Institut de Robòtica i Informàtica Industrial

CSIC · UPC

Biannual Report

Institut de Robòtica i
Informàtica Industrial

Activity Report

2007 - 2008

0

Foreword

0 Foreword

The period 2007-2008 has witnessed important changes for the Institute. On the one hand, we have seen significant growth by opening a new research line, establishing the research groups in: Kinematics and Robot Design; Perception and Manipulation; Mobile Robotics and Intelligent Systems; and Automatic Control. On the other hand, we have expanded our facilities with more space for the Control Laboratory, improved Workshop facilities that include unique rapid prototyping machinery, and the inauguration in 2008 of the Barcelona Robot Lab, a state of the art facility for research in outdoor mobile robotics. In addition, the Institute reached a significant milestone in 2008, with its consolidation on November 2008 as Joint University Research Institute sponsored by the Spanish Scientific Research Council and the Technical University of Catalonia (IUE/163/2008 DOGC 3/4). This distinction levers the Institute from a joint research unit to an entity with more autonomy than before. For instance, the Institute can now offer graduate programs of its own, and its personnel can be seen as a unified collective within UPC. These benefits come also with increased responsibilities. The institute strives for a projection at the international level, and this demands a stronger commitment from all its members to excellence in research, education, and technology transfer.

There have been many research highlights in the past two years including work in computer vision and pattern recognition, networked mobile robotics, parallel robot design, and fuel cell systems. As a result, the Institute produced over 107 scientific publications in the last two years, appearing in international journals, international and national conferences and workshops, book chapters, and book editorials. Of these, three papers appear in the top robotics journal, the IEEE Transactions on Robotics, one in the selective IEEE Transactions on Pattern Analysis and Machine Intelligence, one in the highly ranked Journal of Computational Chemistry, and one in the also highly ranked International Journal of Hydrogen Energy. I feel proud of the professionalism and commitment of our research staff to excellence in scientific research.

The Institute presence in European research has continued strong in 2007 and 2008. The participation in the European projects URUS and PACO-PLUS is producing significant contributions in human oriented robotics. The outcomes are theoretical and technological accomplishments on cognitive systems tailored at achieving greater degrees of autonomy, friendly interfaces for everyday manipulation tasks, and ubiquitous mobile robot systems that help humans in the daily activities of assistance, information, and transportation. At the national level, the Institute participated in large research initiatives such as the MIPRCV project of the Consolider Ingenio 2010 program, focusing on multimodal interaction in pattern recognition and computer vision; and the ELISSA project, part of the larger CRISALIDA CENIT project on energy routing for the electric industry. In addition to these projects, in this period the Institute led fourteen other projects of the national research program in the areas of outdoor mobile robotics, position analysis and motion planning, tensegrity structures, fuel cell systems, and management of water distribution networks.

Alberto Sanfeliu
Director

1

Index

1 Index

0 Foreword
Director's words about the period 2007 - 2008

1 Index
Memory content

2 Overview
Brief Introduction to IRI's activities

3 Research Lines
Research lines and scientific projects

4 Services
Support to the research activities

5 Training
Graduate programs and students theses

6 Outreach
Communicating science to the community

7 People
Staff working at IRI during 2007 - 2008

8 Finances
Budget and expenses

9 Publications
Books, journal papers and conference papers

2

Overview

• • •

2 Overview

Brief History

The Institut de Robòtica i Informàtica Industrial was created in November 1995 as a Joint Research Institute of the Spanish Council for Scientific Research (CSIC) and the Technical University of Catalonia (UPC). After a temporary location at the NEXUS building on the UPC North campus, it moved in 2001 to its current location at the FME building of the UPC South campus, in what is known as the Parc Tecnològic de Barcelona. In 2008 the Institute became a Joint University Research Institute.

Its first director was Prof. Rafael Huber, and upon his retirement the Institute was directed from July 2006 to May 2008 by Prof. Federico Thomas. Its current director is Prof. Alberto Sanfeliu.

Structure

The research activities at IRI are divided in four Research Lines: Kinematics and Robot Design, Perception and Manipulation, Mobile Robotics and Intelligent Systems, and Automatic Control. The Institut is currently staffed with 15 full time researchers and faculty members, 13 postdocs and visiting professors, 24 PhD students, 19 MS students, and 4 contract support personnel.

An Administrative Department with a staff of 5 people, and a Computer Service with 3 members provide support to the research activities. The Institute has specialized facilities that include a Workshop, the Articulated Robotics Laboratory, the Mobile Robotics Laboratory and its associated facility the Barcelona Robot Lab, and the Automatic Control Laboratory. A staff of 4 technicians runs these services. Library support is provided by UPC at its FME library on the same building.

The Institute has the following governing organs: a Director; a Vice-director; a General Manager; an elected Executive Committee, composed by the above three figures plus representatives from the research unit, the support personnel, the research staff, and the students; and a Governing Board composed by all the members in the Executive Committee plus all the PhD members of the Institute.

3

Research

3 Research Funds

Projects on the period 2007 - 2008:   33
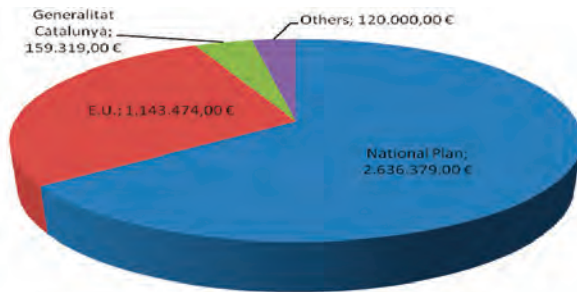
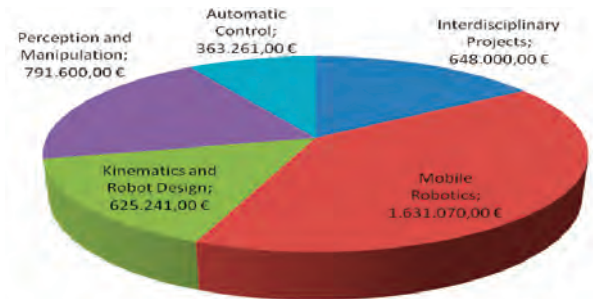**Total Research Funds:**   4.800.171,00 €

Basic research

Number of Projects: 23   Funding: 4.059.172,00 €

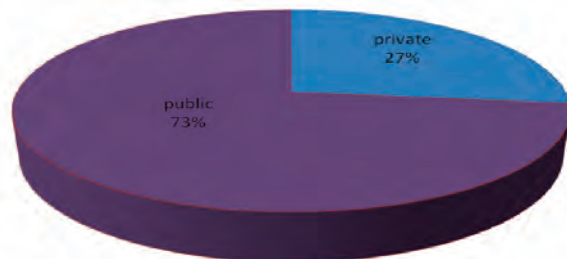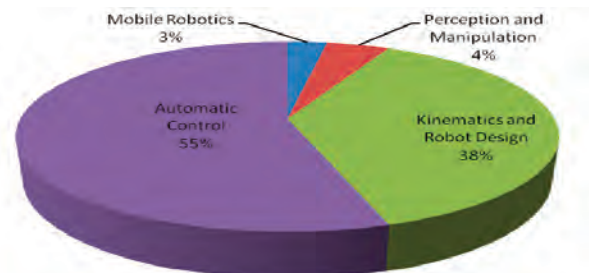*Project funds by source*

Project funds by research line

Technology transfer

Number of contracts: 10   Funding: 740.999,00 €

Contracts by source


Contracts by research line

MIPRCV - Multimodal interaction in pattern recognition and compruter vision

PI: Alberto Sanfeliu, Total budget 648.000 €

MIPRCV establishes a five year research program to develop pattern recognition and computer vision approaches that explicitly deal with the challenges and opportunities entailed by the human interaction paradigm. Based on these approaches, it also aims at implementing actual systems and prototypes for a number of important multimodal interaction applications.
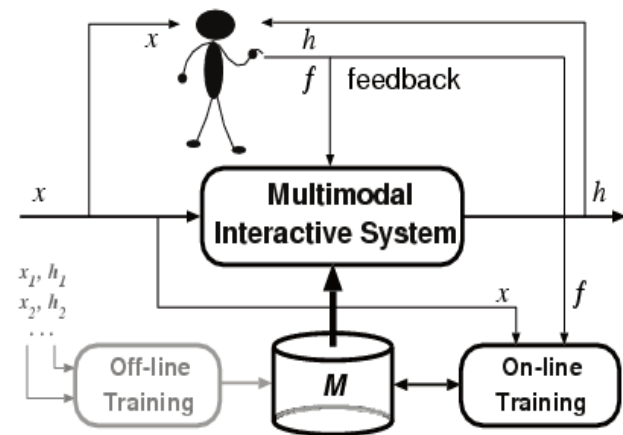
The research consortium that has been constituted to achieve this goal is composed of 81 highly qualified scientists and engineers from seven research groups and ten different public research institutions. This staff includes many internationally renowned researchers in the fields of Pattern Recognition, Machine Learning, Image Processing, Computer Vision, Speech and Language Processing and Robotics. IRI leads research efforts in MIPRCV in the area of Robotics.

Recent trends in robotics aim at developing robot teams; that is, groups of homogeneous or heterogeneous specialised machines which cooperate with each-other to achieve common goals. In this case, machine-machine interaction is to be considered, along with the human-machine interaction of the standard MI framework. In these ubiquitous-robotics environments, interaction among machines entails using specific sensor modalities, such as GPS, WiFi, Bluetooth or RFID nets and even modalities based on mobile phone technology. This raises specific challenges that will need specialised approaches to achieve effective cooperation performance. On the other hand, human-robot interaction (which perfectly fits under the MI framework) needs technologies such as computer vision, tracking and recognition of human actions, speech recognition, along with mobile phone or other wireless communications.

3 Kinematics and Robot Design

The research activities of the Kinematics and Robot Design line are focused in the study of mechanisms and structures from different points of view, starting from the analysis of their possible mobility (position analysis and motion planning), continuing with their design (mechanism synthesis) and, finally, with their actual construction and control (novel parallel robots, tensegrities). The group's research finds applications in mechanism design and computational chemistry.
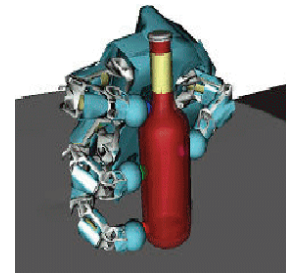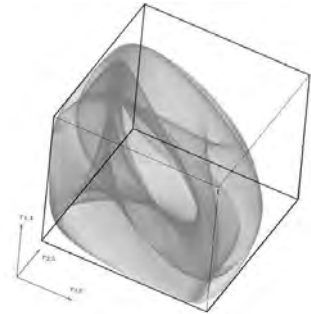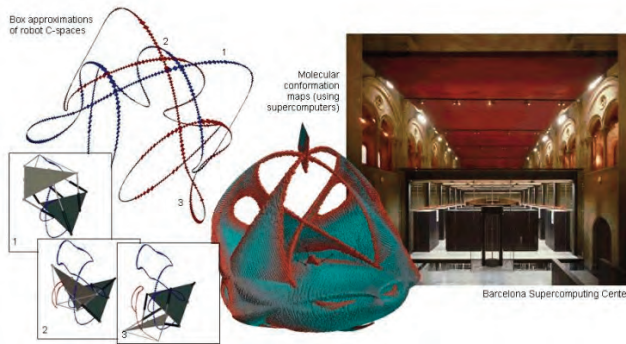
CUIK - Motion planning for robotic systems with arbitrary topology

*PI: Lluis Ros, Total budget 218.060 €*

This project aims at developing efficient algorithms for solving the following strongly NP hard problem: given an arbitrary collection of kinematic constraints among a set of solids, generate all spatial configurations of these solids that satisfy all the constraints. When the number of feasible solutions is infinite the algorithm must also be able to find a discretization of the whole solution space.

CUIK+ - Analysis and motion planning of complex robotic systems

PI: Lluis Ros, Total budget 275.396 €

The goal of this project is to extend the technique for solving the position analysis of robotic systems of arbitrary topology, developed in the aforementioned project, to deal with robotic systems of higher complexity. A system's complexity depends on two parameters: its cardinality (the number of involved bodies) and its mobility (the dimension of its C-space). The present algorithm solves efficiently all cases of low mobility and cardinality, and we seek to extend it in order to treat cases of high mobility and/or cardinality, unsolvable until present. The developed techniques find applications to problems like the kinematic analysis and motion planning of deployable structures, parallel robots, articulated hands, and molecular structures, among others.
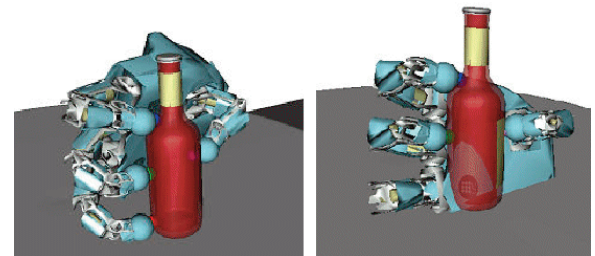
Other projects

SPLAM - Development of SPLAM algorithms for mobile robotics

PI: Josep M Porta, Total budget 30.000 €

WRENCHPAD - A wrench-sensitive touchpad based on a parallel structure

PI: Lluís Ros, Total budget 30.000 €

AMOBIO - Reconstruction and motion analysis of large robotic and biochemical structures

PI: Josep M Porta, Total budget 30.000 €

TenSeBot Tensegrity structures for the development of sensors, manipulators and mobile robots

PI: Josep M Mirats, Total budget 30.000 €

Technology transfer

MANIPTENS - Study and design of a hyper-actuated mechanical manipulator based on tensegrity structures

PI: Josep M Mirats, Total budget 180.672 €

In this project we are designing a tensegrity prototype that avoids collisions with an external moving plane and collisions between its elements. Collisions are taken as additional constraints inside the non-linear optimization process that computes a stable structure when varying the longitude of some of its elements.
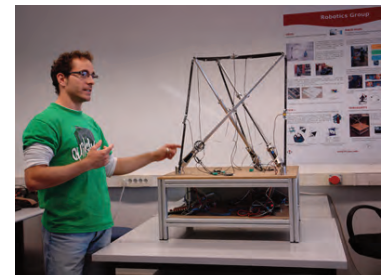
VALTEC - Universal assembly station

PI: Federico Thomas, Total budget 98.190 €

3 Mobile Robotics and Intelligent Systems

The research activities of the Mobile Robotics and Intelligent Systems line are aimed to endow mobile robots and ubiquitous computing devices the necessary skills to aid humans in everyday life activities. These skills range from pure perceptual activities such as tracking, recognition or situation awareness, to motion skills, such as localization, mapping, autonomous navigation, path planning or exploration.

3
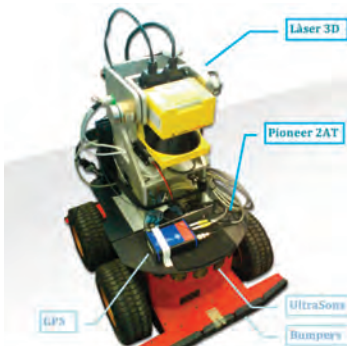
Mobile Robotics and Intelligent Systems Research Projects in the Period 2007-2008

URUS - Ubiquitous networking robotics in urban settings

PI: Alberto Sanfeliu (Consortium Leader), Total budget 498.474 €

The URUS project focuses on the design and development of a cognitive networked robot architecture that in a cooperative way interacts with human beings and the environment for tasks of guidance, assistance, transportation of goods, and surveillance in urban areas. This robot architecture integrates cooperating urban robots, intelligent sensors (video cameras, acoustic sensors, etc.), intelligent devices (PDA, mobile telephones, etc.) and communications.

The main scientific and technological challenges addressed in the project are: navigation and motion coordination between robots; cooperative environment perception; cooperative map building and updating; task negotiation within cooperative systems; human-robot interaction; and wireless communication strategies between users (mobile phones, PDAs), the environment (cameras, acoustic sensors, etc.), and the robots.

UbRob - Ubiquitous robotics for urban areas

PI: Alberto Sanfeliu, Total budget 459.921 €
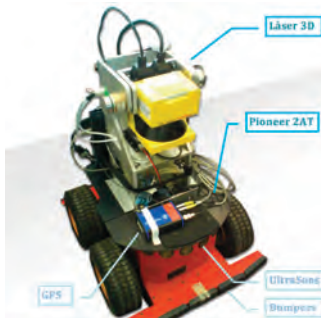
This is a national project complementary to the european project URUS. In URUS the focus is on cooperative robotics, whereas in this project the focus is to develop new techniques that are not considered in the URUS project, for example the design of planning with SLAM for navigation, the recognition of objects invariant to rotation and illumination or the search of algorithms for calibration of ubiquitous sensors, along with new experiments for assistance and guiding of people in an urban area.

3 Mobile Robotics and Intelligent Systems Research Projects in the Period 2007-2008

NAVROB - Integration of robust perception, learning and navigation systems in mobile robotics

PI: Alberto Sanfeliu, Total budget 217.275 €

The primary goal of this project is to make an integrated system that includes perception, learning, and navigation systems for mobile robots in urban or compatible industrial surroundings. In these environments the surface is irregular, illumination conditions are varying, and the disposition of the objects and the obstacles is dynamic. For all these reasons, it is challenging to obtain robust algorithms. By providing different systems for robust perception, the mobile platform should be able to autonomously generate a navigation map of the environment that will in turn serve to enrich a geographic information system.

SIRVENT - Reconfigurable system for vision-based navigation of walking and wheeled robots in nautal environments

PI: Enric Celaya, Total budget 157.400 €

This project deals with the problem of robot navigation in unmodified natural environments. The robot should be able to reach a target defined by the user in a purely visual way. All-terrain robots provided with wheels or tracks were used in moderately abrupt environments, whereas legged robots were used in more challenging scenarios. The control of the navigation process was done by means of a reconfigurable interface allowing the use of any of the available robots, as well as the choice of alternative algorithms for landmark detection and trajectory planning.

3 Mobile Robotics and Intelligent Systems Research Projects in the Period 2007-2008

Other projects and grants

VIS Consolidated Group

PI: Alberto Sanfeliu, Total budget 52.600 €

Complementary action for EU Project URUS

PI: Alberto Sanfeliu, Total budget 35.400 €

EARMU - Active exploration for urban mobile robots

PI: Juan Andrade, Total budget 30.000 €

Technology transfer

ICARUS - Consulting on technology research for the development of a mobile robot navigation system

PI: Alberto Sanfeliu, Total budget 21.000 €

The objectives of the Perception and Manipulation line are to enhance the perception, learning, and planning capabilities of robots in order to achieve higher degrees of autonomy and user-friendliness during everyday manipulation tasks.
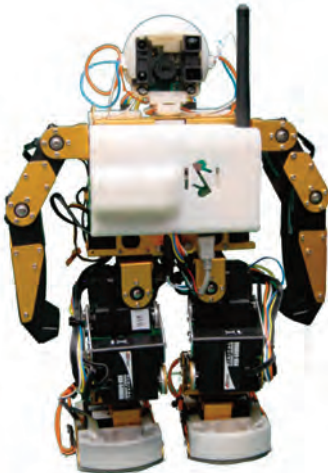
3 Perception and Manipulation
Research Projects in the Period 2007-2008

PACO-PLUS - Perception, action & cognition through learning of object-action complexes

PI: Carme Torras and Juan Andrade, Total budget 645.000 €

The project aims at the design of a cognitive robot that is able to develop perceptual, behavioral and cognitive categories in a measurable way and communicate and share these with humans and other artificial agents. To achieve this, the project brings together a consortium of robotics researchers, engineers, computer vision scientists, linguists, theoretical neuroscientists and cognitive psychologists. Central to the approach is the axiomatic assumption that objects and actions are inseparably intertwined and, thus, the so-called Object-Action Complexes (OACs) are the building blocks of cognition.

Other projects and grants

Complementary action for the EU Project PACO-PLUS
PI: Carme Torras, Total budget 64.000 €

BPnP - Priors for real time detection of 3D rigid and deformable objects
PI: Francesc Moreno, Total budget 30.000 €

Robotics Consolidated Group
PI: Carme Torras, Total budget 52.600 €

Humanoid Lab
PI: Guillem Alenyà, Total budget 5.000 €

Technology transfer

Consulting in computer vision algorithms for robotics
PI: Carme Torras and Guillem Alenyà, Total budget 33.137 €

3 Automatic Control

The Automatic Control Line develops basic and applied research in control theory, with emphasis on nonlinear control, predictive optimal control, diagnosis and fault-tolerant control, large-scale networked systems control, energy-based modelling and control, and decision support systems, with applications in water and energy systems.

Our research efforts find applications in control of fuel cell based systems; efficient energy management in autonomous hybrid and networked power generation and distribution systems; hydrogen generation systems; real-time control of water supply and distribution networks; and measurement validation, efficiency monitoring in water supply and distribution networks.

CONPEM - Design of controllers for the electrochemical process in PEM type fuel cells

PI: Jordi Riera, Total budget 113.275 €

Fuel cells are an important contribution to sustainable power systems due to their high efficiency and low emissions, limited to the process of generation of the hydrogen combustible itself. The project objective was the design, construction and validation of a system prototype of electrical energy generation for isolated loads based on PEM fuel cells. The benefits of the project were:
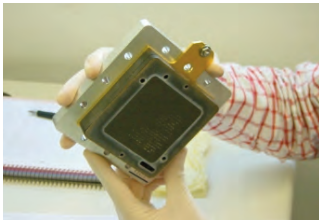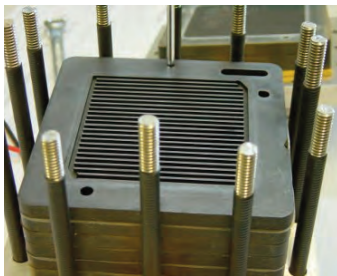

1) proposal of new control methodologies and strategies in electrical energy generation systems;
2) efficiency optimization of the process of energy generation for local loads based on fuel cells.
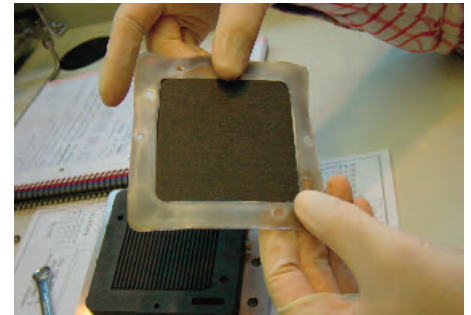
DICOPEM - Advances in the modelling and design of controllers for systems based on PEM type fuel cells

PI: Jordi Riera, Total budget 144.111 €

This project is focused on the modeling and design of controllers for PEMFC. We are working on obtaining a detailed model of the non-linear phenomena inside the fuel cell through the Port Hamiltonian System (PHS) formalism, which permits a unified treatment of the multi-domain system. Because of known limitations about the humidification subsystem modeling and the diffusion modeling, these aspects will be given special attention. The second objective of the project is to obtain reduced models that preserve the PHS structure introducing, for the diffusion effects, fractionary transfer functions. Finally, the third objective of the project is the proposal of controllers.

Taking advantage of PHS theory and the modeling results, we want to design non-linear robust controllers that assure reliable and efficient operation, helps long aging, and provides quality energy able to follow load variations.
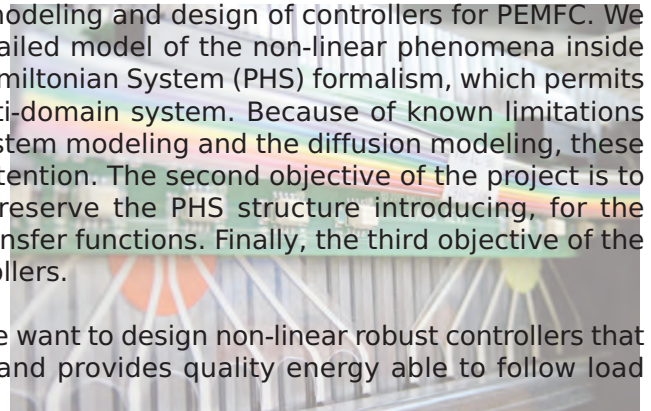
ITACA - Integration of advanced modeling, control, and control techniques applied to the management of the water cycle

PI: Gabriela Cembrano, Total budget 105.875 €

The water cycle refers to systems of recruitment, production, transportation and distribution of drinking water and urban drainage systems, collection of sewage and rainwater that return water to the natural environment, usually, after a cleansing process. This project refers to the use of advanced control techniques to the autonomous management of such systems.

Grants

AECI grant for the development of the project: Controllers for electric energy supply systems based on PEM type fuel cells

PI: Jordi Riera, Total budget 8.650 €

3

ELISSA - Electric incidence scheduling and supervisory algorithms

PI: Jordi Riera, Total budget 260.000 €

The ELISSA project, part of the larger CRISALDA CENIT project, develops new algorithms for intelligent energy routing on large distribution networks. The project seeks to determine through which paths should the energy flow on such networks, in order to avoid line overloads and resource conflicts, minimizing operational costs and blackout risks at the same time. The project will provide tools for safe reconfiguration and after-blackout recovery of such networks, based on the constraint programming paradigm.

Other contracts

CETAQUA - UPC for contributions to the promotion and supervision of research projects on water distribution networks

IP: Gabriela Cembrano, Total budget 45.000 €

CLABSA - Optimum Control of Urban Drainage Systems - Implementation of an integrated tool for the global optimized control of a combined sewer network.

IP: Gabriela Cembrano, Total budget 24.000 €

ICAEN - UPC for the development of a socioeconomical study on hydrogen technology and fuel cells.

IP: Jordi Riera, Total budget 4.000 €

4

Services

4 Robotics Laboratories

Articulated Robots Lab

The Articulated Robots Lab supports the research activities on perception, manipulation and kinematics. Current equipment includes two Staübli RX60 6 DOF manipulators with force torque sensors for cooperative manipulation research, a 7 DOF Barret arm with a three fingered hand for research on compliant human-assisted manipulation and a Delta haptic device for research on telemanipulation, plus general vision and range sensing devices. The laboratory also has 4 small humanoid robots for education activities.

Mobile Robotics and the Barcelona Robot Lab

The Institute has 5 wheeled and 1 legged mobile robots for research on outdoor mobile robotics. These include 2 segway-based mobile platforms, three Activemedia Pioneer robots, a six legged Lauron III walking robot and multiple sensors and cameras.

Furthermore, the Institute has setup the Barcelona Robot Lab, a 10.000 m^2 urban experimental site for outdoor service robotics research with more than 20 cameras and wifi connectivity.
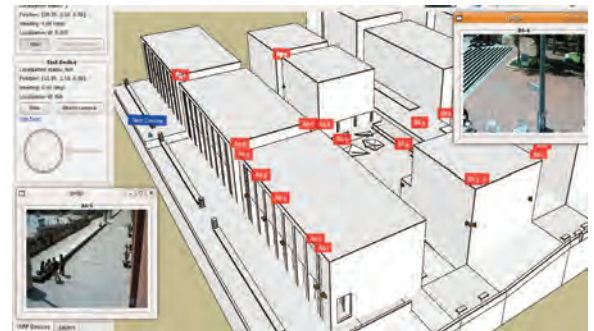
4 Control Laboratory
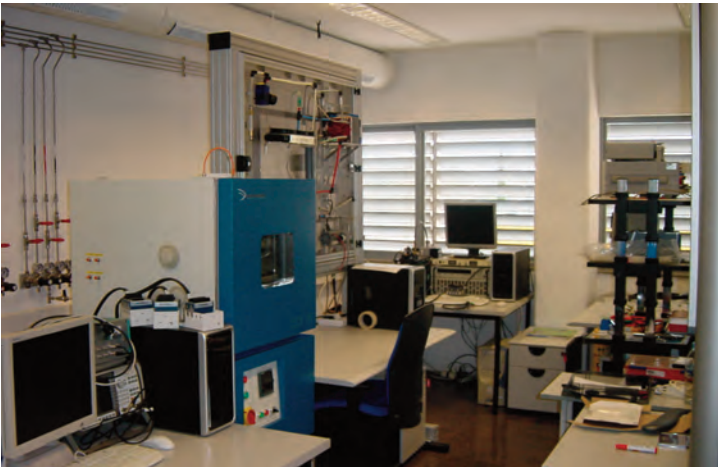
The Control Laboratory is used for the validation and testing of control strategies on fuel cell based energy conversion systems and special electrical machine-based energy generation.

The facilities are equipped with a supervisor system which monitors necessary safety conditions regarding gas leaks and power failure alarms management, automatic air extraction and safe shutdown routines for the test stations in case of emergency.
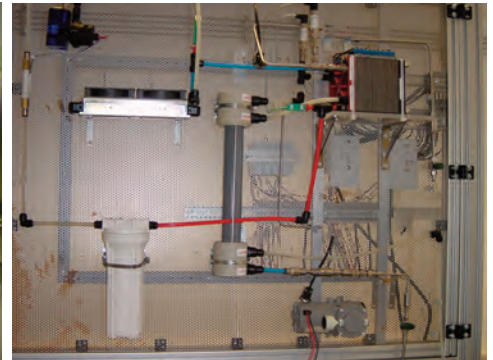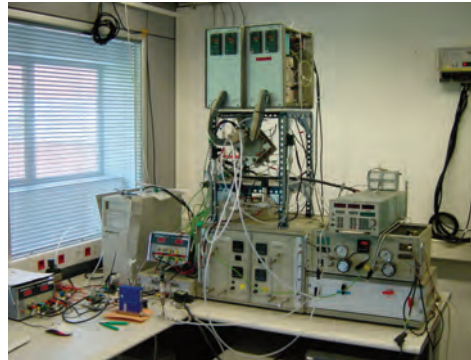
4 General Services

Workshop

The Workshop provides support in the design, and construction of electric, electronic, and mechanical devices and prototypes for the research projects carried out at IRI and partners. Current rapid prototyping equipment at the Workshop includes CNC machines and a 3D plastic printer.

Computer Center and Administration

General services include the Administration and Management which takes care of all the information and accounting tasks associated with research projects and contracts, as well as human resources administration; and the Computer Service provides all the computing and telecommunication needs of the Institute. Library services are provided by UPC at its FME Library facilities.

5

Education

5 Education

Graduate Courses

Robótica móvil y navegación
Alberto Sanfeliu - Juan Andrade.
Universitat Politècnica de Catalunya

Visión por computador I
Alberto Sanfeliu.
Universitat Politècnica de Catalunya

Planificació de trajectòries en robòtica
Pablo Jiménez.
Universitat Politècnica de Catalunya

PhD Theses Finished in 2007 - 2008

Analysis, architecture and fusion methods for vehicle automation
Student: Carlos Albores.
Advisors: Josep Maria Mirats and José Luis Gordillo.
Year: 2007

Estimació del moviment de robots mitjançant contorns actius
Student: Guillem Alenyà.
Advisor: Carme Torras.
Year: 2007

Visual navigation in unknown environments
Student: Teresa Vidal.
Advisors: Alberto Sanfeliu and Juan Andrade.
Year: 2007

5 Education

Ongoing PhD Theses 2007 - 2008

Learning in continuous domains with environment categorization
Student: Alejandro Agostini. Advisor: Enric Celaya.

Detecció visual de landmarks naturals per navegació de robots en exterior
Student: José Luis Albarral. Advisor: Enric Celaya.

Estudio de similitud de grafos y grafos medios para su aplicación en interacción humano-robot
Student: Itziar Bardají. Advisors: Miquel Ferrer and Alberto Sanfeliu.

Workspace computational analysis of closed kinematic chains
Student: Oriol Bohigas. Advisor: Lluís Ros.

Singularity-invariant leg rearrangements in Stewart platforms
Student: Júlia Borràs. Advisor: Federico Thomas.

Localització basada en mapa per a robots mòbils
Student: Andreu Corominas. Advisors: Josep Maria Mirats and Alberto Sanfeliu.

Perception and action under uncertainty
Student: Saúl Cuén. Advisors: Juan Andrade and Carme Torras.

Control de sistemas basados en pilas de combustible tipo PEM
Student: Diego Feroldi. Advisors: Jordi Riera and Maria Serra.

Best next view algorithm for solving object recognition ambiguities
Student: Sergi Foix. Advisors: Carme Torras and Guillem Alenyà.

Modelado y control de un reactor de producción de hidrogeno para la alimentación de pila de combustible
Student: Vanesa Garcia. Advisors: Maria Serra and Jordi Llorca.

Percepción cooperativa de robots móviles para la realización de tareas en zonas urbanas
Anaís Garrell. Advisor: Alberto Sanfeliu.

Analisis de viabilidad, diseño y construcción de un robot paralelo sub-actuado utilizando restricciones no holonómicas
Student: Patrick Grosch. Advisor: Federico Thomas.

Path planning for deformable robotic systems based on tensegrity structures
Student: Sergi Hernàndez. Advisor: Josep Maria Mirats.

5 Education

Distribución de agua líquida en pilas de combustible tipo PEM
Student: Attila Husar. Advisor: Jordi Riera.

Negotiation in distribuited large scale systems: a multi-agent MPC architecture
Student: Valeria Javalera. Advisors: Vicenç Puig and Gabriela Cembrano.

Recognizing actions in outdoor for human services
Student: Agustín Ortega. Advisor: Juan Andrade.

Diseño y validación de estrategias de diagnosis para pilas de combustible
Student: Mauricio Primucci. Advisor: Jordi Riera.

An integrated solution to the synthesis of multifinger grasps
Student: Carlos Rosales. Advisors: Lluìs Ros and Raúl Suárez.

Robot coaching of manipulation tasks using haptics and vision
Student: Leonel Rozo. Advisors: Carme Torras and Pablo Jiménez.

Emerging cooperative behavior for distributed task allocation
Student: Oscar Sandoval. Advisors: Josep Maria Mirats and Alberto Sanfeliu.

Estimation and correction of color changes in environments with non-controlled illumination for mobile robots
Student: Jorge Scandaliaris. Advisor: Alberto Sanfeliu.

Visual servoring para robótica e indústria: enfoque basado en redes neuronales
Student: Oscar Serra. Advisors: Alberto Sanfeliu and René Alquezar.

Camera pose recovery from large databases
Student: Eduard Serradell. Advisor: Francesc Moreno.

Autonomous 3D map building for urban settings with range data
Student: Ernesto Teniente. Advisor: Juan Andrade.

Models for human-robot interaction in urban environments
Student: Eduard Trulls. Advisor: Alberto Sanfeliu.

Simultaneous localization and mapping for mobile robots in urban settings
Student: Rafael Valencia. Advisor: Juan Andrade.

Boosting algorithms for real time object detection
Student: Michael Villamizar. Advisors: Alberto Sanfeliu and Juan Andrade.

5 Education

Master Theses Finished 2007-2008

Disseny, implementació i validació d'un robot subactuat basat en estructures tensegrity
Student: Josep Camps. Advisor: Josep Maria Mirats.

Modelat i comparació entre diferents tècniquest d'identificació per piles de combustible
Student: Lluís Ferrer. Advisor: Maria Serra.

Study of singularities of a family of parallel manipulators
Student: Marçal Garolera. Advisors: Carme Torras and Maria Alberich.

Simulation and control of a tensegrity based mobile robot. Dynamic equations of motion
Student: Albert Graells. Advisor: Josep Maria Mirats.

Implementació d'un métode de fusió sensorial per la navegació de robots mòvils
Student: Abraham León. Advisor: Josep Maria Mirats.

Disseny i construcció d'un làser 3D per al mapejat d'entorns exteriors
Student: Martí Morta. Advisor: Juan Andrade.

Learning inverse kinematics with a strongly biased model and function decomposition
Student: Stefan Ulbrich. Advisor: Vicente Ruíz de Angulo.

Estratègies de gestió d'energia en vehicles híbrids a pila de combustible
Student: Enric Roig. Advisor: Jordi Riera.

Device-independent haptic rendering system
Student: Leonel Rozo. Advisor: Pablo Jiménez.

Realización de una estación de test tipo PEMFC
Student: Tom Sigward. Advisor: Maria Serra.

5 Academic Exchange

IRI students abroad in the period 2007 - 2008

Alejandro Agostini
University of Karlsruhe. Karlsruhe, Alemania.

Alejandro Agostini
Bernstein Center for Computational Neuroscience
Göttingen. Max Planck Institute for Dynamics and
Self-Organization. Göttingen, Alemania.

Guillem Alenyà
Institut National de Recherche en Informatique et
en Automatique (INRIA). Grenoble, France

Andreu Coromines
Intelligent Autonomous System Laboratory.
Universitá degli Studi di Padova. Padova, Italy.

Sergi Hernandez
Dept. of Mechanical and Aerospace Engineering;
University of California. San Diego, USA.

Julia Borràs
Department of Engineering.
University of Ferrara. Ferrara, Italy.

Visiting students and professors at IRI during 2007 -2008

Davide Barcelli
University of Siena, Italy.

Marta Basualdo
Universidad Tecnológica Nacional. Rosario, Argentina

Elena Caini
University of Siena, Italy.

Juan Cortés
Laboratoire d'analyse et d'architecture des systèmes
(LASS-CNRS), Françe.

Babette Dellen
Bernstein Center for Computational Neuroscience.
(BCCN) Goettingen, Germany.

Valentina Fambrini
University of Siena, Italy.

José Luis Gordillo
Instituto Técnico Superior de Monterrey, Mexico.

Ismael Haddad
Institut National des Sciences Appliquées (INSA),
Toulouse, France.

Cristophe Jermann
Universidad de Nantes, France.

Cornel Sultan
Aerospace and ocean engineering
department, Virginia Tech, USA.

6

Outreach

6 Outreach Activities

Inaguration of Barcelona Robot Lab

On November 19th, 2008 the Institute inaugurated the Barcelona Robot Lab, a 10,000 sq.m. zone of the UPC Campus Nord for experimenting with service robots and ubiquitous sensors in urban areas. The event was attended by authorities from UPC, CSIC, and the Catalonia Government.

Community Activities
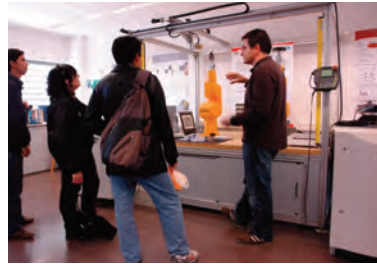
The Institute constantly participates on numerous activities that help disseminating the results of our research to the general public, either with booths and stands or through guided visits to our laboratories. These include the FME Forum organized yearly by UPC's Facultat de Matemàtiques i Estadística, and the Science Week, organized by the Spanish Ministry of Science and Innovation and the Generalitat.

Prizes and Media

We are extremely happy to congratulate our researchers for the prizes and honors they received. These include, the 2008 ACCENTURE and GMV Best PFC in Telematics and Spacial Technologies Awards to Josep Camps, the 2008 ESAII-UPC Best PhD Thesis to Carlos Ocampo, the UPC Best PhD Thesis to Francesc Moreno, and the ECCAI Fellow to Carme Torras.

Our faculty was featured in regional and national media and newspapers, including TeleMataró, iCatFM, Diplomàcia I Protocol, COMRàdioTVE2, Onda Cero. Finally, our researchers participated in several other international meetings such as the EU Cognitive Systems Day, or the Network Robot Forum in Tokio.

7

People

7 People

Automatic Control

Research staff, faculty and postdocs

Cembrano, Gabriela
Ocampo, Carlos
Riera, Jordi
Serra, Maria

PhD students

Feroldi, Diego
García, Vanesa
Guzman, Ana Gabriela
Husar, Attila
Javalera, Valeria
Primucci, Mauricio

Support personnel

Creemers, Tom
García, Francisco

Kinematics and Robot Design

Research staff, faculty and postdocs

Corcho, Francisco José
Jaillet, Léonard
Mirats, Josep Maria
Pérez, Alba
Porta, Josep Maria
Ros, Lluís
Ruíz de Angulo, Vicente
Thomas, Federico

PhD students

Bohigas, Oriol
Borràs, Júlia
Grosch, Patrick
Hernández, Sergi
Rosales, Carlos

Support personnel

Camps, Josep
Cefalo, Massimo

7 People

Mobile Robotics and Intelligent Systems

Research staff, faculty and postdocs

Alquézar, René
Andrade, Juan
Celaya, Enric
Ferrer, Miquel
González, Jordi
Ila, Viorela
Sanfeliu, Alberto

PhD students

Albarral, José Luis
Bardají, Itziar
Corominas, Andreu
Garrell, Anaís
Ortega, Agustín
Scandaliaris, Jorge
Sandoval, Oscar
Serra, Oscar
Serradell, Eduard
Teniente, Ernesto Homar
Trulls, Eduard
Valencia, Rafael
Villamizar, Michael

Support personnel

Biota, Lidia
Emde, Walter
López, Juan Pedro
Pérez, Joan

Perception and Manipulation

Research staff, faculty and postdocs

Alberich, Maria
Alenyà, Guillem
Amat, Josep
Jiménez, Pablo
Moreno, Francesc
Torras, Carme

PhD students

Agostini, Alejandro
Cuén, Saúl
Foix, Sergi
Rozo, Leonel

General Services

Administration

Canales, Ana María
Casañ, Isabel Maria
Llavería, Eva
Expósito, Esther
Rivero, José Luis

Computer Center

Lázaro, José
Roncero, José Luis

Workshop and Laboratories

Allué, Miguel
Cortés, Ferran
Monclús, Eva

8

Finances

• • •

Finances

Budget - 2008

- COMPETITIVE PERSONNEL PROGRAMS; 273.000,00 €
- CSIC SPECIFIC INVESTMENTS ON INFRASTRUCTURE; 137.720,00 €
- CSIC GENERAL BUDGET; 724.442,00 €
- COMPETITIVE PROJECT FUNDS; 1.083.533,30 €
- UPC GENERAL BUDGET; 383.000,00 €

Expenses - 2008

- GENERAL RUNNING EXPENSES 6%
- OTHER PROJECT RELATED EXPENSES 9%
- SCIENTIFIC INFRASTRUCTURE 12%
- PERSONNEL 73%

9

Publications

• • •
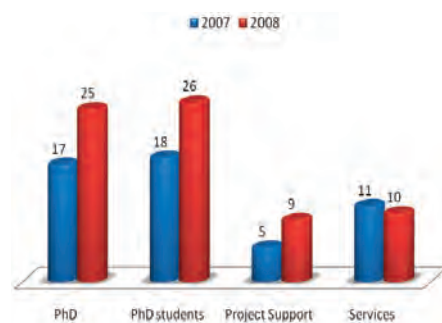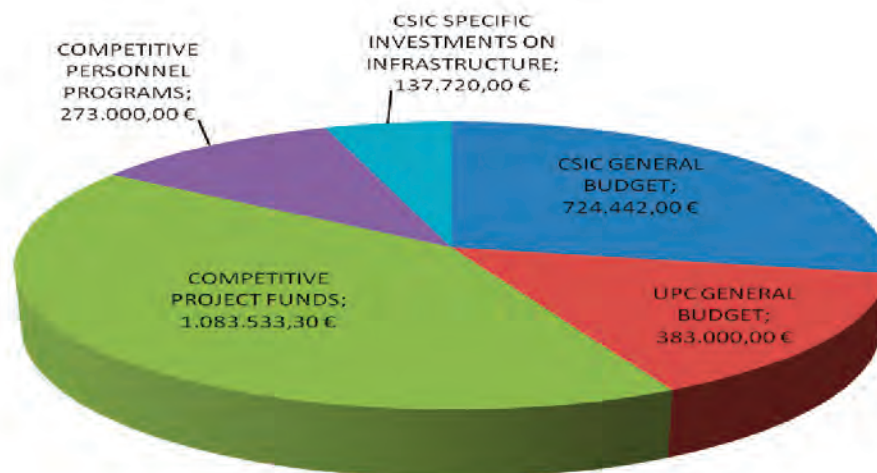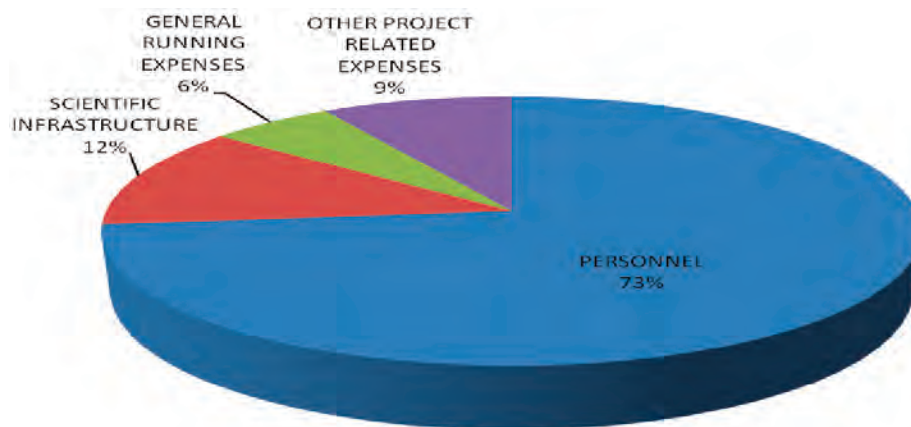
9 Scientific Publications

Journal Articles

M. Alberich-Carramiñana, G. Alenyà, J. Andrade-Cetto, E. Martínez and C. Torras. Recovering the epipolar direction from two affine views of a planar object. **Computer vision and image understanding**, 112(2): 195-209, 2008.

M. Alberich-Carramiñana, F. Thomas and C. Torras. Flagged parallel manipulators. **IEEE transactions on robotics**, 23(5): 1013-1023, 2007.

J. Andrade-Cetto and F. Thomas. A wire-based active tracker. **IEEE transactions on robotics**, 24(3): 642-651, 2008.

A. Corominas-Murtra, J.M. Mirats-Tur and A. Sanfeliu. Action evaluation for mobile robot global localization in cooperative environments. **Robotics and autonomous system**s, 56(10): 807-818, 2008.

C. Fernández, P. Baiget, F.X. Roca and J. Gonzàlez. Interpretation of complex situations in a semantic-based surveillance framework. **Signal processing: image communication**, 23(7): 554-569, 2008.

A. Fernandez-Caballero, A. Sanfeliu and Y. Shirai. Pattern recognition in interdisciplinary perception and intelligence . **Pattern recognition letters**, 29(8): 1021-1029, 2008.

D. Feroldi, M. Serra and J. Riera. Performance improvement of a PEMFC system controlling the cathode outlet air flow. **Journal of power sources**, 169(1): 205-212, 2007.

S. Hernández and J.M. Mirats-Tur. Tensegrity frameworks: static analysis review. **Mechanism and machine theory**, 43(7): 859-881, 2008.

J.A. Hueto, J. Díaz, E. Monclús, I. Navazo, P.P. Vázquez and G. Raspall. A 3D System for training in endoscopical repair of subcondylar fractures of the mandible. **International journal of computer assisted radiology and surgery**, 3(1): 292-292, 2008.

A.P. Husar, C. Kunusch, P.F. Puleston, M.Á. Mayosky and J. Moré. Linear identification and model adjustment of a PEM fuel cell stack. **International journal of hydrogen energy**, 33(13): 3581-3587, 2008.

9 Scientific Publications

A.P. Husar, M. Serra and C. Kunusch. Description of gasket failure in a 7 cell PEMFC stack. **Journal of power sources**, 169(1): 85-91, 2007.

P. Jiménez. Better understanding motion planning: A compared review of "Principles of Robot Motion: theory, algorithms, and implementations". **Computer science review**, 1(1): 67-72, 2007.

J.M. Mirats-Tur, C. Albores and J.L. Gordillo. Communication to: Close form for expressing the uncertainty in odometry position estimate. Application to an autonomous vehicle. **IEEE transactions on robotics**, 23(6): 302-302, 2007.

E. Monclús, I. Navazo, P.P. Vázquez, J. Herrero and J. López. Automatic generation of exploration paths for medical models. **International journal of computer assisted radiology and surgery**, 3(1): 52-53, 2008.

F. Moreno-Noguer, A. Sanfeliu and D. Samaras. Dependent multiple cue integration for robust tracking. **IEEE transactions on pattern analysis and machine intelligence**, 30(4): 670-685, 2008.

F. Moreno-Noguer, A. Sanfeliu and D. Samaras. Integration of deformable contours and a multiple hypotheses Fisher color model for robust tracking in varying illuminant environments. **Image and vision computing**, 25(3): 285-296, 2007.

M. Mozerov, A. Amato, F.X. Roca and J. Gonzàlez. Trajectory occlusion handling with multiple view distance minimization clustering. **Optical engineering**, 47: 2021-2029, 2008.

J.M. Porta, L. Ros, F. Thomas, F. Corcho, J. Cantó and J.J. Pérez. Complete maps of molecular-loop conformational spaces. **Journal of computational chemistry**, 28(13): 2170-2189, 2007.

J.M. Porta, L. Ros, T. Creemers and F. Thomas. Box approximations of planar linkage configuration spaces. **Journal of mechanical design** , 127(4): 397-405, 2007.

I. Rius, J. Gonzàlez, M. Mozerov and F.X. Roca. Automatic learning of 3D pose variability in walking performances for gait analysis. **International journal for computational vision and biomechanics**, 1(1): 33-43, 2008.

9 Scientific Publications

A. Rodríguez, L. Basañez and E. Celaya. A relational positioning methodology for robot task specification and execution. **IEEE transactions on robotics**, 24(3): 600-611, 2008.

V. Ruíz de Angulo and C. Torras. Learning inverse kinematics: Reduced sampling through decomposition into virtual robots. **IEEE transactions on systems, man and cybernetics**: Part B, 38(6): 1571-1577, 2008.

F.M. Sánchez-Martín, P. Jiménez, F. Millán, J. Salvador-Bayarri, V. Monllau, J. Palou and H. Villavicencio. Historia de la robótica: de Arquitas de Tarento al robot da Vinci (Parte II). **Actas urológicas españolas**, 31(3): 185-196, 2007.

A. Sanfeliu, N. Hagita and A. Saffiotti. Editorial. **Robotics and autonomous systems**, 56(10): 791-791, 2008.

A. Sanfeliu, N. Hagita and A. Saffiotti. Network robot systems. **Robotics and autonomous systems**, 56(10): 793-797, 2008.

F. Thomas. A short account of Leonardo Torres' endless spindle. **Mechanism and Machine Theory**, 43(8): 1055-1063, 2008.

J. Varona, J. Gonzàlez, I. Rius and J.J. Villanueva. Importance of detection for video surveillance applications. **Optical engineering**, 47(8): 1-9, 2008.

Books edited

T. Alsinet, J. Puyol-Gruart, C. Torras (editors). Artificial Intelligence Research and Development: Proc. of the 11th International Conference of the Catalan Association for Artificial Intelligence. Volume 184 of Frontiers in Artificial Intelligence and Applications. IOS Press, 2008.

J. Filipe, J. Andrade-Cetto, J. Ferrier (editors). Proceedings of the 5th International Conference on Informatics in Control, Automation and Robotics. INSTICC, 2008.

J. Zaytoon, J. Ferrier, J. Andrade-Cetto, J. Filipe (editors). Proceedings of the 4th International Conference on Informatics in Control, Automation and Robotics. INSTICC, 2007.

9   Scientific Publications

Book Chapters

G. Alenyà and C. Torras. Robot egomotion from the deformation of active contours. In Mobile Robots, Perception & Navigation, 1-18. pro Literatur Verlag, 2007.

J. Andrade-Cetto and M. Villamizar. Object recognition. In Wiley Encyclopedia of Electrical and Electronics Engineering, 1-28. John Wiley & Sons, 2007.

Conference Articles

A. Agostini, E. Celaya, C. Torras and F. Wörgötter. Action rule induction from cause-effect pairs learned through robot-teacher interaction, International Conference on Cognitive Systems, 2008, Karlsruhe, Germany, pp. 213-218, University of Karlsruhe.

M. Al, F.J. Orozco, A. Amato, F.X. Roca and J. Gonzàlez. Finding faces in color images through primitive shape features, 2nd Workshop on Computer Vision: Advances in Research & Development, 2007, Bellaterra, Spain, pp. 1-6.

M. Al, A. Amato, G. Sánchez and J. Gonzàlez. On-line one stroke character recognition using directional features, International Workshop on Advances in Pattern Recognition, 2007, Plymouth, UK, pp. 145-146, Springer.

M. Al, A. Amato, F.X. Roca and J. Gonzàlez. Face detection in color images using primitive shape features, 5th International Conference on Computer Recognition Systems, Wroclaw, Poland, in Computer Recognition Systems 2, Vol 45 of Advances in Soft Computing, pp. 179-186, 2007, Springer.

G. Alenyà and C. Torras. Monocular object pose computation with the foveal-peripheral camera of the humanoid robot Armar-III, 11th International Conference of the Catalan Association for Artificial Intelligence, Sant Martí d'Empúries, Spain, in Artificial Intelligence Research and Development, Vol 184 of Frontiers in Artificial Intelligence and Applications, pp. 355-362, 2008, IOS Press.

G. Alenyà and C. Torras. Zoom control to compensate camera translation within a robot egomotion estimation approach, 6th International Workshop on Robot Motion and Control, Bukowy Dworek, Poland, in Robot Motion and Control 2007, Vol 360 of Lecture Notes in Control and Information Sciences, pp. 1-18, 2007, Springer, Berlin, Germany.

9 Scientific Publications

G. Alenyà, M. Alberich-Carramiñana and C. Torras. Depth from the visual motion of a planar target induced by zooming, IEEE International Conference on Robotics and Automation, 2007, Rome, Italy, pp. 4727-4732, IEEE.

A. Amato, M. Al, J. Lladós and J. Gonzàlez. Computationally efficient graph matching via energy vector extraction, International Workshop on Advances in Pattern Recognition, 2007, Plymouth, UK, pp. 1-7, Springer.

A. Amato, M. Al, M. Mozerov and J. Gonzàlez. Trajectory fusion for multiple camera tracking, 5th International Conference on Computer Recognition Systems, Wroclaw, Poland, in Computer Recognition Systems 2, Vol 45 of Advances in Soft Computing, pp. 19-26, 2007, Springer.

P. Baiget, J. Soto, F.X. Roca and J. Gonzàlez. Automatic generation of computer animated sequences based on human behaviour modelling, 10th International Conference in Computer Graphics and Artificial Intelligence, 2007, Athens, Greece, pp. 1-11, TEIATH.

P. Baiget, C. Fernández, A. Amato, F.X. Roca and J. Gonzàlez. Constructing a path database for scene categorization, 2nd Computer Vision: Advances in Research & Development, 2007, Bellaterra, Spain, pp. 1-6.

P. Baiget, C. Fernández, F.X. Roca and J. Gonzàlez. Automatic learning of conceptual knowledge in image sequences for human behavior interpretation, 3rd Iberian Conference on Pattern Recognition and Image Analysis, Girona, Spain, in Vol 4477 of Lecture Notes in Computer Science, pp. 507-514, 2007, Springer Verlag, Berlin, Germany.

S. Biset, M. Basualdo, V.. García and M. Serra. Análisis de estructuras de control para una planta de generación de H2 para pila de combustible, III Congreso Nacional de Pilas de Combustible, Zaragoza, Spain, in Libro de comunicaciones, pp. 395-398, 2008, APPICE.

J. Borràs, E. Ottaviano, M. Ceccarelli and F. Thomas. Optimal design of a 6-DOF 4-4 parallel manipulator with uncoupled singularities, XVII Congreso Nacional de Ingeniería Mecánica, 2008, Gijón, Spain, pp. 1047-1052, Asociación Española de Ingeniería Mecánica.

J. Borràs, F. Thomas and C. Torras. Architecture singularities in flagged parallel manipulators, IEEE International Conference on Robotics and Automation, 2008, Pasadena, USA, pp. 3844-3850, IEEE.

9 Scientific Publications

J. Borràs, F. Thomas and C. Torras. Analysing the singularities of 6-SPS parallel robots using virtual legs, 2nd International Workshop on Fundamental Issues and Future Research Directions for Parallel Mechanisms and Manipulators, 2008, Montpeller, France, pp. 145-150, LIRMM.

J. Borràs and R. Di Gregorio. Direct position analysis of a large family of spherical and planar parallel manipulators with four loops, 2nd International Workshop on Fundamental Issues and Future Research Directions for Parallel Mechanisms and Manipulators, 2008, Montpellier, France, pp. 19-29, LIRMM.

E. Celaya, T. Creemers and L. Ros. Exact interval propagation for the efficient solution of planar linkages, 12th World Congress in Mechanism and Machine Science, 2007, Besançon, France, pp. 1-7, ASME.

E. Celaya, J.L. Albarral, P. Jiménez and C. Torras. Visually-guided robot navigation: From artificial to natural landmarks, 6th International Conference on Field and Service Robotics, Chamonix, France, Vol 42 of Springer Tracts on Advanced Robotics, pp. 287-296, 2007, Springer, Berlin, Germany.

E. Celaya, J.L. Albarral, P. Jiménez and C. Torras. Natural landmark detection for visually-guided robot navigation, 10th Congress of the Italian Association for Artificial Intelligence, Rome, Italy, in Artificial Intelligence and Human-Oriented Computing, Vol 4733 of Lecture Notes in Computer Science, pp. 555-566, 2007, Springer, Berlin, Germany.

B. Chakraborty, I. Rius, M. Perdersoli, M. Mozerov and J. Gonzàlez. Component-based human detection, 2nd Worshop on Computer Vision: Advances in Research & Development, 2007, Bellaterra, Spain, pp. 1-6.

A. Corominas-Murtra, J.M. Mirats-Tur and A. Sanfeliu. Efficient active global localization for mobile robots operating in large and cooperative environments, IEEE International Conference on Robotics and Automation, 2008, Pasadena, USA, pp. 2758-2763, IEEE.

A. Corominas-Murtra, J.M. Mirats-Tur, O. Sandoval and A. Sanfeliu. Real-time software for mobile robot simulation and experimentation in cooperative environments, 1st International Conference on Simulation, Modelling and Programming for Autonomous Robots, Venice, Italy, in Simulation, Modeling, and Programming for Autonomous Robots, Vol 5321 of Lecture Notes in Computer Science, pp. 135-146, 2008, Springer, Berlin, Germany.

9 Scientific Publications

S. Cuén Rochín, J. Andrade-Cetto and C. Torras. Action selection for robotic manipulation of deformable objects, 2008 Frontier Science Conference Series for Young Researchers: Experimental Cognitive Robotics, 2008, Kanagawa, Japan, pp. 1-6, ESF-JSPS.

T. Escobet, D. Feroldi, S. de Lira, J. Quevedo, J. Riera, M. Serra and V. Puig. Diagnóstico de fallos en sistemas de generación de energía basados en pilas de combustible, III Congreso Nacional de Pilas de Combustible, Zaragoza, Spain, in Libro de comunicaciones, pp. 223-226, 2008, APPICE.

C. Fernández and J. Gonzàlez. Ontology for semantic integration in a cognitive surveillance system, 2nd International Conference on Semantic and Digital Media Technologies, Genoa, Italy, in Semantic Multimedia, Vol 4816 of Lecture Notes in Computer Science, pp. 260-263, 2007, Springer, Berlin, Germany.

C. Fernández, P. Baiget, F.X. Roca and J. Gonzàlez. Semantic annotation of complex human scenes for multimedia surveillance, 10th Congress of the Italian Association for Artificial Intelligence, Rome, Italy, in Artificial Intelligence and Human-Oriented Computing, Vol 4733 of Lecture Notes in Computer Science, pp. 698-709, 2007, Springer, Berlin, Germany.

C. Fernández, P. Baiget, F.X. Roca and J. Gonzàlez. Natural language descriptions of human behaviour from video sequences, 30th German Conference on Artificial Intelligence, Osnabrück, Germany, in Advances in Artificial Intelligence, Vol 4667 of Lecture Notes in Computer Science, pp. 279-292, 2007, Springer, Berlin, Germany.

C. Fernández, P. Baiget, F.X. Roca and J. Gonzàlez. High-level integration for cognitive vision surveillance, 2nd Computer Vision: Advances in Research & Development, 2007, Bellaterra, Spain, pp. 1-6.

D. Feroldi, E.J. Roig Remon, M. Serra and J. Riera. Energy management strategies for fuel cell-hybrid vehicles, I Simposium Ibérico de Hidrógeno, Pilas de Combustible y Baterías Avanzadas, 2008, Bilbao, Spain, pp. 1-26, EHU.

R. Frigola, L. Ros, F. Roure and F. Thomas. A wrench-sensitive touch pad based on a parallel structure, 2008 IEEE International Conference on Robotics and Automation, Pasadena, USA, pp. 3449-3454, IEEE.

9 Scientific Publications

V. García, E. López, M. Serra and J. Llorca. Modelo dinámico de un reformador de etanol a bajas temperaturas para la alimentación de pilas de combustible, III Congreso Nacional de Pilas de Combustible, Zaragoza, Spain, in Libro de comunicaciones, pp. 279-282, 2008, APPICE.

V. García, E. López, M. Serra, J. Llorca and J. Riera. Modeling of a three-stage low temperature ethanol steam reforming reactor for fuel cell applications, 2008 Fuel Cells Science & Technology: Scientific Advances in Fuel Cell Systems, 2008, Copenhagen, Denmark, pp. 100-102, Elsevier.

F.A. García, F.J. Orozco, J. Gonzàlez and L. Arcos. Assessing confidence in cased based reuse step, 10th International Conference of the Catalan Association for Artificial Intelligence, 2007, Sant Julià de Lòria, Andorra, in Artificial Intelligence Research and Development, pp. 161-168, IOS Press.

J. Gonzàlez, F.X. Roca and J.J. Villanueva. HERMES: A research project on human sequence evaluation, 2007 ECCOMAS Thematic Conference on Computational Vision and Medical Image Processing, Porto, Portugal, in Computational Vision and Medical Image Processing: VipIMAGE 2007, pp. 1-6, 2007, Taylor and Francis.

S. Hernández and J.M. Mirats-Tur. A method to generate stable, collision free configurations for tensegrity based robots, IEEE/RSJ International Conference on Intelligent Robot and Systems, 2008, Nice, France, pp. 3769-3774, IEEE.

I. Huerta, D. Rowe, M. Viñas, M. Mozerov and J. Gonzàlez. Background subtraction fusing colour, intensity and edge cues, 2nd Workshop on Computer Vision: Advances in Research & Development, 2007, Bellaterra, Spain, pp. 105-110.

I. Huerta, D. Rowe, M. Mozerov and J. Gonzàlez. Improving background subtraction based on a casuistry of colour-motion segmentation problems, 3rd Iberian Conference on Pattern Recognition and Image Analysis, Girona, Spain, in Vol 4477 of Lecture Notes in Computer Science, pp. 475-482, 2007, Springer Verlag, Berlin, Germany.

A.P. Husar, C. Kunusch, P.F. Puleston and M.Á. Mayosky. Modelado dinámico y validación experimental de una pila de combustible PEM, XIII Congreso Latinoamericano de Control Automático, Mérida, Venezuela, pp. 39-47, Universidad de los Andes.

9 Scientific Publications

A.P. Husar, M. Serra and J. Riera. Experimental methodology for modeling water diffusion transport in a PEMFC stack with respect to membrane temperature and resistance, Fuel Cells Science & Technology: Scientific Advances in Fuel Cell Systems, 2008, Copenhagen, Denmark, pp. 5-5, Elsevier.

V. Ila, J. Andrade-Cetto and A. Sanfeliu. Efficient vision-based loop closing techniques for delayed state robot mapping, Frontier Science Conference Series for Young Researchers: Experimental Cognitive Robotics, 2008, Kanagawa, Japan, pp. 1-6, ESF-JSPS.

V. Ila, J. Andrade-Cetto, R. Valencia and A. Sanfeliu. Vision-based loop closing for delayed state robot mapping, IEEE/RSJ International Conference on Intelligent Robot and Systems, 2007, San Diego, USA, pp. 3892-3897, IEEE .

V. Ila, J. Andrade-Cetto and A. Sanfeliu. Outdoor delayed-state visually augmented odometry, 6th IFAC Symposium on Intelligent Autonomous Vehicles, 2007, Toulouse, France, pp. 1-6, IFAC.

J.M. Mirats-Tur, S. Hernández and A. Graells. Dynamic equations of motion for a 3-bar tensegrity based mobile robot, 12th IEEE International Conference on Emerging Technologies and Factory Automation, 2007, Patras, Grecee, pp. 1334-1339, IEEE.

J.M. Mirats-Tur and C. Albores. Outdoor robot navigation based on a probabilistic data fusion scheme, 2007 IEEE/RSJ International Conference on Intelligent Robot and Systems, San Diego, USA, pp. 3733-3738, IEEE.

J.M. Mirats-Tur. Onto computing the uncertainty for the odometry pose estimate of a mobile robot, 12th IEEE International Conference on Emerging Technologies and Factory Automation, 2007, Patras, Greece, pp. 1340-1345, IEEE.

M. Mozerov, A. Amato, F.X. Roca and J. Gonzàlez. Trajectory extrapolation for multiple views tracking, 8th International Conference on Pattern Recognition and Image Analysis, Yoshkar-Ola, Russia, pp. 85-88, Mari State Technical University.

M. Mozerov, A. Amato, M. Al and J. Gonzàlez. A simple method of multiple camera calibration for the joint top view projection, 5th International Conference on Computer Recognition Systems, Wroclaw, Poland, in Computer Recognition Systems 2, Vol 45 of Advances in Soft Computing, pp. 164-170, 2007, Springer.

9 Scientific Publications

F.J. Orozco, F.X. Roca and J. Gonzàlez. Deterministic and stochastic methods for gaze tracking in real-time, 12th International Conference on Computer Analysis of Images and Patterns, Vienna, Austria, in Computer Analysis of Images and Patterns, Vol 4673 of Lecture Notes in Computer Science, pp. 45-52, 2007, Springer, Berlin, Germany.

F.J. Orozco, J. Gonzàlez, I. Rius and F.X. Roca. Hierarchical eyelid and face tracking, 3rd Iberian Conference on Pattern Recognition and Image Analysis, Girona, Spain, in Vol 4477 of Lecture Notes in Computer Science, pp. 499-506, 2007, Springer Verlag, Berlin, Germany.

F.J. Orozco, F.A. García, L. Arcos and J. Gonzàlez. Spatio-temporal reasoning for reliable facial expression interpretation, 5th International Conference on Computer Vision Systems, 2007, Bielefeld, Germany, pp. 1-10, Bielefeld University.

M. Perdersoli, J. Gonzàlez, B. Chakraborty and J.J. Villanueva. Enhancing real-time human detection based on histograms of oriented gradients, 5th International Conference on Computer Recognition Systems, Wroclaw, Poland, in Computer Recognition Systems 2, Vol 45 of Advances in Soft Computing, pp. 739-746, 2007, Springer.

M. Perdersoli, J. Gonzàlez, B. Chakraborty and J.J. Villanueva. Boosting histograms of oriented gradients for human detection, 2nd Worshop on Computer Vision: Advances in Research & Development, 2007, Bellaterra, Spain, pp. 1-6.

J.M. Porta, J. Cortés, L. Ros and F. Thomas. A space decomposition method for path planning of loop linkages, IEEE/RSJ International Conference on Intelligent Robot and Systems, 2007, San Diego, USA, pp. 1882-1888, IEEE .

M. Primucci, L. Ferrer, M. Serra and J. Riera. Characterisation of fuel cell state using Electrochemical Impedance Spectroscopy analysis, I Simposium Ibérico de Hidrógeno, Pilas de Combustible y Baterías Avanzadas, Bilbao, Spain, pp. 1-26, EHU.

M. Primucci, M. Serra and J. Riera. Test de interrupción de la humidificación para la diagnosis en pilas PEM, III Congreso Nacional de Pilas de Combustible, 2008, Zaragoza, Spain, in Libro de comunicaciones, pp. 1-4, 2008, APPICE.

9 Scientific Publications

V. Puig, D. Feroldi, M. Serra, J. Quevedo and J. Riera. Fault-tolerant MPC control of PEM fuel cells, 17è International Federation of Automatic Control: World Congress, 2008, Seoul, South Korea, pp. 11112-11117, Elsevier.

J. Quevedo, V. Puig and M. Serra. Polynomial approach to design a virtual actuator for a fault tolerant control: Application to a PEM fuel cell, 5th Workshop on Advanced Control and Diagnosis, 2007, Grenoble, France, pp. 1-1, Institut franco-allemand pour les applications de la recherche.

A. Rodríguez, L. Basañez and E. Celaya. Robot task specification and execution through relational positioning, IFAC Workshop on Intelligent Manufacturing Systems, 2007, Alicante, Spain, pp. 1-6, IFAC.

C. Rosales, J.M. Porta, R. Suárez and L. Ros. Finding all valid hand configurations for a given precision grasp, 2008 IEEE International Conference on Robotics and Automation, Pasadena, USA, pp. 1634-1640, IEEE.

D. Rowe, I. Huerta, M. Perdersoli, S. Guinea, J. Gonzàlez and J.J. Villanueva. A hierarchical architecture to multiple target tracking, 2nd Workshop on Computer Vision: Advances in Research & Development, 2007, Bellaterra, Spain, pp. 1-6.

D. Rowe, I. Huerta, J. Gonzàlez and J.J. Villanueva. Robust multiple-people tracking using color-based particle filters, 3rd Iberian Conference on Pattern Recognition and Image Analysis, Girona, Spain, in Vol 4477 of Lecture Notes in Computer Science, pp. 113-120, 2007, Springer Verlag, Berlin, Germany.

D. Rowe, J. Gonzàlez, I. Huerta and J.J. Villanueva. On reasoning over tracking events, 15th Scandinavian Conference on Image Analysis, Aalborg, Denmark, in Image Analysis, Vol 4522 of Lecture Notes in Computer Science, pp. 502-511, 2007, Springer, Berlin, Germany.

V. Ruíz de Angulo and C. Torras. Exploiting single-cycle symmetries in branch-and-prune algorithms, 13th International Conference on Principles and Practice of Constraint Programming, Providence, USA, in Principles and Practice of Constraint Programming, Vol 4741 of Lecture Notes in Computer Science, pp. 864-871, 2007, Springer Verlag, Berlin, Germany.

A. Sanfeliu. Ubiquitous networking robotics in urban sites (URUS), IARP/EURON Workshop on Robotics for Risky Interventions and Environmental Surveillance, 2008, Benicasim, Spain, pp. 1-24, IARP; EURON.

9 Scientific Publications

A. Sanfeliu. URUS: Ubiquitous networking robotics for urban settings, 2008 Cognitive Systems Industry Day, 2008, Sankt Augustin, Germany, pp. 1-26, IAIS.

A. Sanfeliu. URUS: Ubiquitous networking robotics for urban settings, ICRA Workshop on Network Robot Systems, 2008, Pasadena, USA, pp. 1-44, IEEE.

A. Sanfeliu. A view of network robot systems in urban areas in Europe, IROS Workshop on Network Robot Systems, 2008, Nice, France, pp. 1-60, IEEE.

A. Sanfeliu. An European vision of network robot systems in urban areas, Network Robot Forum Meeting, 2008, Tokio, Japan, pp. 1-30, NRF.

A. Sanfeliu. Cooperative issues in network robot systems in urban areas, Lisbon Workshop on New Challenges for Cooperative Robotics, 2008, Lisboa, Portugal, pp. 1-47, ISR.

A. Sanfeliu. Progress on ubiquitous networking robotics in urban settings , IROS Workshop on Network Robot Systems, 2007, San Diego, USA, pp. 8-31, IEEE.

J. Scandaliaris, M. Villamizar, J. Andrade-Cetto and A. Sanfeliu. Robust color contour object detection invariant to shadows, 12th Iberoamerican Congress on Pattern Recognition, 2007, Valparaiso, Chile, in Progress in Pattern Recognition, Image Analysis and Applications, Vol 4756 of Lecture Notes in Computer Science, pp. 301-310, Springer Verlag, Berlin, Germany.

F. Serratosa, G. Sanroma and A. Sanfeliu. A new algorithm to compute the distance between multi-dimensional histograms , 12th Iberoamerican Congress on Pattern Recognition, 2007, Valparaiso, Chile, in Progress in Pattern Recognition, Image Analysis and Applications, Vol 4756 of Lecture Notes in Computer Science, pp. 115-123, Springer Verlag, Berlin, Germany.

F. Thomas and P. Ben-Horin. A nonholonomic 3-DOF parallel robot, 11th International Symposium on Advances in Robot Kinematics, 2008, Batz-sur-Mer, France, pp. 111-118, Springer.

E. Todt and C. Torras. Outdoor landmark-view recognition based on bipartite-graph matching and logistic regression, IEEE International Conference on Robotics and Automation, 2007, Rome, Italy, pp. 4289-4294, IEEE.

9 Scientific Publications

P.P Vázquez, E. Monclús and I. Navazo. Representative views and paths for volume models, 9th International Symposium on Smart Graphics, Rennes, France, in Smart Graphics, Vol 5166 of Lecture Notes in Computer Science, pp. 106-117, 2008, Springer Verlag, Berlin, Germany.

T. Vidal-Calleja, A. Sanfeliu and J. Andrade-Cetto. Guiding and localising in real-time a mobile robot with a monocular camera in non-flat terrains, 6th IFAC Symposium on Intelligent Autonomous Vehicles, 2007, Toulouse, France, pp. 1-6, IFAC.

T. Vidal-Calleja, M. Bryson, S. Sukkarieh, A. Sanfeliu and J. Andrade-Cetto. On the observability of bearing only SLAM, 2007 IEEE International Conference on Robotics and Automation, 2007, Rome, Italy, pp. 4114-4119, IEEE.

M. Villamizar, A. Sanfeliu and J. Andrade-Cetto. Unidimensional multiscale local features for object detection under rotation and mild occlusions, 3rd Iberian Conference on Pattern Recognition and Image Analysis, Girona, Spain, in Vol 4477 of Lecture Notes in Computer Science, pp. 645-651, 2007, Springer Verlag, Berlin, Germany.

Institut de Robòtica i Informàtica industrial
Parc Tecnològic de Barcelona
c/ Llorens i Artigas 4-6
08028 Barcelona.
Tel :+34 93 4015751
Fax: +34 93 4015750
Email: admin-iri@iri.upc.edu

Biannual
Report 07/08

www.iri.upc.edu