Fraser Macfarlane

Hyperspectral Imaging Laboratory
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Current position

Research Software Engineer, James Hutton Institute

Areas of specialization

Hyperspectral Image Processing • Remote Sensing • Compressed Sensing • Mathematical Morphology • Machine Learning • Digital Signal and Image Processing

Work Experience

2021-Present *Research Software Engineer*, Information and Computational Sciences, James Hutton Institute, Invergowrie

June-Sep 2017 *Research Assistant*, University of Strathclyde, Glasgow

June-Sep 2016 *Research Intern*, University of Strathclyde, Glasgow

Education

2017-2022 PhD in Electronic & Electrical Engineering, University of Strathclyde

Signal and Image Processing for Enhanced Long Range Sensing

Hyperspectral Imaging Laboratory

2013-2017 First Class BEng (Hons) in Electronic & Electrical Engineering, University of Strathclyde

Dissertation:

3-Dimensional Facial Model Creation using Stereoscopic Imaging Techniques for Facial Recognition

Key Modules:

Image and Video Processing
Digital Signal Processing
Information Transmission and Security

Photonic Systems
Robotics: Systems and Control

Grants, honours & awards

Grants & Funding

2020 EPSRC National Productivity Investment Fund (NPIF) Innovation Placements (£2230)

Awards

2018 BAE Systems Best ICASE Winner 2018

Publications & talks

Journal Papers

2021 **F. Macfarlane**, P. Murray, S. Marshall, H. White, and G. Arce, "Hyperspectral target detection in the compressed domain using a coded aperture snapshot spectral imager," Appl. Opt. XX(x), xxx-xxx (2021) (In Preparation)

2021 **F. Macfarlane**, P. Murray, S. Marshall, B. Perret, A. N. Evans, and H. White, "Robust object detection in colour images using a multivariate percentage occupancy hit-or-miss transform," *Mathematical Morphology - Theory and Applications*, 5 (1). pp. 128-152. ISSN 2353-3390

2021 **F. Macfarlane**, P. Murray, S. Marshall and H. White, "Investigating the Effects of a Combined Spatial and Spectral Dimensionality Reduction Approach for Aerial Hyperspectral Target Detection Applications," *Remote Sensing* 13, no. 9: 1647. https://doi.org/10.3390/rs13091647

2020 S. Song, D. Gibson, S. Ahmadzadeh, H. O. Chu, B. Warden, R. Overend, **F. Macfarlane**, P. Murray, S. Marshall, M. Aitkenhead, D. Bienkowski and R. Allison, "Low-cost hyper-spectral imaging system using a linear variable bandpass filter for agritech applications," *Appl. Opt. 59, A167-A175* (2020) *Accepted, in press*

Conference Papers

2019 **F. Macfarlane**, P. Murray, S. Marshall, and H. White, "Object detection and classification in aerial hyperspectral imagery using a multivariate hit-or-miss transform," Proc. SPIE 10986, Algorithms, Technologies, and Applications for Multispectral and Hyperspectral Imagery XXV, 1098619 (14 May 2019)

2018 **F. Macfarlane**, P. Murray, S. Marshall, and H. White, "A fast hyperspectral hit-or-miss trans- form with integrated projection-based dimensionality reduction," in *Hyperspectral Imaging & Applications, HSI*, Conference Proceedings

2018 **F. Macfarlane**, P. Murray, S. Marshall, B. Perret, A. N. Evans, and H. White, "A colour hit-or-miss transform based on a rank ordered distance measure," *2018 26th European Signal Processing Conference (EUSIPCO)*, Rome, 2018, pp. 588-592

Teaching Experience

Undergraduate Supervision

2021/2022 Applications of Machine Learning Methods in Agriculture, *University of Dundee*
- Assisted in supervising a Bachelors project

Teaching Assistant

2016-2021 Vertically Integrated Project on Drug Discovery
- This is an interdisciplinary undergraduate project which aims to provide an experience of real research projects

2017-2021 EE320: Signals And Communication Systems
- I performed a tutor role in tutorials and as a demonstrator in laboratories

2017-2021 EE270: Digital Electronics
- I helped to teach and manage the FPGA programming labs

Tutor

2019-2021 EO303: Digital Electronics And Embedded Systems
- I was involved in creating and delivering an online course on digital electronics and FPGA programming aimed at third year Graduate Apprentice level