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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

Dr. rer.-nat. (Ph.D.) in Computer Science, February 2005 - July 2008.
University of Freiburg, Germany. 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.

Languages

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

Professional Achievements

Postdoctoral research fellowship from Spanish Government (Juan de la Cierva). Period: January 2009 - January 2012.

Research Fellowship from Canon Foundation in Europe for a research stay at Kyushu University, Fukuoka, Japan. Period: 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*.

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

Work Experience

University of Zaragoza, Spain. January 2009 - January 2012

Researcher in the Robotics, Perception and Real Time Group, Department of Computer Science and System Engineering.

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

University of Freiburg, Germany. February 2005 - August 2008

Researcher in the Autonomous Intelligent Systems Group, Dept. of Computer Science.

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

Miguel Hernández University, Spain. January 1999 - June 2000.

Researcher at the Bioengineering Institute.

Torrematica S.L. Spain. June 1998 - December 1998

System analyst and software developer.

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

Internship.

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, 2007-2010.

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: Dr. 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 and 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

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.

Professional Activities

Chairmanship

- Co-Organizer of the ICRA 2009 Workshop on people detection and tracking.

Reviewing

- Reviewer for the IEEE Transactions on Robotics journal (TRO).
- 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). Years 2007-2008.
- Reviewer for the IEEE International Conference on Robotics and Automation (ICRA). Years 2006-2008.
- Reviewer for the International Joint Conference on Artificial Intelligence (IJCAI). Year 2007.
- Reviewer for the European Conference on Mobile Robots (ECMR). Year 2007.

Membership

- **I3A** Instituto de Investigación en Ingeniería de Aragón. Zaragoza, Spain.
- **IEEE**. Years 2005-2007, 2009.
- **Bioengineering Institute**, University Miguel Hernández, Spain. Period 1999-2000.

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

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Department of Intelligent Systems
Graduate School of Information Science and Electrical Engineering
Kyushu University
744, Motoooka, Nishi-ku, Fukuoka, 819-0395, Japan
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Graduate School of Information Science and Electrical Engineering
Kyushu University
744, Motoooka, Nishi-ku, Fukuoka, 819-0395, Japan
Email: kurazume at is.kyushu-u.ac.jp

Publications**Books**

- [1] O. M. Mozos, "Semantic Place Labeling with Mobile Robots". *Springer Tracts in Advanced Robotics (STAR)*, Springer, 2009. To appear.

Book Chapters

- [1] M. Ballesta, A. Gil, O. Reinoso, and O. M. Mozos, *Recent Advances in Control Systems, Robotics and Automation*, ch. Evaluation of interest point detectors for visual SLAM, pp. 190-199. InternationalSar, second ed., January 2008.
- [2] O. M. Mozos, A. Gil, M. Ballesta, and O. Reinoso, *Lecture Notes in Computer Science*, vol. 4788 of Current Topics in Artificial Intelligence, ch. Interest Point Detectors for Visual SLAM, pp. 170-179. Springer-Verlag, 2008.
- [3] R. Triebel, O. M. Mozos, and W. Burgard, *Studies in Classification, Data Analysis, and Knowledge Organization*, ch. Relational Learning in Mobile Robotics: An Application to Semantic Labeling of Objects in 2D and 3D Environment Maps, pp. 293-300. Springer, 2008.
- [4] O. M. Mozos, C. Stachniss, A. Rottmann, and W. Burgard, *Robotics Research: Results of the 12th International Symposium ISRR*, vol. 28 of STAR Springer tracts in advanced robotics, ch. Using AdaBoost for Place Labeling and Topological Map Building., pp. 453-472. Springer, 2007.

Journal Articles

- [1] 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.
- [2] 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 (MVA)*, 2009. Published online.
- [3] 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.
- [4] 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.
- [5] 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.
- [6] 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.
- [7] P. Ahnelt, E. Fernandez, O. Martinez, J. A. Bolea, and A. Küber-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

- [1] 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, *Invest. Ophthalmol. Vis. Sci.*, vol. 43, no. 12, pp. 4485-, 2002.
- [2] E. Fernandez, P. Ahnelt, J. A. B. Oscar Martinez, and A. Küber-Heiss, Correlación espacial entre mosaicos de conos azules y células horizontales sin axón en retinas de felinos, *Revista de Neurología*, vol. 30, pp. 219-, February 2000.

Conferences

- [1] 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.
- [2] 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.
- [3] M. Ballesta, A. Gil, O. Reinoso, L. Paya, and O. M. Mozos, Evaluación de detectores de puntos de interés para SLAM visual, in *XXVIII Jornadas de Automática*, (Huelva, Spain,), September 2007.
- [4] 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.
- [5] 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 *Annual Conference of the German Classification Society on Data Analysis, Machine Learning, and Applications (GFKL)*, (Freiburg, Germany), 2007.
- [6] K. O. Arras, O. M. Mozos, and W. Burgard, Using boosted features for the detection of people in 2D range data, in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, pp. 3402-3407, 2007.
- [7] R. Triebel, R. Schmidt, O. M. Mozos, and W. Burgard, Instance-based amn classification for improved object recognition in 2d and 3d laser range data, in *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, (Hyderabad, India), pp. 2225-2230, 2007.
- [8] 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.
- [9] 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.
- [10] 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.
- [11] 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.
- [12] 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.
- [13] 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**

- [14] 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.
- [15] J. Bolea, O. Martinez, P. Ahnelt, and E. Fernandez, Estudio de la correlación espacial en mosaicos de retina: un nuevo método basado en el diagrama de voronoi, in *IV Congreso Iberoamericano de Biofísica*, (Alicante, Spain), October 2000.
- [16] A. Alfaro, M. Martinez, O. Martinez, J. Perez, R. Climent, E. Fernandez, and J. Tormos, Exploración funcional en corteza occipital: cartografía de la representacin cortical de fosfenos mediante estimulación magnética transcraneal, in *XVII Congreso Nacional de Estudiantes de Medicina*, (Alicante, Spain), October 1999.
- [17] E. Fernandez, P. Ahnelt, O. Martinez, J. A. Bolea, and A. Küber-Heiss, Correlación espacial entre mosaicos de conos azules y células horizontales sin axón en retinas de felinos, in *VII Congreso de la Sociedad Española de Neurociencias (SENC)*, (Murcia, Spain), September 1999.
- [18] 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

- [1] 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.
- [2] 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.
- [3] 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.
- [4] 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.
- [5] 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

- [1] O. M. Mozos, Apuntes de inteligencia artificial: Machine learning, *Occams's Razor*, pp. 14-16, January 2008. (In Spanish).

Invited Talks

- [1] O. M. Mozos, Semantic labeling of places with mobile robots, March 2008. Invited talk at the *ESF-JSPS Frontier Science Conference for Young Researchers. Robotics: Experimental Cognitive Robotics*.
- [2] O. M. Mozos, Semantic labeling of places with mobile robots, December 2005. Invited talk at the *Meeting of the Slovenian Pattern Recognition Society (SPRS)*.

Theses

- [1] O. M. Mozos, Semantic Place Labeling with Mobile Robots. PhD thesis, Dept. of Computer Science, University of Freiburg, July 2008.
- [2] O. M. Mozos, Supervised learning of places from range data using adaboost, Master's thesis, University of Freiburg, December 2004.