SILDOMAR TAKAHASHI MONTEIRO

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CURRENT POSITION

Assistant Professor of Electrical Engineering — 2013 – present
Kate Gleason College of Engineering
Rochester Institute of Technology

PREVIOUS POSITIONS

Research Fellow — 2008 – 2013
Australian Centre for Field Robotics
University of Sydney, Australia

Postdoctoral Research Associate — 2007 – 2008
Interdisciplinary Graduate School of Science and Engineering
Tokyo Institute of Technology, Japan

EDUCATION

Ph.D. in Mechano-Micro Engineering, March 2007
Tokyo Institute of Technology, Japan — 2003 – 2007
Thesis: Computational intelligence for optimization and analysis of high dimensional spectral imagery
Advisor: Dr. Yukio Kosugi

M.S. in Computer Science, June 2002
Technological Institute of Aeronautics, Brazil — 2000 – 2002
Thesis: Study of performance of learning algorithms under condition of sensorial ambiguity
Advisor: Dr. Carlos Ribeiro

B.S. in Electrical Engineering, October 1999
University of Amazonas, Brazil — 1994 – 1999

RESEARCH INTERESTS

- *Remote Sensing*: hyperspectral image and signal processing, lidar, radar, data fusion
- *Robotics*: autonomous mobile robots, sensing, perception, learning, mapping
- *Machine Learning*: probabilistic graphical models, dimensionality reduction, reinforcement learning

HONORS AND AWARDS

Postdoctoral research fellowship — 2007 – 2008
Japan Society for the Promotion of Science (JSPS)

Doctoral research scholarship — 2003 – 2007
Japan's Ministry of Education, Culture, Sports, Science and Technology (MONBUSHO)

Master's research scholarship — 2000 – 2002
Brazil's Research Support Foundation of the São Paulo State (FAPESP)

PUBLICATIONS

JOURNAL PAPERS

1. R.J. Murphy, S. Schneider and S.T. Monteiro. Consistency of measurements of wavelength position from hyperspectral imagery: Use of the ferric iron crystal field absorption at ~900 nm as an indicator of mineralogy. *IEEE Transactions on Geoscience and Remote Sensing*, v. 52(5), pp. 2843–2857, 2014.
2. R.J. Murphy and S.T. Monteiro. Mapping the abundance of ferric iron on a vertical mine wall using derivative analysis of hyperspectral imagery. *ISPRS Journal of Photogrammetry and Remote Sensing,* Elsevier Press, 75, pp. 29–39, 2013.
3. R.J. Murphy, S.T. Monteiro and S. Schneider. Evaluating classification techniques for mapping vertical geology using field-based hyperspectral sensors. *IEEE Transactions on Geoscience and Remote Sensing,* 50(8), pp. 3066–3080, 2012. *(Selected for journal cover)*
4. A. Kadkhodaie-Ilkhchi, S.T. Monteiro, F. Ramos and P. Hatherly. Rock recognition from MWD data: a comparative study of boosting, neural networks and fuzzy logic. *IEEE Geoscience and Remote Sensing Letters*, 7(4), pp. 680–684, 2010.
5. T. Edanaga, Y. Minekawa, S.T. Monteiro and Y. Kosugi. Studies on human skin extraction from hyperspectral data using particle swarm optimization. *Journal of the Japan Society of Photogrammetry and Remote Sensing*, 47(3), pp. 23–36, 2008.
6. S.T. Monteiro and Y. Kosugi. Particle swarms for feature extraction of hyperspectral data. *IEICE Transactions on Information and Systems*, Oxford University Press, E90-D(7), pp. 1038–1046, 2007.
7. S.T. Monteiro, Y. Minekawa, Y. Kosugi, T. Akazawa and K. Oda. Prediction of sweetness and amino acid content in soybean crops from hyperspectral imagery. *ISPRS Journal of Photogrammetry and Remote Sensing*, Elsevier Press, 62(1), pp. 2–12, 2007.
8. S.T. Monteiro, K. Uto, Y. Kosugi, N. Kobayashi and E. Watanabe. Optimization of infrared spectral manipulation for surgical visual aid. *Journal of Japan Society of Computer Aided Surgery*, 8(1), pp. 33–38, 2006.
9. S.T. Monteiro, K. Uto, Y. Kosugi, N. Kobayashi, E. Watanabe and K. Kameyama. Feature extraction of hyperspectral data for under spilled blood visualization using particle swarm optimization. *International Journal of Bioelectromagnetism*, 7(1), pp. 232–235, 2005.
10. S.T. Monteiro and C.H.C. Ribeiro. Performance of reinforcement learning algorithms in mobile robotics under conditions of sensorial ambiguity. *Brazilian Journal of Control and Automation*, 15(3), pp. 320–338, 2004.

REFEREED CONFERENCE PAPERS

11. S.T. Monteiro**,** J. Nieto, R.J. Murphy, R. Ramakrishnan and Z. Taylor. Combining strong features for registration of hyperspectral and lidar data from field-based platforms. *IEEE International Geoscience and Remote Sensing Symposium* (IGARSS)*,* pp. 1210–1213, Melbourne, Australia, 2013.
12. S.H. Lee, S.T. Monteiro and S.J. Scheding. Submodular volume simplex analysis: a greedy algorithm for hyperspectral unmixing. *IEEE Workshop on Hyperspectral Image and Signal Processing* (WHISPERS), pp. 1–4, Gainesville, FL, 2013.
13. O.M. Cliff and S.T. Monteiro, Evaluating techniques for learning a feedback controller for low-cost manipulators, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), pp. 704–709, Tokyo, Japan, 2013.
14. T. Jasinski, S.T. Monteiro, I. Antipov and G. Brooker. W-band maritime target classification using high resolution range profiles. *International Conference on Radar* (RADAR), pp. 356–361, Adelaide, Australia, 2013.

15. H. Zhou, P. Hatherly, S.T. Monteiro, F. Ramos, F. Oppolzer and E. Nettleton. Automatic rock recognition from drilling performance data. In *Proc. IEEE International Conference on Robotics and Automation* (ICRA), pp. 3407–3412, St. Paul, MN, 2012.
16. S.T. Monteiro, F. Ramos and P. Hatherly. Learning 3D geological structure from drill-rig sensors for automated mining. In *Proc. International Joint Conference on Artificial Intelligence* (IJCAI), pp. 2500–2506, Barcelona, Spain, 2011. *(Acceptance rate: 17%)*
17. A.S.J. Tjiong and S.T. Monteiro. Feature selection with PSO and kernel methods for hyperspectral classification. In *Proc. IEEE Congress on Evolutionary Computation* (CEC), pp. 1762–1769, New Orleans, MS, 2011.
18. S.T. Monteiro and R.J. Murphy. Embedded feature selection of hyperspectral bands with boosted decision trees. In *Proc. IEEE International Geoscience and Remote Sensing Symposium* (IGARSS), pp. 2361–2364, Vancouver, Canada, 2011.
19. H. Zhou, S.T. Monteiro, P. Hatherly, F. Ramos, E. Nettleton and F. Oppolzer. Automated rock recognition with wavelet feature space projection and Gaussian process classification. In *Proc. IEEE International Conference on Robotics and Automation* (ICRA), pp. 4444–4450, Anchorage, AK, 2010.
20. S.T. Monteiro and R.J. Murphy. Calibrating probabilities for hyperspectral classification of rock types. In *Proc. IEEE International Geoscience and Remote Sensing Symposium* (IGARSS), *pp. 2800–2803,* Honolulu, HI, 2010.
21. J. Nieto, D. Viejo and S.T. Monteiro. 3D geological modelling using laser and hyperspectral data. In *Proc. IEEE International Geoscience and Remote Sensing Symposium* (IGARSS), pp. 4568–4571, Honolulu, HI, 2010.
22. S.T. Monteiro, F. Ramos and P. Hatherly. Conditional random fields for rock characterization using drill measurements. In *Proc. International Conference on Machine Learning and Applications* (ICMLA), pp. 366–371, Miami, FL, 2009.
23. S.T. Monteiro, R.J. Murphy, F. Ramos and J. Nieto. Applying boosting for hyperspectral classification of ore-bearing rocks. In *Proc. IEEE International Workshop on Machine Learning for Signal Processing* (MLSP), pp. 1–6, Grenoble, France, 2009.
24. S. Schneider, R.J. Murphy, S.T. Monteiro and E. Nettleton. On the development of a hyperspectral library for autonomous mining systems. In *Proc. Australasian Conference on Robotics and Automation* (ACRA), pp. 1–10, Sydney, Australia, 2009.
25. H. Zhou, S.T. Monteiro, P. Hatherly, F. Ramos, E. Nettleton and F. Oppolzer. Spectral feature selection for automated rock recognition using Gaussian process classification. In *Proc. Australasian Conference on Robotics and Automation* (ACRA), pp. 1–7, Sydney, Australia, 2009.
26. S.T. Monteiro, K. Uto, Y. Kosugi, K. Oda, Y. Iino and G. Saito. Hyperspectral image classification of grass species in Northeast Japan. In *Proc. IEEE International Geoscience and Remote Sensing Symposium* (IGARSS), v. 4, pp. 399–402, Boston, MA, 2008.
27. Y. Kosugi, D. Guillaume, Y. Takabayashi, S.T. Monteiro, M. Yamaki, K. Uto and G. Saito. Low-altitude hyperspectral imaging of Naruko integrated field for the interpretation of high-altitude observations. In *Proc. International Symposium on Integrated Field Science*, v. 6, pp. 135–136, Sendai, Japan, 2008.
28. S.T. Monteiro and Y. Kosugi. A particle swarm optimization-based approach for hyperspectral band selection. In *Proc. IEEE Congress on Evolutionary Computation* (CEC), pp. 3335–3340, Singapore, 2007.

29. S.T. Monteiro and Y. Kosugi. Applying particle swarm intelligence for feature selection of spectral imagery. In *Proc. International Conference on Intelligent Systems Design and Applications* (ISDA), pp. 933–938, Rio de Janeiro, Brazil, 2007.
30. S.T. Monteiro, Y. Minekawa, Y. Kosugi, T. Akazawa, and K. Oda. Prediction of sweetness and nitrogen content in soybean crops from high resolution hyperspectral imagery. In *Proc. IEEE International Geoscience and Remote Sensing Symposium* (IGARSS), vol. 5, pp. 2263–2266, Denver, CO, 2006.
31. S.T. Monteiro, Y. Minekawa, Y. Kosugi, T. Akazawa, and K. Oda. High resolution hyperspectral imagery for estimating sweetness content in soybean crops. In *Proc. Conference of the Institute of Electronics, Information and Communication Engineers* (IEICE), BS-6-13, SE-24, Tokyo, Japan, 2006.
32. S.T. Monteiro, H. Nakamoto, H. Ogawa, and N. Matsuhira. Robust mobile robot map building using sonar and vision. In *Proc. JSME Conference on Robotics and Mechatronics* (ROBOMEC), 2P1-N-052, pp. 1–4, Kobe, Japan, 2005.
33. S.T. Monteiro, K. Uto, Y. Kosugi, and E. Watanabe. Towards applying hyperspectral imagery as an intraoperative visual aid tool. In *Proc. IASTED International Conference on Visualization, Imaging and Image Processing* (VIIP), pp. 483–488, Marbella, Spain, 2004.
34. S.T. Monteiro and C.H.C. Ribeiro. Acquisition of cognitive maps for the Magellan Pro mobile robot. In *Proc. 14th Brazilian Automation Conference* (CBA), pp.1543–1548, Natal, Brazil, 2002.

WORKSHOP PAPERS

35. S.T. Monteiro, F. Ramos and P. Hatherly. Learning CRF models from drill rig sensors for autonomous mining. *NIPS Workshop on Learning from Multiple Sources with Applications to Robotics*, pp. 1–4, Whistler, Canada, 2009.
36. S.T. Monteiro, K. Uto, Y. Kosugi and E. Watanabe. Towards a surgical tool using hyperspectral imagery as visual aid. *MICCAI Workshop on Augmented Environments for Medical Imaging and Computer-aided Surgery*, pp. 97–103, Rennes, France, 2004.

BOOKS

37. S.T. Monteiro. *Automatic Hyperspectral Data Analysis: A machine learning approach to high dimensional feature extraction*. Saarbrucken: VDM Verlag, May 2010. ISBN: 978-3639255164.

TECHNICAL REPORTS

38. H. Zhou, P. Hatherly, S.T. Monteiro, F. Ramos, F. Oppolzer and E. Nettleton. *A hybrid GP regression and clustering approach for characterizing rock properties from drilling data*. ACFR Technical Report 2011-001, 2011.
39. F. Ramos, S.T. Monteiro and P. Hatherly. *Report on iron ore rock recognition trials*. ACFR Technical Report 2009-001, 2009.

PATENTS

1. Y. Kosugi, S.T. Monteiro, K. Uto and E. Watanabe, *Means and equipment for surgical viewing aid*, US patent application 2004/604,743. Japan 2006-085688.

RESEARCH FUNDING

- RIT Grant Writer's Boot Camp seed funding, PI. *Conditional random fields for spectra-spatial classification of hyperspectral imagery*, $5,000, 2014
- JSPS fellowship grant, PI. *Study on high-performance parallel particle swarm optimizers for hyperspectral data analysis*, JPY$12 million ($120,000), 2007 – 2008

SUPERVISION

PHD STUDENTS

Tomasz Jasinski, 2011 – present *(joint with G. Brooker)*
Seong Lee, 2011 – 2013 *(passed 2nd year PhD review)*

UNDERGRADUATE STUDENTS

Christopher Tatsch, 2014 (visiting research student)
Oliver Cliff, 2012 *(first class honors)*
Rodney Li, 2012
Louis Zhou, 2012
Ken Pang, 2011 *(first class honors)*
Robbert Fujiwara, 2011 *(first class honors)*
Samuel Perrett, 2011
Anthony Tjiong, 2010 *(first class honors)*
Hans Hadiardja, 2010

POSTDOCS

Nasir Ahsan, Mar./2013 – Aug./2013

TEACHING

Artificial Intelligence Explorations *(undergraduate/graduate)*	Spring, 2014
Advanced Programming in C++	Fall, 2013
Computer Vision and Image Processing	2011 – 2012
Professional Engineering and IT	2009 – 2013

PROFESSIONAL ACTIVITIES

EDITORIAL

- Guest Editor of the Journal of Field Robotics (JFR) special issue on *Alternative sensing techniques for robot perception*, 2014

CONFERENCE COMMITTEE

- Program Co-Chair of the *Australasian Conference on Robotics and Automation* (ACRA), 2009

WORKSHOPS ORGANIZED

- Co-Organizer of Robotics Science and Systems (RSS 2012) conference workshop (with T. Peynot, A. Kelly, M. Devy) *Beyond laser and vision: Alternative sensing techniques for robot perception*, 2012

SOCIETY SERVICE

- Co-chair of IEEE GRSS Chapter at *Australian Capital Territory and NSW*, 2011– 2012
- Member of IEEE GRSS Working Group on *Standard algorithm data and evaluation*, 2012

JOURNAL REVIEWING

- IEEE Transactions on Geoscience and Remote Sensing (TGRS)
- IEEE Geoscience and Remote Sensing Letters (GRSL)
- IEEE Journal of Selected Topics in Earth Observations and Remote Sensing (JSTARS)
- IEEE Robotics and Automation Magazine (RAM)
- IEEE Transactions on Evolutionary Computation (TEVC)

- Robotics and Autonomous Systems (RAS)
- Journal of Field Robotics (JFR)
- Remote Sensing (*mdpi*)
- International Journal of Adaptive Control and Signal Processing (IJACSP)

CONFERENCE REVIEWING

- IEEE Workshop on Hyperspectral Image and Signal Processing (WHISPERS)
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- IEEE Congress on Evolutionary Computation (CEC)
- IEEE Symposium Series on Computational Intelligence (SSCI)
- International Conference on Unmanned Aerial Vehicles (UAV)
- Conference on Digital Image Computing: Techniques and Applications (DICTA)

REVIEW PANEL

- *Australian Research Council* (ARC) Discovery Projects assessor, 2009

DEPARTMENTAL SERVICE

PHD COMMITTEE MEMBER

Motlatsi Seotsanyana. Annual progress review, 2011, 2012
Andrew Palmer. Annual progress review, 2012

PROFESSIONAL MEMBERSHIPS

- Member of Institute of Electrical and Electronics Engineers (IEEE)
  Geoscience and Remote Sensing Society
  Robotics and Automation Society
- Member of Association for Computing Machinery (ACM)
  Special Interest Group on Artificial Intelligence

RECENT COLLABORATORS

Irina Antipov (Defence Science and Technology Org.)
Graham Brooker (University of Sydney)
Michel Devy (University of Toulouse)
Jenny Du (Mississippi State University)
Alonzo Kelly (Carnegie Mellon University)
Richard Murphy (University of Sydney)
Juan Nieto (University of Sydney)
Thierry Peynot (Queensland University of Technology)
Fabio Ramos (University of Sydney)
Stephen Scheding (University of Sydney)

INVITED TALKS

1. RIT, *Center for Imaging Science Seminar Series,* Rochester, NY, 2014
2. University of Adelaide, *Mechanical Engineering seminar*, Australia, 2012
3. University of Queensland, *IT and EE seminar*, Australia, 2011
4. University of Amazonas, *Computer Science and Engineering seminar*, Brazil, 2009
5. University of Sydney, *ACFR pizza seminar*, Australia, 2008

6. Tokyo Institute of Technology, *Tokyo Tech-KAIST Joint Workshop*, Japan, 2007
7. Waseda University, *21st Century COE Eight Universities Joint Symposium*, Japan, 2005