

# *Curriculum Vitae*

Fabio Tozeto Ramos

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## **Research Interests:**

Field Robotics, machine learning, Bayesian statistics, probabilistic networks.

## **Education**

- Doctor of Philosophy, Field Robotics, February 2007.  
Australian Centre for Field Robotics, The University of Sydney, Australia.  
Title: Recognising, Representing and Mapping Natural in Unstructured Environments.
- Master of Science, Mechatronics Engineering, June 2003.  
Polytechnique School, University of Sao Paulo, Brazil.  
Title: Anytime, Anyspace Probabilistic Inference.
- Bachelor of Science, Mechatronics Engineering, December 2000.  
Polytechnique School, University of Sao Paulo, Brazil.  
Title: Bayesian Network Implementation in Embedded Systems.

## **Positions**

- ARC Research Fellow  
Australian Centre for Field Robotics, University of Sydney, Australia. February 2007 to present.
- PhD Candidate  
Australian Centre for Field Robotics, University of Sydney, Australia. August 2003 to February 2007.
- Master of Science Candidate  
University of Sao Paulo, Brazil. Funded by HP Labs Palo Alto, USA, January 2002 to June 2003.
- Product Manager  
Siemens Brazil, Automation and Drives Division, January 2000 to December 2000.
- Research Student  
Mechatronics Engineering Department, University of Sao Paulo, January 1998 to January 2000.

## Awards and Honours

- ARC Australian Postdoctoral Fellowship, October 2007.
- Australasian Conference on Robotics and Automation (ACRA), Best Paper Award, 2007.
- International Conference on Intelligent Robots and Systems (IROS), Best Paper Award, August 2005.
- The University of Sydney, Research Fellowship in Field Robotics, August 2003 - February 2007.
- HP Labs, Palo Alto, Research Fellowship on Probabilistic Reasoning, December 2001 - June 2003.
- CAPES PET Research Fellowship, Programa Especial de Treinamento (Special Training Program), January 1997 - December 2000.

## Professional Activities

### Editorial Board

- Associate Editor, IEEE International Conference on Robotics and Automation (ICRA), 2006 to present.
- Associate Editor, IEEE/RSJ International Conference on Intelligent Robots (IROS), 2010 to present.
- Publication Chair, Robotics Science and Systems, 2008.

### Program Committee

- IEEE Transactions on Robotics, 2006 to present.
- Journal of Robotics and Autonomous Systems, 2005 to present.
- Journal of Field Robotics, 2007 to present.
- International Journal of Robotics Research, 2008 to present.
- Robotics Science and Systems Conference, 2007 to present.
- IEEE International Conference on Robotics and Automation, 2006 to present.
- IEEE/RSJ International Conference on Intelligent Robots, 2006 to present.
- International Joint Conference on Artificial Intelligence (IJCAI), 2009.
- Association for the Advancement of Artificial Intelligence (AAAI), 2008.

## Invited talks

- SLAM Summer School, Sydney, Australia, January 2009.
- EVIC, University of Chile, Santiago, Chile. December, 2008.
- Rio Tinto, Resource Estimation Group, Perth, Australia. April, 2008.
- Carnegie Mellow University, Robotics Institute, Pittsburgh, USA. November, 2007.
- Carnegie Mellow University, NREC, Pittsburgh, USA. November, 2007.
- Georgia Institute of Technology, Atlanta, USA. October, 2007.
- Jet Propulsion Lab, Pasadena, USA. October, 2007.
- University of Sao Paulo, Sao Paulo, Brazil. September, 2007.
- BAE Systems Advanced Technology Centre, Bristol, UK. July, 2005.
- HP Labs (Palo Alto, USA), July 2004.

## Peer-Review Publications

The Excellence in Research for Australia (ERA) rank for conferences is indicated at the end of the references. It ranks conferences into three classes (A, B and C). The Thompson's rank (when available) and Impact Factor (IF) is provided for journals.

## Books

1. O. Brock, J. Trinkle, **F.T. Ramos**, editors. Proceedings of Robotics Science and Systems IV, 2009. MIT Press.
2. **F.T. Ramos** Recognising, representing and mapping natural features in unstructured environments, 2009. VDM-Verlag.

## Book Chapters

3. **F.T. Ramos**, W. Kadous, D. Fox. Learning to associate image features with CRF-Matching. *The 11th International Symposium on Experimental Robotics (ISER)*, Springer Tracts in Advanced Robotics (STAR). , Springer-Verlag, 2009.
4. B. Douillard, D. Fox, \***F.T. Ramos**. A spatio-temporal probabilistic model for multi-sensor multi-class object recognition. *The 13th International Symposium of Robotics Research (ISRR)*, In Press, 2010.
5. **F.T. Ramos**, J. Nieto, H. Durrant-Whyte. Combining object recognition and SLAM for extended map representations. *The 10th International Symposium of Experimental Robotics (ISER 2006)*, Springer Tracts in Advanced Robotics (STAR), Springer-Verlag, 2006.
6. B. Upcroft, M.F. Ridley, L. Ong, B. Douillard, T. Kaupp, S. Kumar, T. Bailey, **F.T. Ramos**, A. Makarenko, A. Brooks, S. Sukkarieh, H. Durrant-Whyte. Multi-level state estimation in an outdoor decentralised sensor network. *The 10th International Symposium of Experimental Robotics (ISER 2006)*, Springer Tracts in Advanced Robotics (STAR), Springer-Verlag, 2006.

## Journal Articles

7. S. Vasudevan, **F.T. Ramos**, E. Nettleton, H. Durrant-Whyte. Large scale terrain modeling using Gaussian processes, *IEEE Robotics and Automation Magazine*, In Press. (Accepted 02/02/2010) (Rank 1, IF 3.0)
8. M. Bryson, A. Reid, **F.T. Ramos**, S. Sukkarieh. Airborne Vision-based mapping and classification of large farmland environments. *Journal of Field Robotics*, In Press. (Accepted 14/01/2010) (Rank 3, IF 2.684)
9. A. Kadkhodaie-Ilkhchi, S. Monteiro, **F.T. Ramos**, P. Hatherly. Rock recognition from MWD data: A comparative study of boosting, neural networks and fuzzy logic. *IEEE Geoscience and Remote Sensing Letters*, In Press. (Accepted 06/01/2010) (IF 1.832)
10. S. Vasudevan, **F.T. Ramos**, E. Nettleton, H. Durrant-Whyte. Gaussian process modeling of large-scale terrain. *Journal of Field Robotics*, vol 26, no. 10, pp. 812-840, 2009. (Rank 3, IF 2.684)
11. **F.T. Ramos**, S. Kumar, B. Upcroft, H. Durrant-Whyte. A natural feature representation for unstructured environments. *IEEE Transactions on Robotics*, vol. 24, no. 6, pp. 1329-1340, 2008. (Rank 4, IF 2.656)
12. **F.T. Ramos**, B. Dickson, S. Kumar. Denoising aerial Gamma-ray surveying through non-linear dimensionality reduction. *Journal of Field Robotics*, vol. 24, no. 6, pp. 849-861, 2007. (Rank 3, IF 2.684)

13. **F.T. Ramos**, B. Upcroft, S. Kumar, H. Durrant-Whyte. A Bayesian approach for place recognition. *Journal of Robotics and Autonomous Systems*. In Press. (Accepted July 2009) (Rank 8, IF 1.214)
14. T. Kaupp, B. Douillard, **F. T. Ramos**, A. Makarenko, B. Upcroft. Shared environment representation for a human-robot team performing information fusion. *Journal of Field Robotics*, vol. 24, no. 11-12, pp. 911-942, 2007. (Rank 3, IF 2.684)
15. **F.T. Ramos**, F.G. Cozman. Anytime anyspace probabilistic inference. *International Journal of Approximate Reasoning*, vol. 38, no. 1, pp. 53-80, 2005. (IF 1.708)

## Conference Papers

16. S. O'Callaghan, **F.T. Ramos**, H. Durrant-Whyte. Gaussian process occupancy maps incorporating sensor and location uncertainty. In *IEEE International Conference on Robotics and Automation*, 2010. (Accepted 31/12/2009) (A)
17. S. Vasudevan, **F.T. Ramos**, E. Nettleton, H. Durrant-Whyte. Gaussian process fusion for large-scale terrain modeling. In *IEEE International Conference on Robotics and Automation*, 2010. (Accepted 31/12/2009) (A)
18. H. Zhou, S. Monteiro, P. Hatherly, **F.T. Ramos**, E. Nettleton, F. Oppolzer. Automated rock recognition with wavelet feature space projection and Gaussian process classification. In *IEEE International Conference on Robotics and Automation*, 2010. (Accepted 31/12/2009) (A)
19. A. Singh, **F.T. Ramos**, H. Durrant-Whyte, W. Kaiser. Modeling and decision making in spatio-temporal processes for environmental surveillance. In *IEEE International Conference on Robotics and Automation*, 2010. (Accepted 31/12/2009) (A)
20. J. Ven, **F.T. Ramos**, G.D. Tipaldi. An integrated probabilistic model for scan-matching, moving object detection and motion estimation. In *IEEE International Conference on Robotics and Automation*, 2010. (Accepted 31/12/2009) (A)
21. Z. Sun, J. Ven, **F.T. Ramos**, H. Durrant-Whyte. Inferring motion uncertainty from shape-matching. In *IEEE International Conference on Robotics and Automation*, 2010. (Accepted 31/12/2009) (A)
22. S. Monteiro, R. Murphy, **F.T. Ramos**, J. Nieto. Applying boosting for hyperspectral classification of ore-bearing rocks. In *IEEE Machine Learning for Signal Processing Workshop*, 2009.
23. S. Monteiro, **F.T. Ramos**, P. Hatherly. Conditional random fields for rock characterization using drill measurements. In *IEEE International Conference on Machine Learning Applications*, 2009. (C)
24. A. Melkumyan, **F.T. Ramos**. A sparse covariance function for exact Gaussian process inference in large datasets. In *International Joint Conference on Artificial Intelligence*, 2009. (A)
25. G.D. Tipaldi, **F.T. Ramos**. Motion clustering and estimation with conditional random fields. In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2009. (A)
26. B. Douillard, A. Brooks, **F.T. Ramos**. A 3D laser and vision based classifier. *International Conference on Intelligent Sensors, Sensor Networks & Information Processing*, 2009. (B)
27. S. O'Callaghan, **F.T. Ramos**, H. Durrant-Whyte. Contextual occupancy maps using Gaussian processes. In *IEEE International Conference on Robotics and Automation*, 2009. (A)
28. S. Vasudevan, **F.T. Ramos**, E. Nettleton, H. Durrant-Whyte, A. Blair. Gaussian process modeling of large-scale terrain. In *IEEE International Conference on Robotics and Automation*, 2009. (A)

29. K. Granström, J. Callmer, **F.T. Ramos**, J. Nieto. Learning to detect loop closure from range data. In *IEEE International Conference on Robotics and Automation*, 2009. (A)
30. S. Vasudevan, **F.T. Ramos**, E. Nettleton, H. Durrant-Whyte. Evaluation of Gaussian processes for large-scale terrain modeling. In *Proceedings of the Australasian Conference on Robotics and Automation*, 2009. (B)
31. H. Zhou, S. Monteiro, P. Hatherly, **F.T. Ramos**, E. Nettleton, F. Oppolzer. Spectral feature selection for automated rock recognition using Gaussian process classification. In *Proceedings of the Australasian Conference on Robotics and Automation*, 2009. (B)
32. C. Cadena, **F.T. Ramos**, J. Neira, Efficient large scale SLAM including data association using the Combined Filter, In *European Conference on Mobile Robotics*, ECMR«09, 2009.
33. B. Douillard, D. Fox, **F.T. Ramos**. Conditional random fields for outdoor object mapping. In *IROS workshop: Robotics Challenges for Machine Learning II*, 2008.
34. B. Douillard, D. Fox, **F.T. Ramos**. Laser and vision based outdoor object mapping. In *Proceedings of the Robotics: Science and Systems IV*, 2008. (A)
35. J. Callmer, K. Granström, J. Nieto, **F.T. Ramos**. Tree of words for visual loop closure detection in urban SLAM. In *Proceedings of the Australasian Conference on Robotics and Automation*, 2008. (B)
36. **F.T. Ramos**, B. Douillard, D. Fox. Conditional random fields for data association and recognition in urban environments. In *Neural Information Processing Systems Conference (NIPS), Workshop*, 2007. (A)
37. B. Douillard, D. Fox, **F.T. Ramos**. A spatio-temporal probabilistic model for multi-sensor object recognition. *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2007. (A)
38. **F.T. Ramos**, P. Hatherly. Learning to characterise rock properties from geophysical Logs. *Australian Mining Technology Conference*, 2007.
39. **F.T. Ramos**, D. Fox, H. Durrant-Whyte. CRF-Matching: Conditional random fields for feature-based scan matching. In *Proceedings of Robotics Science and Systems (RSS)*, Atlanta, USA, 2007. (A)
40. **F.T. Ramos**, B. Dickson, H. Durrant-Whyte. Denoising with non-linear dimensionality reduction. In *Exploration Conference*, Toronto, Canada, 2007.
41. **F.T. Ramos**, J. Nieto, H. Durrant-Whyte. Recognising and modelling landmarks to close loops in outdoor SLAM. In *Proceedings of the IEEE International Conference on Robotics and Automation*, Rome, Italy, 2007. (A)
42. J. Underwood, S. Scheduling, **F.T. Ramos**. Real-Time map building with uncertainty using colour camera and scanning laser. In *Proceedings of the Australasian Conference on Robotics and Automation*, 2007. (**Best student paper award.**) (B)
43. S. Kumar, **F.T. Ramos**, B. Douillard, M.F. Ridley, H. Durrant-Whyte. A Novel Visual Perception Framework. In *Proceedings of the 9th IEEE International Conference on Control, Automation, Robotics and Vision*, pp. 824-829, Singapore, 2006. (A)
44. B. Upcroft, B. Douillard, T. Kaupp, M.F. Ridley, L. Ong, S. Kumar, T.A. Bailey, **F.T. Ramos**, S. Sukkarieh, H. Durrant-Whyte. Non-Gaussian state estimation in an outdoor decentralised sensor network. In *Proceedings of the IEEE Conference on Decision and Control*, San Diego, USA, 2006. (A)
45. **F.T. Ramos**, S. Kumar, B. Upcroft, H. Durrant-Whyte. Recognising and segmenting objects in natural environments. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, Beijing, China, 2006. (A)

46. **F.T. Ramos**, J. Nieto, H. Durrant-Whyte. Dimensionality reduction to recognise and associate landmarks in outdoor SLAM. In *20th Annual Conference on Neural Information Processing Systems NIPS - Workshop on Novel Applications of Dimensionality Reduction*, Vancouver, Canada, 2006. (A)
47. R. Wang, S. Kumar, **F.T. Ramos**, T. Kaupp, B. Upcroft, H. Durrant-Whyte. Probabilistic classification of hyperspectral images by learning nonlinear dimensionality reduction mapping. In *Proceedings of the 9th International Conference on Information Fusion*, Florence, Italy, 2006. (C)
48. **F.T. Ramos**, S. Kumar, B. Upcroft, H. Durrant-Whyte. Representing natural objects in unstructured environments. In *19th Annual Conference on Neural Information Processing Systems NIPS - Workshop on Machine Learning Based Robotics*, Vancouver, Canada, 2005. (A)
49. **F.T. Ramos**, H. Durrant-Whyte, B. Upcroft. Learning articulated motion structures with Bayesian Networks. In *Proceedings of the 8th International Conference on Information Fusion*, Philadelphia, USA, 2005. (C)
50. T. Kaupp, A. Makarenko, **F.T. Ramos**, H. Durrant-Whyte. Human sensor model for range observations. In *Proceedings of International Joint Conference on Artificial Intelligence, Workshop on Reasoning with Uncertainty in Robotics*, Edinburgh, UK, 2005.
51. X. Wang, **F.T. Ramos**. Applying structural EM in autonomous planetary exploration missions using hyperspectral image spectroscopy. In *Proceedings of IEEE International Conference on Robotics and Automation*, Barcelona, Spain, 2005. (A)
52. T. Kaupp, A. Makarenko, **F.T. Ramos**, S. Williams, H. Durrant-Whyte. Adaptive human sensor model in sensor networks. In *Proceedings of the 8th International Conference on Information Fusion*, Philadelphia, USA, 2005. (C)
53. S. Kumar, **F.T. Ramos**, B. Upcroft, H. Durrant-Whyte. A statistical framework for natural features representation. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, Edmonton, Canada, 2005. (**Best paper award out of 1250 submissions**) (A)
54. **F.T. Ramos**, B. Upcroft, S. Kumar, H. Durrant-Whyte. A Bayesian approach for place recognition. In *Proceedings of International Joint Conference on Artificial Intelligence, Workshop on Reasoning with Uncertainty in Robotics*, Edinburgh, UK, 2005.
55. **F. T. Ramos**, H. Durrant-Whyte. Learning Complex Motion Structures. In *Proceedings of the International Conference on Machine Learning, Workshop on Statistical Relational Learning and its Connections to Other Fields*, Banff, Canada, 2004. (A)
56. J. Ide, F. G. Cozman, **F. T. Ramos**. Generating Random Bayesian Networks with Constraints on Induced Width. In *Proceedings of European Conference on Artificial Intelligence*, Valencia, Spain, 2004. (A)
57. **F. T. Ramos**, M. Ackermann, F. G. Cozman. RoboPET: A Semi-Autonomous Robot for Hazardous Inspections. In *Proceedings of the 17th International Congress of Mechanical Engineering*, Sao Paulo, Brazil, 2003.
58. **F.T.Ramos**, F.G.Cozman, J.Ide. Embedded Bayesian Networks: Anyspace, Anytime Probabilistic Inference. In *Proceedings of the AAAI/KDD/UAI-2002 Joint Workshop on Real-time Decision Support and Diagnosis systems*, pp. 13-19, AAAI Press, Edmonton, Canada, 2002.

## Other Publications

59. **F. T. Ramos.** Recognising, Representing and Mapping Natural Features in Unstructured Environments. PhD thesis. Australian Centre for Field Robotics, University of Sydney, Australia, 2007.
60. J. Ide, F. G. Cozman, **F. T. Ramos.** Generation of Random Bayesian Networks with Constraints on Induced Width, with Application to the Average Analysis of Quasi-random Sampling, d-Connectivity, and Loopy Propagation. *Tech. Report BT/PMR*, University of Sao Paulo, Brazil, 2004.
61. **F. T. Ramos.** Probabilistic Inference with Memory and Time Constraints (in Portuguese). MSc thesis. Escola Politecnica, University of Sao Paulo, Brazil, 2003.

## Patents and Provisional Patents

- PCT/AU2009/000265, Method and System For Exploiting Information From Heterogeneous Sources
- PCT/AU2009/001668, A Method and System of Data Modelling
- 2009902150 (Patent Pending), A Method and System for Data Analysis and Synthesis
- 2008904884 (Patent Pending), A Method of Establishing and Maintaining a Model of Terrain Data
- 2009904466 (Patent Pending), A method and system for multiple dataset Gaussian process modeling
- 2009901932 (Patent Pending), Integrated Automation System With Picture Compilation System