Dr Lewis McMillan

Curriculum Vitae

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School of Computer Science , University of St Andrews, Fife, KY16 9SS, Scotland.
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Research Interests

My research interests involve using code to solve various physics, biophotonic, or medical problems. With a particular interest in using Monte Carlo radiation transfer techniques to probe light distribution in tissue.

Education and Qualifications

2015 - 2019	Ph.D.	University of St Andrews
		Supervised by Dr. Kenny Wood & Prof. Tom Brown
	Thesis Title:	**Advanced 3D Monte Carlo algorithms for biophotonic and medical applications**
	Projects:	Modelling of wave phenomena in Monte Carlo radiative transfer.
		Simulation of laser tissue ablation.
		Modelling of tissue autofluorescence for novel biomarkers for cardiovascular disease.
2010 - 2015	MPhys (Hons) (2:1)	University of St Andrews
	Dissertation Title:	**Measurement and simulation of scattering in diffuse media.**

Employment History

October 2019 - Present **Post-doctoral researcher** SUPA School of Physics and Astronomy, St Andrews University

- Translation and optimisation of pre-existing galaxy image analysis code for future application to data from the Large Synoptic Survey Telescope (LSST)
- Addition of various image analysis routines, expanding the codes ability.
- Working with LSST:UK so that the code can interface with their data centre.
- Creation of notebooks to allow public access to science.

January 2020 - Present **Post-doctoral researcher** School of Computer Science, St Andrews University

- Creation of an automatic counting algorithm, for the purpose of counting dolphin populations in the Pacific ocean.
- Using “classical” computer vision techniques to generate a dataset of “possible” dolphins for labeling by a human expert.
- Using the labeled dataset and machine learning methods to count dolphins from drone video footage.

Teaching

2015 - Present **Postgraduate Demonstrator** University of St Andrews

- PH5023 Monte Carlo Radiation Transport Techniques; demonstrated in lab sessions and gave guest lectures.
- AS3013 Computational Astrophysics; lab session demonstrator.
- CS5014 Machine Learning; lab session demonstrator.
- Invigilator for several tests.
- Assistant supervisor for 14 undergraduate dissertations at BSc, MPhys, and MSci level in both Physics and Computer Science.

Reviewer

- Medical Research Scotland - 2020

Publications

Published:

- I.R.M. Barnard, E. Eadie, L. McMillan, H. Moseley, T. Brown, K. Wood, R. Dawe, Could psoralen plus ultraviolet A1 (“PUVA1”) work? Depth penetration achieved by phototherapy lamps. *British Journal of Dermatology* 2019.

- I.R.M. Barnard, P. Tierney, C.L. Campbell, L. McMillan, H. Moseley, E. Eadie, C.T.A. Brown, K. Wood, Quantifying Direct DNA Damage in the Basal Layer of Skin Exposed to UV Radiation from Sunbeds. *Journal of Photochemistry and Photobiology*, Volume 94, Issue 5, pp 1017-1025.

Currently in review:

- L. McMillan, P. O'Mahoney, K. Feng, K. Zhou, I.R.M. Barnard, C. Li, S. Ibbotson, E. Eadie, C.T.A. Brown, and K. Wood, Development of a predictive Monte Carlo radiative transfer model for ablative fractional skin laser, *Lasers in Surgery and Medicine (in review)*

Currently in preparation:

- L. McMillan, S. Reidt, C. McNicol, I.R.M Barnard, M. MacDonald, C.T.A. Brown, K. Wood, Imaging in thick samples, a phased Monte Carlo radiation transfer algorithm.
- L. McMillan, S. Smirni, I.R.M Barnard, F. Khan, C.T.A. Brown, K. Wood, Modelling of tissue autofluorescence for novel biomarkers for cardiovascular disease.

Prizes

Best Talk: British Medical and Lasers Association Conference 2019

Talks and posters presented

- British Medical and Lasers Association Conference, Darlington, May 2016, talk
- British Medical and Lasers Association Conference, Manchester, May 2017, talk
- Invited speaker at St Andrews Monte Carlo Summer School, St Andrews, August 2017, talk
- Invited speaker at St Andrews Computer Science School Seminar, April 2019, talk
- British Medical and Lasers Association Conference, London, May 2019, talk
- International Conference of Biophotonics, St Andrews, May 2019, poster
- Invited speaker at St Andrews Monte Carlo Summer School, St Andrews, August 2019, talk
- Co-Founded "Code & Cake" seminar series 2018-2019 (`https://code-and-cake.github.io/`)

Courses Attended

- Hands-on Introduction to HPC, EPCC, Edinburgh, 2016
- Message-passing Programming with MPI, EPCC, Edinburgh, 2017

Other Skills

IT:	Linux, Inkscape, Git, Blender, LaTeX, Microsoft Office Suite, ImageJ
Programming:	Fortran, Python, BASH, C/C++, Mathematica, IDL
Programming libraries:	Numpy, Matplotlib, Astropy, PyTorch, Scipy, Scikit-image, openCV, Parsl, Pandas, Numba
Languages:	French (basic)
Driving:	Full, clean driving licence

Other Work Experience

2014 - 2015, Summer 2019	Hospitality Supervisor	St Andrews University Hospitality and Catering Department
Summer 2013	Office Assistant	G.F Job Ltd.
2012 - 2013	Barman/Waiter	Clubhouse Hotel and Restaurant
March 2012	Science Demonstrator	St Andrews Physics Department
2009 - 2010	Customer Service Assistant	Sommerfields
2008 - 2009	Customer Service Assistant	Woolworths

Interests

Running, guitar, programming, walking, 6-a-side football

References

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Dr. D Harris-Birtill
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