

JOHN MURRAY-BRUCE | Postdoctoral Research Associate

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EDUCATION

- Nov. 2012 – Dec. 2016 *Imperial College London* *Ph.D., Electrical and Electronic Engineering*
- Thesis Title: Sensing physical fields: inverse problems for the diffusion equation and beyond.
 - Advisor: Professor Pier Luigi Dragotti.
- Oct. 2008 – Jun. 2012 *Imperial College London* *M.Eng., Electrical and Electronic Engineering*
- Result: 1st Class with honours (ranked second overall with 83% aggregate).
 - Relevant Modules: Signal Processing, Wavelets, Adaptive Signal Processing, Control Theory.
- Sep. 2005 – Jun. 2007 *Northolt High School (6th Form)*
- Result: A in A-level Maths, Further Maths, Physics, Chemistry and, B in AS Biology.
 - Advanced Extension Awards (AEA): Merits in Mathematics and Chemistry.
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ACADEMIC EMPLOYMENT

- Mar. 2017 – *Boston University (Postdoctoral Research Associate), Boston, MA, USA*
- Research in computational imaging: Non-line-of-sight imaging, low-photon/photon-efficient imaging, Helium and focused ion beam microscopy.
 - Organising internal group meetings, talks and research presentations.
 - Mentoring Ph.D. and undergraduate students.
- Nov. 2012 – Feb. 2017 *Imperial College London (Research Assistant), London UK*
- Co-supervised undergraduate and postgraduate (M.Eng./M.Sc.) student projects.
 - Teaching assistant for Mathematics and Signal Processing courses.
 - Organised and delivered internal talks and research presentations.
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RESEARCH INTERESTS

Computer Vision, Signal processing, Computational imaging, Computational photography, Image processing, Inverse problems, PDEs, and Machine learning.

PUBLICATIONS

Peer-reviewed Journals

1. C. P. Saunders*, [J. Murray-Bruce](#)* and V. K. Goyal, *Computational Periscopy with an Ordinary Digital camera*. Accepted to Nature, 2018. (* = contributed equally)
2. M. Peng, [J. Murray-Bruce](#), K. K. Berggren and V. K. Goyal, *Source Shot Noise Mitigation by Time-Resolved Measurement in Ion Beam Microscopy*. In Preparation, 2018.

3. S. C. Medin, J. Murray-Bruce, David Castañón and V. K. Goyal, *Beyond Binomial and Negative Binomial: Adaptation in Bernoulli Parameter Estimation*. Under Revision (IEEE Trans. Computational Imaging), arXiv:1809.08801, 2018.
4. J. Murray-Bruce and P. L. Dragotti, *A sampling framework for physics-driven inverse source problems*, IEEE Trans. on Signal Processing, vol. 65 (24), pp. 6365-6380, December 2017.
5. J. Murray-Bruce and P. L. Dragotti, *Physics-driven quantized consensus for distributed diffusion source estimation using sensor networks*. EURASIP Journal on Advances in Signal Processing, 2016 (1), pp. 1-22, February 2016.
6. J. Murray-Bruce and P.L. Dragotti, *Estimating Localized Sources of Diffusion Fields using Spatiotemporal Sensor Measurements*, IEEE Trans. on Signal Processing, vol. 63 (12), pp. 3018-3031, June 2015.

Peer-reviewed Conferences

1. M. Peng, J. Murray-Bruce, K. K. Berggren and V. K. Goyal, *Source Shot Noise Mitigation in Helium Ion and Focused Ion Beam Microscopy*. In Proc. Int. Conf. on Helium and emerging Focused Ion Beams, Dresden, Germany, June 2018.
2. M. Peng, J. Murray-Bruce, K. K. Berggren and V. K. Goyal, *Source Shot Noise Mitigation in Scanned Beam Microscopy*. In Proc. Int. Conf. on Electron, Ion, and Photon Beam Technology and Nanofabrication, Puerto Rico, May 2018.
3. S. Werth, J. Murray-Bruce, Y. Ma, C. Saunders, C. Yu, W. T. Freeman and V. K. Goyal, *Occluder Aided Computational Periscopy*. In Proc. IEEE Int. Conf. on Computational Photography, PA, USA, May 2018. (**Best Poster Award**).
4. S. C. Medin, J. Murray-Bruce and V. K. Goyal, *Optimal stopping times for estimating Bernoulli parameters with applications to active imaging*. In Proc. IEEE Int. Conf. on Acoustics, Speech and Signal Processing, Alberta, Canada, April 2018.
5. J. Murray-Bruce and P. L. Dragotti, *Spatiotemporal Sampling Trade-off for Inverse Diffusion Source Problems*. In Proc. 2017 International Conference on Sampling Theory and Applications (SampTA '17), Tallinn, Estonia, July 2017.
6. J. Murray-Bruce and P. L. Dragotti, *Solving Inverse Source Problems for Sources with Arbitrary Shapes using Sensor Networks*, In Proc. 25th European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning, Bruges, Belgium, April 2017.
7. J. Murray-Bruce and P. L. Dragotti, *Solving inverse source problems for linear PDEs using sparse sensor measurements*. In Proc. 50th Asilomar Conf. on Signals, Systems and Computers, IL, USA, November 2016.
8. J. Murray-Bruce and P. L. Dragotti, *Solving physics-driven inverse problems via structured least-squares*. In Proc. 2016 European Signal Processing Conf., Budapest, Hungary, August 2016.
9. J. Murray-Bruce and P. L. Dragotti, *Reconstructing non-point sources of diffusion fields using sensor measurements*. In Proc. 41st IEEE Int. Conf. on Acoustics, Speech and Signal Processing, Shanghai, China, March 2016.
10. J. Murray-Bruce and P.L. Dragotti, *Consensus for the Distributed Estimation of Point Diffusion Sources in Sensor Networks*, IEEE Int. Conf. on Acoustics, Speech and Signal Processing, Brisbane, Australia, April 2015.

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11. J. Murray-Bruce and P. L. Dragotti, *Reconstructing diffusion fields sampled with a network of arbitrarily distributed sensors*. In Proc. IMA 10th Int. Conf. on Mathematics in Signal Processing, Birmingham, UK, December 2014.
12. J. Murray-Bruce and P. L. Dragotti, *Reconstructing diffusion fields sampled with a network of arbitrarily distributed sensors*. In Proc. 2014 European Signal Processing Conf., Lisbon, Portugal, September 2014.
13. J. Murray-Bruce and P. L. Dragotti, *Spatio-temporal sampling and reconstruction of diffusion fields induced by point sources*. In Proc. 39th IEEE Int. Conf. on Acoustics, Speech and Signal Processing, Florence, Italy, May 2014.

INVITED TALKS

1. Banff International Research Station (BIRS) Workshop on 'Intersection of Information Theory and Signal Processing: New Signal Models, their Information Content and Acquisition Complexity,' Calgary, Canada (October 29, 2018).
2. Mitsubishi Electric Research Laboratories, Cambridge, MA (May 30, 2018).
3. Vanderbilt University, Dept. of Math. 'Computational Analysis Seminar,' Nashville, TN (November 8, 2017).
4. Int. Conf. on Sampling Theory and Applications, Special Session on 'Dynamical Sampling,' Tallinn, Estonia (July 3, 2017).
5. Boston University, 'Electrical and Computer Engineering Seminar,' Boston, MA (November 4, 2016).
6. University of Bremen, *Zentrum für Technomathematik* Workshop on 'Inverse Problems for PDEs,' Bremen, Germany (March 29, 2016).
7. Allerton Conf., Special session on 'Inverse Problems,' Allerton, IL (October 2, 2015).

ACHIEVEMENTS AND AWARDS

2018	Award for Best Poster, Int. Conf. Computational Photography.
2012	Institute of Engineering and Technology (IET) Prize, 'Best All-round Performance' in M.Eng. Degree. Top-2 student overall in the M.Eng. degree.
2009	Roll-of-Honour, Software Engineering (outstanding end-of-year project).
2008	Maurice Hancock Award for outstanding entry results (Imperial).
2004 – 2007	Best in Mathematics and Chemistry (2007); Gold Certificate and 'Best in School' Certificate at the UKMT Senior Mathematical Olympiad (2006); Head teacher's award (2004, 2005); Bronze Certificates at the UKMT Intermediate Mathematical Olympiad (2004, 2005).

MENTORSHIP EXPERIENCE

Ph.D. candidates

- **Charles P. Saunders**, Boston Uni., (Mar. 2017 – ongoing)
 - *Project*: Non-line-of sight imaging with consumer cameras.

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- **Minxu Peng**, Boston Uni., (Mar. 2017 – ongoing)
 - *Project*: Focussed ion beam microscopy.
- **Sheila Werth**, Boston Uni., (Sep. 2017 – Mar. 2018)
 - *Project*: Corner camera for non-line-of-sight imaging.
 - Work received **Best Poster Award** at the 2018 ICCP.

Undergraduates and Masters students

- **Safa C. Medin**, Boston Uni. (Visiting student intern: Jun. 2017 – Sep. 2017, and Jun. 2018 – Sep. 2018)
 - *Project*: Optimal stopping times for estimating arrays of Bernoulli parameters.
 - Work led to a **conference publication** and **journal** preprint (undergoing revision).
- **Roxana Alexandru**, M.Eng. EEE, Imperial College London (Nov. 2015 – Jun. 2016)
 - *Project*: Rumour Source Detection in Social Networks.
 - Awarded **Eric Laithwaite Prize** for ‘outstanding innovation in the final year undergraduate individual project’.
- **Tianxiao Zhao**, B.Eng. EEE, Imperial College London, (Nov. 2015 – Jun. 2016)
 - *Project*: Modelling the spreading of rumours on graphs.

PROFESSIONAL ACTIVITIES AND SERVICES

Professional memberships

- Member IEEE (Signal Processing society and Computational Imaging special interest group member).

Reviewer services

- **Journals**: IEEE Transactions on Signal Processing, IEEE Transactions on Image Processing, Elsevier Neurocomputing, IEEE Transactions on Signal and Image Processing over Networks, SPIE Journal of Electronic Imaging (JEI), EURASIP Journal of Advances in Signal Processing.
- **Conferences**: ICASSP 2019, SSP 2018, WCNC 2017, ESANN 2017, ICASSP 2016, EUSIPCO 2014.

NON-ACADEMIC EMPLOYMENTS

Jun. – Sept. 2012

SunGard Corp (Implementations Consultant), Oxford UK

- Worked within Interfaces team and enhanced the Adaptiv™ Fast Credit Checker platform.
- Test-Driven Development in Visual C#, as well as, code optimisation and profiling.

Jun. – Sept. 2011

UBS Technology Intern (Exchange Traded Derivatives IT), London UK

- Java Developer within SwisKey™ Clearing (SKC) team, worked on enhancements for the Client File Reconciliation engine (a platform for SKC QA test team).
- Learnt and applied SCRUM as an Agile Software Development methodology.

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- Oct. 2007 – May 2013 *Private Mathematics and Science Tutor, London UK*
- Taught both Undergraduate, A-level and GCSE students.
 - 100% pass rate (with ~80% achieving the top grade).

EXTRA-CURRICULAR ACTIVITIES

- Aug. 2013 *Fast FX Derivatives Pricing Suite*
- Built a GUI for pricing several FX derivatives.
 - Extensive research into available literature on computing 'sharp' approximations.
 - Developed in C# leveraging OOP methodologies and Design Patterns.
- Oct. 2010 – Jun. 2012 *Captain and President of Imperial College School of Medicine (ICSM) Basketball Team*
- Organised and led bi-weekly training sessions, league matches.
 - Organised tours and competitions against other med-schools.
 - Scouted for and recruited new team members.
- Nov. 2008 – Feb. 2009 *Finance Manager of 'Imperial AfroGala 2008/09'*
- On the executive committee for the biggest student-led Afro-Caribbean event within the UK.
 - Responsible for Cost Projections and Pricing.
 - Managed a team of 20 members.

SKILLS AND OTHER INTERESTS

- *Computer skills* – Matlab (Expert), C (Advanced), C# (Advanced), Microsoft Office (Advanced), Java (Intermediate), C++ (Intermediate), Python (Intermediate), Delphi Pascal (Advanced), HTML/XML (Advanced), JavaScript (Advanced).
- *Languages* – English (Native), Yoruba (Intermediate).

REFERENCES AVAILABLE ON REQUEST