

Mathew Legg

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New Zealand

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Summary

- 15+ years experience in software/hardware development.
- 10 years experience undertaking and managing projects related to development of sensors and measurement systems, acoustics, ultrasonics, 3D computer vision, etc.
- 8+ years experience leading the work/research of engineers. Group leader, project leader and overall project coordinator, Deputy Postgraduate Lead, coordinator of university courses including project based learning courses, and supervisor of students who have successfully completed (4 PhD students [2 as main supervisor], 10 masters level students, 50+ honours level engineering students, etc).
- Experienced researcher in the areas of development of sensor/measurement systems, hardware (PCB design, CAD, 3D printing, fabrication, etc), software programming, digital signal processing, data analysis, mathematical modelling, lab/field trials, etc.
- Project lead/coordinator for 2 multi-million dollar project with leadership oversight on multiple others.
- Worked on 5 large (million dollar or more) collaborative projects related to the agricultural, forestry, marine/shipping, power transmission, aeronautical industries.
- Experienced in engaging with both internal engineers and external stakeholders.

Professional positions held

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

Lecturer of Engineering courses related to signals and systems, digital signal processing, control systems, electronics, sensors, machine learning, etc. Supervision of postgraduate and honours students, leading projects, applying for grants, industry engagement, etc.

Department of Physics, University of Auckland **Auckland, New Zealand**
Postdoctoral Research Fellow *2014–2017*

Researcher on two MBIE Smart Ideas projects related to developing novel acoustic/ultrasonic sensor systems for pasture biomass estimation and wood quality measurement. Worked closely with Scion and AgResearch and the industry partner Gallagher Group, Hamilton.

Brunel Innovation Centre (BIC), Brunel University **Cambridge, UK**
Research Fellow *2013–2014*

Research on 3 EU FP7 projects related to the shipping, power transmission, and aeronautical industries. Project lead (2 projects), overall coordinator (1 project), group leader of the Power Ultrasonics Group requiring leadership oversight of a range of other projects. Worked with industry partners such as Lloyd's Register, etc. Industrial supervisor of PhD students.

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

Lectured electronics and digital signal processing. Also, performed research on a project funded by the NZ forestry industry.

Academic qualifications

University of Auckland	Auckland, New Zealand
<i>PhD – Physics</i>	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

Projects Experience

An Automated Grape Yield Estimation System.....

Project Lead, Engineering Department, Massey University 2018-2021

Responsibilities: Obtained funding, led/managed project, main PhD supervisor, and assisted in research/publishing. Development of automated grape yield estimation system. Funded (\$120,000 NZD) by New Zealand Wine Growers Association. Research includes colour and depth cameras, 3D computer vision, machine learning, ultrasonic array, lab/field trials.

Precision Acoustic Sensors for Pastoral and Arable Farming.....

Acoustic/Hardware/Software Engineer, Engineering Department, Massey University 2019

Postdoc, Department of Physics, University of Auckland Oct 2015 - Apr 2017

Responsibilities: Hardware and software development, lab/field trials, signal processing, data analysis, reporting, algorithm development, working closely industry end user and co-funder (Gallagher Group). MBIE Smart Idea's project (\$1M NZD) developing an ultrasonic array system for pasture biomass estimation. Gallagher patented the ultrasonic system I developed with the project lead, Stuart Bradley. We are the two inventors on the patents.

Acoustic Non-destructive Evaluation of Wood Properties.....

Postdoc, Department of Physics, University of Auckland May 2014 – Apr. 2016

Responsibilities: Hardware and software development, lab/field trials, signal processing, data analysis, reporting, etc. MBIE Smart Idea's project subcontract (\$398,356 NZD) from Scion developing acoustic/ultrasonic wood property (e.g stiffness) measurement system.

CleanShip – Prevention and Detection of Fouling on Ship Hulls.....

Research Fellow, Brunel Innovation Centre, Brunel University, UK 2013–2014

Responsibilities: Project lead for Brunel and performed overall project coordination, working closely with the end users including Lloyd's Register, hardware and software development, lab/field trials, PhD supervision, etc. European Union FP7 collaborative project (€1,358,557) related to development of an ultrasonic antifouling system for ship hulls.

Chaplin: High Power Transmission Line Cable Inspection.....

Research Fellow, Brunel Innovation Centre, Brunel University, UK 2013–2014

Responsibilities: Project lead for Brunel, hardware and software development, lab/field trials, PhD supervision, etc. European Union FP7 collaborative project (€1,181,714) related to development of an ultrasonic guided wave sensing system for the detection of defects in high voltage transmission line cables.

Safewire: Long Range Ultrasonic Inspection of Aircraft Wiring.....

Research Fellow, Brunel Innovation Centre, Brunel University, UK 2013–2014

Responsibilities: Lab trials, signal processing, data analysis, reporting. European Union FP7 collaborative project (€1,387,460) related to development of an ultrasonic guided wave sensing system for the detection of defects in aircraft wiring.

Acoustic Automated Knot Detection.....

Department of Physics, University of Auckland 2012

Responsibilities: Lab/filed trials, signal processing, data analysis, reporting. Funded (\$18,000 NZD) by [SWI - Solid Wood Innovation](#). Investigating automatic detection of knots in logs using acoustics for the Kaingaroa Processing Plant (KPP), which processes/sorts logs.

PhD (2007–2012) and MSc Research (2006–2007) - University of Auckland

Research includes development of a 72 microphone array for 3D imaging of sound and a multi-frequency acoustic radar for wind and rain profiling. Required hardware/software development, lab/field trials, signal processing, data analysis, etc.

Leadership Experience

Engineering Department, Massey University

2017-Present

Deputy Postgraduate Lead for SFAT, Massey University since 2022 involving oversight of Massey's Engineering postgraduate matters and student issues. Health and safety representative from 2023. Consistently highest course coordination loading within Engineering for several years. My manager has said this is an indication of my reliability. Led two projects and have been the main supervisor of 2 PhD students (1 completed, 1 currently in the examination process), co-supervisor of 6 PhD students (2 completed, 4 current), supervisor of 10 Master of Engineering Studies students (9 completed, 1 current), sole supervisor of the research of over 50 fourth year Engineering students, etc. I have also been the Chair of the IEEE NZ Signal Processing Society and representative on the IEEE North Section board from 2022. Since 2018, I have been on the Acoustics Society of New Zealand board (the professional body for NZ acoustic engineers/researcher).

Brunel Innovation Centre, Brunel University, Cambridge, UK

2013-2014

Project leader for 2 FP7 EU projects (successfully completed and delivered on time and in budget). Overall project coordinator responsibilities for one of these. Group leader of the High Power Ultrasound Group. Assisted with work required for European Union FP7 project negotiations, including leading negotiations meeting with EU in Brussels.

Professional Strengths

Skills:

- 15+ years experience in software/hardware development.
- R&D experience developing sensors measurement systems, signal processing, 3D computer vision, hardware, software, signal processing.
- Experienced in hardware development including circuit design, printed circuit board, component population, CAD design, laser cutting, 3D printing, fabrication, etc.
- Software development includes digital signal processing, simulations, and custom algorithm development for measurement systems such as microphone/ultrasonic array measurement systems. Implementing algorithms presented in academic literature.
- Experience working on 5 large (million dollar+) collaborative projects in the forestry, agriculture, shipping, electric power transmission, and aerospace industries.
- 8+ years experience leading engineers, groups and projects. Project lead/coordination for 2 multi-million dollar projects. Supervision to completion of 14 postgraduate students and 50+ honours engineering students.

Software proficiencies:

- Full Microsoft software suit, Latex, etc.
- Programming languages: Very experienced in Matlab/experience in Python and C/C++.
- CAD design: Autodesk Inventor and SolidWorks.
- Printed circuit board design: Altium and Labcenter Proteus.
- Business Intelligence and Analytics (BIA): Data mining using custom made Excel files.

Citizenship: Citizen of New Zealand, Ireland and Australia.