

# Bradley.J Gram-Hansen

<http://www.robots.ox.ac.uk/~bradley>  
[bradley.gram.hansen@gmail.com](mailto:bradley.gram.hansen@gmail.com) | +447526607354  
"Life is nothing but an electron looking for a place to rest"

## EDUCATION

### UNIVERSITY OF OXFORD

PHD IN MACHINE LEARNING AND STATISTICS  
Supervisors : Prof Yee Wyhe Teh • Dr Tom Rainforth  
Dr Atılım Günes Baydin • Prof Frank Wood • Prof Phil Torr  
Expected completion by Oct 2020 | Oxford, UK

### UNIVERSITY OF NOTTINGHAM

MMATH IN MATHEMATICS  
BACHELORS IN MATHEMATICAL PHYSICS  
2011 - 2015 | Nottingham, UK  
Grade: 75% avg over 4 years. First (GPA 4.0)

## LINKS

Github:// [bayesianbrad](#)  
Google Scholar:// [Publications](#)  
LinkedIn:// [bradleygramhansen](#)  
Twitter:// [@bayesianbrad](#)  
Blog:// [Bradley's Blog](#)

## SKILLS

### TECHNICAL SKILLS

Statistical Modelling  
Machine Learning  
Probabilistic Programming  
Markov Chain Monte Carlo  
Gaussian Processes  
Regression  
Neural Networks  
Deep Learning  
Bayesian Inference  
Time Series  
Differential Equations  
Relativity  
Analysis  
Quantum and Classical Mechanics  
Quantum and Classical Information Theory  
Linear Algebra  
Stochastic Processes  
Quantum Field Theory  
Mathematical Biology  
Non-linear Systems

### PROGRAMMING SKILLS

Python • Matlab • Clojure •  
C++ • Git • Docker & Singularity • Shell •  
Linux & UNIX •  $\LaTeX$  • HTML

### SPECIFIC LIBRARIES

Pytorch • Pyro • Pyprob • Matplotlib • Numpy •  
Scikit-learn • SciPy • Jupyter Notebook • Many  
others

### INTERPERSONAL SKILLS

Team player • Patient • Organised  
Motivator • Responsible • Adaptive  
Hard-working • Good Listener • Observant •  
Analytical

### LANGUAGES

English (Native) • Mandarin (Learning) • French  
(Basic)

### REFERENCES

Several available upon request.

## EXPERIENCE

### TECHNICAL CONSULTANT CONSULTING, JUN 2019 – NOW

- I work with several social ventures, ranging from creating localised electricity grids to providing education to children across Africa.
- I offer insights and technical solutions on how to apply statistical analysis and machine learning 'AI' to their problems.
- This role requires me to constantly think outside of the box and deploy unique solutions.

### FRONTIER DEVELOPMENT LAB RESEARCH INTERN, JUN 2018 – OCT 2018

- I designed a state-of-the-art system for generating automated maps of informal settlements from low-resolution satellite imagery. This was the first time any such thing had been done with this type of low-resolution data structure.
- I had to collaborate on this project with the European Space Agency, Oxford University, SA Catapult, NVidia and UNICEF.
- I had to develop methods that were robust to very noisy data.

### UNIVERSITY OF NOTTINGHAM RESEARCH INTERN, JUN 2014 – SEPT 2014

- I worked on developing novel techniques for analysing quantum channels and quantum maps in a relativistic framework using Gaussian states.
- I worked both independently and as part of a small team

## RESEARCH

### OXCSML AND TORR VISION GROUP Oct 2016 – Present | Oxford, UK

- Designing probabilistic programming languages and interpretable AI systems, with a focus on social and scientific applications, especially for physics-based applications.
- Developed new inference strategies that leverage deep learning frameworks.
- Created a customisable probabilistic programming system for "First-order models", enabling new classes of inference algorithms to be deployed in probabilistic programming systems.
- Developed a framework for overriding any industrial simulator, written in any language and connecting it to a generic probabilistic programming systems to perform statistically correct inference.
- Developed my own framework and algorithm for performing inference on small data-sets with Gaussian Processes.

## INVITED TALKS

- Invited by the UN to give a talk on AI for space at the AI for good global summit. Geneva, CH, 2019
- Invited to the Oxford centre for Human Brain Activity to give a talk on Probabilistic Programming. Oxford, UK, 2018.
- Invited to ESA Esrin to give a talk on using machine learning to detect informal settlements. ESA Esrin, IT, 2018.

## AWARDS

### ACADEMIC

- |           |  |
|-----------|--|
| 2019      | Runner-up in the Vice-Chancellor's Social Impact Award |
| 2019      | NeulPS travel award                                    |
| 2018      | FDL Award for Unexpected Discovery                     |
| 2016-2020 | EPSRC Fully-Funded 4-Year PhD Studentship              |
| 2014      | EPSRC Summer Research Award                            |
| 2014      | BP Ambition Award                                      |
| 2012      | Eliahou Dangoor Scholarship                            |
| 2012      | PWC High Flyers Award                                  |
| 2011      | Sir Peter Mansfield High Achiever Scholarship          |
| 2011-2015 | St Ann's Experian Scholarship                          |
| 2011-2015 | First in the Family Scholarship                        |
| 2010      | Excellent Dedication and Contribution A-level Physics  |
| 2010      | Interest and Enthusiasm A-level Mathematics            |

### SPORTING

- |           |   |
|-----------|---|
| 2016      | IronMan Copenhagen 11th in Age Group                  |
| 2016      | Silver Medal, Fell Running Championships              |
| 2005-2007 | National mini field youth hockey champion U13 and U15 |

## PUBLICATIONS

### PUBLISHED PAPERS

- AG. Baydin, L. Heinrich, W. Bhimji, **B. Gram-Hansen**, G. Louppe, L. Shao, K. Cranmer and F.Wood, **Efficient Probabilistic Inference in the Quest for Physics Beyond the Standard Model** The International Conference on Neural Information Processing Systems (NeurIPS) 2019
- AG. Baydin, L. Heinrich, W. Bhimji, **B. Gram-Hansen**, G. Louppe, L. Shao, K. Cranmer and F.Wood, **Etalumis: Bringing Probabilistic Programming to Scientific Simulators at Scale** The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC) 2019
- **B. Gram-Hansen**\*, Y. Zhou\*, T. Kohn, T. Rainforth, H. Yang and F. Wood, **A Low-Level Probabilistic Programming Language for Non-Differentiable Models** The 22nd International Conference on Artificial Intelligence and Statistics (AISTATS) 2019
- **B. Gram-Hansen**\*, P. Helber\*, I. Varatharajan, F. Azam, A. Coca-Castro, V. Kopackova and P. Bilinski, **Mapping Informal Settlements in Developing Countries using Machine Learning and Low Resolution Multi-spectral Data** The AAAI/ACM Conference on AI Ethics and Society (AAAI) 2018
- **B. Gram-Hansen**\*, Y. Zhou\*, T. Kohn, T. Rainforth, H. Yang and F. Wood, **Hamiltonian Monte Carlo for Probabilistic Programs with Discontinuities** The International Conference on Probabilistic Programming 2018

### WORKSHOP PAPERS

- **B. Gram-Hansen**\*, C. Schroeder de Witt\*, P.H.S.Torr, Y.W. Teh, T. Rainforth and AG. Baydin, **Hijacking Malaria Simulators with Probabilistic Programming** AI for Social Good Workshop at the International Conference on Machine Learning (ICML) 2019
- **B. Gram-Hansen**, P. Helber, I. Varatharajan, F. Azam, A. Coca-Castro, V. Kopackova and P. Bilinski, **Generating Material Maps to Map Informal Settlements** Machine Learning for the Developing World Workshop at the 32nd Conference for Neural Information Processing Systems (NeurIPS) 2018
- **B. Gram-Hansen**\*, C. Schroeder de Witt\*, P.H.S.Torr, Y.W. Teh, A. G. Baydin and T. Rainforth, **Efficient Bayesian Inference for Nested Simulators** 2nd Symposium on Advances in Approximate Bayesian Inference (AABI) 2019

### PRE-PRINTS

- **B. Gram-Hansen** and S.J Roberts, Multi-layer Stacked Gaussian Processes 2019
- **B. Gram-Hansen**, An investigation into the creation of entanglement mediated by interaction Dissertation 2015
- **B. Gram-Hansen**, An Insight Into: Quantum Random Walks Thesis 2014

## REVIEWING DUTIES

- NeurIPS 2019 workshop on Deep Learning for the Physical Sciences
- NeurIPS 2019 main conference
- NeurIPS 2018 workshop on Deep Learning for the Physical Sciences
- NeurIPS 2018 workshop on Critiquing and Correcting Trends in Machine Learning