s21062182)) [Q1].
- [16] N. Faulkner, B. Parr, F. Alam, M. **Legg**, and S. Demidenko, "Caploc: Capacitive sensing floor for device-free localization and fall detection," *IEEE Access*, vol. 8, pp. 187353–187364, 2020. ([doi:10.1109/ACCESS.2020.3029971](https://doi.org/10.1109/ACCESS.2020.3029971)) [Q1].
- [17] A. Bakar, T. Glass, H. Tee, F. Alam, and M. **Legg**, "Accurate visible light positioning using multiple photodiode receiver and machine learning," *IEEE Transactions on*

- Instrumentation and Measurement*, vol. 70, pp. 1–12, 2020. ([doi:10.1109/TIM.2020.3024526](https://doi.org/10.1109/TIM.2020.3024526)) [Q1].
- [18] N. Faulkner, F. Alam, M. **Legg**, and S. Demidenko, “Watchers on the wall: Passive visible light-based positioning and tracking with embedded light-sensors on the wall,” *IEEE Transactions on Instrumentation and Measurement*, vol. 69, no. 5, pp. 2522–2532, 2020. ([dio:10.1109/TIM.2019.2953373](https://doi.org/10.1109/TIM.2019.2953373)) [Q1].
- [19] M. **Legg** and S. Bradley, “Ultrasonic arrays for remote sensing of pasture biomass,” *Remote Sensing*, vol. 12, no. 1, 2020. ([dio:10.3390/rs12010111](https://doi.org/10.3390/rs12010111)) [Q1].
- [20] M. **Legg** and S. Bradley, “Ultrasonic proximal sensing of pasture biomass,” *Remote Sensing*, vol. 11, no. 20, 2019. ([dio:10.3390/rs11202459](https://doi.org/10.3390/rs11202459)) [Q1].
- [21] F. Alam, N. Faulkner, M. **Legg**, and S. Demidenko, “Indoor visible light positioning using spring-relaxation technique in real-world setting,” *IEEE Access*, vol. 7, pp. 91347–91359, 2019. ([dio:10.1109/access.2019.29279220](https://doi.org/10.1109/access.2019.29279220)) [Q1].
- [22] M. K. Yücel, M. **Legg**, V. Kappatos, and T. Gan, “An ultrasonic guided wave approach for the inspection of overhead transmission line cables,” *Applied Acoustics*, vol. 122, pp. 23–34, 2017. (doi.org/10.1016/j.apacoust.2017.02.003) [Q1].
- [23] M. **Legg** and S. Bradley, “Measurement of stiffness of standing trees and felled logs using acoustics: A review,” *Journal of the Acoustic Society of America*, vol. 139, Feb. 2016 2016. ([dio:10.1121/1.4940210](https://doi.org/10.1121/1.4940210)) [Q1].
- [24] H. Habibi, T. Gan, M. **Legg**, I. de Carellan, V. Kappatos, V. Tzitzilonis, and C. Selcuk, “Acoustic antifouling study with application for ship hulls,” *International Journal of Engineering Technologies and Management Research*, vol. 3, pp. 14–30, Apr. 2016.
- [25] M. Yücel, S. Fateri, M. **Legg**, A. Wilkinson, V. Kappatos, C. Selcuk, and T. Gan, “Coded waveform excitation for high resolution ultrasonic guided wave response,” *Industrial Informatics, IEEE Transactions on*, vol. 12, no. 1, pp. 257–266, 2015. ([dio:10.1109/TII.2015.2501762](https://doi.org/10.1109/TII.2015.2501762)) [Q1].
- [26] M. **Legg**, M. Yücel, V. Kappatos, C. Selcuk, and T. Gan, “Increased range of ultrasonic guided wave testing of overhead transmission line cables using dispersion compensation,” *Ultrasonics*, 2015. ([dio:10.1016/j.ultras.2015.04.009](https://doi.org/10.1016/j.ultras.2015.04.009)) [Q1].
- [27] M. **Legg**, M. Yücel, I. Garciade de Carellan, V. Kappatos, C. Selcuk, and T. Gan, “Acoustic methods for biofouling control: A review,” *Ocean Engineering*, vol. 103, pp. 237–247, 2015. ([dio:10.1016/j.oceaneng.2015.04.070](https://doi.org/10.1016/j.oceaneng.2015.04.070)) [Q1].
- [28] M. **Legg** and S. Bradley, “Non-destructive assessment of wood properties in tree stems using acoustic imaging,” *New Zealand Acoustics*, vol. 28, no. 3, pp. 20–24, 2015. (https://www.acoustics.org.nz/sites/www.acoustics.org.nz/files/journal/pdfs/Mathew_L_ANZ2015.pdf) [Originally in 22nd Biennial Conference of the Acoustical Society of New Zealand, Christchurch, 24–25 Nov. 2014].

- [29] M. **Legg** and S. Bradley, "Automatic 3D scanning surface generation for microphone array acoustic imaging," *Applied Acoustics*, vol. 76, pp. 230–237, 2014. ([doi:10.1016/j.apacoust.2013.08.008](https://doi.org/10.1016/j.apacoust.2013.08.008)) [Q1].
- [30] M. **Legg** and S. Bradley, "A combined microphone and camera calibration technique with application to acoustic imaging," *Image Processing, IEEE Transactions on*, vol. 22, no. 10, pp. 4028–4039, 2013. ([dio:10.1109/TIP.2013.2268974](https://doi.org/10.1109/TIP.2013.2268974)) [Q1].

Research journals in progress

- [31] A. Bakar, M. **Legg**, D. Konings, and F. Alam, "Comparison of stiffness measurements of wooden rods obtained using acoustic guided waves and static bending tests." (Finalising draft).

There is also a range of other journal papers that are in progress.

Conference proceedings

- [32] A. Bakar and M. **Legg**, "Experimental measurement of phase velocity of ultrasonic guided waves using wave propagation theory," in *Acoustics 2022*, (Wellington, New Zealand), 31 Oct – 2 Nov 2022.
- [33] A. Bakar and M. **Legg**, "Non-destructive testing on a wooden cylindrical rod using guided wave and shear transducer arrays," in *Acoustics 2022*, (Wellington, New Zealand), 31 Oct – 2 Nov 2022.
- [34] D. Konings and M. **Legg**, "Delivering an effective balance of soft and technical skills within project-based engineering courses," in *2020 IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE)*, pp. 157–164, 2020. ([dio:10.1109/TALE48869.2020.9368493](https://doi.org/10.1109/TALE48869.2020.9368493)).
- [35] M. **Legg**, S. Bradley, and W. King, "Ultrasonic sensing of pasture biomass," in *4th International Caparica Conference on Ultrasonic-based Applications: From Analysis to Synthesis 2020 (Ultrasonics 2020)*, (Caparica, Portugal), July 20-23 2020. Invited speaker (conference fees waived).
- [36] B. Parr, M. **Legg**, F. Alam, and S. Bradley, "Acoustic identification of grape clusters occluded by foliage," in *Sensors and Applications Symposium (SAS 2020)*, (Kuala Lumpur, Malaysia), pp. 1–6, March 9-11 2020. ([dio:10.1109/SAS48726.2020.9220078](https://doi.org/10.1109/SAS48726.2020.9220078)).
- [37] B. Parr, M. **Legg**, and S. Cox, "Development of a hand-held 3D scanning acoustic camera," in *Sensors and Applications Symposium (SAS 2020)*, (Kuala Lumpur, Malaysia), pp. 1–6, March 9-11 2020. ([dio:10.1109/SAS48726.2020.9220013](https://doi.org/10.1109/SAS48726.2020.9220013)).
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