

Rafael dos Santos de Oliveira

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Research interests and expertise

Machine learning, robotics, Bayesian statistics, optimisation, deep learning, artificial intelligence

Employment History

- 2023 – now **Senior Research Scientist**
Data61, CSIRO, Australia
Developing scalable probabilistic Machine Learning methods for Adaptive Experimental Design, Robotic Manipulation, and Sports Analytics
Supervisor: Dr. Edwin Bonilla

- 2021 – 2023 **Research fellow**
Brain and Mind Centre, the University of Sydney, Australia
Worked on Bayesian Inference and Machine Learning algorithms for decision making in Mental Health and Robotics applications
Supervisor: Dr. Frank Iorfino

- 2018 – 2021 **Research fellow**
School of Computer Science, the University of Sydney, Australia.
Worked on Machine Learning and Statistical Modelling algorithms for Robotics and Geoscience applications
Supervisor: Prof. Fabio Ramos and Prof. Sally Cripps

- 2015 – 2018 **Tutor**
School of Computer Science, the University of Sydney, Australia.
Tutored postgraduate unit Machine Learning and Data Mining (COMP5318)

- 2013 – 2014 **Design verification engineer**
Laboratory of Control and Automation, Engineering Application and Design, Federal University of Rio de Janeiro (UFRJ), Brazil

Education

- 2014 – 2018 **Doctor of Philosophy** in Engineering and Computer Science
The University of Sydney, Australia
Title: *Bayesian optimisation for planning under uncertainty*
Supervisor: Prof. Fabio Ramos

- 2009 – 2014 **Bachelor of Science** in Electronics and Computer Engineering
Federal University of Rio de Janeiro, Brazil
Title: *Design of the on-board electronics for a mobile robot applied to occupational therapy activities*
Supervisor: Prof. Ramon R. Costa

- 2012 **Study abroad**
University of Massachusetts, Dartmouth, USA
1-year study abroad as part of bachelor's in Electronics and Computer Engineering.

Awards

- 2014 – 2018 **■ Brazil Science without Borders PhD Scholarship**
Ministry of Education, Brazil.
- 2016 – 2018 **■ Data61 PhD Top-Up Scholarship**
Data61/CSIRO, Australia.
- 2023 **■ Best reviewer**
39th Conference on Uncertainty in Artificial Intelligence (UAI 2023), USA

Skills

- Languages **■ English (fluent), Portuguese (native) & Japanese (basic).**
- Programming **■ Python, C/C++, Java, LaTeX, Robot Operating System (ROS), NumPy, JAX, PyTorch, GPyTorch, BoTorch, Pyro, NumPyro, PyMC3, scikit-learn, SciPy**

Selected publications

Bibliography

- Chowdhury, Sayak Ray and **Rafael Oliveira** (2023). ‘Value Function Approximations via Kernel Embeddings for No-Regret Reinforcement Learning’. In: *Asian Conference on Machine Learning*. PMLR, pp. 249–264.
- Guzman, Rel, **Rafael Oliveira**, and Fabio Ramos (2022a). ‘Adaptive Model Predictive Control by Learning Classifiers’. In: *Proceedings of the 4th Conference on Learning for Dynamics and Control*. Stanford, CA, USA: PMLR.
- (2022b). ‘Bayesian Optimisation for Robust Model Predictive Control under Model Parameter Uncertainty’. In: *2022 IEEE International Conference on Robotics and Automation (ICRA)*. Philadelphia, PA, USA: IEEE.
- Oliveira, Rafael**, Richard Scalzo, Robert Kohn, Sally Cripps, Kyle Hardman, John Close, Nasrin Taghavi, and Charles Lemckert (2022). ‘Bayesian optimization with informative parametric models via sequential Monte Carlo’. In: *Data-Centric Engineering* 3, e5.
- Oliveira, Rafael**, Louis Tiao, and Fabio Ramos (2022). ‘Batch Bayesian optimisation via density-ratio estimation with guarantees’. In: *36th Conference on Neural Information Processing Systems (NeurIPS 2022)*. New Orleans, LA, USA.
- Warren, Houston, **Rafael Oliveira**, and Fabio Ramos (2022). ‘Generalized Bayesian Quadrature with Spectral Kernels’. In: *The 38th Conference on Uncertainty in Artificial Intelligence (UAI)*. Eindhoven, the Netherlands.
- Oliveira, Rafael**, Lionel Ott, and Fabio Ramos (2021). ‘No-regret approximate inference via Bayesian optimisation’. In: *Proceedings of the Thirty-Seventh Conference on Uncertainty in Artificial Intelligence (UAI)*. Vol. 161. PMLR, pp. 2082–2092.
- Barcelos, Lucas, Alexander Lambert, **Rafael Oliveira**, Paulo Borges, Byron Boots, and Fabio Ramos (2021). ‘Dual Online Stein Variational Inference for Control and Dynamics’. In: *Proceedings of Robotics: Science and Systems (RSS)*. Virtual.
- Guzman, Rel, **Rafael Oliveira**, and Fabio Ramos (2021). ‘Heteroscedastic Bayesian Optimisation for Stochastic Model Predictive Control’. In: *IEEE Robotics and Automation Letters* 6.1, pp. 56–63.

- Mohasel Afshar, Hadi, **Rafael Oliveira**, and Sally Cripps (2021). ‘Non-Volume Preserving Hamiltonian Monte Carlo and No-U-Turn Samplers’. In: *Proceedings of the 24th International Conference on Artificial Intelligence and Statistics (AISTATS)*. Vol. 130. PMLR.
- Barcelos, Lucas, **Rafael Oliveira**, Rafael Possas, Lionel Ott, and Fabio Ramos (2020). ‘DISCO: Double likelihood-free Inference Stochastic Control’. In: *2020 IEEE International Conference on Robotics and Automation (ICRA)*. Paris, France: IEEE.
- Chowdhury, Sayak R., **Rafael Oliveira**, and Fabio Ramos (2020). ‘Active Learning of Conditional Mean Embeddings via Bayesian Optimisation’. In: *Proceedings of the 36th Conference on Uncertainty in Artificial Intelligence (UAI)*. Toronto, Canada: PMLR v. 124.
- Oliveira, Rafael**, Lionel Ott, Vitor Guizilini, and Fabio Ramos (2020). ‘Bayesian Optimisation for Safe Navigation Under Localisation Uncertainty’. In: *Robotics Research, the 18th International Symposium (ISRR)*. Cham: Springer, pp. 489–504.
- Possas, Rafael, Lucas Barcelos, **Rafael Oliveira**, Dieter Fox, and Fabio Ramos (2020). ‘Online BayesSim for Combined Simulator Parameter Inference and Policy Improvement’. In: *2020 IEEE/RSJ International Conference on Robots and Intelligent Systems (IROS)*. Las Vegas, NV, USA: IEEE.
- Tompkins, Anthony, **Rafael Oliveira**, and Fabio Ramos (2020). ‘Sparse Spectrum Warped Input Measures for Nonstationary Kernel Learning’. In: *Advances in Neural Information Processing Systems 33 (NeurIPS 2020)*. Vol. 33. Virtual.
- Oliveira, Rafael**, Lionel Ott, and Fabio Ramos (2019a). ‘Bayesian optimisation under uncertain inputs’. In: *The 22nd International Conference on Artificial Intelligence and Statistics (AISTATS 2019)*. Vol. 89. Proceedings of Machine Learning Research. Naha, Japan: PMLR.
- (2019b). ‘Distributional Bayesian optimisation for variational inference on black-box simulators’. In: *2nd Symposium on Advances in Approximate Bayesian Inference (AABI)*. Vancouver, Canada.
- Oliveira, Rafael**, Fernando H. M. Rocha, Lionel Ott, Vitor Guizilini, Fabio Ramos, and Valdir Grassi (2018). ‘Learning to Race through Coordinate Descent Bayesian Optimisation’. In: *IEEE International Conference on Robotics and Automation (ICRA)*. Brisbane, Australia: IEEE, pp. 6431–6438.
- Oliveira, Rafael**, Lionel Ott, and Fabio Ramos (2016). ‘Active Perception for Modelling Energy Consumption in Off-Road Navigation’. In: *Australasian Conference on Robotics and Automation (ACRA)*. Brisbane, Australia: ARAA.

Collaborations

- 2021 – now **Prof. Sally Cripps and Dr. Roman Marchant (Data61/CSIRO, Australia)**
Developing statistical approaches for longitudinal data in mental health services. Paper submitted to Evidence-Based Mental Health journal in 2022.
- 2019 – now **Sayak R. Chowdhury (Boston University, USA)**
Developing kernel embedding methods for Bayesian optimisation and reinforcement learning. Papers published at UAI 2020 and submitted to ACML 2022.
- 2018 – now **Prof. Fabio Ramos (NVIDIA, USA)**
Bayesian optimisation and approximate inference methods. Several publications.
- 2019 – 2021 **Prof. John Close (Australian National University, Australia)**
Statistical methods to detect leaks in water mains using quantum gravity sensors. Paper published at Cambridge’s Data-Centric Engineering journal (2022).
- 2019 – 2020 **Michele Lochhead (Origin Energy, Australia)**
Machine learning models for sub-surface assets. Decision-support tools developed.

References

Prof Fabio Ramos

Professor

The University of Sydney, Australia

Dr Frank Iorfino

Senior Research Fellow

The University of Sydney, Australia