2021 Latin American Robotics Symposium (LARS 2021), 2021 Brazilian Symposium on Robotics (SBR 2021), and 2021 Workshop on Robotics in Education (WRE 2021)

Natal, Brazil
11 – 15 October 2021

IEEE Catalog Number: CFP21A78-POD
ISBN: 978-1-6654-0762-5

Copyright © 2021 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP21A78-POD
ISBN (Print-On-Demand):	978-1-6654-0762-5
ISBN (Online):	978-1-6654-0761-8
ISSN:	2639-1775

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

2021 Latin American Robotics Symposium (LARS), 2021 Brazilian Symposium on Robotics (SBR) and 2021 Workshop on Robotics in Education (WRE)

LARS-SBR-WRE 2021

Table of Contents

Acknowledgments ii

Preface iii

Committees v

Latin American Robotics Symposium and Brazilian Robotics Symposium

Assistive Robotics and Human Robot Interaction

A Strategy to Validate Knowledge Representation in Service Robots through Experimentation Applied to the SLAM Domain . . . 1
Maria Cornejo-Lupa, Dennis Barrios-Aranibar, Yudith Cardinale, Regina Ticona Herrera, Manoel Andrade, Jose A. Diaz-Amado

A Review of Emotions in Human-Robot Interaction . . . 7
Lara Ottoni, Jes de Jesus Cerqueira

Creating a Digital Twin as an Open Source Learning Tool for Mobile Robotics . . . 13
Carlos Magrin, Gustavo Del Conte, Eduardo Todt

Extended Reality for Teleoperated Mobile Robots . . . 19
Arturo Batistute, Edvaldo Santos, Karam Takieddine, Pedro Lazari, Lidia Rocha, Kelen Vivaldini

RoboCup@Home: Evaluation of voice recognition systems for domestic service robots and introducing Latino Dataset . . . 25
Eric Brinckhaus, Guillermo Trinidad, Mathias Etcheverry, Federico Andrade

Aerial and Aquatic Vehicles

Tracking Nonlinear Model Predictive Control for Obstacle Avoidance . . . 30
Marcelo Santos, Antonio Ferramosca, Guilherme Raffo

Unmanned Aerial Vehicle with Hybrid Lift and Propulsion . . . 36
Alysson Lucena, Raimundo Freire Jr., Luiz Gonçalves

Trajectory Detection Method for Transmission Line Path Following Control . . . 42
Guilherme Pussente, Tiago Santa Maria, André Marcato, Eduardo Aguiar

Performance evaluation of LoRa and ZigBee technologies applied to FANETs . . . 48
Leonardo Ferreira, Luis Silva, Paulo Rosa

Analysis and Contributions of Classical Techniques for Path Planning . . . 54
Lidia Rocha, Kelen Vivaldini

Cooperative Observation of Malicious Targets in a 3D Urban Traffic Environment Using UAVs . . . 60
Matheus Araújo, João Andrade, Thayanne da Silva, Leonardo da Costa, Raimundo Ferro Jr., Gabriel Melo, Douglas Silva, Gustavo Campos

Energy Management in Autonomous Vessels Using Restricted Boltzmann Machine . . . 66
Wanderson Corrêa, André Araújo, Rodrigo Aguiar, Davi Santos, Daniel Dias, Esteban Clua, Luiz Gonçalves

Autonomous And Collective Intelligence for UAV Swarm in Target Search Scenario . . . 72
Luiz Giacomossi Jr., Flavio Souza, Raphael Cortes, Huascar Cortez, Cauê Ferreira, Cesar Marcondes, Denis Loubach, Elton Sbruzzi, Filipe Verri, Johnny Marques, Lourenço Pereira, Marcos Maximo, Vitor Curtis

Cooperative and Decentralized Decision-Making for Loyal Wingman UAVs . . . 78
Luiz Giacomossi Jr., Stiven Dias, José Brancalion, Marcos Maximo

Unmanned Aerial Vehicle Framework for Algae Monitoring . . . 84
Aline Almeida, Eduardo Nascimento, Isaac Alvarez, Pedro Kim, Lidia Rocha, Kelen Vivaldini

Analysis of a Hybrid Unmanned Aerial Underwater Vehicle Considering the Environment Transition . 90
Vivian Aoki, Pedro Pinheiro, Paulo Drews Jr., Mauro Cunha, Lucas Tuchtenhagen

Engagement Decision Support for Beyond Visual Range Air Combat . . . 96
Joao Dantas, André Costa, Diego Geraldo, Marcos Maximo, Takashi Yoneyama

Sugarcane crop line angle estimation based on pixel accumulation and Savitzky-Golay filtering . . . 102
Raphael Ferreira, André Hernandes

Geometric Primitive Fitting in Large Structure 3D Point Clouds Acquired by Drones . . . 108
Igor Maurell, Paulo Drews Jr., Carlos Eguti, Cauê Ferreira

Detection of invasive vegetation through UAV and Deep Learning . . . 114
Camargo Charles , Pedro Kim, Aline Almeida, Lidia Rocha, Eduardo Nascimento, Kelen Vivaldini

Control and Robotic Systems

Surrogates for the Assessment of Robotic Manipulators Reliability . . . 120
Fabian Lara-Molina, Edson Koroishi, Jaqueline Machida

Quasi-static Optimal Design of a Pneumatic Soft Robot to Maximize Pressure-to-Force Transference . 126
Carlos Vázquez-Garcia, Christian Trejo-Ramos, Vicente Parra-Vega, Ernesto Olguín-Díaz

A Lagrangian Dynamic Model for Soft Cylindrical Robots Without Internal Holonomic Constraint . . 132
Christian Trejo-Ramos, Ernesto Olguín-Díaz, Vicente Parra-Vega, Carlos Vázquez-Garcia

6D Grasping Based On Lateral Curvatures and Geometric Primitives . . . 138
Daniel Oliveira, Caio Viturino, André Conceição

6D Robotic Grasping System using Convolutional Neural Networks and Adaptive Artificial Potential Fields with Orientation Control . . . 144
Caio Viturino, Daniel Oliveira, André Conceição, Ubiratan Junior

Development of a Wearable Underactuated Finger Exoskeleton for Haptics: Preliminary Formal Results 150
Gilberto Reyes-Perez, Nadia Garcia-Hernández, Vicente Parra-Vega

Constrained Control of non-Holonomic Mobile Manipulator by Explicit Reference Governor . . . 156
Luiz Hage, Ebrahim El'youssef, Edson De Pieri

Proposal of a multimodal robotic architecture considering social constraints applied to an intelligent wheelchair . . . 162
Vinicius Moitinho, Félix Brito, Jose Diaz-Amado, Vitor Costa, Daniel Sousa, Elvio Prado, Cleia Libarino, João Soares

Dynamic Modeling and Control Optimization of Free-Floating Dual-Arm Space Robots in Task Space 168
Gabriel Rodrigues, Tatiana Pazelli

Discrete Movement Control of a Bio-Inspired Multi-Legged Robot . . . 174
Helton Nogueira, Felipe Oliveira, José Pio

Vision, Sensing and Mapping

A New Approach of Monocular Visual Odometry to Trajectory Estimation Within a Plantation . . . 180
Gabriel Araújo, Jorge Filho, Vitor Higuti, Marcelo Becker

Degradation-Driven Underwater Image Enhancement . . . 186
Claudio Mello Jr., Paulo Drews Jr., Silvia Botelho

Pedestrian trajectory prediction with pose representation and latent space variables . . . 192
Anderson dos Santos, Valdir Grassi Junior

Spark in the dark: evaluating encoder-decoder pairs for COVID-19 CT's semantic segmentation . . . 198
Bruno Krinski, Daniel Ruiz, Eduardo Todt

A Framework for Underwater Vehicle Localization based on Cross-view and Cross-domain Acoustic and Aerial Images . . . 204
Matheus dos Santos, Giovanni Giacomo, Paulo Drews Jr., Silvia Botelho, Claudio Mello Jr.

Comparison Between two Recurrent Multitasking Networks for Robot Relocation . . . 210
Dunfrey Aragão, Tiago Nascimento

Comparison of Visual SLAM Algorithms ORB-SLAM2, RTAB-Map and SPTAM in Internal and External Environments with ROS . . . 216
Kesse de Jesus, Henry Kobs, Anselmo Cukla, Marco Cuadros, Daniel Gamarra

A Visual Inspection Proposal to Identify Corrosion Levels in Marine Vessels Using a Deep Neural Network . . . 222
Luciane Soares, Silvia Botelho, Ricardo Nagel, Paulo Drews Jr.

Localization Using OSM Landmarks . . . 228
Maximilian Kunz, Axel Vierling, Patrick Wolf, Karsten Berns

Improving the Mobile Robots Indoor Localization System by Combining SLAM with Fiducial Markers 234
Alexandre Oliveira Júnior., Luis Piardi, Eduardo Bertogna, Paulo Leitão

An Approach to Improve Simultaneous Localization and Mapping in Human Populated Environments 240
Kevin Inofuente-Colque, Sergio Ferreira-Andrade, Dennis Barrios-Aranibar, Yudith Cardinale, Jose Diaz-Amado

Performance Comparison of Convolutional Neural Network Models for Object Detection in Tethered Balloon Imagery . . . 246
Débora dos Santos, André Françani, Marcos Maximo, Arthur Ferreira

Performance Analysis of Relative GPS Positioning as Function of Latency . . . 252
Gustavo Carvalho, Felipe Silva

Position control of an Omnidirectional Robot through Visual Servoing . . . 258
Pedro Figueroa-Saire, Raquel Esperanza-Patiño

Targets Detection Using Multiple Foveas . . . 264
Petrúcio Medeiros, Rafael Gomes, Luiz Gonçalves

Active Localization for Mobile Service Robots in Symmetrical and Open Environments . . . 270
Federico Andrade, Martin Llofriu, Mercedes Tanco, Guillermo Barnech, Gonzalo Tejera

VBM granulometry for real applications in the fertilizer industry . . . 276
Nelson Traversi, Douglas Goulart, Julio Mendonça, Silvia Botelho, Luciane Soares, Emanuel Estrada, Paulo Drews Jr., Vinicius Oliveira

Water Classification Based on Underwater Monocular Image . . . 282
Everton Toledo, Edwilson Vaz-Jr., Paulo Drews Jr.

Occupancy Grid Map Estimation Based on Visual SLAM and Ground Segmentation . . . 288
Mirella Melo, Lucas Cambuim, Edna Barros

On Aquaculture Enhancements Through Robotic Behaviour Actuation . . . 294
Letieri Ávila, Silvia Botelho, Marcelo Pias, Bruna Guterres, Je Nam Junior

Robot Soccer

Geometry Analysis and Force Simulation of a Kicker System's Flat Solenoid to Robots for the Small Size League Category . . . 300
Danillo Santos, Guilherme Silva, Ítalo Silva, Pedro Motta, Júlia de Souza, Joaquim Araújo, João Cajueiro, Pedro Silva, Adam Pinto

A Minimalist Open Source Behavior Tree Framework in C++ . . . 306
Gustavo Silva, Marcos Maximo, Lourenço Pereira

Mechanical and Dynamic Analysis for Design and Development of a RoboCup SSL Dribbling Mechanism312
Victor Araújo, Edgleyson Silva, João Monteiro, Rebecca Sousa, Cecília Silva, Pedro Santana, Edna Barros

Optimizing Univector Field Navigation Parameters Using CMA-ES . . . 318
Thayna Baldão, Marcos Maximo, Takashi Yoneyama

Navigation and Path Planning

CBNAV: Costmap Based Approach to Deep Reinforcement Learning Mobile Robot Navigation 324
Darci Junior., Eduardo Todt

Addressing Lane Keeping and Intersections using Deep Conditional Reinforcement Learning 330
Vítor Silva, Valdir Grassi Jr.

Towards a Simple Navigation Strategy for Autonomous Inspection of Ducts and Galleries 336
Guilherme Pereira, Carolina Duarte, David Marques, Héctor Azpúrua, Gustavo Pessin, Gustavo Freitas

Workshop of Robotics in Education

Robotics in Education

EduRoSC-Prof: Continuous Education Method for Teacher Formation in Educational Robotics for K-12 Teaching 342
Denilton Oliveira, Carla Fernandes, Julio Melo, Orivaldo Santana-Júnior, Dennis Barrios-Aranibar, Raquel Patino-Escarcina, Luciane Garcia, Luiz Gonçalves

A Survey on Continuing Education of Teachers in Educational Robotics 348
Denilton Oliveira, Luciane Garcia, Luiz Gonçalves

Building a Robotics at School Project with Social Transformation 354
Luciana Gomes, Igor Pinto, Bruno Taira, Gustavo Nicio, João Campi, Mateus Pereira, Tábata Macedo, Yago Barbosa, Rafael Aroca, Osmar Ogashawara, André Hernandes, Tatiana Pazelli

Easy Learning of Reinforcement Learning with a Gamified Tool 360
Elson Dreveck, Alex Salgado, Esteban Clua, Luiz Gonçalves

Edubot Project: Analyzing the adaptation of robotics classes to the remote environment 366
Giovanna Bottino, Sheila Araújo, Caio Saigg, Mariana Bernardes Matias, Roberto Baptista

Teaching Robotics in Pandemic Times Through Remote Education 371
Raphael Silva, Carlos Joventino, Jonathas Pereira, Lucas Correa

Author Index **377**