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Robotics, Perception and Real Time Group
Department of Computer Science and System
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Spanish Citizenship



Research Interests

Artificial Intelligence, Autonomous Robotics, Machine Learning, Pattern Recognition, Artificial and Natural Vision, Cognitive Systems, Brain Computer Interfaces.

Education

Ph.D. Student in Computer Science, February 2005 - July 2008.
University of Freiburg, Germany.
Dissertation title: *Semantic Labeling of Places with Mobile Robots*.
Advisor: Prof. Dr. Wolfram Burgard.

M.Sc. Applied Computer Science, September 2002 - February 2005.
University of Freiburg, Germany.

M.Sc. Bioengineering, September 1998 - September 2000.
Miguel Hernandez University, Spain.

M.Eng. Computer Science, October 1992 - June 1997.
University of Alicante, Spain.

Academic Positions

University of Zaragoza, Spain. January 2009 - January 2012
Researcher in the Robotics, Perception and Real Time Group, Department of Computer Science and System Engineering.

University of Freiburg, Germany. February 2005 - August 2008
Researcher in the Autonomous Intelligent Systems Group, Dept. of Computer Science.

Miguel Hernández University, Spain. January 1999 - June 2000.
Researcher at the Bioengineering Institute.

Non-Academic Positions

Caja de Ahorros del Mediterraneo (Savings Bank), Spain. October 2008 - January 2009.
Financial risk analyst.

Caja de Ahorros del Mediterraneo (Savings Bank), Spain. June 2000 - June 2002.
System analyst and software developer for online banking.

Torrematica S.L. Spain. June 1998 - December 1998
System analyst and software developer.

Applications Engineering (IDASA). Spain. June 1997 - June 1998
Internship.

Achievements

Fellowship. Postdoctoral fellowship (Juan de la Cierva) from Spanish Government. 2009-2012.

Fellowship. Fellowship from Canon Foundation in Europe for a research stay at Kyushu University, Fukuoka, Japan. March - May 2008.

Best student paper award finalist. IEEE International Conference on Robotics and Automation (ICRA), 2005. Paper title: *Supervised learning of places from range data using AdaBoost*.

Fellowship. Spanish predoctoral Fellowship (FPI). Miguel Hernández University, Alicante, Spain. January 1999 - June 2000.

Participation in Research Projects

EVA Human robot interaction, 2006-2009.
Spanish national project from Ministerio de Educacion y Ciencia. ID: DPI2006-15630-C02-02.
Position: researcher.

Cognitive Systems for Cognitive Assistants - CoSy, February 2005 - September 2008.
European Union FP6 IST Cognitive Systems Integrated project.
Position: researcher.

SmartTer. Vehicle for Autonomous Navigation and Mapping in Outdoor Environments, 2007.
Joint project between the ETH Zurich, the EPLF in Lausanne, and the University of Freiburg.
Participating in the European Land-Robot Trial (ELROB), 2006.
Position: researcher.

Sistema de percepción visual móvil y cooperativo como soporte para la realización de tareas con redes de robots, 2004-2007.
Spanish project from Ministerio de Educacion y Ciencia.
Position: researcher.

Mecanismos de degeneración, regeneración y reparación en un modelo experimental neurodegenerativo, June 1999 - June 2000.
Spanish project from Ministerio de Educacion y Ciencia.
Position: researcher.

Research Stays

University of Freiburg, Germany.. February 2009.
Social Robotics Laboratory
Department of Computer Science
Host: Kai O. Arras.

Kyushu University, Fukuoka, Japan. March 2008 - May 2008.
Hasegawa Laboratory & Kurazume Laboratory
Department of Intelligent Systems
Graduate School of Information Science and Electrical Engineering
Kyushu University

Host: Professor Tsutomu Hasegawa, Professor Ryo Kurazume.

University of Ljubljana, Ljubljana, Slovenia. November 2005 - February 2006.

Faculty of Computer and Information Science.

Research topic: integration of vision and laser sensors for place labeling of autonomous robots in indoor environments.

Host: Professor Ales Leonardis.

Kungl Tekniska Högskolan, Stockholm, Sweden. September 2005.

Centre for Autonomous Systems.

Research topic: integration of software for SLAM and place recognition for autonomous robots.

Host: Professor Henrik I. Christensen.

Miguel Hernández University, Alicante, Spain. December 2006 - January 2007

Automation, Robotics and Computer Vision Lab.

Research topic: study of interest point detectors and descriptors for visual SLAM.

Host: Assistant Professor Oscar Reinoso García.

Teaching Experience

At the University of Freiburg:

- **Tutor**, University of Freiburg, Germany.
Summer term 2007.
Seminar: Raumkognition (Spatial Cognition).
Language: German.
- **Tutor**, University of Freiburg, Germany.
Winter term 2006 - 2007.
Seminar: Robot Navigation.
Language: English, German.
- **Tutor**, University of Freiburg, Germany.
Summer term 2006.
Seminar: Autonomous Intelligent Systems.
Language: English, German.
- **Teaching Assistant**, University of Freiburg, Germany.
Summer term 2006.
Lecture: Introduction to Mobile Robotics.
Language: English.
- **Tutor**, University of Freiburg, Germany.
Winter term 2005-2006.
Seminar: Autonomous Mobile Systems.
Language: English, German.
- **Tutor**, University of Freiburg, Germany.
Summer term 2005.
Seminar: Autonomous Mobile Systems.
Language: English, German.
- **Lecturer**, Miguel Hernández University. Spain.
October-November, 2000.
Course: "Redes Telematicas Avanzadas" (Advanced Networks).
Language: Spanish.

Chairmanships / Editorial boards

- Co-Organizer of the ICRA 2009 Workshop on People Detection and Tracking, 2009.
- Guest editor of International Journal of Social Robotics (Special Issue on People Detection and Tracking), 2010.

Reviewing

- Reviewer for the Robotics and Autonomous Systems journal (RAS).
- Reviewer for IEEE Transactions on Pattern Analysis and Machine Intelligence journal (TPAMI).
- Reviewer for the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). Year 2007.
- Reviewer for the IEEE International Conference on Robotics and Automation (ICRA). Years 2006, 2007, 2008.
- Reviewer for the International Joint Conference on Artificial Intelligence (IJCAI). Year 2007.
- Reviewer for the European Conference on Mobile Robots (ECMR). Year 2007.

Membership

- IEEE Period 2005-2007.
- Bioengineering Institute, University Miguel Hernández, Spain. Period 1999-2000.

Languages

Spanish (Native), English, German, Catalan/Valencian, Japanese (beginner).

References

Professor Wolfram Burgard

Institut fuer Informatik
Albert-Ludwigs-Universitt Freiburg
Georges-Koehler-Allee, Geb. 079
D-79110 Freiburg
Germany
Email: burgard@informatik.uni-freiburg.de

Professor Aleš Leonardis

Visual Cognitive Systems Laboratory
Faculty of Computer and Information Science
University of Ljubljana
Tržaška 25
SI-1001 Ljubljana
Slovenia
Email: ales.leonardis@fri.uni-lj.si

Professor Henrik I. Christensen

Robotics and Intelligent Machines @ GT
Georgia Institute of Technology
Interactive Computing / College of Computing
85 5th Street, Room 237
Atlanta, GA 30332-0760
USA
Email: hic@cc.gatech.edu

Professor Tsutomu Hasegawa

Intelligent Robots and Vision Systems Laboratory
Department of Intelligent Systems
Graduate School of Information Science and Electrical Engineering
Kyushu University
744, Motoooka, Nishi-ku, Fukuoka, 819-0395
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Professor Ryo Kurazume

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Graduate School of Information Science and Electrical Engineering
Kyushu University
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Japan
Email: kurazume@is.kyushu-u.ac.jp

Publications

Books

- O. M. Mozos, “Semantic Place Labeling with Mobile Robots”. *Springer Tracts in Advanced Robotics (STAR)*, Springer, 2010.

Edited

- K. O. Arras and O. M. Mozos, eds., “Special issue on people detection and tracking”. *International Journal of Social Robotics*, 2010.
- K. O. Arras and O. M. Mozos, eds., “Proceedings of the Workshop on People Detection and Tracking”, *International Conference on Robotics and Automation (ICRA)*, May 2009.

Book Chapters

- A. Pronobis, P. Jensfelt, K. Sj, H. Zender, G.-J. M. Kruijff, O. M. Mozos, and W. Burgard, “Semantic modelling of space”, in *Cognitive Systems: Final Report of the CoSy Project* (H. I. Christensen, A. Sloman, G.-J. M. Kruijff, and J. Wyatt, eds.), Germany: Springer, 2009. To appear.
- M. Ballesta, A. Gil, O. Reinoso, and O. M. Mozos, “Evaluation of interest point detectors for visual SLAM”, in *Recent Advances in Control Systems, Robotics and Automation* (S. Pennacchio, ed.), pp. 190-199, Italy: InternationalSar, second ed., January 2008.
- O. M. Mozos, A. Gil, M. Ballesta, and O. Reinoso, “Interest point detectors for visual SLAM”, in *12th Conference of the Spanish Association for Artificial Intelligence, CAEPIA 2007* (D. Borrajo, L. Castillo, and J. M. Corchado, eds.), vol. 4788 of Lecture Notes in Artificial Intelligence, pp. 170-179, Germany: Springer, 2008.
- R. Triebel, O. M. Mozos, and W. Burgard, “Relational learning in mobile robotics: An application to semantic labeling of objects in 2D and 3D environment maps”, in *Proc. 31th Annual Conference of the Gesellschaft fr Klassifikation* (C. Preisach, H. Burkhardt, L. Schmidt-Thieme, and R. Decker, eds.), Studies in Classification, Data Analysis, and Knowledge Organization, pp. 293-300, Germany: Springer, 2008.
- O. M. Mozos, C. Stachniss, A. Rottmann, and W. Burgard, “Using adaboost for place labeling and topological map building”, in *Robotics Research: Results of the 12th International Symposium ISRR* (S. Thrun, R. Brooks, and H. Durrant-Whyte, eds.), vol. 28 of STAR Springer tracts in advanced robotics, pp. 453-472, Germany: Springer, 2007.

Journal Articles

- O. M. Mozos, R. Kurazume, and T. Hasegawa, “Multi-part people detection using 2D range data”, *International Journal of Social Robotics*, 2010.
- C. Stachniss, O. M. Mozos, and W. Burgard, “Efficient exploration of unknown indoor environments using a team of mobile robots”, *Annals of Mathematics and Artificial Intelligence (AMAI)*, vol. 52, pp. 205-227, March 2009.
- A. Pronobis, O. M. Mozos, B. Caputo, and P. Jensfelt, “Multi-modal semantic place classification”, *International Journal of Robotics Research*, 2009.
- A. Gil, O. M. Mozos, M. Ballesta, and O. Reinoso, “A comparative evaluation of interest point detectors and local descriptors for visual SLAM.” *Machine Vision and Applications*, 2009.
- H. Zender, O. M. Mozos, P. Jensfelt, G.-J. M. Kruijff, and W. Burgard, “Conceptual spatial representations for indoor mobile robots”, *Robotics and Autonomous Systems (RAS)*, vol. 56, pp. 493-502, June 2008.

- O. M. Mozos, R. Triebel, P. Jensfelt, A. Rottmann, and W. Burgard, “Supervised semantic labeling of places using information extracted from sensor data”, *Robotics and Autonomous Systems (RAS)*, vol. 55, pp. 391-402, May 2007.
- M. Ballesta, A. Gil, O. Reinoso, and O. M. Mozos, “Evaluation of interest point detectors for visual SLAM”, *International Journal of Factory Automation, Robotics and Soft Computing*, vol. 4, pp. 86-95, 2007.
- C. Stachniss, G. Grisetti, O. M. Mozos, and W. Burgard, “Efficiently learning metric and topological maps with autonomous service robots”, *it-Information Technology*, vol. 49, no. 4, pp. 232-237, 2007.
- P. Ahnelt, E. Fernandez, O. Martinez, J. A. Bolea, and A. Kber-Heiss, “Irregular s-cone mosaics in felid retinas. spatial interaction with axonless horizontal revealed by cross-correlation”, *Journal of the Optical Society of America A (JOSAA)*, vol. 17, pp. 580-588, March 2000.

Journal Abstracts

- E. Fernandez, A. Alfaro, J.-M. Tormos, R. Climent, O. Martinez, M. Martinez, and A. Pascual-Leone, “Neurophysiological evaluation of visual cortex excitability using image-guided transcranial magnetic stimulation”, *Investigative Ophthalmology and Visual Science (IOVS)*, vol. 43, no. 12, pp. 4485-, 2002.
- E. Fernandez, P. Ahnelt, O. Martinez, J. A. Bolea, and A. Kber-Heiss, “Correlacin espacial entre mosaicos de conos azules y clulas horizontales sin axn en retinas de felinos”, *Revista de Neurologia*, vol. 30, pp. 219-, February 2000.

Conferences

- O. M. Mozos, J. A. Bolea, E. Fernandez, and P. K. Ahnelt, “V-proportion: A method based on the voronoi diagram to study spatial relations between neuronal mosaics”, in *Proceedings of the XIII Encuentros de Geometria Computacional*, (Zaragoza, Spain), June 2009.
- A. Pronobis, O. M. Mozos, and B. Caputo, “SVM-based discriminative accumulation scheme for place recognition”, in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, (Pasadena, CA, USA), pp. 522-529, May 2008.
- O. M. Mozos, A. Gil, M. Ballesta, and O. Reinoso, “Interest point detectors for visual SLAM”, in *Proceedings of the Conference of the Spanish Association for Artificial Intelligence (CAEPIA)*, (Salamanca, Spain), November 2007.
- M. Ballesta, A. Gil, O. Reinoso, L. Paya, and O. M. Mozos, “Evaluacin de detectores de puntos de inters para SLAM visual”, in *XXVIII Jornadas de Automtica*, (Huelva, Spain.), September 2007.
- H. Zender, P. Jensfelt, O. M. Mozos, G.-J. M. Kruijff, and W. Burgard, “An integrated robotic system for spatial understanding and situated interaction in indoor environments”, in *Proceedings of the Conference on Artificial Intelligence (AAAI)*, (Vancouver, British Columbia, Canada), 2007.
- R. Triebel, O. M. Mozos, W. Burgard. “Relational Learning in Mobile Robotics: An Application to Semantic Labeling of Objects in 2D and 3D Environment Maps.” in *Proc. of the Annual Conference of the German Classification Society on Data Analysis, Machine Learning, and Applications (GfKI)*. Freiburg, Germany. March, 2007.
- K. O. Arras, O. M. Mozos, W. Burgard. “Using Boosted Features for the Detection of People in 2D Range Data.” in *Proc. of the IEEE International Conference on Robotics and Automation (ICRA)*. pp. 3402-3407. Rome, Italy. April, 2007.
- R. Triebel, R. Schmidt, O. M. Mozos, Wolfram Burgard. “Instance-based AMN Classification for Improved Object Recognition in 2D and 3D Laser Range Data.” In *Proc. of the Twentieth International Joint Conference on Artificial Intelligence (IJCAI)*. pp. 2225-2230. Hyderabad, India. January, 2007.
- O. M. Mozos and W. Burgard, “Supervised learning of topological maps using semantic information extracted from range data.”, in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, (Beijing, China), 2006.

- A. Gil, O. Reinoso, W. Burgard, C. Stachniss, and O. M. Mozos, “Improving data association in rao-blackwellized visual SLAM”, in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, (Beijing, China), pp. 2076-2081, 2006.
- A. Gil, O. Reinoso, C. Fernandez, A. Vicente, A. Rottmann, and O. M. Mozos, “Simultaneous localization and mapping in unmodified environments using stereo vision”, in *Proceedings of the International Conference on Informatics in Control, Automation and Robotics (ICINCO)*, (Setbal, Portugal), pp. 302-309, 2006.
- C. Stachniss, O. M. Mozos, and W. Burgard, “Speeding-up multi-robot exploration by considering semantic place information,” in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, (Orlando, FL, USA), pp. 1692-1697, 2006.
- A. Rottmann, O. M. Mozos, C. Stachniss, and W. Burgard, “Semantic place classification of indoor environments with mobile robots using boosting,” in *Proceedings of the National Conference on Artificial Intelligence (AAAI)*, (Pittsburgh, PA, USA), pp. 1306-1311, 2005
- O. M. Mozos, C. Stachniss, and W. Burgard, “Supervised learning of places from range data using AdaBoost,” in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, (Barcelona, Spain), pp. 1742-1747, 2005. **Finalist best student paper.**
- E. Fernandez, J. Tormos, A. Alfaro, R. Climent, O. Martinez, and A. Pascual-Leone, “Neurophysiological evaluation of visual cortex excitability using image-guided transcranial magnetic stimulation,” in *Annual Spring Meeting of the Association for Research in Vision and Ophthalmology (ARVO)*, (Fort Lauderdale, USA), May 2002.
- J. Bolea, O. Martinez, P. Ahnelt, and E. Fernandez, “Estudio de la correlacin espacial en mosaicos de retina: un nuevo mtodo basado en el diagrama de voronoi,” in *IV Congreso Iberoamericano de Biofsica*, (Alicante, Spain), October 2000.
- A. Alfaro, M. Martinez, O. Martinez, J. Prez, R. Climent, E. Fernandez, and J. Tormos, “Exploracin funcional en corteza occipital: cartografa de la representacin cortical de fosfenos mediante estimulacin magnntia transcraneal,” in *XVII Congreso Nacional de Estudiantes de Medicina*, (Alicante, Spain), October 1999.
- E. Fernandez, P. Ahnelt, O. Martinez, J. A. Bolea, and A. Küber-Heiss, “Correlacion espacial entre mosaicos de conos azules y celulas horizontales sin axon en retinas de felinos,” in *VII Congreso de la Sociedad Espaola de Neurociencias (SENC)*, (Murcia, Spain), September 1999.
- E. Fernandez, P. Ahnelt, O. Martinez, J. A. Bolea, and A. Küber-Heiss, “Räumliche korrelation des irregulären blau-zapfen mosaiks in säuger-retinae mit axon horizontalzellen,” in *Proceedings of the Meeting Austrian Neuroscience Association (ANA)*, (Salzburg, Austria), September 1999.

Workshops and Symposia

- O. M. Mozos, R. Kurazume, and T. Hasegawa, “Multi-layer people detection using 2D range data,” in *Proceedings of the ICRA 2009 Workshop: People Detection and Tracking*, 2009.
- M. Ballesta, A. Gil, O. M. Mozos, and O. Reinoso, “Local descriptors for visual SLAM,” in *Workshop on Robotics and Mathematics (ROBOMAT)*, (Coimbra, Portugal), September 2007.
- O. M. Mozos, P. Jensfelt, H. Zender, G.-J. M. Kruijff, and W. Burgard, “From labels to semantics: An integrated system for conceptual spatial representations of indoor environments for mobile robots,” in *Proceedings of the IEEE/RSJ IROS 2007 Workshop: Semantic information in robotics*, (San Diego, CA, USA), 2007.
- O. M. Mozos, P. Jensfelt, H. Zender, G.-J. M. Kruijff, and W. Burgard, “From labels to semantics: An integrated system for conceptual spatial representations of indoor environments for mobile robots,” in *Proceedings of the IEEE ICRA Workshop: Semantic information in robotics*, pp. 33-40, 2007.
- O. M. Mozos, A. Rottmann, R. Triebel, P. Jensfelt, and W. Burgard, “Semantic labeling of places using information extracted from laser and vision sensor data,” in *Proceedings of the IEEE/RSJ IROS Workshop: From sensors to human spatial concepts*, (Beijing, China), 2006.
- C. Stachniss, O. M. Mozos, A. Rottmann, and W. Burgard, “Semantic labeling of places,” in *International Symposium of Robotics Research (ISRR)*, (San Francisco, CA, USA), October 2005.

Magazines and Unrefereed Journal Articles

- O. M. Mozos, “Apuntes de inteligencia artificial: Machine learning,” in *Occams’s Razor*, pp. 14-16, January 2008.

Invited Talks

- O. M. Mozos, “Semantic labeling of places with mobile robots,” Invited talk at the *ESF-JSPS Frontier Science Conference for Young Researchers. Robotics: Experimental Cognitive Robotics*. Kanagawa, Japan. March 2008.
- O. M. Mozos, “Semantic Labeling of Places with Mobile Robots.” *Meeting of the Slovenian Pattern Recognition Society (SPRS)*. Ljubljana, Slovenia, December, 2005.

Theses

- O. M. Mozos, “Semantic Place Labeling with Mobile Robots.” PhD thesis, University of Freiburg, Freiburg, Germany, July 2008.
- O. M. Mozos, “Supervised learning of places from range data using adaboost,” Master’s thesis, University of Freiburg, December 2004.