Dr John W. Mooney

Curriculum Vitae

11 Alder Hill Avenue, Leeds
LS6 4JQ, UK
Mobile (+44)7854707332
jmooney538@gmail.com

Education

2014-2019 **PhD**, *Quantum Information Group*, University of Leeds, UK.
Developing cheap and portable magnetocardiography for detection of heart disease in a clinical Environment.

2008–2012 **MPhys/BSc (with Research Placement) in Physics**, *University of Leeds*, UK.
With modules taken in, Quantum Information & Computation, Quantum Optics, Quantum Field Theory, Photonics, Classical & Quantum Mechanics, Condensed Matter, Nanotechnology, Plasma Physics and Theoretical Physics.

2006–2008 **A-Level studies**, *Carmel College*, St Helens, Merseyside.
3 **A**'s for Mathematics, Physics and Biology
3 **B**'s for Further Mathematics, Critical Thinking and General studies.

2001–2006 **GCSE's**, *St Gregory's High School*, Warrington, Cheshire.
Awarded 10 GCSE's including Double Award Science, English, Mathematics.

PhD Thesis

Title *A Biomagnetic Field Mapping System for Detection of Heart Disease in a Clinical Environment.*

Supervisors Prof. Ben Varcoe & Dr Almut Beige

Description The culmination of a decades work developing a cheap and portable magnetocardiograph, the thesis documents the whole journey whilst focusing on my contributions to the two key problems in magnetocardiography, namely noise abatement and diagnostics. I created a framework for understanding the effect of spatial coherence on denoising performance, allowing magnetocardiography to be reliably performed outside of magnetic shielded rooms. I also built a range of diagnostic algorithms, from classical statistical techniques to a convolutional neural network that exhibited world class diagnostic performance. Then used these neural networks to map the diagnostic information content in the cardiac cycle, which allowed further refinement of the denoising algorithms.

Master's Thesis

Title *The observation of near resonance atom-field interactions in the fluorescence of a Rubidium atom beam.*

Supervisors Assoc. Prof. Vivien Kendon & Prof. Ben Varcoe

Description The project was to build an atomic physics experiment, capable of observing Rabi Oscillations, which occur at nanosecond time-scales, and test the feasibility of its design by comparing the experimental observations with a numerical model of the atom ensemble based on Fermi's Golden Rule. The experiment used a pulsed, frequency stabilised 780nm laser to excite a beam of Rubidium atoms. The resulting Fluorescence was measured by a photodiodoe and mapped over a range of pulse lengths (1-100ns) and frequencies (±500MHz).

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Relevant Experience

May–October 2014 **Support Engineer**, *Creavo Medical Technologies Ltd.*, Coventry/Leeds.
My role was to help the commercialisation of our prototype magnetocardiography device, assisting knowledge transfer transfer our research from the university lab to the newly formed spin-out company and their associated manufacturing partners.

July–October 2012 **Research Associate**, *Quantum Information group*, University of Leeds.
After trying for several years to detect the tiny magnetic field of the human heart with cheap copper induction coils, we started to see hints of signal in the noise. This 3 month project was a sprint effort to develop a larger array of magnetometers and capture clinically useful information. The resulting system was successful and created a wealth of data for honing the vital denoising algorithms. The device then underwent a small clinical trial at Leeds General Infirmary.

2010–July 2012 **Enterprise Scholarship**, *University of Leeds*.
My business proposal for a rapid prototyping company based on open source 3D printer technology was accepted for the University of Leeds' Enterprise scholarship. My experience with Reprap 3D printers started as an interest in the Reprap project, a summer research grant was used to purchase parts for my first printer, which was used for several experimental polymer physics projects. Further funding was provided by a local design company Disruptive Innovations, who paid for a second printer.

2009–July 2012 **Physics Research placement**, *Quantum Information group*, University of Leeds.
A part of my degree course, 6 weeks of paid research each summer in the QIX Lab with Prof. Ben Varcoe. Research topics include; 3D printing technology (which involved hands on experience in mechanics, electronics and programming), measurement of polymer material properties and measurement of acoustic properties using IR interferometry (in order to investigate the feasibility of 3D printing optic mounts).

2006–2008 **Shop Assistant (part time)**, *Outdoor World*, Warrington.
Just under two years retail experience doing many jobs for a local camping shop.

Computing skills

Languages	Python, Tensorflow, C/C++	Platforms	Linux, Mac OS, Windows
Hardware	From embedded systems to high performance watercooled monsters	CAD Tools	Solidworks, OpenSCAD, QCAD, Eagle/KiCAD

References

Professor Benjamin T. H. Varcoe — Head of Quantum Information Experimentation(QIX), University of Leeds, b.varcoe@leeds.ac.uk, +44 01133438290

Dr Almut Beige — University of Leeds, a.beige@leeds.ac.uk