2022 IEEE International Conference on Automation/XXV Congress of the Chilean Association of Automatic Control (ICA-ACCA 2022)

Curico, Chile
24-28 October 2022

Pages 1-421

IEEE Catalog Number: CFP22G74-POD
ISBN: 978-1-6654-9409-0

Copyright © 2022 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: CFP22G74-POD
ISBN (Print-On-Demand): 978-1-6654-9409-0
ISBN (Online): 978-1-6654-9408-3

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

Table of Contents

INVITED PAPERS

An Approach to a Vertical Farming Low-cost to Reach Sustainable Vegetable Crops 1
Gilda Carrasco Silva, Fernando Fuentes-Peñailillo, Ricardo Pérez-Guzmán, Pabla Rebolledo-González and Paula Manríquez-Novoa

Fractional Order Adaptive Control: A Brief Summary 7
Manuel Duarte Mermoud and Juan Carlos Travieso-Torres

Control design for cyber-physical systems under DoS attacks 13
Márcio Júnior Lacerda, Pedro M. Oliveira and Jonathan M. Palma

Remote sensing tools for monitoring water requirements and water stress in vineyards and fruit trees 19
Samuel Ortega-Farías, Fernando Fuentes-Peñailillo, Karen Gutter and Ricardo Vega

TECHNICAL PAPERS

— AUTOMATIC CONTROL (Application), INSTRUMENTATION & REMOTE SENSOR —

Control of a Virtual Cascade Integrated System with Constant Steam Feed Boiler to a Reactor for the Production of Aluminum Chloride Using a Model Predictive Control MPC 25
David Amores, Javier Villagómez, Jacqueline Llanos and Diego Oritz

Experimental Validation of Cooperative Adaptive Cruise Control Schemes Under the Presence of Time Delays 33
Diego Badillo, Felipe Villenas, Cristóbal Huidobro, Francisco Vargas and Andrés Alejandro Peters Rivas

Performance Comparison between LQR, GPC and ANFIS controllers for Load Frequency Control in a Small Hydro Power Plant 39
Pável A. Campos-Peña, Jose O. Aliaga-Yauri, Daniel L. Barrera-Esparta and Manuel R. Gomez-Casasola

Automation of a LAG (Liquefied Petroleum Gas) plant 45
Pedro Duarte and Federico Fernandez

An Overview of Recent Advances in Energy Storage for Solar Power Systems 51
Seada Hussen, Frie Ayalew, Mohit Bajaj, Naveen Kumar Sharma, Francisco Jurado and Kamel Kamel

Architecture of the Low-Level Flight Controllers for the 3D Trajectory Motion in a Quadcopter 57
Alain Nascimento Guimarães, Claudio Garcia and Eduardo Lorenzetti Pellini

MPC-based traction control for electric vehicles 63
Alvaro Palma, Agustín Reyes, Jaime Rohten, Nathalie Risso, Daniel Quezada and Vladimir Esparza

Image Processing Technique Applied to Electrical Substations Based on Drones with Thermal Vision for Predictive Maintenance 68
Andres Prieto, Ivan Rodriguez, Jorge Rodas, Enrique Paiva, Raul Gregor, Enrique Chaparro and Eduardo Prieto-Araujo

An Adaptive Neuro-Fuzzy PID Controller Approach for thermal Systems: An Experimental Validation 74
Gabriel Salazar, Francisco Rossomando and Oscar Camacho

Design of an Automatic Sorting Machine on the Conveyor Belt System Based on Product Temperature 79
Ujjawal Singh, Abdul Rahman, Saroj Kumar Mahato, S Surya, Mohit Bajaj, Francisco Jurado and Salah Kamel

Modeling of a Photovoltaic Panel and Solar Tracking Control 85
Ivan Velasquez, Boris Pavez, Roberto Moncada, Valentina YaÑez and Jorge Sandoval

— AUTOMATIC CONTROL (Theory) —

PI and PID Controller Tuning with Deep Reinforcement Learning 91
Kelyn Botina, Juan Gonzalo Álvarez and Edinson Cortes

Induced Coprime Factorization for Continuous Time Systems with Delay 97
Lisandra Bravo Alvarez and Alejandro J. Rojas

An overview of Digital Twins Methods Applied to Lithium-Ion Batteries 103
Valentina Bugueño Olivos, Karina Acosta Barbosa, Saravanakumar Rajendran and Matías Díaz Díaz

Realization and comparative analysis of Fractional Order Controllers for different discretization methods 110
Carlos Calderon Cordova and Roger Sarango

A Gaussian Sum Smoothing algorithm for Hammerstein-Wiener State-Space Systems 116
Angel L. Cedeño, Rodrigo Carvajal and Juan Agüero

Partial Feedback Linearization and Reference Signal Tracking Control for Ball-and-Plate System 123
Angel L. Cedeño, Reinier López Ahuar, Manuel Olivares, César Silva and Juan Agüero

Sliding-Mode Controller Based on Fractional Order Calculus for Chemical Processes 129
Nicola Di Teodoro, Diego Ochoa-Tocachi, Hanna Aboukheir and Oscar Camacho

T-S Fuzzy H_{oo} Observer-Controller Design for 2-D Systems 135
Badreddine El Haiek, Taha Zoulagh, Hicham El Aiss, Karina Acosta Barbosa and Abdelaziz Hmamed

Robust Control of Continuous-time Systems with Pole Uncertainties 143
Eduardo A. Elgueta and Juan I. Yuz

Model Reference Adaptive Control for Ball-and-Plate System 149
Reinier López Ahuar, Angel L. Cedeño, Manuel Olivares, Juan Agüero and Cesar Silva

SNR Based Detection and Estimation of AWN Channel Parameters Changes 155
Alejandro Rojas

Design, simulation and comparison of control strategies for the optimal positioning of mobile Wireless Sensor Networks 161
César Sandoval, Pablo Adasme and Claudio Urrea

Dynamic Output-Feedback Controller Design for Interval Positive Linear Systems 168
Amanda Spagolla, Cecília de Freitas Morais, Pedro Luis Dias Peres and Ricardo Coração de Leão Fontoura de Oliveira

Solving the equation of the physical pendulum by some numerical methods of differential equations 174
Salustiano Vega, Osvaldo Vega and Eduardo Ortigoza

A numerical study of a Kalman filtering based strategy for platooning with lossy communication 179
Felipe Villenas, Francisco Vargas and Andrés Peters

— BIOENGINEERING & BIOINFORMATICS —

Deep learning algorithm applied to bacteria recognition 185
Carlos E. Alegría Guajardo, Xaviera A. López-Cortés and Sergio Hernandez

Accuracy and Precision Study of Commonly Used Non-Invasive Blood Pressure Monitors, Using a Simulator Device as a Reference 191
Alonso Alfaro and Pablo Roncagliolo

Designing an Active Ankle-Foot Prosthesis: Digital Prototype, Modeling and Control 197
Gabriela A. Caprini, Carolina M. Cunha, Arnaldo G. L. Junior and Rafhael M. de Andrade

Scalable Management Architecture for Electronic Health Records Based on Blockchain ... 201
Alvaro Díaz and Hector Kaschel

Development and Evaluation of the Antimicrobial Activity to Produce a Hand Sanitizing Gel with Essential Oils of Cinnamon (Cinnamomum zeylanicum), Eucalyptus (Eucalyptus globulus) and Tangerine (Citrus maxima) 208
Pablo Parra, Kevin Cedeño and Paul Maldonado

Application of the BIM Methodology in Hospital Constructions 214
Antonio Rienzo and German Blanchard

— CHALLENGES AND TRENDS IN ENERGY TO MITIGATE CLIMATE CHANGE AND ENERGY POVERTY —

Water Splitting Dynamics of High Voltaje Pulsed Alkaline Electrolysis 220
Matías Albornoz, Marco Rivera, Roberto Ramírez, Felipe Varas and Patrick Wheeler

A review of solar and wind energy in Paraguay 227
Magno Ayala, Sergio Toledo, Guadalupe Ramirez, Antonella Prado, David Caballero, Marco Rivera, Patrick Wheeler and Raul Gregor

An Overview of the Colombian Power System 232
Manuel Bravo-Lopez, Samuel Marin, Jhon-Ronald Terreros-Barrento, Alejandro Garcés, Alexander Molina, Marco Rivera and Patrick Wheeler

Appropriate Technology as an Alternative to Mitigate Energy Poverty in Rural Communities 238
Guillermo Catuogno, Gaston Frias, Carlos Catuogno, Guillermo Garcia, Marco Rivera and Patrick Wheeler

Right to energy and vital minimum: repercussions in the Chilean constitutional debate . . . 244
Julián Cortés, Paz Araya Jofré, Cristian Flores Fernández, Fernanda Skewes, Óscar Guzmán and Marco Rivera

Climate Change in Argentina, Renewable Energies and their Implications 250
Pablo Cossutta, Milagros Moutin, Alan Mechoulam, Santiago Barbero and Miguel Aguirre

Electrodependent Patients: Regulations, Possible Technical Solutions and Case Study 255
Gaston Frias, Guillermo Catuogno, Marco Rivera, Patrick Wheeler and Guillermo Garcia

Trends and Challenges for Access to Energy in Electro-dependent People 261
Oscar Guzmán, Fernanda Skewes, Julian Cortes, Marco Rivera and Guillermo Catuogno

Carbon Neutrality Scenario Projection Model under Uncertainty 267
Vicente Sepúlveda Figueroa and Carlos Benavides Farías

Management Instruments in the New Climate Change Framework Law 273
Fernanda Skewes, Julián Cortés, Óscar Guzmán and Marco Rivera

Trends and Challenges in Sustainable Energy Management Models for Public Health Services 279
Jose Suarez, Marcia Silva, Marco Rivera and Patrick Wheeler

The Photovoltaic Greenhouse as Energy Hub for a More Sustainable Agriculture 285
Miguel Torres, Claudio Burgos, Daniel Casagrande, Diego Muñoz, Manuel Pinto, Hernán Reyes and Benjamín Acuña

— COMMUNICATION, SIGNAL PROCESSING & IOT —

Flexible Microstrip Antenna for IoT and 5G Wireless Systems 291
Cristian Ahumada, Hector Kaschel, Sergio Cordero and Roman Osorio-Comparan

Strategy Based on Game Theory To Reduce Total Latency in The Location of Controllers in a Software Defined Network 296
Tomas De la Cuadra, Pablo Adasme, Claudio Valencia and Skarlett Cáceres

Design and Evaluation of an Experimental Visible Light Communications Platform 303
Camilo Fredes, Pablo Palacios, Cesar Azurdia and Ismael Soto

Design of Triband Microstrip antenna for WLAN/WiWAX applications 308
Hector Kaschel and Cristian Ahumada

Precoder optimization for interference channels with interference alignment 313
Felipe Maturana, Maria Constanza Estela and Pablo Adasme

Minimizing Latency and Number of Controllers in Software Defined Networking 319
Andres Viveros, Pablo Adasme and Enrique San Juan Urrutia

Optimization of QoS Parameters in Software-Defined Networks 325
Andres Viveros, Hector Kaschel and Pablo Adasme

— DIGITAL AGRICULTURE —

Classification of Diseased and Healthy Apple Leaves through Extreme Learning Machines . 331
Roberto Ahumada-García, David Zabala-Blanco, Ismael Soto, Xaviera A. López-Cortés and Ricardo J. Barrientos

Towards indicators for agricultural production through biomathematical modeling using an interactive web platform . . . 338
William Campillay, Fernando Fuentes-Peñailillo and Samuel Ortega-Farías

Proposal of water status monitoring of adult Populus commercial stands using satellite imagery . . . 344
Paulo Cañete-Salinas, Diego Romero, Jaime Venegas, Cristian Espinosa, Khristopher Ogass and César Acevedo-Opazo

A Microclimate Greenhouse Multivariable Control: A Guide to use Hardware in the Loop Simulation . . . 349
Gustavo Cevallos, Javier Pinzon and Oscar Camacho

Classification of organic quinoa crops using multispectral aerial imagery and machine learning techniques . . . 355
Andres Flores

Towards the monitoring of water consumption of crops using digital agriculture techniques 361
Fernando Fuentes, Samuel Ortega, Fei Tian, Ricardo Perez, Vicente Calderon and Daniel Perez

Use of a natural language processing bot for agricultural water management . . . 366
Fernando Fuentes, Ricardo Perez, Samuel Ortega, Karen Gutter, Hector Nieto and Rodrigo Paredes

Use of remote sensing and ground-based measurements for the evaluation of the SIRSD-S program in Biobio Region, Chile . . . 372
Fernando Fuentes-Peñailillo, Roberto Jara and Carlos Bopp

Smart Agriculture 4.0: Technology Recommendations and Interoperability of Devices, Sensors and Data Management using Blockchain . . . 377
Hector Kaschel, Sergio Cordero, Pablo Adasme and Cristian Ahumada

Test chamber to analyse post-harvest climatic effects on fruit . . . 384
Víctor Miranda and Mario Fernandez

Design of a temperature test chamber for fruit study . . . 391
Víctor Miranda and Mario Fernandez

Database generation to identify cow's movements for detecting estrus and lameness . . . 398
Carlos Muñoz, Juan Huircan and Fernando Huenupan

Identification of a reduced order model for greenhouse control based on CFD model results and experimental validation . . . 404
Danilo Pastrana, Fabián G. Pierart and Ernesto Rubio

Greenhouse Parametric Computational Fluid Dynamic model . . . 410
Fabián G. Pierart, Daniel Vergara Sanhueza and Santiago Riquelme

Traceability System for an Agricultural Supply Network based on Blockchain 416
Daniel Pérez Guzmán, Marco Rivera, Fernando Fuentes, Alejandro Díaz, Ricardo Pérez and José Villar

Towards the automatic simulation of fruit trees phenology: assessment of weather forecast data for calculating thermal time 422
Camilo Riveros-Burgos and Catalina Pinto

Implementing two methods to compute the area covered by watermelon plants using aerial RGB imagery 426
Camilo Riveros-Burgos, Catalina Pinto, Daniel E. Casagrande and Rodrigo Contreras-Soto

Digital agriculture for urban crops: design of an IoT platform for monitoring variables. . . . 430
Jhonatan Paolo Tovar Soto, Mateo Orrego González and Jonathan Antonio Sierra Sánchez

— ELECTRICAL MACHINES & ELECTRIC POWER SYSTEMS —

Static Planning of the Expansion of Electrical Energy Transmission Systems Using Intelligent Algorithms 436
Renato Andrade Mosqueira Furtado and Ivo Silva Junior

Multi-criteria decision making for prioritization of Distribution System alternatives in 23 kV 442
Felix Fernandez, Francisco Barreto, Jazmin Sanabria, Eduardo Ortigoza, Daniel Rios, Gabriel Baum and Arturo González

Hydropower Potential Assessment of Four Selected Sites in the North Interconnected Network Zone of Cameroon 447
Kidmo Kaoga Dieudonné, Mohit Bajaj, Kitmo Bahn, Olena Rubanenko, Francisco Jurado and Salah Kamel

Impact of ancillary services in the steady-state security region in distribution systems 453
Mateus Lima, Ranielli Pombo, João Passos and Othon Ávila

Quick Comparison of the Cogging Torque Severity in Permanent Magnet Synchronous Machines with Segmented Stator Core 460
Carlos Madariaga, Cesar Gallardo, Juan A. Tapia, Werner Jara and Danilo Riquelme

Speed Control of a Six-Phase IM with Reactive Power Minimization for a Multi-Modular Matrix Converter Using an Inner PTC 466
Edgar Maqueda, Sergio Toledo, David Caballero, Magno Ayala, Ever Quiñonez, Rodrigo Romero, Raul Gregor and Marco Rivera

Vibration Analysis and Mitigation Techniques for Electrical Drives in Electric and Hybrid Vehicles 472
Cristobal Palma and Cristian Garcia

Reliability of Electrical Service in Medium Voltage Aerial Distribution Networks, Applying an Automatic Restoration Scheme Through Reclosers (Loop Automation) 478
Pablo Parra, Ervin Solano and David Gomezcoello

Analysis of the Relationship of Inertia and Net Load in the Chilean Power System 486
Roberto Perez and Hector Chavez

Reduced order model for two areas to represent coherent groups in Power Electric Systems 492
Jorge Ramirez, Aldo Barrueto, Juan Quiroz and Hector Chavez

Optimal Placement of PMUs Using Henry Gas Solubility Optimization for State Estimation of Power System 497
Ali Selim, Salah Kamel, Mohamed Abdelkader and Francisco Jurado

— ENERGY —

Multi-criteria analysis of the performance in the use of electrical energy in the UNA: An approach based on AHP . . . 503
Fabio Aquino, Félix Fernández and Eduardo Ortigoza

Contingency Assessment of an ANN-based Method for Monitoring Load Margin of Power Systems . . . 509
Murilo E. C. Bento

PMU-Based Power System Stabilizer Design Using Reptile Search Algorithm . . . 514
Murilo E. C. Bento

Estimation of Green Hydrogen production potential in the Piura region from water electrolysis . . . 520
Daniel Caravantes, Juan Diego Carbajal and Daniel Marcelo-Aldana

Increasing Distribution Network Capacity through Storage in Central American Countries: A Case Study . . . 526
Gustavo Adolfo Gomez Ramirez, Isaac A Luévano Reyes, Gonzalo Mora-Jiménez, Luis Claudio García Santander, Markel Zubiaga Laskano and Carlos Meza

Design and energy balance of a bagasse-fired water-tube boiler for non-centrifugal sugar production using steam technology . . . 532
Daniel Marcelo-Aldana and Sebastian Laca-Cuglievan

Mathematical modelling and numerical simulation of the drying chamber of an indirect solar dryer . . . 538
Daniel Marcelo-Aldana, Gustavo Vasquez-Tantas, Elder Mendoza Orbegoso and Raul La Madrid

Peruvian Rural Jaggery Making Process: Heat Transfer Coefficients Determination in Pool Boiling Pans . . . 544
Elder Mendoza Orbegoso, Luis Delgado, Raúl La Madrid and Daniel Marcelo-Aldana

Application of the Perceptor Hierarchical Model to the negotiations on the cost of electricity service of a binational hydropower plant: the case of ITAIPU . . . 551
Eduardo Ortigoza, Victorio Oxilia, Fernando Ferreira, Juan Carlos Cabral and Diego Coronel

Analysis and Modeling of an Electromagnetic Speed Regulator for Wind Energy Conversion Systems . . . 559
Andrés Ortiz Salazar, Daniel Carlos De Carvalho Crisóstomo, Glauco George Cipriano Maniçoba, Evandro Ailson De Freitas Nunes and Elmer Rolando Llanos Villarreal

What Should DNOs Foster? A Single DG or Multiple Small DGs?: A Statistical Power-Flow Analysis for the Chilean Case . . . 565
Bastián Rodríguez, Lorenzo Reyes and Héctor Chávez

Optimal Coordination of Directional Overcurrent Relay Using Coyote Optimization Algorithm . . . 570
Ali Selim, Salah Kamel, Hagag Abdul Jabir and Francisco Jurado

What hides Chile's electricity mix data: A Data Science perspective 576
Javier Soto, Michaol Moore, Xaviera A. López-Cortés, Ruber Hernández-García and Iván Merino

— ENGINEERING EDUCATION —

Current Loop Control for an Educational Magnetic Levitation System 582
Carlos Muñoz and Felipe Llanos

Parameter identification of a two-wheeled self balancing robot settled as an educational platform 588
Carlos Muñoz, Andrés Mogollon, Alejandro López and Luis Olave

Explainable Prediction of Academic Failure Using Bayesian Networks 595
Juan Tarbes, Pamela Morales, Marcos Levano, Pablo Schwarzenberg, Orietta Nicolis and Billy Peralta

Educational Processes Automation with Support in Digital Design and 3D Printing 601
Irais Zavala, Alfredo Reyes, Luisa Navarro and Narda Reyes

— INFORMATICS, BIG DATA & DATA SCIENCE —

Off-line Writer Identification based on Small Segments of Handwritten Text and Convolutional Neural Networks 607
Guillermo Becerra, Marco Mora, Verónica Aubin and Ruber Hernández-García

Preliminary results on anomaly detection and recognition in spacecraft telemetry 613
Sara Cuellar, Gonzalo Farías, Matilde Santos and Fernando Alonso

Identification of Ethical Issues in the Phases of the Software Development Life Cycle: A Preliminary Secondary Study 619
Lucrecia Llerena, Carlos Almeida, John W. Castro and Darlyn Buenaño

Tool for the selection of software development methodologies for small projects and small equipment 625
Nahur Manuel Meléndez Araya, José Gallardo and Nahur J. Meléndez Castillo

Combining MRA y LSTM for predicting the sismicity in Chile 631
Orietta Nicolis, Felipe Carrasco, Billy Peralta and Felipe Lopetegui

Evaluation of nodes distribution for linear terrain objects to calculate the optimal parameters of coordinate reference systems in terms of the Republic of Chile 637
Aleksei Portnov

Preliminary results with BERT for human activity recognition using skeleton sequences features 643
Heilym Ramirez, Sergio Velastin, Ernesto Fabregas and Gonzalo Farías

Electrical fault classification strategies for maintenance models using machine learning algorithms 649
Luis Felipe Rau, Marcela Jamett and Pablo Adasme

Fast Tuning of Extreme Learning Machine Neural Networks based con Simple Optimization Algorithms 655
Marcelo Tobar, Marco Mora Cofre, Fabian Silva-Pavez, Italo Torres and Pedro Barria

DCAEAD: Denoising system for assisted driving images applying an autoencoder architecture 660
Luis Carlos Torres Vega, Andrea Paola Ardila Sanchez, Ghiordy Ferney Contreras Contreras, Sergio Alexander Castro Casadiego, Byron Medina Delgado and Dinael Guevara Ibarra

A New Fast Training Algorithm for Autoencoder Neural Networks based on Extreme Learning Machine 666
Angel Vasquez, Marco Mora, Karina Vilches, Fabian Silva, Italo Torres and Pedro Barria

— MANUFACTURING, IIOT, INDUSTRY 4.0 & OTHER APPLICATIONS —

Information model for the digital transformation of manufacturing systems in small and medium enterprises 673
William Gutierrez, Jesus Alfonso Lopez Sotelo and Jesus Hamilton Ortiz

Energy Meter Proposal for Residential Smart Grid based on IoT Technologies 679
Alberto Marroquín, Adalberto Gómez, Hector Carias and Carlos Bran

Blue Ocean Strategy: A look from the literature 683
Nahur Manuel Meléndez Araya, Manuel H. Ruiz Ulloa, Jenny G. Pizarro Ruz and Pablo O. Cruzat Pacheco

Validating effect of Refactoring of IEC 61499 Function Block in Distributed Control Systems 689
Ernesto Monroy Cruz, Luis Rodolfo García Carrillo, Sandeep Patil, Primo Cerón Obregón and Jan Francisco Cerón García

Machine learning based condition monitoring of a DC-link capacitor in a Back-to-Back converter 695
Saravanakumar Rajendran, Debashisha Jena, Matias Diaz and V S Kirthika Devi

Preparation of automatic plastic extruder with support of emerging technology 700
Alfredo Reyes, Luisa Navarro, Ariday Conde and Karina Reyes

Detection of glass' position using computer vision for the automation of the waterjet cutting machines 705
Miquéias Silva Filho, Júlia Cabral and Carlos Alberto Souza Filho

An Evaluation of the Diverse Actuation System in Nuclear Power Plants 711
Renan A. Travi and Claudio Garcia

— MECHATRONICS, ROBOTICS, FMS, VISION & ARTIFICIAL INTELLIGENCE —

Convolutional Neural Network (CNN) and Industrial Robot Arm applied to an automatic coffee bean selection system 717
Carlos Calderon Cordova, John Robles, Sulay Morocho and Roger Sarango

Integration of a robotic arm Lynxmotion to a Robotino Festo through a Raspberry Pi 4 .. 723
Bryan Díaz, Nicolás Pacheco and Leonardo Vinces

Cobots in automation and at home 728
Gaston Lefranc, Roman Osorio-Comparán, Mario Mario Peña-Cabrera and Ismael Lopez-Juarez

Traffic Signal Classifier for Mobile Robot Navigation Control 734
Alberto Marroquín and Gonzalo Farias

A Novel Adaptive Actor-Critic Reinforcement Learning Controller for Constrained Robots 739
Luis Pantoja Garcia, Rodolfo Garcia Rodriguez and Vicente Parra Vega

A Proposal for Deep Online Facial Verification using Selfies and Id document 745
Ricardo Reyes, Billy Peralta, Orietta Nicolis and Luis Caro

Methodologies for optical character recognition using convolutional neural networks and open source tools applied to industrial production lines 751
Armando Uribe, William Gutierrez and Ian Mateo Rodriguez

PVEIN-MLELM: a novel palm vein identification approach through multilayer extreme learning machine 758
David Zabala-Blanco, Ruber Hernández-García, Ricardo J. Barrientos and Roberto Ahumada-García

Fingerprint Classification with the Extreme Learning Machine Algorithm for Multilayer Perceptron 764
David Zabala-Blanco, Axel Quinteros, Marco Mora, Ruber Hernández-García and Marco Flores-Calero

— POWER ELECTRONICS —

Maximum Power Point Tracking for a Wind Energy Generation System 770
Fernando Araneda, Brayan Figueroa, Hernán Mangas, Karina Vera, Jaime Rohten, Daniel Quezada and Nathalie Risso

FPGA Implementation of ADMM for Model Predictive Control in a DC/AC Converter ... 775
Juan Escarate, Reinier Lopez, Angel L. Cedeño, Cesar Silva, Juan C. Aguero and Gonzalo Carvajal

Primary Control With Virtual Impedance for a Highly Resistive Autonomous Microgrid .. 781
Álvaro Garay and Marco Fernández

Experimental Assessment of a Modular Multilevel Converter using OPAL-RT Control and Power Stages for Low Frequency AC transmission systems 788
Efraín Ibaceta Valenzuela, Alexander Rojas Aceituno, Matías Díaz Díaz, Enrique Espina González, Matías Uriarte González and Juan Carlos Travieso

Performance Evaluation of 13- Level Inverter with Reactive Load 794
Vijayaraja L, Yanusha N, Ganesh Kumar S and Marco Rivera

Fault-tolerant coupled predictive current control applied to multi-modular DC-AC converter 800
Sergio Núñez, Sergio Toledo, Magno Ayala, Rodrigo Romero, Ever Quiñonez, Carlos Romero, Julio Pacher, Alfredo Renault, Raúl Gregor and Marco Rivera

Space Vector Modulation applied to a Multi-Modular Matrix Converter for Current Control in Six-phase Generation Systems 806
Ever Quiñonez, Marcos Gomez Redondo, Sergio Toledo, David Caballero, Sergio Eduardo Núñez Aquino, Rodrigo Nicolas Romero Vega, Edgar Maqueda, Leonardo Comparatore, Raul Gregor and Marco Rivera

Improved Algorithm for NLC Strategy in Modular Multilevel Matrix Converter 812
Tomas Ravet, Karina A. Barbosa, Felix Rojas, Jonathan Lillo, Manuel Lopez and Marcos Plitt

Modulation (SV-PSPWM) in combination with current predictive control applied to three-phase active power filter based on cascaded H-bridge converters. 818
Alfredo Renault, Julio Pacher, Leonardo Comparatore, Jorge Esteban Rodas Benítez, Raul Gregor and Marco Rivera

Review of Modular Multilevel Converters Applied to High Voltage AC and DC Transmission Systems 824
Alexander Rojas, Matias Diaz, Juan Carlos Travieso and Matías Uriarte

Fault-Tolerant Predictive Current Control with Input Reactive Power Minimization in Six-phase Generation System Driven by a Multi-Modular Matrix Converter 830
Rodrigo Romero, Sergio Toledo, Carlos Romero, David Caballero, Edgar Maqueda, Alfredo Renault, Ever Quiñonez, Sergio Eduardo Núñez Aquino, Raul Gregor and Marco Rivera

— VIRTUAL REALITY AND INTERACTIVE SOFTWARE (ALGORITHMS, IMMERSIVE SYSTEMS, SOCIAL, HCI, ENTERTAINMENT AND SERIOUS APPLICATIONS IN DIFFERENT FIELDS SUCH AS HEALTH, INDUSTRY, CULTURAL HERITAGE, EDUCATION, AMONG OTHERS) —

The Hilbert-Huang Transform as a method and tool to support the analysis of non-linear and non-stationary electroencephalographic signals 836
Felisa Córdova, Fernando Cifuentes and Hernán Díaz

A Virtual Reality System for Fruit Processing Line Personnel Training: A Usability Study 840
Liza Jego, Nicolas A. Barriga and Felipe Besoain

Android App to Monitor the Position of a Group of Robots in a Hospital 845
Roman Osorio-Comparan, Alan Mariscal, Roberto Tovar, Victor Lomas, Ginno Millan and Gaston Lefranc

Virtual Monitoring of the 3D Movement of a Mobile Object, using UNITY 851
Roman Osorio-Comparan, Fausto Osorio, Hector Kaschel, Cristian Ahumada, Sergio Cordero and Gaston Lefranc

Adversarial Search Algorithms Performance in the Yote Game 857
Luis Torres and Nicolas A. Barriga