Ricardo Omar **Chavez-Garcia**

Born in Oaxaca, Mexico
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Researcher at Cognitive and Mobile Robotics Research Group

Dalle Molle Institute for Artificial Intelligence Research (IDSIA)
University of Applied Sciences and Arts
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Switzerland

Research Interests

I am interested in proposing and developing intelligent systems for robotic platforms that interact with the real world. I work on stochastic approaches for robotic perception and interaction. My research perspectives concern the environment understanding and learning of sensorimotor representations for decision-making tasks.

Research and Development Experience

Cognitive Robotics 2017-current

Research on cognitive models for robotic knowledge discovery – *Dalle Molle Institute for Artificial Intelligence Research (IDSIA)*

Integration of cognitive approaches and uncertain information in knowledge discovery models for robotic applications.
www.idsia.ch | www.nccr-robotics.ch

Developmental Robotics 2015-2017

Research and Development of a Cognitive Perception System for Situation awareness and Semantic Scene Interpretation – *Institut des Systèmes Intelligents et de Robotique (ISIR)*

Proposal and development of an active cognitive perception system for modelling the environment by integrating action and perception processes. www.roboergosum.isir.upmc.fr

Autonomous Vehicles 2011-2014

Responsible for the Perception Process in the *interactIVe (accident avoidance by active intervention for Intelligent Vehicles) IP European Project*

Proposal and development of a multi-sensor fusion solution for vehicle frontal object perception applications. It involved: outdoor environment mapping and localization; and detection, tracking and classification of multiple objects of interest in different driving scenarios. www.interactive-ip.eu

Robotic Platforms 2012-2014

Responsible for the Robotic Platforms — *Machine Learning Team (AMA) Grenoble Informatics Laboratory (LIG)*

Development of robotic drivers and sensor (mono-camera and 2D lidar scanner) data processing modules for Wifibot and Nao robotic platforms. www.liglab.fr

Education

Ph.D. in Mathematics and Computer Science 2010-2014

University of Grenoble 1 (Université Joseph Fourier), Grenoble, France

Thesis: *Multiple Sensor Fusion for Detection, Classification and Tracking of Moving Objects in Driving Environments*
Description: Two multi-sensor fusion approaches were proposed to include classification information from different sources of evidence in a whole perception solution. Uncertainty and imprecision from sensor measurements, object detections and object classification process were considered as key factors to improve the final perception output.
Thesis Advisor: Olivier AYCARD, Ph.D.

Master in Computer Science 2008–2010

National Institute of Astrophysics, Optics and Electronics, Puebla, Mexico

Thesis: *Re-ranking of retrieved images using a combination of visual and textual features*
Description: A multiple modal approach was proposed to represent images using textual and visual features. This approach uses a multi-modal representation to re-rank a list of retrieved images by applying Markov Random Fields.
Thesis advisors: Manuel MONTES-Y-GOMEZ, Ph.D. and Luis Enrique SUCAR, Ph.D.

Computer Engineer 2001–2006

Technological University of Mixteca, Oaxaca, Mexico

Thesis: *Coordinated Construction of Ontologies for Documents Ranking*
Description: Development of a software infrastructure for building knowledge repositories using ontological representations.
Thesis advisor: M. Auxilio MEDINA, Ph.D.

Publications

Discovering and Manipulating Affordances. R. Omar Chavez-Garcia, Mihai Andries, Raja Chatila and Pierre Luce-Vayrac. The 2016 International Symposium on Experimental Robotics (ISER 2016). *-to appear-*.

Discovering Affordances Through Perception and Manipulation. R. Omar Chavez-Garcia, Raja Chatila and Pierre Luce-Vayrac. 2016 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2016), pp. 3959-3964. October 2016

From Perception and Manipulation to Affordance Formalization. R. Omar Chavez-Garcia, Mihai Andries, Pierre Luce-Vayrac and Raja Chatila. Workshop on Machine Learning Methods for High-Level Cognitive Capabilities in Robotics 2016, Daejeon, South Korea.

Multiple Sensor Fusion and Classification for Moving Object Detection and Tracking. Ricardo Omar Chavez-Garcia, Olivier Aycard. IEEE Transactions on Intelligent Transportation Systems, vol. 17, issue 2, pp. 252-534. September 2015.

Multiple Sensor Fusion for Detection, Classification and Tracking of Moving Objects in Driving Environments. R. Omar Chavez-Garcia. Ph.D Thesis, 2014. University of Grenoble1

Fusion at Detection Level for Frontal Object Perception. R. Omar Chavez-Garcia, Trung-Dung Vu, Olivier Aycard and Fabio Tango. IEEE Intelligent Vehicles Symposium (IV), 2014

Research Report on Sensor Data Fusion. Anastasia Bolovinou, Angelos Amditis, Nikos Floudas, Christina Kotsiourou, Trung-Dung Vu, R. Omar Chavez-Garcia, Olivier Aycard, Fabio Tango, Mario DallaFontana, Chris Benson, Nils Appenrodt, Markus Schutz, Sebastian Pangerl, Florian Janda, Erich Fuchse, Lali Ghosh, Mirko Meuter, Daniel Schuck and Christian Nunn. 7th Framework Programme ICT-2009.6.1: ICT for Safety and Energy Efficiency in Mobility Grant Agreement No. 246587 Large-scale Integrated Project. InteractIVe Project Consortium, 2013

Fusion framework for moving-object classification. R. Omar Chavez-Garcia, Trung-Dung Vu, Olivier Aycard and Fabio Tango. 16th International Conference on Information Fusion (FUSION), pp. 1159-1166, 2013

Multimodal Markov Random Field for Image Reranking Based on Relevance Feedback. R. Omar Chavez-Garcia, Hugo Jair Escalante and Luis Enrique Sucar. ISRN Machine Vision, vol. 2013, February 2013.

Frontal Object Perception Using Radar and Mono-Vision. R. Omar Chavez-Garcia, Julien Burlet, Trung-dung Vu and Olivier Aycard. IEEE Intelligent Vehicles Symposium (IV), pp. 159-164, 2012

Using a Markov Random Field for Image Re-ranking Based on Visual and Textual Features. R. Omar Chavez-Garcia, Manuel Montes and L. Enrique Sucar. Computación y Sistemas Vol. 14, No. 4, 2011.

A Probabilistic Method for Ranking Refinement in Geographic Information Retrieval. Esau Villatoro-Tello, R. Omar Chavez-García, Manuel Montes-y-Gómez, Luis Villaseñor-Pineda, L. Enrique Sucar. Procesamiento de Lenguaje Natural, No. 44, pp. 123-130, April 2010.

Image Re-Ranking Based on Relevance Feedback Combining Internal and External Similarities. R. Omar Chavez-Garcia, Manuel Montes-y-Gómez, Luis Enrique Sucar. In proceeding of: Proceedings of the Twenty-Third International Florida Artificial Intelligence Research Society Conference. May 19-21, 2010, Daytona Beach, Florida.

RDF-Based Model For Encoding Document Hierarchies. Ma. Auxilio Medina J., Alfredo Sanchez and R. Omar Chavez-Garcia. Proceedings of the 17th International Conference on Electronics, Communications and Computers (CONIELECOMP). Puebla, Mexico, 2007.

Construction, Implementation and Maintenance of Ontologies of Records. Ma. Auxilio Medina, Alberto Chavez Aragon, and R. Omar Chavez-Garcia. In Proceedings of the Fourth Latin American Web Congress (LAWEB). Puebla, Mexico, May 2006.

Copyrighted Software Solutions

2014 Multi-sensor Frontal Object Perception
S105 - FOP - *Frontal Objects Perception (P032)* - IDDN.FR.001.180016.000.S.C.2014.000.20700

2014 Multi-sensor Moving Object Classification
S106 - MOC - *Moving Objects Classification (P033)* - IDDN.FR.001.180017.000.S.C.2014.000.20700

Conferences and Presentations

2016 Discovering Affordances Through Perception and Manipulation · 2016 IEEE/RSJ International Conference on Intelligent Robots and Systems, Daejeon, South Korea

2016 Discovering and Manipulating Affordances · The 2016 International Symposium on Experimental Robotics, Tokyo, Japan

2014 Contributions to Perception for Intelligent Vehicles · National Institute of Astrophysics, Optics and Electronics, Puebla, Mexico

2013 Fusion Framework for Moving-object Classification · 16th International Conference on Information Fusion (FUSION), Istanbul, Turkey

2012 Frontal Object Perception Using Radar and Mono-Vision · IV Intelligent Vehicles Symposium, Alcalá de Henares, Spain

2010 Image Re-ranking Method Based on a Multimodal Markov Random Field · Automatic Image Annotation and Retrieval Workshop (AIARW), Puebla, Mexico

2006 Construction, Implementation and Maintenance of Ontologies of Records. · Fourth Latin American Web Congress, Puebla, Mexico

Computer Skills

Programming C++, Python, Javascript, PHP, Shell scripting, R, Java

Laboratory Platforms ROS, Matlab

Communication Skills

Languages

English · Professional proficiency

French · Professional proficiency

Spanish · Mothertongue

Academic Activities

Co-supervisor Fall 2016 Master 2 integrative project ”Surveliance system for industrial safety in human-robo environments” – University Pierre and Marie Curie.

Proposal and supervision of a machine learning approach for detecting and tracking moving agents (humans and industrial robots) in robotic environments.

Co-supervisor Fall 2016 Master 1 internship: Robot visual self-recognition – University Pierre and Marie Curie.

Proposal and supervision of a probabilistic approach for robot self-recognition using visual flow.

Teaching assistant Master 2 Fall, 2016 Master Science Technologies, Santé (Engineering Sciences) - University Pierre and Marie Curie

Pattern Recognition

Teaching assistant Master 1 Fall, 2016 Master Science Technologies, Santé (Engineering Sciences) - University Pierre and Marie Curie

Programming on Linux Systems

Co-supervisor Fall, 2015 Master 2 Integrative project ”Stereo Vision Module for Parallel Architectures” for Master1 degree – University Pierre and Marie Curie.

Proposal and supervision of a Software-Hardware module for acquisition and processing of stereo data.

Co-supervisor Spring, 2015

Master2 internship: Sensori-motor representations for interactive robots – University Pierre and Marie Curie.

Association of perceptual elements from visual sensors and proprioceptive data to create sensori-motor representations.

Teaching assistant Fall, 2012

Informatique instrumentale et multimédia · Université Joseph Fourier

Theory of Algorithms and Introduction to Programming for undergraduate students.

Affiliations and Awards

February 2017 Qualification for university lecturer – French Ministry for National Education, Higher Education and Research

- Computer engineering, automatic control and signal processing
- Informatics

April, 2016 Member of the IEEE Technical Committee on Cognitive Robotics — IEEE Robotics and Automation Society

January, 2014 Member of The International Society of Information Fusion

November, 2010 Best Master in Science thesis on Artificial Intelligence Award

Granted by Mexican Society for Artificial Intelligence, for the thesis: 'Re-ranking of retrieved images using a combination of visual and textual features'

November, 2009 Best Student in Master in Computational Sciences Program Award

Granted by the National Institute of Astrophysics Optics and Electronics, for an outstanding academic performance

November, 2008 Master in Science Scholarship

Scholarship by the Mexican National Council of Science and Technology (CONACyT)

Academic activities

Invited reviewer for:

- *IEEE Transactions on Intelligent Transportation Systems 2015, 2016, 2017*
- *IEEE International Conference on Robotics and Automation 2017*
- *The Intelligent Vehicles Symposium 2014, 2015, 2016, 2017*
- *Elsevier Computer Networks Journal 2016*
- *The IEEE 18th International Conference on Intelligent Transportation Systems 2015*
- *The Seventh International Conference on Social Robotics 2015*

Invited Program Committee Member for *The International Symposium on Intelligent Computing Systems 2016*

February 9, 2017