

# **2012 Brazilian Robotics Symposium and Latin American Robotics Symposium**

## **(SBR-LARS 2012)**

**Fortaleza, Brazil  
16 – 19 October 2012**



IEEE Catalog Number: CFP12LAR-PRT  
ISBN: 978-1-4673-4650-4

# **2012 Brazilian Robotics Symposium and Latin American Robotics Symposium**

## **SBR-LARS 2012**

### **Table of Contents**

Preface.....	x
Technical Program Committee.....	xi
Reviewers.....	xiii

---

### **Technical Papers**

A Visual-Perception Layer Applied to Reactive Navigation .....	1
<i>A. Miranda Neto, A. Corrêa Victorino, and J. V. Ferreira</i>	
Reinforcement Learning with Case-Based Heuristics for RoboCup Soccer	
Keepaway .....	7
<i>Luiz A. Celiberto Jr., Jackson P. Matsuura, Ramón López de Mántaras,         and Reinaldo A. C. Bianchi</i>	
Multi-agent Multi-objective Learning Using Heuristically Accelerated	
Reinforcement Learning .....	14
<i>Leonardo A. Ferreira, Reinaldo A. C. Bianchi, and Carlos H. C. Ribeiro</i>	
Designing a Real Time Artificial Vision System for Human Interaction	
with an Omnidirectional Mobile Platform .....	21
<i>Carolina Moreno Salcedo, Cesar Augusto Peña, Jés de Jesus Cerqueira,         and Antonio Marcus Nogueira Lima</i>	
Web-Based Robot Programming Environment and Control Architecture .....	27
<i>Rafael V. Aroca, Renato Q. Gardiman, and Luiz Marcos G. Gonçalves</i>	
Explicit Analytic Solution for Inverse Kinematics of Bioloid Humanoid Robot .....	33
<i>J. Victor Nunez, Abraham Briseno, Dora A. Rodriguez, J. Manuel Ibarra,     and Victor M. Rodriguez</i>	
2.5-Dimensional Grid Mapping from Stereo Vision for Robotic Navigation .....	39
<i>Anderson A. S. Souza and Luiz M. G. Gonçalves</i>	
A Real Time 6DOF Visual SLAM System Using a Monocular Camera .....	45
<i>Andrés Díaz, Eduardo Caicedo, Lina Paz, and Pedro Piniés</i>	
Simulation Platform for Quadricopter: Using Matlab/Simulink and X-Plane .....	51
<i>Helosman V. Figueiredo and Osamu Saotome</i>	

Cooperative Robotic Exploration and Transport of Unknown Objects .....	56
<i>Elizabeth D. S. Costa, Pedro M. Shiroma, and Mario F. M. Campos</i>	
Robotic Communication Backbone .....	62
<i>Elerson Rubens da S. Santos and Marcos A. M. Vieira</i>	
Fully Autonomous Quadrotor: A Testbed Platform for Aerial Robotics Tasks .....	68
<i>João P. F. Guimarães, Tania L. Laura, Armando S. Sanca, Alessandro N. Schildt, Michel S. de-Deus, Pablo J. Alsina, Andre T. da-Silva, and Adelardo A. D. Medeiros</i>	
Dynamic Swarm Formation with Potential Fields and A* Path Planning in 3D Environment .....	74
<i>Carlos Bentes and Osamu Saotome</i>	
Mobile Robot Localization in Indoor Environments Using Multiple Wireless Technologies .....	79
<i>Moisés Lisboa Rodrigues, Luiz Filipe M. Vieira, and Mario F. M. Campos</i>	
A Local Search Approach for Improving Multi-Robot Routing in Exploration Missions .....	85
<i>Rodolfo C. Cavalcante, Thiago F. Noronha, and Luiz Chaimowicz</i>	
Vision-Based Autonomous Topological Navigation in Outdoor Environments .....	91
<i>Daniel Oliva Sales and Fernando Santos Osório</i>	
Implementation and Closed Loop Identification of a Two Wheeled Inverted Pendulum Mobile Robot .....	97
<i>Gladys Y. Morales, Sergio A. Plazas, and Luis F. Cómbita</i>	
An Evolutionary Software Engineering Approach Applied to a Hybrid Algorithm for Face Recognition .....	103
<i>Aldo Martinez, Hector Vargas, and Jose Perez</i>	
A Low-Cost Localization System Based on Artificial Landmarks .....	109
<i>Cláudio dos S. Fernandes, Mario F. M. Campos, and Luiz Chaimowicz</i>	
Trajectory Planning for UAVs in 3D Environments Using a Moving Band in Potential Sigmoid Fields .....	115
<i>Diego Mauricio Rivera, Flavio Augusto Prieto, and Ricardo Ramírez</i>	
Comparison of a Mechanical and Biomechanical System Applied in the Human Wrist Rehabilitation Using a Cable-Based System .....	120
<i>André M. Barbosa, Lucas A. O. Rodrigues, Silvio S. dos Santos, and Rogério S. Gonçalves</i>	
Inverse Kinematics of a 10 DOF Modular Hyper-Redundant Robot Resorting to Exhaustive and Error-Optimization Methods: A Comparative Study .....	125
<i>Mario Sáenz Espinoza, José Gonçalves, Paulo Leitão, José Luis González Sánchez, and Alberto Herreros</i>	
Concept Design and Analysis of a Novel Robot for Rehabilitation and Assistance .....	131
<i>Isela Carrera, Alexandre Campos, and Hector A. Moreno</i>	

Global Localisation Algorithm from a Multiple Hypotheses Set .....	137
<i>Miguel Pinto, Héber Sobreira, A. Paulo Moreira, and Hélio Mendonça</i>	
A Methodology to Designing Strategies for Robot Soccer Based on Discrete Event Systems Formalism .....	143
<i>Phillipe Cardoso, Lucas Molina, Eduardo O. Freire, and Elyson A. N. Carvalho</i>	
Construction and Modeling of a Two-Degree-of-Freedom Helicopter .....	150
<i>K. M. Camacho, J. A. Burgos, and L. F. Combita</i>	
Autonomous Navigation with Obstacle Avoidance for a Car-Like Robot .....	156
<i>Alexandre S. Brandao, Andre S. Sasaki, Carlos R. Castelano Jr., Rafael R. Cruz, and Ricardo Carelli</i>	
High-Level Flight Controllers Applied to Helicopter Navigation: A Comparative Study .....	162
<i>Igor H. B. Pizetta, Alexandre S. Brandão, Mario Sarcinelli-Filho, and Ricardo Carelli</i>	
High-Level Nonlinear Underactuated Controller for a Leader-Follower Formation Involving a Miniature Helicopter and a Ground Robot .....	168
<i>Alexandre S. Brandão, Igor H. B. Pizetta, Mario Sarcinelli-Filho, and Ricardo Carelli</i>	
A Proposal of QLearning to Control the Attack of a 2D Robot Soccer Simulation Team .....	174
<i>José Rodrigo Ferreira Neri, Maicon Rafael Zatelli, Carlos Henrique Farias dos Santos, and João Alberto Fabro</i>	
Predictive Control via Multi-Parametric Programming Applied to the Dynamic Model of a Robotic Wheelchair .....	179
<i>Gustavo P. C. Weinkeller, José L. F. Salles, and Teodiano F.B. Filho</i>	
Market-Based Task Allocation in a Multi-robot Surveillance System .....	185
<i>Alejandro Pustowka and Eduardo F. Caicedo</i>	
Recognition of Human Motions for Imitation and Control of a Humanoid Robot .....	190
<i>Fernando Zuher and Roseli Romero</i>	
Multi-robot SLAM on Client-Server Architecture .....	196
<i>Diego Alberto Castro, Carlos Fernando Morales, and R. Fernando De la Rosa</i>	
A Terrain-Based Path Planning for Mobile Robots with Bounded Curvature .....	202
<i>Paulo L. J. Drews Jr., Douglas G. Macharet, and Mario F. M. Campos</i>	
On the Analysis of a Swarm Intelligence Based Coordination Model for Multiple Unmanned Aerial Vehicles .....	208
<i>Diego M. P. F. Silva, Luiz Felipe F. de Oliveira, Mariana G. M. Macedo, and Carmelo J. A. Bastos Filho</i>	
Planning for Simultaneous Localization and Mapping Using Topological Information .....	214
<i>Rafael Gonçalves Colares and Luiz Chaimowicz</i>	

On Monocular Visual Odometry for Indoor Ground Vehicles .....	220
<i>Bruno Silva, Aquiles Burlamaqui, and Luiz Gonçalves</i>	
Optimal Trajectory Tracking of the Underwater Robot through a Clifford Algebra .....	226
<i>André Schneider de Oliveira, Edson Roberto De Pieri, and Ubirajara Franco Moreno</i>	
Adhesion Force Control and Active Gravitational Compensation for Autonomous Inspection in LPG Storage Spheres .....	232
<i>André Schneider de Oliveira, Lucia Valéria Ramos de Arruda, Flávio Neves Jr., Rodrigo Valério Espinoza, and João Pedro Battistella Nadas</i>	
Ortholeg Project - Development of an Active Orthosis Prototype for Lower Limbs .....	239
<i>Márcio V. de Araujo, Glaumo N. da Silva, Lennedy C. Soares, and Pablo J. Alsina</i>	
Spatial and Perceptive Mapping Using Semantically Self-Organizing Maps Applied to Mobile Robots .....	245
<i>Mônica Figueiredo, Sílvia Botelho, Paulo Drews, and Celina Haffele</i>	
Imitation of Facial Expressions for a Virtual Robotic Head .....	251
<i>Valéria de Carvalho Santos, Roseli Aparecida Francelin Romero, and Sergio R. Díaz-Miguel Coca</i>	
Performance Evaluation of Attitude Estimation Algorithms in the Design of an AHRS for Fixed Wing UAVs .....	255
<i>Rogério R. Lima and Leonardo A. B. Tôrres</i>	
Dynamic Feedback Controller of an Unmanned Aerial Vehicle .....	261
<i>Erick Pfeifer and Fuad Kassab Jr.</i>	
Multi-robot Cooperation Based on Learning Social Models .....	267
<i>Rosiery Maia and Luiz Marcos Gonçalves</i>	
Using Space D* for Crowded Real Robots Environments .....	273
<i>Luan Silveira, Renan Q. Maffei, Felipe Almeida, Matheus Longaray, Silvia S. C. Botelho, Paulo J. L. Drews Jr., Alessandro de L. Bicho, and Nelson L. Duarte Filho</i>	
Cognitive-Merged Statistical Pattern Recognition Method for Image Processing in Mobile Robot Navigation .....	279
<i>Luciano C. Lulio, Mario L. Tronco, and Arthur J. V. Porto</i>	
Six DOF Stereoscopic Eye-in-Hand Visual Servo System BIBOT .....	284
<i>Rex Gascón B. and Manuel Barraza R.</i>	
Recognition and Separation of Objects on a Lego Mindstorms NXT Conveyor Belt Using Log-Polar Transform and Artificial Neural Networks .....	290
<i>Álvaro C. Parietti Filho and Marcos B. R. Vallim</i>	
Development of a Force Model Representative of a Milling Process Presenting a Spatial Behavior .....	296
<i>Felipe Barreto Campelo Cruz</i>	

Parallel High Dimensional Self Organizing Maps Using CUDA .....	302
<i>Felipe C. Moraes, Silvia C. Botelho, Nelson Duarte Filho,     and Joel Felipe O. Gaya</i>	
Fixed-Point Neural Network Ensembles for Visual Navigation .....	307
<i>Mauricio A. Dias and Fernando S. Osorio</i>	
An FPGA-Based Robotics Platform for Educational and Research Applications .....	313
<i>Marcel D. A. Siqueira, Júlio Conforto, and Marcos B. R. Vallim</i>	
Manipulator Control Based on the Dual Quaternion Framework for Intuitive Teleoperation Using Kinect .....	319
<i>Murilo M. Marinho, André A. Geraldes, Antônio P. L. Bó, and Geovany A. Borges</i>	
Modeling and Design of an Autonomous Unmanned Aerial Vehicle Quadrotor Prototype for Applications in Swarm of Robots .....	325
<i>David A. do Nascimento, Cristóvão Z. Rufino, Sergio Campello Oliveira,     and Marcílio André Félix Feitosa</i>	
<b>Author Index .....</b>	<b>329</b>