

PROGRAMME

I Brazilian Robotics Symposium (SBR'2012)

IX Latin American Robotics Symposium (LARS'2012)

III Workshop on Educational Robotics (WRE'2012)

I Workshop on MSc Dissertation and PhD Thesis in Robotics (WTDR'2012)

I Best MSc Dissertation/PhD Thesis Contest (CTDR'2012)

Fortaleza, Ceará, Brazil – October 16 to 19th, 2012

ORGANIZATION

UNIFOR – University of Fortaleza

UFC – Federal University of Ceará

PROMOTION

SBC – Brazilian Computer Society

TECHNICAL SUPPORT

SBA - Brazilian Automation Society

SBIC - Brazilian Society on Computational Intelligence

COORDINATION

I Brazilian Robotics Symposium (SBR'2012)

IX Latin American Robotics Symposium (LARS'2012)

Program Chair: Prof. Dr. Guilherme de Alencar Barreto
Federal University of Ceará (UFC)

III Workshop on Educational Robotics (WRE'2012)

Program Chairs: Prof. Dr. Luiz Marcos Garcia Gonçalves
Profa. Dra. Luciane Terra dos Santos Garcia
Federal University of Rio Grande do Norte (UFRN)

I Workshop on MSc Dissertation and PhD Thesis in Robotics (WTDR'2012)

I Best MSc Dissertation/PhD Thesis Contest (CTDR'2012)

Program Chairs: Profa. Dra. Silvia Silva da Costa Botelho
Federal University of Rio Grande (FURG)
Prof. Dr. Fernando Santos Osório
University of São Paulo, São Carlos (USP/SC)

SBR/LARS/WRE/WTDR/CTDR 2012 Programme

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October 16-19, 2012 – Fortaleza, Ceará, Brazil

Final Programme and Timetable

Schedule	October 16th, 2012 <i>Tuesday</i>	October 17th, 2012 <i>Wednesday</i>	October 18th, 2012 <i>Thursday</i>	October 19th, 2012 <i>Friday</i>
08:30h - 09:00h	Tutorials	Opening ceremony (Robotics Trends 2012)	-----	-----
09:00h - 10:00h	A and B (Part 1)	Plenary Talk A	Plenary Talk B	Plenary Talk C
10:00h - 10:20h	<i>Coffe Break</i>	<i>Coffe Break</i>	<i>Coffe Break</i>	<i>Coffe Break</i>
10:20h - 12:20h	Tutorials A and B (Part 2)	Technical Sessions SBR/LARS – 1 SBR/LARS – 2	Technical Sessions SBR/LARS – 7 SBR/LARS – 8	Technical Sessions OBR – 1 / OBR – 2 WTDR – 1 / WTDR – 2
			Opening ceremony WRE'2012 (11:20h - 12:20h)	
12:20h - 14:20h	<i>Lunch Time</i>	<i>Lunch Time</i>	<i>Lunch Time</i>	<i>Lunch Time</i>
14:20h - 16:20h	Tutorials C and D (Part 1)	Technical Sessions SBR/LARS – 3 SBR/LARS – 4 Tutorials E and F (Part 1)	Technical Sessions SBR/LARS – 9 WRE – 1	Technical Sessions CTDR – M CTDR - D WRE - 3
16:20h - 16:40h	<i>Coffe Break</i>	<i>Coffe Break</i>	<i>Coffe Break</i>	<i>Coffe Break</i>
16:40h – 18:20h	Tutorials C and D (Part 2)	Technical Sessions SBR/LARS – 5 SBR/LARS – 6 Tutorials E and F (Part 2)	Technical Sessions SBR/LARS – 10 WRE - 2	Short-Course Prof. Rafael Aroca
18:20h - 20:30h	-----	Welcome cocktail	PANEL WRE'2012 Building Educational Robots from Scrap (18:20h – 19:20h)	Prize Award Ceremony CTDR'2012/WRE'2012 (18:20h – 19:00h)
			-----	Meeting SBC-CER
20:30h - 22:30h	-----	-----	Conference dinner	

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University of Fortaleza - UNIFOR

October 16-19, 2012 – Fortaleza, Ceará, Brazil

October 16th, 2012 (Wednesday)

Time Schedule	Place	Activity
08:30h – 10:00h	Room A01	Tutorial A: Veículos Autônomos e Inteligentes: Desafios, Tecnologias, Iniciativas Internacionais e Nacionais Speakers: Fernando Santos Osório (Universidade de São Paulo, São Carlos) Denis Fernando Wolf (Universidade de São Paulo, São Carlos) Leandro Carlos Fernandes (Universidade de São Paulo, São Carlos)
	Room A04	Tutorial B: ROS + Arduino: Um SDK em Software e Hardware para Automação e Robótica Speaker: Silvia Silva da Costa Botelho (Universidade Federal do Rio Grande)
10:00h - 10:20h		Coffee Break
10:20h – 12:20h	Rooms A01	Tutorial A (continuation)
	Rooms A04	Tutorial B (continuation)
12:20h - 14:20h		Lunch Time
14:20h - 16:20h	Room A01	Tutorial C: Robotic Operating System (ROS) Speaker: Elerson Rubens da S. Santos (Universidade Federal de Minas Gerais) Fabricio F. Carvalho (Universidade Federal de Minas Gerais) Marcos Augusto M. Vieira (Universidade Federal de Minas Gerais)
	Room A04	Tutorial D: Introdução ao Raciocínio Espacial Qualitativo e suas Aplicações Speaker: Paulo E. Santos (Centro Universitário da FEI)
16:20h - 16:40h		Coffee Break
16:40h - 18:20h	Room A01	Tutorial C (continuation)
	Room A04	Tutorial D (continuation)

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University of Fortaleza - UNIFOR

October 16-19, 2012 – Fortaleza, Ceará, Brazil

October 17th, 2012 (Tuesday)

Time Schedule	Place	Activity
08:30h – 09:00h	Library Auditorium	Opening Ceremony (Robotics Trends 2012)
09:00h - 10:00h	Library Auditorium	Plenary Talk A (Prof. Luís <i>Paulo Reis</i> - University of <i>Minho</i> , Portugal)
10:00h - 10:20h		Coffee Break
10:20h - 12:20h	Room B42	Technical Session SBR/LARS-1: Robotic Vision and Image Processing I
	Room B44	Technical Session SBR/LARS-2: Machine Learning for Robotics I
12:20h - 14:20h		Lunch Time
14:20h - 16:20h	Room B42	Technical Session SBR/LARS-3: Design, Modeling and Control of UAVs
	Room B44	Technical Session SBR/LARS-4: Robotic Vision and Image Processing II
	Room A01	Tutorial E: Robust Control of Space Manipulators Speaker: Tatiana F. P. A. T. Pazelli (Universidade de São Paulo, São Carlos)
	Room A04	Tutorial F: Introduction to the Simulator of the i-Cub Humanoid Robot Speaker: Ananda Lima Freire (Federal University of Ceará)
16:20h - 16:40h		Coffee Break
16:40h - 18:20h	Room B42	Technical Session SBR/LARS-5: Self-Localization, Mapping and Navigation I
	Room B44	Technical Session SBR/LARS-6: Robot Control and Modeling I
	Room A01	Tutorial E (continuation)
	Room A04	Tutorial F (continuation)
18:20h - 20:00h	Lounge	Opening Cocktail

SBR/LARS/WRE/WTDR/CTDR 2012 Programme

Plenary Talk A (Wednesday, October 17th, 09:00h – 10:00h, Library Auditorium)

Speaker: Prof. Luis Paulo Reis (University of Minho, Portugal)

Title: Flexible Coordination of Multi-Robot Teams: Applications in Robotic Soccer

Abstract

RoboCup is a worldwide initiative, that aims at fostering artificial intelligence and robotics research. This domain is organized around several Leagues, with different characteristics, and distinct robotic teams but where multi-agent coordination and strategic planning are two of the major research topics. However, innovations in these areas are often developed and applied to only one domain and a single RoboCup league, without proper generalization. This talk presents high-level, flexible coordination methodologies that may be applied to create multi-robot teams capable of performing complex tasks in dynamic environments such as playing in distinct RoboCup leagues. The methodologies described include flexible formations (situation based strategic positioning), dynamic role and positioning exchange, flexible setplays (freely-definable, flexible and multi-step plans) and the concept of strategy (combining tactics, situations, formations, roles and setplays). The application of these methodologies to different RoboCup leagues (such as the simulation 2d, simulation 3d, rescue, middle size and standard platform league) is also described. They enabled our teams to achieve very good results in RoboCup international competitions including winning 4 World and 10 European championships in distinct leagues among several other awards.

Short Bio

Luis Paulo Reis is an Associate Professor at the Information Systems Department at the School of Engineering, University of Minho, Portugal and a member of the Directive Board of the Artificial Intelligence and Computer Science Lab, Portugal. He received his Electrical Engineering and MSc degrees from the University of Porto in 1993 and 1995, and a PhD in Electrical Engineering (Artificial Intelligence/Robotics) at the same University in 2003. During the last years he has lectured courses of Artificial Intelligence, Intelligent Robotics, Information Systems, Simulation and Modeling, Planning and Scheduling and Logic Programming mostly at the PhD level. His research interests include also Multi-Agent Systems (MAS) and Intelligent Simulation. He was principal investigator of more than 10 research projects in those areas and he was evaluator for the European Commission for FP6 Projects. He is the team leader of FC Portugal robotic soccer team/project, three times World Champion and seven times European Champion in RoboCup. He also won more than 30 scientific awards, including best papers at several conferences such as ICEIS and Robotica. He supervised 10 PhD thesis and more than 75 MSc thesis to completion and is currently supervising 15 PhD theses. He is the author of more than 250 publications in international conferences and journals. He belonged to the PC of more than 100 international conferences including EPIA, ECAI, AAMAS, AIS, ICAART, Iberamia, RoboCup Symp., Robotica, CISTI, ISVC, VipImage, ComplImage, LARS/EnRI, IECON, SOCO, ASM, KDIR, among others. He is member of IEEE, ACM, APPIA, among several other professional associations and president of the general assembly of both SPR - Portuguese Society for Robotics and AISTI - Iberian association for Information Systems and Technology.

SBR/LARS/WRE/WTDR/CTDR 2012 Programme

October 17th, 2012 / Wednesday / MORNING (10:20h – 12:20h)

Technical Session (SBR/LARS – 1: Robotic Vision and Image Processing I) - Room B42 - Chair:

- 10:20h – 10:40h **A Visual-Perception Layer Applied to Reactive Navigation**
Arthur de Miranda Neto (Universidade de Campinas)
Alessandro Corrêa Victorino (Heudiasyc Laboratory UMR 7253 CNRS/UTC, France)
Janito Vaqueiro Ferreira (Universidade de Campinas)
- 10:40h – 11:00h **Designing a Real Time Artificial Vision System For Human Interaction With an Omnidirectional Mobile Platform**
Carolina Moreno Salcedo (Universidade Federal da Bahia)
Cesar Peña (Universidade Federal da Bahia)
Jés Cerqueira (Universidade Federal da Bahia)
Antonio Marcus Nogueira Lima (Universidade Federal de Campina Grande)
- 11:00h – 11:20h **2.5-Dimensional Grid Mapping from Stereo Vision for Robotic Navigation**
Anderson Souza (Universidade do Estado do Rio Grande do Norte)
Luiz Marcos Gonçalves (Universidade Federal do Rio Grande do Norte)
- 11:20h – 11:40h **A Low-Cost Localization System Based on Artificial Landmarks**
Cláudio Fernandes (Universidade Federal de Minas Gerais)
Mário Fernando Campos (Universidade Federal de Minas Gerais)
Luiz Chaimowicz (Universidade Federal de Minas Gerais)
- 11:40h – 12:00h **Vision-Based Autonomous Topological Navigation in Outdoor Environments**
Daniel Sales (Universidade de São Paulo, São Carlos)
Fernando Osório (Universidade de São Paulo, São Carlos)
- 12:00h – 12:20h **Imitation of Facial Expressions for a Virtual Robotic Head**
Valéria Santos (Universidade de São Paulo)
Roseli A. Francelin Romero (Universidade de São Paulo, São Carlos)
Sergio R. Coca (Universidad Politécnica de Madrid, Spain)

Technical Session (SBR/LARS – 2: Machine Learning for Robotics I) - Room B44 - Chair:

- 10:20h – 10:40h **Reinforcement Learning with Case-Based Heuristics for RoboCup Soccer Keepaway**
Luiz Celiberto (Instituto Tecnológico da Aeronáutica)
Jackson Matsuura (Instituto Tecnológico da Aeronáutica)
Ramon de Mantaras (IIIA-CSIC, Spain)
Reinaldo Bianchi (Centro Universitário da FEI)
- 10:40h – 11:00h **A Proposal of QLearning to Control the Attack of a 2D Robot Soccer Simulation Team**
José Rodrigo Ferreira Neri (Universidade Federal de Santa Catarina)
Maicon Rafael Zatteli (Universidade Federal de Santa Catarina)
Carlos Henrique dos Santos (UNIOESTE)
João Alberto Fabro (Universidade Tecnológica Federal do Paraná)
- 11:00h – 11:20h **Multi-agent Multi-objective Learning using Heuristically Accelerated Reinforcement Learning**
Leonardo Ferreira (Centro Universitário da FEI)
Reinaldo Bianchi (Centro Universitario da FEI)
Carlos Ribeiro (Instituto Tecnológico da Aeronáutica)
- 11:20h – 11:40h **Parallel High Dimensional Self Organizing Maps Using CUDA**
Felipe Moraes (Universidade Federal do Rio Grande)
Sílvia S. da Costa Botelho (Universidade Federal do Rio Grande)
Nelson Duarte Filho (Universidade Federal do Rio Grande)
Joel Felipe O. Gaya (Universidade Federal do Rio Grande)
- 11:40h – 12:00h **Fixed-Point Implementation of Neural Networks for Visual Navigation**
Maurício Dias (Universidade de São Paulo, São Carlos)
Fernando Osório (Universidade de São Paulo, São Carlos)
- 12:00h – 12:20h -----

SBR/LARS/WRE/WTDR/CTDR 2012 Programme

October 17th, 2012 / Wednesday / EARLY AFTERNOON (14:20h – 16:20h)

Technical Session (SBR/LARS – 3: Design, Modeling and Control of UAVs) - Room B42 - Chair:

- 14:20h – 14:40h **Dynamic Feedback Controller of an Unmanned Aerial Vehicle**
Erick Pfeifer (Universidade de São Paulo)
Fuad Kassab Jr. (Universidade de São Paulo)
- 14:40h – 15:00h **Performance Evaluation of Attitude Estimation Algorithms in the Design of an AHRS for Fixed Wing UAVs**
Rogério Lima (Universidade Federal de Minas Gerais)
Leonardo A. Borges Torres (Universidade Federal de Minas Gerais)
- 15:00h – 15:20h **Simulation Platform for Quadricopter: Using Matlab/Simulink and X-Plane**
Helosman Figueiredo (Instituto Tecnológico de Aeronáutica)
Osamu Saotome (Instituto Tecnológico de Aeronáutica)
- 15:20h – 15:40h **Fully Autonomous Quadrotor: A Testbed Platform for Aerial Robotics Tasks**
João Paulo Guimarães (Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Norte)
Tania Laura (Universidade Federal do Rio Grande do Norte)
Armando Sanca (Universidade Estadual de Feira de Santana)
Alessandro Schildt (Universidade Federal do Rio Grande do Norte)
Michel Santana de Deus (Universidade Federal do Rio Grande do Norte)
Pablo Alsina (Universidade Federal do Rio Grande do Norte)
André T. da Silva (Universidade Federal do Rio Grande do Norte)
Adelardo Medeiros (Universidade Federal do Rio Grande do Norte)
- 15:40h – 16:00h **High-Level Flight Controllers Applied to Helicopter Navigation: A Comparative Study**
Igor Pizetta (Universidade Federal do Espírito Santo)
Alexandre Brandão (Universidade Federal de Viçosa)
Mário Sarcinelli-Filho (Universidade Federal do Espírito Santo)
Ricardo Carelli (Universidad Nacional de San Juan, Argentina)
- 16:00h – 16:20h **High-Level Nonlinear Underactuated Controller for a Leader-Follower Formation Involving a Miniature Helicopter and a Ground Robot**
Alexandre Brandão (Universidade Federal de Viçosa)
Igor Pizetta (Universidade Federal do Espírito Santo)
Mário Sarcinelli-Filho (Universidade Federal do Espírito Santo)
Ricardo Carelli (Universidad Nacional de San Juan, Argentina)

Technical Session (SBR/LARS – 4: Robotic Vision and Image Processing II) - Room B44 - Chair:

- 14:20h – 14:40h **An Evolutionary Software Approach Applied to a Hybrid Algorithm for Face Recognition**
Aldo Martinez (Universidad Popular Autónoma del Estado de Puebla, Mexico)
Hector Vargas (Universidad Popular Autónoma del Estado de Puebla, Mexico)
Jose Luis Perez Ramirez (Universidad Popular Autónoma del Estado de Puebla, Mexico)
- 14:40h – 15:00h **On Monocular Visual Odometry for Indoor Ground Vehicles**
Bruno da Silva (Universidade Federal do Rio Grande do Norte)
Aquiles Burlamaqui (Universidade Federal do Rio Grande do Norte)
Luiz Marcos Gonçalves (Universidade Federal do Rio Grande do Norte)
- 15:00h – 15:20h **Recognition of Human Motions for Imitation and Control of a Humanoid Robot**
Fernando Zuher (Universidade de São Paulo, São Carlos)
Roseli Francelin Romero (Universidade de São Paulo, São Carlos)
- 15:20h – 15:40h **Six DOF Stereoscopic Eye-in-Hand Visual Servo System BIBOT**
Rex Gascon (Universidad de Tarapacá, Chile)
Manuel Barraza R. (Universidad de Tarapacá, Chile)
- 15:40h – 16:00h **Recognition and Separation of Objects on a Lego Mindstorms NXT Conveyor Belt using Log-Polar Transform and Artificial Neural Networks**
Álvaro Filho (Universidade Tecnológica Federal do Paraná)
Marcos Banheti Rabello Vallim (Universidade Tecnológica Federal do Paraná)
- 16:00h – 16:20h **Cognitive-merged Statistical Pattern Recognition Method for Image Processing in Mobile Robot Navigation**
Luciano Lulio (Universidade de São Paulo, São Carlos)
Mário L. Tronco (Universidade de São Paulo, São Carlos)

SBR/LARS/WRE/WTDR/CTDR 2012 Programme

Arthur J. V. Porto (Universidade de São Paulo, São Carlos)

October 17th, 2012 / Wednesday / LATE AFTERNOON (16:40h – 18:20h)

Technical Session (SBR/LARS – 5: Self-Localization, Mapping and Navigation I) - Room B42 - Chair:

- 16:40h – 17:00h **Robotic Communication Backbone**
Elerson Santos (Universidade Federal de Minas Gerais)
Marcos Vieira (Universidade Federal de Minas Gerais)
- 17:00h – 17:20h **Mobile Robot Localization in Indoor Environments Using Multiple Wireless Technologies**
Moisés Rodrigues (Universidade Federal de Minas Gerais)
Luiz Filipe Vieira (Universidade Federal de Minas Gerais)
Mário Fernando Campos (Universidade Federal de Minas Gerais)
- 17:20h – 17:40h **Global Localisation Algorithm from a Multiple Hypotheses Set**
Miguel Pinto (Faculdade de Engenharia da Universidade do Porto, Portugal)
Héber Sobreira (Faculdade de Engenharia da Universidade do Porto, Portugal)
Paulo Moreira (Faculdade de Engenharia da Universidade do Porto, Portugal)
Hélio Mendonça (Faculdade de Engenharia da Universidade do Porto, Portugal)
- 17:40h – 18:00h **Multi-Robot SLAM on Client-Server Architecture**
Diego Alberto Castro (Universidad de los Andes, Colombia)
Carlos Fernando Morales (Universidad de los Andes, Colombia)
R. Fernando De la Rosa (Universidad de los Andes, Colombia)
- 18:00h – 18:20h **A Terrain-Based Path Planning for Mobile Robots with Bounded Curvature**
Paulo Drews Jr (Universidade Federal do Rio Grande)
Douglas Macharet (Universidade Federal de Minas Gerais)
Mario Fernando Campos (Universidade Federal de Minas Gerais)

Technical Session (SBR/LARS – 6: Robot Control and Modeling I) - Room B44 - Chair:

- 16:40h – 17:00h **Web-Based Robot Programming Environment and Control Architecture**
Rafael Aroca (Universidade Federal do Rio Grande do Norte)
Renato Gardiman (Universidade Federal do Rio Grande do Norte)
Luiz Marcos Gonçalves (Universidade Federal do Rio Grande do Norte)
- 17:00h – 17:20h **A Methodology to Designing Strategies for Robot Soccer Based on Discrete Event Systems Formalism**
Phillipe Cardoso (Universidade Federal de Sergipe)
Lucas Molina (Universidade Federal de Sergipe)
Eduardo Freire (Universidade Federal de Sergipe)
Elyson Carvalho (Universidade Federal de Sergipe)
- 17:20h – 17:40h **Autonomous Navigation with Obstacle Avoidance for a Car-like Robot**
Alexandre Brandão (Universidade Federal de Viçosa)
Andre Sasaki (Universidade Federal de Viçosa)
Carlos Castelano (Universidade Federal de Viçosa)
Rafael Cruz (Universidade Federal de Viçosa)
Ricardo Carelli (Universidad Nacional de San Juan, Argentina)
- 17:40h – 18:00h **Development of a Force Model Representative of a Milling Process Presenting a Spatial Behavior**
Felipe Barreto Campelo Cruz (Universidade Tecnológica Federal do Paraná)
- 18:00h – 18:20h **Modeling and Design of an Autonomous Unmanned Aerial Vehicle Quadrotor Prototype for Applications in Swarm of Robots**
David Alain Nascimento (Universidade de Pernambuco)
Cristóvão Zuppardo Rufino (Universidade de Pernambuco)
Sergio Campello Oliveira (Universidade de Pernambuco)
Marcílio Feitosa (Universidade de Pernambuco)

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University of Fortaleza - UNIFOR

October 16-19, 2012 – Fortaleza, Ceará, Brazil

October 18th, 2012 (Thursday)

Time Schedule	Place	Activity
09:00h - 10:00h	Library Auditorium	Plenary Talk B (Prof. Mário Fernando Montenegro Campos – Federal University of Minas Gerais, Brazil)
10:00h - 10:20h		Coffee Break
10:20h - 12:20h	Room B42	Technical Session SBR/LARS-7: Self-Localization, Mapping and Navigation II
	Room B44	Technical Session SBR/LARS-8: Robot Control and Modeling II
11:20h – 12:20h	Room A01	Opening ceremony WRE'2012
12:20h - 14:20h		Lunch Time
14:20h - 16:20h	Room A01	Technical Session SBR/LARS-9: Multi-Robot and Multi-Agent Systems
	Room A02	Technical Session WRE-1: Aspectos Educacionais da Robótica
16:20h - 16:40h		Coffee Break
16:40h - 18:20h	Room A01	Technical Session SBR/LARS-10: Robot Control and Modeling III
	Room A02	Technical Session WRE-2: Plataformas e Sistemas para o Ensino de Robótica
18:20h – 19:20h	Room B42	PANEL WRE'2012: Building Educational Robots from Scrap
20:00h - 22:00h	To be defined	Conference dinner

SBR/LARS/WRE/WTDR/CTDR 2012 Programme

Plenary Talk B (Thursday, October 18th, 09:00h – 10:00h, Library Auditorium)

Speaker: Prof. Mário Fernando Montenegro Campos (Federal University of Minas Gerais, Brazil)

Title: Cooperative and Collaborative Robotics

Abstract

There has been an increased research interest on multiple mobile robots that are capable to work collectively to accomplish tasks otherwise more difficult or even impossible with a single robot. This is mainly due to the fact that several fascinating issues arise when several robots need to collaborate, and the literature abounds with approaches to tackle planning, control, task allocation, and many other relevant problems. In this talk we will provide a brief overview of the area, the main challenges and open problems, and illustrate with results of past and present projects on cooperative mobile robots.

Short Bio

Mario Fernando Montenegro Campos, Ph.D., is a Professor of Computer Vision and Robotics in the Department of Computer Science at the Federal University of Minas Gerais (UFMG), Belo Horizonte, Brazil. He holds B.S. degrees in Engineering, and M.S. in Computer Science, all from the Universidade Federal de Minas Gerais, and a Ph.D. in Computer and Information Science from the University of Pennsylvania, USA. His research interests include cooperative robotics, robot vision, sensor information processing. His main contributions are in haptics, multirobot cooperation, aerial robotics and robot vision. He is the founder and director of the Vision and Robotics Lab -- VeRLab, UFMG, Brazil. He has been a Distinguished Lecturer in the IEEE Robotics and Automation Society.

SBR/LARS/WRE/WTDR/CTDR 2012 Programme

October 18th, 2012 / Thursday / MORNING (10:20h – 12:20h)

Technical Session (SBR/LARS – 7: Self-Localization, Mapping and Navigation II) - Room B42 - Chair:

- 10:20h – 10:40h **Planning for Simultaneous Localization and Mapping using Topological Information**
Rafael Gonçalves Colares (Universidade Federal de Minas Gerais)
Luiz Chaimowicz (Universidade Federal de Minas Gerais)
- 10:40h – 11:00h **Optimal Trajectory Tracking of the Underwater Robot through a Clifford Algebra**
Andre Schneider de Oliveira (Instituto Federal do Paraná)
Edson Roberto De Pieri (Universidade Federal de Santa Catarina)
Ubirajara Moreno (Universidade Federal de Santa Catarina)
- 11:00h – 11:20h **Using Space D* for Crowded Real Robots Environments**
Luan Silveira (Universidade Federal do Rio Grande)
Renan de Queiroz Maffei (Universidade Federal do Rio Grande do Sul)
Felipe Almeida (Universidade Federal do Rio Grande)
Matheus Longaray (Universidade Federal do Rio Grande)
Silvia Botelho (Universidade Federal do Rio Grande)
Paulo Drews Jr (Universidade Federal do Rio Grande)
Alessandro de L. Bicho (Universidade Federal do Rio Grande)
Nelson Duarte Filho (Universidade Federal do Rio Grande)
- 11:20h – 11:40h **Spatial and Perceptive Mapping using Semantically Self-Organizing Maps applied to Mobile Robots**
Mônica Figueiredo (Universidade Federal do Rio Grande)
Sílvia Botelho (Universidade Federal do Rio Grande)
Paulo Drews Jr (Universidade Federal do Rio Grande)
Celina Haffele (Universidade Federal do Rio Grande)
- 11:40h – 12:00h **A Real Time 6DOF Visual SLAM System Using a Monocular Camera**
Andrés Díaz (Universidad del Valle, Colombia)
Lina Paz (Universidad de Zaragoza, Spain)
Pedro Piniés (Universidad de Zaragoza, Spain)
Eduardo Caicedo (Universidad del Valle, Colombia)
- 12:00h – 12:20h **Trajectory Planning for UAVs in 3D Environments Using a Moving Band in Potential Sigmoid Fields**
Diego Rivera (Universidad Nacional de Colombia)
Flavio Prieto (Universidad Nacional de Colombia)
Ricardo Ramirez (Universidad Nacional de Colombia)

SBR/LARS/WRE/WTDR/CTDR 2012 Programme

October 18th, 2012 / Thursday / MORNING (10:20h – 12:20h)

Technical Session (SBR/LARS – 8: Robot Control and Modeling II) - Room A01 - Chair:

- 10:20h – 10:40h **Construction and Modeling of a Two-Degree-of-Freedom Helicopter**
Kelly Camacho (Universidad Distrital Francisco José de Caldas, Colombia)
Jorge Burgos (Universidad Distrital Francisco José de Caldas, Colombia)
Luis Combata (Universidad Distrital Francisco José de Caldas, Colombia)
- 10:40h – 11:00h **Analytic Kinematics for Bioloid Humanoid Robot**
J. Victor Nunez (Universidad Politecnica de Sinaloa, Mexico)
Abraham Briseno (Universidad Politecnica de Sinaloa, Mexico)
Dora A. Rodriguez (Universidad Politecnica de Sinaloa, Mexico)
J. Manuel Ibarra (CINVESTAV, Mexico)
Victor M. Rodriguez (Universidad Politecnica de Sinaloa, Mexico)
- 11:00h – 11:20h **Implementation and Closed Loop Identification of a Two Wheeled Inverted Pendulum Mobile Robot**
Gladys Morales Guzmán (Universidad Distrital Francisco José de Caldas, Colombia)
Sergio Plazas Bernal (Universidad Distrital Francisco José de Caldas, Colombia)
Luis Cómbita (Universidad Distrital Francisco José de Caldas, Colombia)
- 11:20h – 11:40h **Inverse Kinematics of a 10 DOF Modular Hyper-Redundant Robot Resorting to Exhaustive and Error-Optimization Methods: A Comparative Study**
Mario Saenz Espinoza (Instituto Politécnico de Bragança, Portugal)
José Gonçalves (INESC TEC, Portugal)
Paulo Leitao (Instituto Politécnico de Bragança, Portugal)
José Luis González Sánchez (Universidad de Valladolid, Spain)
Alberto Herreros (Universidad de Valladolid, Spain)
- 11:40h – 12:00h **Predictive Control via Multi-Parametric Programming Applied to the Dynamic Model of a Robotic Wheelchair**
Gustavo Weinkeller (UCL - Faculdade do Centro Leste)
José Leandro Salles (Universidade Federal do Espírito Santo)
Teodiano F. Bastos Filho (Universidade Federal do Espírito Santo)
- 12:00h – 12:20h **Adhesion Force Control and Active Gravitational Compensation for Autonomous Inspection in LPG Storage Spheres**
André Schneider de Oliveira (Instituto Federal do Paraná)
Lucia Valéria R. de Arruda (Universidade Tecnológica Federal do Paraná)
Flávio Neves-Júnior (Universidade Tecnológica Federal do Paraná)
Rodrigo Espinoza (Universidade Tecnológica Federal do Paraná)
João Pedro B. Nadas (Universidade Tecnológica Federal do Paraná)

SBR/LARS/WRE/WTDR/CTDR 2012 Programme

October 18th, 2012 / Thursday / EARLY AFTERNOON (14:20h – 16:20h)

Technical Session (SBR/LARS – 9: Multi-Robot and Multi-Agent Systems) - Room A01 - Chair:

- 14:20h – 14:40h **Cooperative Robotic Exploration and Transport of Unknown Objects**
Elizabeth Costa (Universidade Federal de Minas Gerais)
Pedro Shiroma (Universidade Federal de São João Del-Rei)
Mário Fernando Campos (Universidade Federal de Minas Gerais)
- 14:40h – 15:00h **A Local Search Approach for Improving Multi-Robot Routing in Exploration Missions**
Rodolfo Cavalcante (Universidade Federal de Alagoas - Campus Arapiraca)
Thiago Noronha (Universidade Federal de Minas Gerais)
Luiz Chaimowicz (Universidade Federal de Minas Gerais)
- 15:00h – 15:20h **Market-Based Task Allocation in a Multi-Robot Surveillance System**
Alejandro Michael Pustowka Reyes (Universidad del Valle, Colombia)
Eduardo Caicedo (Universidad del Valle, Colombia)
- 15:20h – 15:40h **On the Analysis of a Swarm Intelligence Based Coordination Model for Multiple Unmanned Aerial Vehicles**
Diego Silva (Universidade de Pernambuco)
Luiz Felipe Oliveira (Universidade de Pernambuco)
Mariana Macedo (Universidade de Pernambuco)
Carmelo Bastos-Filho (Universidade de Pernambuco)
- 15:40h – 16:00h **Multi-Robot Cooperation Based on Learning Social Models**
Rosierly Maia (Universidade do Estado do Rio Grande do Norte)
Luiz Gonçalves (Universidade Federal do Rio Grande do Norte)
- 16:00h – 16:20h **Dynamic Swarm Formation with Potential Fields and A* Path Planning in 3D Environment**
Carlos Bentes (Instituto Tecnológico da Aeronáutica)
Osamu Saitome (Instituto Tecnológico da Aeronáutica)

Technical Session (WRE-1: Aspectos Educacionais da Robótica) - Room A02 - Chair:

- 14:20h – 14:40h **Robótica Educacional: Desenvolvendo Inteligências**
Claudia Benevento (Universidade Federal Fluminense)
- 14:40h – 15:00h **Robótica como Meio de Promoção da Interdisciplinaridade no Ensino Profissionalizante**
Felipe Martins (Instituto Federal de Educação, Ciência e Tecnologia do Espírito Santo)
Hudson Oliveira (Instituto Federal de Educação, Ciência e Tecnologia do Espírito Santo)
Gabriela Oliveira (Instituto Federal de Educação, Ciência e Tecnologia do Espírito Santo)
- 15:00h – 15:20h **Robótica na Escola: Ferramenta Pedagógica Inovadora**
Juliano Miranda (Universidade Estadual de Goiás)
- 15:20h – 15:40h **A Robótica Educacional como Meio de Integração Entre o Ensino Fundamental e de Graduação Pelo Uso da Linguagem Logo**
Luis Fernando Freire de Souza (Universidade Federal de São João del-Rei)
Gabriela Reis (Universidade Federal de São João del-Rei)
Eduardo Pereira (Universidade Federal de São João del-Rei)
- 15:40h – 16:00h **Tecnologia e Educação: Da Informatização à Robótica Educacional**
Cristiane Pelisolli Cabral (Secretaria Municipal de Educação de Porto Alegre)
- 16:00h – 16:20h **Robótica como Alternativa nos Processos Educativos da Educação Infantil e dos Anos Iniciais do Ensino Fundamental**
Gregori Betiato Bieniek (Universidade Federal da Fronteira Sul)
Luana Tortelli (Universidade Federal da Fronteira Sul)
Mirian Cátia Zarpelon (Universidade Federal da Fronteira Sul)
Anibal Lopes Guedes (Professor da Universidade Federal da Fronteira Sul)
Rodrigo Saballa de Carvalho (Universidade Federal da Fronteira Sul)
Fernanda Lopes Guedes (Instituto Federal Sul-Rio-Grandense)

SBR/LARS/WRE/WTDR/CTDR 2012 Programme

October 18th, 2012 / Thursday / LATE AFTERNOON (16:40h – 18:20h)

Technical Session (SBR/LARS – 10: Robot Control and Modeling III) - Room A01 - Chair:

- 16:40h – 17:00h **Comparison of a Mechanical and Biomechanical System Applied in the Human Hand Rehabilitation Using a Cable-Based System**
André Barbosa (Universidade Federal de Uberlândia)
Lucas Rodrigues (Universidade Federal de Uberlândia)
Sílvia dos Santos (Universidade Federal de Uberlândia)
Rogério Sales Gonçalves (Universidade Federal de Uberlândia)
- 17:00h – 17:20h **Concept Design and Analysis of a Novel Robot for Rehabilitation and Assistance**
Isela Carrera (Universidad Politécnica de Madrid, Spain)
Alexandre Campos (Universidade do Estado de Santa Catarina)
Héctor Moreno (Universidad Politécnica de Madrid, Spain)
- 17:20h – 17:40h **Manipulator Control Based on the Dual Quaternion Framework for Intuitive Teleoperation Using Kinect**
Murilo Marinho (Universidade de Brasília)
André Geraldes (Universidade de Brasília)
Antônio Lanari Bó (Universidade de Brasília)
Geovany A. Borges (Universidade de Brasília)
- 17:40h – 18:00h **Ortholeg Project - Development of an Active Orthosis Prototype For Lower Limbs**
Márcio V. de Araújo (Universidade Federal do Rio Grande do Norte)
Glaumo Silva (Universidade Federal do Rio Grande do Norte)
Lennedy Soares (Universidade Federal do Rio Grande do Norte)
Pablo Alsina (Universidade Federal do Rio Grande do Norte)
- 18:00h – 18:20h **A FPGA-Based Robotics Platform for Educational and Research Applications**
Marcel Danilo Alves Siqueira (Universidade Tecnológica Federal do Paraná)
Júlio Conforto (Universidade Tecnológica Federal do Paraná)
Marcos Banheti Rabello Vallim (Universidade Tecnológica Federal do Paraná)

Technical Session (WRE-2: Plataformas e Sistemas para o Ensino de Robótica) - Room A02 - Chair:

- 16:40h – 17:00h **A Study About Materials For Use in Educational Robotics**
Francisco Ioneiton Silva (Universidade Estadual da Paraíba)
Daniel Scherer (Universidade Estadual da Paraíba)
- 17:00h – 17:20h **Remote Laboratory on Mobile Robotics TeleMobileRobotLab**
Kevin Sánchez (Universidad de los Andes, Colombia)
David Acero (Maregua)
Fernando De la Rosa R. (Universidad de los Andes, Colombia)
- 17:20h – 17:40h **Um Robô por Aluno: Uma Realidade Possível**
Rafael Aroca (Universidade Federal do Rio Grande do Norte)
Renata Barros (Universidade Federal do Rio Grande do Norte)
Aquiles Burlamaqui (Universidade Federal do Rio Grande do Norte)
Luiz Gonçalves (Universidade Federal do Rio Grande do Norte)
- 17:40h – 18:00h **SimRobô: Simulador para Robótica com Propósito Educacional**
Marco Túlio Chella (Universidade Federal de Sergipe)
- 18:00h – 18:20h **ADA-TOPOBO: Um Ambiente Dual de Aprendizagem Utilizando Kits Educacionais**
Fernanda Mota (Universidade Federal do Rio Grande)
Iverson Santos (Universidade Católica de Pelotas)
Vagner Rosa (Universidade Federal do Rio Grande)
Sílvia Botelho (Universidade Federal do Rio Grande)
Marcos Amaral (Universidade Federal do Rio Grande)
- 18:20h – 18:40h **Uma Nova Abordagem em Robótica Educacional utilizando Simuladores e Kits de Robótica Livre**
Carla Fernandes (Universidade Federal do Rio Grande do Norte)
Sarah Thomaz (Universidade Federal do Rio Grande do Norte)
Luiz Gonçalves (Universidade Federal do Rio Grande do Norte)

SBR/LARS/WRE/WTDR/CTDR 2012 Programme

I Brazilian Robotics Symposium (SBR'2012)

IX Latin American Robotics Symposium (LARS'2012)

III Workshop on Educational Robotics (WRE'2012)

I Workshop on MSc Dissertation and PhD Thesis in Robotics (WTDR'2012)

I Best MSc Dissertation/PhD Thesis Contest (CTDR'2012)

University of Fortaleza - UNIFOR

October 16-19, 2012 – Fortaleza, Ceará, Brazil

October 19th, 2012 (Friday)

Time Schedule	Place	Activity
09:00h - 10:00h	Library Auditorium	Plenary Talk C (Prof. Luiz Marcos Garcia Gonçalves)
10:00h - 10:20h		Coffee Break
10:20h - 12:20h	Room A01	Technical Session OBR-1 (Ensino Básico)
	Room A02	Technical Session OBR-2 (Ensino Fundamental)
	Room B42	Technical Session WTDR - 1
	Room B44	Technical Session WTDR - 2
12:20h - 14:20h		Lunch Time
14:20h - 16:20h	Room B42	Technical Session CTDR – M (MSc dissertations competition)
	Room B44	Technical Session CTDR – D (PhD theses competition)
	Room A01	Technical Session WRE-3: Propostas e Práticas de Robótica Educacional
16:20h - 16:40h		Coffee Break
16:40h - 18:20h	Room A01	Short-Course (Prof. Rafael Aroca): Very Low Cost Platforms for Educational Robotics
18:20h – 19:00h	Room A02	Prize Award Ceremony (CTDR'2012 / WRE'2012)
19:00h – 22:30h	Library Auditorium	Meeting SBC-CER

SBR/LARS/WRE/WTDR/CTDR 2012 Programme

Plenary Talk C (Friday, October 19th, 09:00h – 10:00h, Library Auditorium)

Speaker: Prof. Luiz Marcos Garcia Gonçalves (Federal University of Rio Grande do Norte, Brazil)

Title: Educational Robotics: History and Challenges

Abstract

We tell, in our point of view, the history of Educational Robotics including basic concepts and needs and give some directions and perspectives related to research. So the main challenges related to research and general activities in Educational Robotics are treated in this talk.

Short Bio

Luiz Goncalves holds a Doctorate in Systems and Computing Engineering from Federal University of Rio de Janeiro graduated in 1999. He is Associate Professor at the Computing Engineering and Automation Department of Federal University of Rio Grande do Norte, Brazil. He is member of the IEEE Latin American Robotics Council (since 2002) and he was the Chair for Brazilian Committee on Robotics and on Computer Graphics and Image Processing both under Brazilian Computer Society. Luiz edited 3 books, published more than 120 articles and oriented more than 25 graduate students. Moreover, Luiz has been one of the organizers of the Brazilian robotics cup in the past years, which involves thousands of students across Brazil. He is also one of the responsables for bringing the robotics world cup 2014 to Brazil. His research interests are in Computer Vision, Robotics, and all aspects of Graphics Processing. He is also a member of IEEE and IEEE/RAS.

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SBR/LARS/WRE/WTDR/CTDR 2012 Programme

Short-Course (Friday, October 19th, 16:40h – 18:20h, Room A01)

Speaker: Prof. Rafael Aroca (Federal University of Rio Grande do Norte, Brazil)

Title: Very Low Cost Platforms for Educational Robotics

Abstract

The usage of robots on educational environments is an increasingly consolidated practice. Although there are situations where the main objective is teaching robotics itself, there are also many cases where robots are used in other courses and contexts as motivating and attractive tools for students to learn several subjects, such as math, science and technology. Unfortunately, robotics kits and educational robots are still expensive, especially for developing countries. Searching for solutions, the African Robotics Network (AFRON) created the 10-dollar robot design challenge. The mini-course will present some of the winners of the challenge, giving emphasis to the N-Bot, an educational robotics platform designed and built on the Natalnet laboratory (UFRN). N-Bot costs between 11 and 15 dollars and includes a web based development environment, allowing its usage on any computer that has a web browser, dispensing software installations, and making its usage easier on public computers. Detailed information for construction and programming of this robot will also be presented.

Short Bio

Rafael is an electronics technician and holds an Informatics degree and a master of sciences degree in Mechatronics Engineering both from the University of São Paulo (USP). He has over 12 years of industry experience in embedded systems, IT systems and servers administration. His main research interests are in Embedded Systems, Operating Systems and Robotics. Currently, he is a PhD student at the Electrical and Computing Engineering Graduate Program of Federal University of Rio Grande do Norte (UFRN), Brazil. Rafael is an IEEE member since 2005 and is also a member of IEEE Robotics and Automation Society.

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SBR/LARS/WRE/WTDR/CTDR 2012 Programme

October 19th, 2012 / Friday / MORNING (10:20h – 12:20h)

Technical Session (WTDR-1) - Room B42 - Chair:

- 10:20h – 10:50h **NeuroFSM: Aprendizado de Autômatos Finitos Através do Uso de Redes Neurais Artificiais Aplicadas à Robôs Móveis e Veículos Autônomos**
Daniel Sales (Universidade de São Paulo, São Carlos)
Fernando Osório (Universidade de São Paulo, São Carlos)
- 10:50h – 11:20h **Parallel Mechanisms Controlled by Non-Conventional Control Strategies**
Allan Albuquerque (Pontifícia Universidade Católica do Rio de Janeiro)
Mauro Speranza Neto (Pontifícia Universidade Católica do Rio de Janeiro)
Marco Meggiolaro (Pontifícia Universidade Católica do Rio de Janeiro)
- 11:20h – 11:50h **Imitação de Expressões Faciais para Aprendizado de Emoções em Robótica Social**
Valéria Santos (Universidade de São Paulo, São Carlos)
Roseli Francelin Romero (Universidade de São Paulo, São Carlos)
- 11:50h – 12:20h **Sistemas Bio-inspirados de Coordenação de Múltiplos Robôs Móveis**
Rodrigo Calvo (Universidade de São Paulo, São Carlos)
Roseli Francelin Romero (Universidade de São Paulo, São Carlos)

Technical Session (WTDR-2) - Room B44 - Chair:

- 10:20h – 10:50h **Localização Cooperativa, Descentralizada e Baseada em Marcos Dinâmicos em Enxames de Robôs Móveis**
Anderson Pires (Centro Federal de Educação Tecnológica de Minas Gerais)
Luiz Chaimowicz (Universidade Federal de Minas Gerais)
- 10:50h – 11:20h **Planejamento de Trajetória em Tempo Real para Veículos Autônomos**
Diego Sciotti (Universidade de São Paulo, São Carlos)
Denis Wolf (Universidade de São Paulo, São Carlos)
- 11:20h – 11:50h **S-Educ: Um Simulador de Ambiente de Robótica Educacional em Plataforma Virtual**
Carla Fernandes (Universidade Federal do Rio Grande do Norte)
Luiz Gonçalves (Universidade Federal do Rio Grande do Norte)
- 11:50h – 12:20h **Projeto, Implementação e Otimização de RNAs em Hardware para Aplicação em Veículos Autônomos**
Maurício Dias (Universidade de São Paulo, São Carlos)
Fernando Osório (Universidade de São Paulo, São Carlos)

SBR/LARS/WRE/WTDR/CTDR 2012 Programme

October 19th, 2012 / Friday / EARLY AFTERNOON (14:20h – 16:20h)

Technical Session (WRE-3:) - Room A01 - Chair:

- 14:20h – 14:40h **Integração de Múltiplas Plataformas Robóticas no Ensino Fundamental e Médio**
Alexandre Silva (Universidade Federal de Alagoas)
Eliana Almeida (Universidade Federal de Alagoas)
- 14:40h – 15:00h **Projeto de Integração Engenharia-Escola para Competições de Robótica**
Alberto Angonese (Instituto Militar de Engenharia)
Stefano Henrique Rodrigues (Instituto Militar de Engenharia)
Paulo Fernando Ferreira Rosa (Instituto Militar de Engenharia)
- 15:00h – 15:20h **O Uso Pedagógico de um Manipulador Robótico, Utilizando o Reconhecimento de Cores para Separação de Elementos em Uma Esteira**
Rafael Tavares Coutinho (Instituto Federal de Educação, Ciência e Tecnologia da Paraíba)
Rayann P. A. Azevedo (Instituto Federal de Educação, Ciência e Tecnologia da Paraíba)
Icaro Araújo (Instituto Federal de Educação, Ciência e Tecnologia da Paraíba)
Eliel Santos (Instituto Federal de Educação, Ciência e Tecnologia da Paraíba)
Ademar Goncalves da Costa Junior (Instituto Federal de Educação, Ciência e Tecnologia da Paraíba)
- 15:20h – 15:40h **As Competições Universitárias e a Carreira Profissional do Aluno de Graduação: Um Estudo de Caso Sobre a Equipe UAIrobots-SEK**
Gabriela Reis (Universidade Federal de São João del-Rei)
Luis Fernando Freire de Souza (Universidade Federal de São João del-Rei)
Felipe Carvalho (Universidade Federal de São João del-Rei)
Marcos Abdalla Jr (Universidade Federal de São João del-Rei)
Erivelton Geraldo Nepomuceno (Universidade Federal de São João del-Rei)
Marcio Barroso (Universidade Federal de São João del-Rei)
- 15:40h – 16:00h **LUDEbot: Uma plataforma com Servomotores e Sensoriamento utilizando a Placa Arduino e Controle Externo**
Eduardo Amaral (Instituto Federal de Educação, Ciência e Tecnologia do Espírito Santo)
Luiza Pin (Instituto Federal de Educação, Ciência e Tecnologia do Espírito Santo)
Débora Oliveira (Instituto Federal de Educação, Ciência e Tecnologia do Espírito Santo)
- 16:00h – 16:20h **Robô Detector de Focos de Incêndio Desenvolvido para uma Competição de Robótica**
Taiser Barros (SENAI – RS)
Walter Lages (Universidade Federal do Rio Grande do Sul)

SBR/LARS/WRE/WTDR/CTDR 2012 Programme

October 19th, 2012 / Friday / EARLY AFTERNOON (14:20h – 16:20h)

Technical Session (CTDR-M) - Room B42 - Chair:

- 14:20h – 15:00h **A Real-Time Navigation System for Autonomous Underwater Vehicle**
Fábio Zaroni (Universidade de São Paulo)
Ettore de Barros (University of São Paulo)
- 15:00h – 15:40h **Plataforma de Software para Robôs Móveis Autônomos**
Silas F.R. Alves (Universidade Estadual Paulista),
João Rosario (Universidade de Campinas)
Humberto Ferasoli Filho (Universidade Estadual Paulista)
- 15:40h – 16:20h **Co-Projeto de Hardware/Software para Correlação de Imagens**
Maurício Dias (Universidade de São Paulo, São Carlos)
Fernando Osório (Universidade de São Paulo, São Carlos)
- 16:20h – 16:30h *Closed Session: Discussion among the referees and grade assignments*

Technical Session (CTDR-D) - Room B44 - Chair:

- 14:20h – 15:00h **IGMN: A Connectionist Approach for Incremental Robotic Tasks**
Milton Heinen (Universidade do Estado de Santa Catarina)
Paulo Engel (Universidade Federal do Rio Grande do Sul)
- 15:00h – 15:40h **Montagem e Controle H-infinito Não Linear de Manipuladores Espaciais com Base Flutuante**
Tatiana Pazelli (Universidade de São Paulo, São Carlos)
Marco H. Terra (Universidade de São Paulo, São Carlos)
Adriano Siqueira (Universidade de São Paulo, São Carlos)
- 15:40h – 16:20h **Sistema de Referência de Atitude baseado no Filtro de Kalman Robusto Recursivo**
Roberto Inoue (Universidade de São Paulo, São Carlos)
Marco H. Terra (Universidade de São Paulo, São Carlos)
- 16:20h – 16:30h *Closed Session: Discussion among the referees and grade assignments*