



IEEE ICA-ACCA 22

For the development of sustainable agricultural systems

https://controlautomatico.org/ica_acca2022/

Organizers



MacroFacultad
Ingeniería - Chile

Sponsors



IEEE ICA-ACCA 2022

International Conference on Automation (ICA)

XXV Congreso de la Asociación Chilena de Control Automático (ACCA)

Hybrid Conference | October 24-28, 2022

Online Conference | October 24-28, 2022

Face to Face Conference and Online Conference

Universidad de Talca, Curicó, Chile

Beginning on October 24, 2022



IEEE ICA-ACCA 2022 is IEEE Official Conference #56767

IEEE ICA-ACCA 2022

For the development of sustainable Agricultural Systems

IEEE INTERNATIONAL CONFERENCE ON AUTOMATION (ICA) XXV CONGRESO DE LA ASOCIACIÓN CHILENA DE CONTROL AUTOMÁTICO (ACCA)

A Hybrid Conference in Universidad de Talca, Curicó, Chile
Onsite and Online Conference, Chile
October 24-28, 2022

Organizers

ASOCIACIÓN CHILENA DE CONTROL AUTOMÁTICO
IEEE Chilean Chapter on Control Systems
CITRA, Universidad de Talca, Chile

Sponsorships

Colegio de Ingenieros de Chile
AIE, Chile
IEEE Chile Centro Section
IEEE Chile Sur Section



More information in https://controlautomatico.org/ica_acca2022 and https://controlautomatico.org/ica_acca2022/contact

IEEE ICA-ACCA 2022

For the development of sustainable Agricultural Systems

Welcome by IEEE Chilecon2019 Co-Chair

Welcome to IEEE INTERNATIONAL CONFERENCE ON AUTOMATION (ICA)

Welcome to this conference in all areas of the automation, communication and computer engineering, biomedical engineering, power engineering and industrial engineering. The IEEE ICA-ACCA 2022 conference accept innovations, research, development, and applications in education, so that the all authors share, discuss, defend, and validate what you do and show what makes the community of those in the technical sessions. The IEEE ICA-ACCA 2022 Conference Lemma is *For the development of sustainable Agricultural Systems*. The idea is to promote digital agriculture and it is called to present papers, ideas, problems, etc. In this important area for Chile and Latin American countries. There are already small and medium agricultural entrepreneurs who are interested in the new developments. There will be keynote Speakers and Forum to deal with problems. Accepted papers will be submitted for inclusion into IEEE Xplore subject to meeting IEEE quality requirements.

This Conference is organized by ASOCIACIÓN CHILENA DE CONTROL AUTOMÁTICO, IEEE Chilean Chapter on Control Systems, y CITRA, Universidad de Talca, Chile. This is a Hybrid Conference there two parts a face-to-face and the other part online. The onsite is held in Facultad de Ingeniería in Universidad de Talca, close to the city of Curicó, Chile- IEEE Consejo Chile with its two sections: IEEE Chile Centro and Chile Sur and it is aligned with this Conference,

The Chilean Association of Automatic Control (**ACCA: Asociación Chilena de Control Automático**) is a non-profit organization dedicated to promoting the theory and application of automation to modeling, simulation, emulation, design, implementation, test, evaluation, and training of engineering systems. ACCA members are also interested in applying automation tools to biology, economics, and social sciences. To meet these objectives, ACCA has been organizing workshops, seminars, courses, and congresses since 1974. ACCA is also a meeting point for diverse people (entrepreneurs, business professionals, and researchers) from all automation areas.

The Conference objectives are:

- Disseminate and expose the national average in recent research findings and developments in the areas of electrical, electronics, computer engineering, biomedical engineering, industrial engineering.
- To promote the advancement and exchange of knowledge and experience in the areas of these disciplines among academics, professionals and students.
- To promote the ties of friendship and cooperation between professionals, academics and students in those areas.

The main objectives of these conferences are to facilitate the exchange of knowledge, experiences, innovations, theoretical and applied research, produce an atmosphere of camaraderie and cooperation, promote discussion and validation not of the one presented in the Technical Sessions. That is the heart and reason for being of this Conference. There are 11 invited experts from Latin American countries, the USA, Europe and our country who contribute by presenting their experiments and ideas. We invite you to pain severalrticipate in discussions in these sessions, as well as outside of it, so that we can contribute to the development of our countries, how to solve problems that affect humanity with collaboration and sharing ideas. One of them is how to take advantage of and improve agriculture using digital technologies. This Conference is to exchange knowledge, research results, new ideas and projects, applications in industries and, above all, to get to know each other, explore and start cooperation and collaboration, strengthen professional ties and friendship ties. Here one comes to present what he has done, to offer constructive criticism and to learn from each other.

The alliance that exists between Asociación Chilena de Control Automático ACCA), the IEEE Chile Section and its IEEE CS, SMC Chilean Chapters is a long-standing one: since 1987, to carry out joint technical activities such as the IEEE Chilecon Conference and ACCA Congress united to IEEE ICA (International Conference on Automatic). These activities are supported by Universities, in this opportunity is the Universidad de Talca, sede Curicó., with some sponsorship important institutions and companies. Since 2014, this conference is growing up with more participation from about 25 countries- We are beginning to think in the 50th anniversary of ACCA in 2024, the next Conference.

This year we have as Honorary President Dr. Manuel Duarte, who has been President of Acca and a great organizer of Congresses, workshops and control seminars, from the University of Chile for almost 40 years and now at UNniversidad Central.

We invite you to listen, to dialogue, to agree and disagree with our guests in their Talks, in the Discussion Panels, and especially in the technical sessions. This year we have a 11 Keynote Speakers and Discussion Panel about Technology Transfer for a digital agriculture, to produce a synergy of development in our country and Latin Americans. We have received 173 papers with authors from 25 countries, and 148 have been accepted, in the areas of digital agriculture, bioengineering, automatic control, engineering education, communications, robotics, virtual reality, artificial intelligence, informatics and computer science. renewable energy, power electronics, power systems. We thank all of you for your participation.

This conference is official from the IEEE and the papers accepted and presented will be in IEEE Xplore, which is Scopus.

I invite you to enjoy your stay or meet people online. We will enable a room to chat online.

I want to thank the University of Talca, especially the Citra Research Center, its professors and authorities who have felt their support and the entire ACCA and IEEE team that make this Conference possible.

All of you that participating in this Conference, you are the most important actor to realize all the expectations that our society expects from us, the engineers, to produce jobs and innovations that allow to achieve a better quality of life and of opportunity to work in our countries in Latin America.

Gastón Lefranc,

IEEE The IEEE ICA-ACCA 2022 Conference Co-President

Honoris Causa Professor, Agora University, Romania

IEEE ICA-ACCA 2022

For the development of sustainable Agricultural Systems

IEEE INTERNATIONAL CONFERENCE ON AUTOMATION (ICA)
XXV CONGRESO DE LA ASOCIACIÓN CHILENA DE CONTROL AUTOMÁTICO (ACCA)

Organization Conference Committee

Honorary President: Dr. Manuel Duarte

Conference Presidents:

Mario Fernández, Universidad de Talca, Gastón Lefranc Profesor Honoris Causa Agora University, Romania

Committee:

Karina Barbosa Universidad de Santiago de Chile, Ginno Millán, Cristián Durán Universidad del Bío-Bío, ILE) Carlos Muñoz Universidad de la Frontera (CHILE

Steering Committee

Mario Fernández Universidad de Talca, Felipe Besoain Universidad de Talca, . Dr. Fernando Fuentes Universidad de Talca, Jonathan Palma Universidad de Talca

IPC Committee

Honorary President Dr. Manuel Duarte

Dra. Karina Barbosa Universidad de Santiago de Chile
Dr. Cristián Durán Universidad del Bío-Bío (CHILE)(CHILE)
Dr. Jonathan Palma Universidad de Talca(CHILE)(CHILE)
Dr. Felipe Besoain Universidad de Talca(CHILE)(CHILE)
Dr. Fernando Fuentes Universidad de Talca(CHILE)(CHILE)
Dr. Héctor Cornide Universidad de Atacama
Dr. Ginno Millán
(CHILE)

Dra. Felisa Córdova Universidad Finis Terrae(CHILE)(CHILE)
Dr. Héctor Kaschel Universidad de Santiago de Chile (CHILE)(CHILE)
Dr. Mario Fernández Universidad de Talca (CHILE)(CHILE)
Dr. Carlos Muñoz Universidad de la Frontera (CHILE)(CHILE)
MSc. Gastón Lefranc Pontificia Universidad Católica de Valparaíso (CHILE)(CHILE)
Dr. Roberto Mondaca Universidad de la Frontera (CHILE)(CHILE)
Dr. Jaime Rohten Universidad del Bío-Bío (CHILE)

ASOCIACIÓN CHILENA DE CONTROL AUTOMÁTICO

Board of Directors ACCA 2017-2022

President ACCA: Mario Fernández.
Vice-President: Ricardo Pérez.
Secretary: Cristián Durán.
Treasurer: Karina Barbosa.
Directors: Gastón Lefranc, Juan Yuz, Ernesto Rubio, and Daniel Sbarbaro.

Past Presidents

Guillermo González (1974-1982), Aldo Cipriano (1983-1985), Juan L. Hernández (1986-1988), Gastón Lefranc (1989-1992), Felisa Córdova (1993-1995), Eligio Amthauer (1995-1997), Manuel Duarte (1998-2001), Héctor Kaschel (2002-2005), Carlos Muñoz (2006-2009), Marcos Orchard (2010-2012), Carolina Lagos (2013-2017), Mario Fernández (2018-2022).

IEEE Chilean Chapter on Control Systems

Board of Directors 2022-2023

Chair: Karina Barbosa
Héctor Ramírez
Norelys Aguila Camacho
Gastón Lefranc

IEEE ICA-ACCA 2022

For the development of sustainable Agricultural Systems

Program

MONDAY OCTOBER 24

Face-to-face all Rooms and Online Broadcast Transmission

GMT-3	Monday October 24		
	Room 1 ((Face-to-face))		
9:00	INAUGURATION		
9:30-10:30	Keynote Speaker 1 <i>Adaptive Control</i> Dr Manuel Duarte Universidad Central, Chile		
10:30-10:50	Coffee Break		
10:55-11:55	Keynote Speaker 2 <i>Vertical farming: trends and challenges</i> Gilda Carrasco PhD. Universidad de Talca, Chile		
12:00-13:00	Keynote Speaker 8 <i>Control Design for Cyber-physical Systems Under Attacks</i> Dr. Márcio J. Lacerda, Federal University of São João del-Rei, Brasil		
13:10	Lunch		
14:15	Begin online connection		
	Room 1 (Face-to-face)	Room 2 (Face-to-face)	Room 3 (Face-to-face)
14:30-15:50	Session 1 Track <i>AGRICULTURE</i> 0395, 0826, 1078, 4484	Session 4 Track <i>INDUSTRY/CONTROL</i> 0426, 0741, 4798, 9587	Session 7 Track <i>ENERGY/SEP</i> 2774, 5918, 9294, 9340
16:00-17:20	Session 2 Track <i>AGRICULTURE</i> 3236, 7377, 8434, 9112	Session 5 Track <i>CONTROL</i> 0804, 1058, 4920, 6092	Session 8 Track <i>INFORMATICS</i> 1791, 3078, 3539, 4489,
17:30-18:00	Coffee Break		
18:10-19:50	Session 3 Track <i>POWER ELECTRONICS</i> 2204, 4725, 5290, 7733, 8006	Session 6 Track <i>VIRTUAL REALITY/ROBOTICS/INDUSTRY</i> 2013, 4164, 4529, 8163	Session 9 Track <i>ENERGY/EDUCATION COMMUNICATION</i> 7265, 8361, 0647, 6790, 8642
20:00	END OF 1st DAY		

WEDNESDAY OCTOBER 26

Sessions 17 to 24, papers online

GMT-3	Wednesday October 26			
8:00	Traslado hacia Colchagua			
9:00	<i>Visita a VIÑA CASA SILVA</i> DEGUSTACIÓN DE VINOS			
12:00	Almuerzo en <i>DelMoli45/Viña Estampa - Palmilla</i>			
13:00	Traslado hacia Curicó			
13:45	Begin online connection			
	Room 1 (Híbrido)	Room 2 (Online)	Room 3 (Online)	Room 4 (Online)
14:30-15:30	Keynote Speaker 9 <i>Introduction to Extreme Learning Neural Networks.</i> Dr. Marco Antonio Mora C. Universidad Católica del Maule, Talca, Chile			
15:30-16:30	Keynote Speaker 7 <i>AI enable decision support systems: an effective and efficient</i> Janusz Kacprzyk Polish Academy of Sciences			
16:35-16:55	Coffee Break			
17:00-18:20	Session 17 Track <i>INDUSTRY</i> 0691, 4748, 6229	Session 19 Track <i>CONTROL I</i> 1298, 8546, 8753	Session 21 Track <i>ENERGY</i> 6570, 7061, 7461, 8395	Session 23 Track <i>VIRTUAL REALITY</i> 0196, 2192, 6169, 8673
18:30-19:30	Session 18 Track <i>EDUCATION/INDUSTRY</i> 8799, 7032, 9209	Session 20 Track <i>CONTROL II</i> 1264, 2712, 6436	Session 22 Track <i>RENEWAL ENERGY</i> 1248, 1927, 3655, 5789	Session 24 Track <i>INFORMATICS</i> 1301, 3780, 4012, 6267
	END OF 3rd DAY			

TUESDAY OCTOBER 25

Face-to-face in ROOM 1. Sessions 10 to 16, papers online

GMT-3	Tuesday October 25			
	Room 1 ((Face-to-face))			
9:30-10:30	Keynote Speaker 5 <i>Mapping Evapotranspiration and Crop Stress with Unmanned Aerial Vehicles: cost-effective approach.</i> Héctor Nieto. Institute of Agricultural Sciences. Spain			
10:30-10:50	Coffee Break			
10:55-11:55	Keynote Speaker 11 <i>Current Trends in Multi-Objective Search in Artificial Intelligent.</i> Dr. Carlos Hernández, Universidad San Sebastian (USS), Chile.			
12:00-13:00	DISCUSSION PANEL: DIGITAL AGRICULTURE GUESTS: Felipe Ewertz , Research manager of MASTERPLANT SUR S.A., Matias Pincheira , Research manager of IIVO, Luis Ahumada , Director of research of ABUD & Cia, José Antonio Reyes , Director of THINKAGRO. MODERATOR: Fernando Fuentes , CITRA – Universidad de Talca.			
13:10	Lunch			
14:15	Begin online connection			
	Room 1 (Face-to-face)	Room 2 (Online)	Room 3 (Online)	Room 4 (Online)
14:30-15:50	Keynote Speaker 3 <i>Remote sensing tools for monitoring water requirements and water stress in vineyards and fruit trees.</i> Samuel Ortega-Farías, CITRA, Chile	Session 11 Track <i>BIOENGINEERING</i> 0954, 1330, 5280, 5479	Session 13 Track <i>ENERGY</i> 0568, 0677, 0727, 1821	Session 15 Track <i>CONTROL I</i> 1569, 1883, 2465, 3408
16:00-17:00	Session 10 Track <i>AGRICULTURE/INDUSTRY</i> 3425, 6419, 9497	Keynote Speaker 6 <i>Advances in Soft Computing and Applications</i> Valentina Emilia Balas Aurel Vlaicu University of Arad, Romania		
17:10-17:40	Coffee Break			
17:50-19:10		Session 12 Track <i>AGRICULTURE/BIOENGINEERING</i> 1384, 2112, 5791, 9001	Session 14 Track <i>ENERGY</i> 1905, 3451, 5022, 5946	Session 16 Track <i>CONTROL I</i> 3639, 7000, 8113
21:00	BANQUET			

THURSDAY OCTOBER 27

Sessions 25 to 32, papers online

GMT-3	Thursday October 27			
13:45	Begin online connection			
	Room 1 (Online)	Room 2 (Online)	Room 3 (Online)	Room 4 (Online)
14:00-15:00	Keynote Speaker 10 <i>The top-down approach in systems engineering and education. (With emphasis on Digital Electronics and Greenhouse technology)</i> Marius Balas, Aurel Vlaicu University of Arad, Romania			
15:10-16:30	Session 25 Track <i>AGRICULTURE</i> 3159, 3379, 3600, 5123	Session 27 Track <i>ROBOTICS</i> 1734, 2721, 3941, 5160	Session 29 Track <i>RENEWAL ENERGY</i> 6128, 6151, 6514, 7915	Session 31 Track <i>COMMUNICATION</i> 1232, 3783, 3825, 7401
16:35-16:55	Coffee Break			
17:00-18:20	Session 26 Track <i>AGRICULTURE</i> 2844, 3103, 7527, 9150	Session 28 Track <i>ROBOTICS</i> 5526, 5997, 8391	Session 30 Track <i>RENEWAL ENERGY</i> 8076, 8254, 8994	Session 32 Track <i>INFORMATICS/COMMUNICATION</i> 3283, 8288, 7935, 8237
	END OF 4th DAY			

IEEE ICA-ACCA 2022
For the development of sustainable Agricultural Systems
FRIDAY OCTOBER 28
Sessions 33 to 38, papers online

GMT-3	Friday October 28		
	Room 1 (Online)		
11:00	Keynote Speaker 4 <i>Achievements and Opportunities of Unmanned Aerial Vehicles in Precision Agriculture</i> Alfonso Torres-Rua, Ph.D. Utah State University, EE.UU.		
13:45	Begin online connection		
	Room 1 (Online)	Room 2 (Online)	Room 3 (Online)
14:00-15:40	Session 33 Track <i>POWER ELECTRONICS</i> 0404, 1694, 6709, 8918	Session 35 Track <i>CONTROL II</i> 2716,2949,3551,6273	Session 37 Track <i>SEP</i> 0236, 1635, 2034, 4181
15:50-16:50	Session 34 Track <i>POWER ELECTRONICS</i> 8942, 9039, 9704	Session 36 Track <i>CONTROL II</i> 7752, 9346, 9909	Session 38 Track <i>SEP</i> 6563, 7778, 8420
17:00-17:20	CLAUSTRATION CEREMONY		
	LAST DAY		

KEYNOTE SPEAKERS

Talk video will be enable on demand

Go to page 18 to see abstract of the talk and bio sketch

Invited	Talk	Speaker	Institution
Keynote Speaker 1	<i>Adaptive Control.</i>	Dr. Manuel Duarte	Universidad Central, Chile
Keynote Speaker 2	<i>Vertical farming: trends and challenges.</i>	Dra. Gilda Carrasco	Universidad de Talca, Chile
Keynote Speaker 3	<i>Remote sensing tools for monitoring water requirements and water stress in vineyards and fruit trees.</i>	Dr. Samuel Ortega-Farias	Universidad de Talca - CITRA, Chile
Keynote Speaker 4	<i>Achievements and Opportunities of Unmanned Aerial Vehicles in Precision Agriculture.</i>	Dr. Alfonso F. Torres-Rua	Utah State University, USA
Keynote Speaker 5	<i>Mapping Evapotranspiration and Crop Stress with Unmanned Aerial Vehicles: cost-effective approach.</i>	Dr. Héctor Nieto	Institute of Agricultural Sciences. Spain
Keynote Speaker 6	<i>Advances in Soft Computing and Applications</i>	Dra. Valentina Balas	Aurel Vlaicu University of Arad, Romania
Keynote Speaker 7	<i>AI enable decision support systems: an effective and efficient</i>	Dr. Janusz Kacprzyk	Polish Academy of Sciences
Keynote Speaker 8	<i>Control design for cyber-physical systems</i>	Dr. Márcio J. Lacerda	Fed. University of São João del-Rei, Brazil.
Keynote Speaker 9	<i>Introduction to Extreme Learning Neural Networks</i>	Dr. Marco Antonio Mora C.	Universidad Católica del Maule, Chile
Keynote Speaker 10	<i>Current Trends in Multi-Objective Search in Artificial Intelligence</i>	Dr. Carlos Hernández	Universidad San Sebastian (USS), Chile
Keynote Speaker 11	<i>The top-down approach in systems engineering and education</i>	Dr. Marius Balas	Aurel Vlaicu University of Arad, Romania

IEEE ICA-ACCA 2022

For the development of sustainable Agricultural Systems

Technical Sessions. Monday, October 24

ROOM 1

ROOM 1 Monday October 24 Session Chair: FERNANDO FUENTES		
Session 1/Track AGRICULTURE Papers:395, 826, 1078, 4484		
Time	ID #	Authors/Title
14:30	0395	Daniel Pérez Guzmán, Marco Rivera, Fernando Fuentes, Alejandro Díaz, Ricardo Pérez and José Villar. <i>Traceability System for an Agricultural Supply Network based on Blockchain</i>
		Blockchain is a type of database that stores data in a decentralized way using cryptography. This technology is being used in different fields, such as those involving supply chains. One such field is agriculture, where different actors interact to keep track of products and register their state as they are transported. Considering the importance of this information, it is desired to guarantee its reliability, and decrease the human error involved when capturing data. This project considers a prototype system in which information of agricultural products is registered by farmers and IoT ...
14:50	0826	Fernando Fuentes-Peñailillo, Roberto Jara and Carlos Bopp. <i>Use of remote sensing and ground-based measurements for the evaluation of the SIRSD-S program in Biobio Region, Chile</i>
		Currently, soil degradation represents a severe problem for the forestry-agricultural sector in various regions of the world. Chile is not an exception to this trend since vast extensions of territory have been affected by erosive processes, which represent the leading cause of soil degradation levels. Therefore, to recover the productive potential of degraded agricultural soils, Chile has implemented 2010 the program "Incentive System for Agro-environmental Sustainability of Agricultural Soils" (SIRSD-S). In this context, this research aims to calculate the levels of potential soil erosion ...
15:10	1078	Victor Miranda and Mario Fernandez. <i>Test chamber to analyse post-harvest climatic effects on fruit</i>
		One of the main interests of fruit producers is that their products reach the final consumer in the best possible conditions. This condition is very critical in climacteric fruits since the ripening process stops when the fruit is harvested. From that moment, and until it is received by the final consumer, the fruit deteriorates. Therefore, it is relevant to be able to determine the factors that influence this deterioration. It is known that temperature and humidity play a predominant role during the post-harvest process, since they favour the softening and dehydration of the fruit. To study ...
15:30	4484	Victor Miranda and Mario Fernandez. <i>Design of a temperature test chamber for fruit study</i>
		The present work deals with the design and construction of a temperature test chamber for fruit studies. This equipment is developed in order to be able to reproduce the real conditions of temperature to which the fruit varieties to be studied are exposed from the moment they are harvested until they are stored in the conservation units. If the study is restricted to cherries and blueberries, in Chile they are grown from the IV to the XI region (including the XIV and XVI regions). The temperature of these regions in the summer season varies between 10°C and 35°C. For this reason, equipment ...

ROOM 1 Monday October 24, Session Chair: FERNANDO FUENTES		
Session 2 / Track AGRICULTURE Papers-ID: 3236, 7377, 8434, 9112		
Time	ID #	Authors/Title
16:00	3236	Fernando Fuentes, Samuel Ortega, Fei Tian, Ricardo Perez, Vicente Calderon and Daniel Perez. <i>Towards the monitoring of water consumption of crops using digital agriculture techniques</i>
		It has become necessary to implement strategies to accurately determine water demand at the field level to optimize water use. To achieve this, new digital agriculture techniques based on the use of remote sensing have made it possible to obtain spatially distributed information that, in combination with biomathematical modeling, would allow the spatial and temporal determination of the water consumption of crops. This research proposes the development of a Web Platform (Millimetric) capable of processing and interacting with maps based on geospatial information and meteorological data to determine the crop water consumption based on the original formulation of the METRIC model. In a complementary way, Black box and usability tests were carried out on users to validate the usability of the system.
16:20	7377	Carlos Muñoz, Juan Huirican and Fernando Huenupan. <i>Database generation to identify cow's movements for detecting estrus and lameness</i>
		This work shows the procedure of acquiring and storing the records captured at a rate of 10 samples per second by an IoT collar designed for cows and using video records to identify and tag the respective movements. By tagging, we mean the process of searching, classifying, and manually marking the start and end times of a cow's movement of interest. Thus, the resulting database comprises the temporal signals from the IoT collar's accelerometers and their respective tags, classifying the type of movement the cow performs. This database is a core result for training automatic ...
16:40	8434	William Campillay, Fernando Fuentes-Peñailillo and Samuel Ortega-Farias. <i>Towards indicators for agricultural production through biomathematical modeling using an interactive web platform</i>
		Climate change has an impact on agricultural systems, affecting control and management practices. Field knowledge provided by the farmer and theoretical knowledge lack a useful articulation for decision making and the generation of adaptation strategies. Therefore, in our work we created a technological tool, hosted on a web page with the objective of linking knowledge. In the application we incorporate a classical biochemical model that qualitatively represents the vegetative and floral growth of plants. In this paper, we describe in detail the modeling techniques and also report the ...
17:00	9112	Fernando Fuentes, Ricardo Perez, Samuel Ortega, Karen Gutter, Hector Nieto and Rodrigo Paredes. <i>Use of a natural language processing bot for agricultural water management</i>
		Mediterranean areas such as the central zone of Chile have faced severe limitations in water availability for irrigation due to a combination of various factors such as unsustainable industry use and climate change. Several strategies have been developed to overcome this problem, such as using physiological measurements to estimate plant water status. However, these measurements are time-consuming, destructive, and require trained personnel. A fast-response and easy-to-understand tool are needed to optimize the use of irrigation water in a simple and fast way and to generate management ...

ROOM 1 Monday October 24, Session Chair: SERGIO CORDERO		
Session 3 / Track POWER ELECTRONICS Papers ID: 2204, 4725, 5290, 7733, 8006		
Time	ID #	Authors/Title
18:10	2204	Alexander Rojas, Matías Díaz, Juan Carlos Travieso and Matías Uriarte. <i>Review of Modular Multilevel Converter Applied to High Voltage AC and DC Transmission Systems</i>
		Due to the need for zero-emission electricity generation, there has been a growing interest in the development of technology associated with offshore wind power plants. For the same reason, interest in Low Frequency Alternating Current (LFAC) transmission has grown, since it is capable of transmitting over a greater distance than High Voltage Alternating Current (HVAC), with lower losses and at a lower cost than HVAC. High Voltage Direct Current (HVDC) technology. This paper presents a review of HVAC, HVDC and LFAC transmission systems, with a focus on describing the Modular Multilevel ...
18:30	4725	Fernando Aranedo, Brayan Figueroa, Hernán Mangas, Karina Vera, Jaime Rohten, Daniel Quezada and Nathalie Rizzo. <i>Maximum Power Point Tracking for a Wind Energy Generation System</i>
		Wind energy is one of the most important sources of renewable energy because it has great characteristics such as being clean and easy to use. However, not all the energy received by the turbine can be transformed to electric power. To obtain maximum power extraction, many algorithms have been implemented using the different characteristics of the wind energy generation system. This paper proposes a Perturb and Observe algorithm on the angular velocity of the turbine rotor to achieve tracking of the maximum power point. A DC-DC converter (Boost Converter) was used in conjunction with the ...
18:50	5290	Tomas Ravet, Karina A. Barbosa, Felix Rojas, Jonathan Lillo, Manuel Lopez and Marcos Plitt. <i>Improved Algorithm for NLC Strategy in Modular Multilevel Matrix Converter</i>
		The Modular Multilevel Matrix Converter (M3C), also known as Triple Star Bridge Cells (TSBC) Converter from the family of Modular Multilevel Cascade Converter (MMCC) has taken importance in medium frequency (MF) applications due to its modularity, redundancy and high power quality. On the other hand, an Nearest Level Control (NLC) strategy for a medium frequency modulation it is a good option due his low/fundamental switching frequency, however, this method requires a limitation in the switching algorithm, since being an open loop method is possible that the switching times increase ...
19:10	7733	Efrain Ibaceta Valenzuela, Alexander Rojas Aceituno, Matías Díaz Díaz, Enrique Espina González, Matías Uriarte González and Juan Carlos Travieso. <i>Experimental Assessment of a Modular Multilevel Converter using OPAL-RT Control and Power Stages for Low Frequency AC transmission systems</i>
		Modular Multilevel Converters are being widely used in high-power applications such as Low Frequency Alternating Current transmission systems due to the main advantages of scalability, modular configuration and high-quality power. For industrial applications, hundreds of power cells have to be connected in a cascade to reach high-power ratios. However, most of the current academic research is validated using prototypes equipped with a low number of power cells. Consequently, this paper presents the testing and start-up procedure of 60 power cells Modular Multilevel Converter test-bench based ...
17:30	8006	Miguel Torres, Claudio Burgos, Daniel Casagrande, Diego Muñoz, Manuel Pinto, Hernán Reyes and Benjamín Acuña. <i>The Photovoltaic Greenhouse as Energy Hub for a More Sustainable Agriculture</i>
		This work introduces the concept of the greenhouse as an energy hub in agriculture thanks to the addition of roof-mounted photovoltaic systems integrated into the structure of the greenhouse. The results of a project comprising the design, construction, and evaluation of the energy production of two photovoltaic greenhouses over two years are presented. One greenhouse is equipped with conventional PV panels (PVG), and the other with semi-transparent panels (ST-PVG). For the PVG, the upper half of the roof is covered with 22 conventional PV panels, resulting in overall roof ...

IEEE ICA-ACCA 2022

For the development of sustainable Agricultural Systems

Technical Sessions. Monday, October 24

ROOM 2

ROOM 2 Monday October 24 Session Chair: JAIME ROHTEN		
Session 4 / Track INDUSTRY/CONTROL Papers-ID: 0426, 0741, 4798, 9587		
Time	ID #	Authors/Title
14:30	0426	Lisandra Bravo Alvarez and Alejandro J. Rojas. <i>Induced Coprime Factorization for Continuous Time Systems with Delay</i>
		In this work we consider the case of continuous time systems with delay. It is well known that control of such type of plant models are hard, even more if they happen to be unstable plant models. The Youla Kucera (YK) parameterization of all stabilizing controllers has proved to be a useful tool to achieve the required controller solution. At the core of the YK parameterization lies the coprime factorization (CF) of the plant model together with the Bezout identity. However, synthesizing the different terms in RH_∞ satisfying the Bezout identity can become cumbersome in the ...
14:50	0741	Felipe Villenas, Francisco Vargas, and Andrés Peters. <i>A numerical study of a Kalman filtering based strategy for platooning with lossy communication</i>
		In this article, we consider homogeneous platoons where vehicles communicate through lossy links. We assume a predecessor following topology in where each vehicle sends its position to the immediate follower agent, and the transmission is subject to random data loss modeled as a Bernoulli process. A Kalman filtering based strategy is proposed to estimate the missing data. Such approach is compared with one where the missing data is replaced by a linear extrapolation based on previous data. The performance of each strategy is studied through numerical simulations for different data loss probabilities. The simulation results show that the Kalman filter-based strategy achieves a considerably better performance compared to the linear extrapolation case considering both, the tracking and the estimation errors
15:10	4798	Diego Badillo, Felipe Villenas, Cristóbal Huidobro, Francisco Vargas and Andrés Alejandro Peters Rivas. <i>Experimental Validation of Cooperative Adaptive Cruise Control Schemes Under the Presence of Time Delays</i>
		This paper considers the experimental validation of theoretical results for cooperative platooning using the PL-TOON platform. In particular, we study an information relaying algorithm that enables a chain of autonomous vehicles, when there is perfect communication, to navigate in a string stable fashion, that is, without amplifying disturbances as they propagate along the vehicle string. Using the aforementioned experimental platform, we verify that such an algorithm can improve the string stability characteristics of a set of autonomous agents traveling in a tight formation on tracks. ...
15:30	9587	Alvaro Palma, Agustín Reyes, Jaime Rohten, Nathalie Rizzo, Daniel Quezada and Vladimir Esparza. <i>MPC-based traction control for electric vehicles</i>
		The car technology shift to powertrain electrification gives us plenty of new ways to improve safety, one of such is the regenerative brake sustained by the capability of the instant torque that an electric motor can produce. This paper examines the simulated control of torque, securing a safe acceleration, and braking procedure, this is achieved by computing the dynamics of a car with a quarter vehicle model and the characteristics of a tire. Then a model predictive control (MPC) strategy is adopted in order to control the torque needed to follow a slip ratio given as reference. ...

ROOM 2 Monday October 24, Session Chair: JAIME ROHTEN		
Session 5 / Track CONTROL Papers-ID: 0804, 1058, 4920, 6092		
Time	ID #	Authors/Title
16:00	0804	Amanda Spagolla, Cecília de Freitas Morais, Ricardo Coração de Leão Fontoura de Oliveira and Pedro Luis Dias Peres. <i>Dynamic Output-Feedback Controller Design for Interval Positive Linear Systems</i>
		This paper addresses the problem of designing dynamic output-feedback stabilizing controllers for positive linear systems with interval uncertainties. Both continuous and discrete-time cases are investigated. For this purpose, sufficient linear matrix inequality (LMI) conditions for the existence of full order dynamic output-feedback controllers are proposed. As main property, the Lyapunov matrix and the matrices of the controller realization appear affinely in the conditions, simplifying the treatment of the closed-loop positivity constraint. An optimization algorithm with initial ...
16:20	1058	Badreddine El Haiek, Taha Zoulagh, Hicham El Aiss, Karina Acosta Barbosa and Abdelaziz Hmamed. <i>T-S Fuzzy H_∞ Observer-Controller Design for 2-D Systems</i>
		This paper deals with the design problem of fuzzy observer-based H_∞ control for two dimensional 2-D discrete-time Takagi-Sugeno (T-S) fuzzy systems described by the second Fornasini-Marchesini F-M model. By using fuzzy Lyapunov functions and introducing free-weighting matrices, a new design methodology is established. Then, with the help of some special derivations, Bilinear Matrix Inequalities (BMIs) are successfully transformed into a set of Linear Matrix Inequalities (LMIs) which can be solved using a single step resolution procedure. Then, the presented method allows ...
16:40	4920	Valentina Bugeño Olivos, Karina Acosta Barbosa, Saravanakumar Rajendran and Matias Díaz Díaz. <i>An overview of Digital Twins Methods Applied to Lithium-Ion Batteries</i>
		The continuous monitoring of the energy storage system in electric vehicles is essential for safe operation. In particular, most electric vehicles use Lithium-ion batteries due to their power and energy density, which can introduce instability in their performance. Recently, the use of digital twins has been able to provide more information to the battery management system for real-time decision-making. This paper presents an overview of the main methods for modeling lithium-ion batteries and the identification of parameters of these models, summarizing their advantages and disadvantages. ...
17:00	6092	Alejandro Rojas. <i>SNR Based Detection and Estimation of AWN Channel Parameters Changes</i>
		Here we consider the case of a feedback control loop stabilized over an additive white noise (AWN) channel subject to a Signal-to-Noise Ratio (SNR) constraint. On that premise the initially known AWN channel may change its mean and/or variance due to changing transmission circumstances. Based on the channel input measurement we propose here the detection of such changes and the estimation of the new mean and/or variance values based on the channel SNR estimation, in particular for the AWN channel variance changes. We study the cases of the AWN channel when it is assumed to be ...

ROOM 2 Monday October 24, Session Chair: KARINA BARBOSA		
Session 6 / Tracks: VIRTUAL REALITY/ROBÓTICS/INDUSTRY Papers-ID: 2013, 4164, 4529, 8163		
Time	ID #	Authors/Title
18:10	2013	Alberto Marroquín, Adalberto Gómez, Hector Carias and Carlos Bran. <i>Energy Meter Proposal for Residential Smart Grid based on IoT Technologies</i>
		Currently, technological progress has allowed the development of digital solutions to everyday problems, this has led to the beginning of industry 4.0 in Latin America (LATAM). This fourth industrial revolution seeks to transform manual processes, by combining physical systems with digital systems to create automated, autonomous and intelligent systems. Among the Industry 4.0 enabling technologies are: embedded systems, Internet of Things (IoT), cloud services, etc. This work shows a proposal that combines these technologies to implement a smart energy meter with a precision close to ...
18:30	4164	Saravanakumar Rajendran, Debashisha Jena, Matias Diaz and V S Kirthika Devi. <i>Machine learning based condition monitoring of a DC-link capacitor in a Back-to-Back converter</i>
		The utilization of power electronic equipment has increased the significance of their continuous operation. Therefore, proper condition monitoring is important for power electronic converters to avoid unpredictable maintenance. Furthermore, a dc-link capacitor is a critical component in power electronic converters. However, the existing condition monitoring techniques may require additional sensors or injection of controlled voltage to the converters. This work proposes a K-nearest neighbor, support vector machine, and Naive Bayes classification algorithms based on condition monitoring of ...
18:50	4529	Ernesto Monroy Cruz, Luis Rodolfo García Carrillo, Sandeep Patil, Primo Cerón Obregón and Jan Francisco Cerón García. <i>Validating effect of Refactoring of IEC 61499 Function Block in Distributed Control Systems</i>
		We are in the era of continued adoption of Industry 4.0 vision and standard. As the Industrial Cyber-Physical System applications move from centralized to decentralized systems, there is a need to follow a newer and better software design patterns and refactoring techniques for dependable software for these systems. There have been few works that present diverse design patterns and refactoring methods, and this article presents a case study of applying couple of refactoring methods and techniques in order to improve readability, maintainability, reuse-ability and debugging friendliness of ...
19:10	8163	Luis Torres and Nicolas A. Barriga. <i>Adversarial Search Algorithms' Performance in the Yot'e Game</i>
		The performance of several adversarial search algorithms is very dependent on the move generation and ordering procedure, as well as on the transposition table characteristics. In this work we compare Alpha-beta, MTD-f and NegaScout performance in the presence and absence of the following features: transposition table, Hash Move heuristic and move ordering using the evaluation function. We found that NegaScout did not yield major improvements over Alpha-Beta, which is likely due to the move ordering performed using a weak evaluation function. In most cases, MTD-f examines fewer nodes, and ...

IEEE ICA-ACCA 2022

For the development of sustainable Agricultural Systems

Technical Sessions. Monday, October 24

ROOM 3

ROOM 3 Monday October 24, Session Chair: HÉCTOR CHAVEZ		
Session 7 / Track ENERGY/SEP Papers-ID: 2774, 5918, 9294, 9340		
Time	ID #	Authors/Title
14:30	2774	Bastián Rodríguez, Lorenzo Reyes and Héctor Chávez. <i>What Should DNOs Foster? A Single DG or Multiple Small DGs?: A Statistical Power-Flow Analysis for the Chilean Case</i>
		Although distributed generation (DG) has been continuously growing in importance in recent years, the number of DG projects in developing countries is still little. In Chile, for example, small DGs have three possibilities for interconnecting with the grid, (i) a small means of distributed generation (PMGD), which has its own connection point with the grid up to 99S-MW, (ii) a net-billing project (NB), which is installed in the premises of a consumer, up to 300S-kW, or (iii) self-consumption projects. In this paper, we run a statistical power-flow analysis to compare the integration ...
14:50	5918	Jorge Ramirez, Aldo Barrueto, Juan Quiroz and Hector Chavez. <i>Reduced order model for two areas to represent coherent groups in Power Electric Systems</i>
		The analysis of the frequency response of multi-area power systems is a complex and intensive task in the use of computational resources. This paper considers the implementation of a reduced model to represent coherent groups in a two area power system and the tuning of a synchronization coefficient, that represents the equivalent tie line. This work provides a basis for future analysis of more complex power systems, with three or more coherent areas.
15:10	9294	Cristobal Palma and Cristian Garcia. <i>Vibration Analysis and Mitigation Techniques for Electrical Drives in Electric and Hybrid Vehicles</i>
		This present document is a brief of the techniques and strategy of active control to decrease the vibrations in the permanent magnet motors with a focus on electric and hybrid vehicles, of the research carried out the active control techniques seen are focused on predictive control with finite states and the use of fourier transforms to determine vibration spectrum, in addition, a short analysis is made of an article on networks the use of neural networks to optimize control.
15:30	9340	Roberto Perez and Hector Chavez. <i>Analysis of the Relationship of Inertia and Net Load in the Chilean Power System</i>
		The Chilean power system is dominated by thermal and hydraulic units that make it a robust system in inertia. In recent times there has been an increase in renewable generation units in the system, which do not have inertia. In addition, decarbonization policies propose the replacement of thermal units with renewable ones. Therefore, the Chilean power system will be a low inertia system in the future, so the improvement of techniques to identify inertia will be of great importance. This work shows the use of Unit Commitment and Data Driven techniques to identify the inertia of the ...

ROOM 3 Monday October 24, Session Chair: MARCELA JAMETT		
Session 8 / Track INFORMATICS Papers-ID: 1791, 3078, 3539, 4489		
Time	ID #	Authors/Title
16:00	1791	Sara Cuellar, Gonzalo Fariás, Matilde Santos and Fernando Alonso. <i>Preliminary results on anomaly detection and recognition in spacecraft telemetry</i>
		Space missions are critical systems that must cope with extreme conditions such as temperature changes, radiation and vibration. Due to the complexity of their structure and operation, these systems are designed in such way that they can mitigate errors and handle critical situations. The only available communication link and way by which the ground station can monitor the health of the satellite and act upon possible failures is status telemetry. This paper presents the implementation of a machine learning-based anomaly detection system for satellite telemetry; the data used corresponds ...
16:20	3078	Angel Vasquez, Marco Mora, Karina Vilches, Fabian Silva, Italo Torres and Pedro Barria. <i>A New Fast Training Algorithm for Autoencoder Neural Networks based on Extreme Learning Machine</i>
		Autoencoders are neural networks that are characterized by having the same inputs and outputs. This kind of Neural Networks aim to estimate a nonlinear transformation whose parameters allow to represent the input patterns to the network. The Extreme Learning Machine (ELM-AE) Autoencoders have random weights and biases in the hidden layer, and compute the output parameters by solving an overdetermined linear system using the Moore-Penrose Pseudoinverse. ELM-AE training is based on the Fast Iterative Shrinkage-Thresholding (FISTA). In this paper, we propose to improve the ...
16:40	3539	Orietta Nicolis, Felipe Carrasco, Billy Peralta and Felipe Lopetegui. <i>Combining MRA y LSTM for predicting the seismicity in Chile</i>
		The present work is carried out considering the high level of complexity related to the prediction of seismic events, since a good prediction of seismicity would improve the ability to make decisions in advance and thus avoid catastrophic effects. This study focuses on the analysis of seismicity in two areas of Chile and proposes a new methodology to predict the seismic intensity function (expected number of seismic events per day) based on multiresolution wavelet analysis and the Long Short Term Memory (LSTM) neural network. First of all, the intensity function is calculated using the ...
16:55	4489	Luis Felipe Rau, Marcela Jamett and Pablo Adasme. <i>Electrical fault classification strategies for maintenance models using machine learning algorithms</i>
		Mining equipment suppliers are investigating new maintenance models for mining truck monitoring and control systems that focus on process efficiency due to the high costs involved. The aim of this article is to generate a predictive maintenance model for electrical faults through machine learning algorithms that predict and classify the severity of faults in harnesses. The study is carried out in the harnesses of the control system of the diesel engine component of a fleet of trucks. Predictive analysis considers two factors: number and trends of failures associated with a proposed ...

ROOM 3 Monday October 24, Session Chair: CARLOS MUÑOZ		
Session 9 / Tracks ENERGY/ EDUCATION/COMMUNICATION Papers-ID: 8361, 7265, 0647, 6790, 8642		
Time	ID #	Authors/Title
18:10	7265	Heilym Ramirez, Sergio Velastin, Ernesto Fabregas and Gonzalo Fariás. <i>Preliminary results with BERT for human activity recognition using skeleton sequences features</i>
		The use of artificial intelligence techniques for the recognition of human activity has been an important area of research. Several approaches have been proposed and a large part of them address this problem through vision with conventional RGB cameras. Some of the most significant problems in human activity recognition systems are privacy, the limitations of the operating devices and the comparison of machine learning and deep learning techniques for the prediction of said activity. The present document presents an activity recognition system by means of a recurrent neural network BERT, ...
18:30	8361	Carlos Madariaga, Cesar Gallardo, Juan A. Tapia, Werner Jara and Danilo Riquelme. <i>Quick Comparison of the Cogging Torque Severity in Permanent Magnet Synchronous Machines with Segmented Stator Core</i>
		This paper presents the determination of a numerical indicator that allows the quick comparison of the cogging torque in permanent magnet synchronous machines (PMSMs) with both segmented stator and conventional stator structures, considering different pole/slot combinations. By means of two-dimensional finite element simulations of 18 different machine designs, it was proven that comparison indicators used for conventional PMSMs cannot be implemented for PMSMs with segmented stator core. Instead, the proposed indicator considers the change of periodicity in MSIPs with segmented stator core ...
18:50	0647	Carlos Muñoz and Felipe Llanos. <i>Current Loop Control for an Educational Magnetic Levitation System</i>
		Magnetic levitation is a complex, highly nonlinear, and absolute unstable system. The setback of this process for making educative platforms is the need for real-time position sensing of the suspended ball. This paper describes the levitation of a metallic object by a state feedback control loop when the only measured output is the electrical current. The process is detailed in stages, starting with the physical equations that describe this system, the linearization of the model, and showing that the system with the electric current as output is controllable and observable. ...
19:10	6790	Carlos Muñoz, Andrés Mogollon, Alejandro López and Luis Olave. <i>Parameter identification of a two-wheeled self-balancing robot settled as an educational platform</i>
		In the present work, the implementation of a two-wheeled robot is shown on the platform and in a simulated model. We identified the parameters to calibrate the simulated model by comparing the platform's and model's behavior. The model's selected parameters were adjusted to minimize the error measured in an approximate 40 seconds trajectory starting from an initial condition of pi/2 rads. The calibrated model is aimed to be used in control courses for studying feedback control loops.
19:30	8642	Camilo Fredes, Pablo Palacios, Cesar Azurdia and Ismael Soto. <i>Design and Evaluation of an Experimental Visible Light Communications Platform</i>
		Visible Light Communications (VLC) are proving to be a promising candidate for the development of 6G communication networks. However, many developments in new devices and materials need to be done to deal with the limitations and drawbacks of VLC. In the meantime, the work and the experiments done here show that it's possible to implement a light based communication system in non-controlled environments, getting positive values for SNR besides having a lot of noise sources such as ambient and artificial lightning. All of this within the context of designing and implementing an experimental ...

IEEE ICA-ACCA 2022

For the development of sustainable Agricultural Systems

Technical Sessions. Tuesday, October 25

ROOM1

ROOM1 Tuesday October 25, Session Chair:		
Session 10 / Track AGRICULTURE Paper-ID: 3425, 6419, 9497		
Time	ID #	Authors/Title
16:00	3425	Alberto Marroquín and Gonzalo Farias. <i>Traffic Signal Classifier Proposal for Navigation Control of Mobile Robots</i>
		The current computational advance allows us to develop technological solutions to everyday problems, for example, today mobile robots are used for the automated transport of raw materials. Therefore, the study of mobile robotics applications, such as obstacle avoidance and autonomous navigation, is of great importance in the academic world. A proposal for the design of a traffic signal classifier is described below, which can be integrated into the navigation control of a mobile robot, to send commands according to the identified traffic signal and the robot modifies its linear speed or its ..
16:20	6419	Juan Tarbes, Pamela Morales, Marcos Levano, Pablo Schwarzenberg, Orietta Nicolis and Billy Peralta. <i>Explainable Prediction of Academic Failure Using Bayesian Networks</i>
		Currently, academic dropout is a crucial problem of higher education institutions in Chile due to the high social and economic costs that it entails. Usually, dropout prediction is performed using computational methods analyzing the student's personal information as well as their academic indicators during their studies, which require a period of time to know them. Moreover, this event is highly correlated to the academic failure of several key courses. An attractive alternative is to apply an initial test to achieve this prediction without requiring completion of the typical study ...
16:40	9497	Ricardo Reyes, Billy Peralta, Orietta Nicolis and Luis Caro. <i>A Proposal for Deep Online Facial Verification using Selfies and Id document</i>
		Currently, cybersecurity has become one of the most important issues in the society, due to the growing technological evolution and use of digital platforms by organizations to connect with their users. A non-invasive biometric way of accessing an organizational platform is by verifying the presence of the user's face given by selfie photography in a database of authorized users. However, this procedure requires the prior construction of a database of authorized users, which prevents online verification of a person's identity. A feasible way to carry out an online verification is by ...

ROOM2

ROOM 2 Tuesday October 25, Session Chair: ANTONIO RIENZO		
Session 11 / Track BIOENGINEERING papers-ID: 0954, 1330, 5280, 5479		
Time	ID #	Authors/Title
14:30	0954	Alonso Alfaro and Pablo Roncagliolo. <i>Accuracy and Precision Study of Commonly Used Non-Invasive Blood Pressure Monitors, Using a Simulator Device as a Reference</i>
		With the progressive abandon of traditional medical equipment containing mercury, automatic electronic sphygmomanometers (NIBP measurers) are being purchased instead of traditional sphygmomanometers, however the difference in the quality of performance (accuracy and precision) comes in question. In this paper we compare the performance of an electronic automatic NIBP measurer sold commonly in the market in contrast with a NIBP measurer module integrated in a multi-parameter monitor. Our study showed that, as expected, there was a difference between the performance of these two types of ...
14:50	1330	Gabriela A. Caprini, Carolina M. Cunha, Rafael M. de Andrade and Arnaldo G. L. Junior. <i>Designing an Active Ankle-Foot Prosthesis: Digital Prototype, Modeling and Control</i>
		Foot amputation can happen due to several factors and cause severe changes in the individual's gait pattern, reduces mobility and generates injuries. Over the past two decades, researchers have dedicated efforts to develop transibial pros- theses capable of reproducing healthy foot movement to help the amputee rehabilitation process. This work presents the digital prototype, dynamic modeling and preliminary control of an active ankle-foot prosthesis. The powertrain of the devices is composed of a EC 60 flat 200 W motor coupled to a CPL-20A- 50-2 51:1 harmonic drive to generate ...
15:10	5280	Antonio Rienzo and German Blanchard. <i>Application of the BIM Methodology in Hospital Constructions</i>
		In Chile, a high number of hospital establishments are in the project, design and construction stages, and due to its complexity, the use of the BIM methodology constitutes an opportunity to take advantage of all its potential for the benefit of the timely and good results of these works, especially considering its social impact. This paper examines the definitions and functionalities of BIM within hospital projects and presents some cases of hospital projects that have used the methodology to obtain the benefits it offers. It concludes with different aspects to consider for the successful ...
15:30	5479	Pablo Parra, Kevin Cedeño and Paul Maldonado. <i>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)</i>
		This study investigated the antimicrobial property of three plant species with the aim of incorporating them into the formulation of hand sanitizing gels. Essential oils were obtained from the peel or epicarp, bark and leaves by hydro distillation using the Clevenger method. The determination of the antimicrobial activity was carried out by the Kirby-Bauer method in which the inhibition diameters generated by the sensitivity discs containing three different types of essential oils at various concentrations against the bacteria Escherichia coli ATCC 25922 and Staphylococcus aureus ATCC 25923. This study determined the potential of the antimicrobial activity of the essential oils of Cinnamomum zeylanicum that generated a greater diameter of inhibition 25.47 ± 0.21 mm for E. Coli and 26.47 ± 0.40 mm for S. aureus, compared to the species Eucalyptus globulus and Citrus. maximum. Obtaining yields range between 0.8% and 1.6%, the highest yield being that of the Citrus maxima species. In the development of the hand sanitizing gel, formulations with a density of 0.8778 ±0.001 g/ml were obtained with organoleptic characteristics typical of essential oils

ROOM 2 Tuesday October 25 Session Chair: HÉCTOR KASCHEL		
Session 12 / Track AGRICULTURE/BIOENGINEERING Papers-ID: 1384, 2112, 5791, 9001,		
Time	ID #	Authors/Title
16:00	1384	Roberto Ahumada-García, David Zabala-Blanco, Ismael Soto, Xaviera A. López-Cortés and Ricardo J. Barrientos. <i>Classification of Diseased and Healthy Apple Leaves through Extreme Learning Machines</i>
		Diseases in agricultural crops are a risk for fruit productivity and quality. Chile is a fruit exporting country; that needs the development of technologies for diseases prevent and treat. Farmers have been exploring how to use Artificial Intelligence to solve problems. Nowadays, deep artificial intelligence models have a great performance. However, farmers need to reduce economic costs, thus, it is important to explore artificial intelligence models. These models should be easy to implement on low-cost electronic devices. Extreme Learning Machines (ELM) stand out for their fast and stable ...
16:20	2112	Camilo Riveros-Burgos, Catalina Pinto, Daniel E. Casagrande and Rodrigo Contreras-Soto. <i>Implementing two methods to compute the area covered by watermelon plants using aerial RGB imagery</i>
		The increase of technological resources and the automation of agricultural processes have contributed to the development of new technologies that allow for characterizing and evaluating the phenotype of plants. Specifically, in a climate change scenario, plant phenotyping technologies are fundamental to accelerating breeding programs of essential crops and contribute to the selection process for the development and subsequent development of new varieties and cultivars. One-dimensional (1D) and two-dimensional (2D) vision systems have been an integral part of the successful implementation of ...
16:40	5791	Alvaro Diaz and Hector Kaschel. <i>Scalable Management Architecture for Electronic Health Records Based on Blockchain</i>
		The rise of communication and information technology in conjunction with the health emergency due to COVID-19 has accelerated the implementation of electronic health records (EHR). These registries are constantly growing and put people's privacy, information security and health data at risk. The use of the blockchain is shown as an alternative for the distribution and management of health data. However, the blockchain has limitations of scalability and interoperability. This work proposes a scalable management architecture based on blockchain that will be analyzed by comparing it with ...
17:00	9001	Carlos E. Alegria Guajardo, Xaviera A. López-Cortés and Sergio Hernandez. <i>Deep learning algorithm applied to bacteria recognition</i>
		Pathogenic bacteria are harmful microorganisms ca- pable of causing diseases. To fight or eliminate those microorgan- isms, antibiotics with antimicrobial action have been developed wich can be synthetic or semi synthetic. Through time, bacteria has developed mechanisms to fight this antimicrobial action, generating the antibiotic resistance. This issue is a serious global problem that affects the health area. Because of this, a workflow based on the KDD methodology. The proposed approach use data obtained through MALDI-TOF mass spectrometry techniques without preprocessing, in ...

IEEE ICA-ACCA 2022

Technical Sessions. Tuesday, October 25

ROOM 3

ROOM 3 Tuesday October 25, Session Chair: EDUARDO ORTIGOZA (PARAGUAY)		
Session 13 / Track ENERGY Papers-ID: 0568, 0677, 0727, 1821		
Time	ID #	Authors/Title
14:30	0568	Fabio Aquino, Félix Fernández and Eduardo Ortigoza. <i>Multi-criteria analysis of the performance in the use of electrical energy in the UNA: An approach based on AHP</i>
		Currently, energy efficiency, alternative sources and rational use of energy are widely used concepts to achieve process profitability, electricity bill reduction, security of supply and mitigation of environmental costs, being useful for all final consumption sectors of a country. The main objective of this work is to perform an analysis of the electric energy management of the Faculties of the National University of Asuncion (UNA). It is proposed to use the Analytic Hierarchy Process (AHP) method to analyze and rank those faculties that have a better performance in the management of ...
14:50	0677	Daniel Marcelo-Aldana, Gustavo Vasquez-Tantas and Elder Mendoza Orbegoso. <i>Mathematical modelling and numerical simulation of the drying chamber of an indirect solar dryer</i>
		Drying is one of the oldest methods employed by farmers to avoid spoiling agricultural products and allowing for longer storage times. Farmers at ASPROBO (Organic Banana Producers Association), an association in the district of Buenos Aires in the province of Morropon, Piura, Peru, use the traditional open sun drying of cocoa beans. Open sun drying has several drawbacks (slowness, uneven drying, inability to control the temperature, unprotected from bad weather on rainy days). In order to overcome these disadvantages, a change from traditional sun drying to indirect, direct, or mixed solar ...
15:10	0727	Gustavo Adolfo Gomez Ramirez, Isaac A Luévano Reyes, Gonzalo Mora-Jiménez, Luis Claudio García Santander, Markel Zubiaga Laskano and Carlos Meza. <i>Increasing Distribution Network Capacity through Storage in Central American Countries: A Case Study</i>
		Power systems have adapted to the requirements of consumers, however, more demand is for more and better electrical services as high reliability and availability are required every day. These demands are challenging to meet in weak power grids where significant transmission losses are present and the system is not very reliable. A photovoltaic and storage system represents a considerable value option to relieve congestion in the industrial distribution system, improve load voltage profiles, and increase availability. If implemented on a large scale, they can directly impact demand management ...
15:30	1821	Ali Selim, Salah Kamel, Hagag Abdul Jabir and Francisco Jurado. <i>Optimal Coordination of Directional Overcurrent Relay Using Coyote Optimization Algorithm</i>
		The purpose of protection devices in the power systems is to detect the fault occurrence in the protected zone and isolate it as fast as possible out of the healthy rest of the zone. Therefore, this work proposes a direct optimization approach called the Coyote Optimization Algorithm (COA) in an electrical power system, for coordinating the functioning of directional overcurrent relays (DOCRs). It is believed that coordination is a non-linear optimization problem with several operational constraints. Finding the optimal time dial settings (TDS) for relay settings and selecting a current to ...

ROOM 3 Tuesday October 25 Session Chair: MURILO E. C. BENTO (BRAZIL)		
Session 14 / Track ENERGY Papers-ID: 1905, 3451, 5022, 5946		
Time	ID #	Authors/Title
16:00	1905	Murilo E. C. Bento. <i>Contingency Assessment of an ANN-based Method for Monitoring Load Margin of Power Systems</i>
		The load margin is an important index used in the power system operation planning stage and informs how far the system is from instability. Machine learning techniques such as Neural Networks (NNs) have been shown to be effective in monitoring the load margin from Phasor Measurement Units data, but the difficulty of generalizing to unseen operating cases can affect their reliability and, consequently, future voltage control strategies. This article proposes to evaluate, through different metrics, a method of monitoring the load margin based on NNs when the system is subject to operational ...
16:20	3451	Murilo E. C. Bento. <i>PMU-Based Power System Stabilizer Design Using Reptile Search Algorithm</i>
		The presence of low-frequency oscillation modes with low-damping rates can compromise the operating performance of power systems. The development of synchronized phasor measurement systems allowed the development of damping controllers based on Phasor Measurement Unit (PMU) data and the results are promising in improving the damping rates of oscillation modes. However, this controller relies on reliable data from PMUs that may be subject to failure from cyber-attacks. This paper proposes a controller design method using the Reptile Search Algorithm (RSA) algorithm considering robustness to ...
16:40	5022	Javier Soto, Michael Moore, Xaviera A. López-Cortés, Ruber Hernández-García and Iván Merino. <i>What hides Chile's electricity mix data: A Data Science perspective</i>
		In the context of decarbonization and fossil fuel independence, Chile has a great task ahead. The most relevant is to become carbon neutral by 2050 by replacing fossil fuels with clean energy sources, where, besides hydraulics, solar and wind power are the chosen ones. However, the commitment to rely on intermittent sources requires a variety of studies to support the roadmap and the success of this decarbonization plan. Therefore, this study aims to understand the behavior of the energy mix and its sources by analyzing the historical production data according to the geographical context. ...
17:00	5946	Daniel Marcelo-Aldana and Sebastian Laca-Cuglievan. <i>Design and energy balance of a bagasse-fired water-tube boiler for non-centrifugal sugar production using steam technology</i>
		The article focuses on rigorously describing, analyzing, and calculating all the stages of the steam generation process by means of a water tube boiler using sugarcane bagasse as fuel. The steam produced will be used for the non-centrifugal sugar production process. The mathematical model is obtained from the law of conservation of energy for open systems in steady-state flow in thermodynamics and the laws of Fourier, Newton, and Stefan-Boltzmann in heat transfer. The Newton-Raphson method is applied to solve non-linear equations. Finally, the variation of fuel moisture and steam production ...

ROOM 4

ROOM 4 Tuesday October 25, Session Chair:		
Session 15 / Track CONTROL Papers-ID: 1569, 1883, 2465, 3408		
Time	ID #	Authors/Title
14:30	1569	Ujjawal Ujjawal Singh, Abdul Rahman, Saroj Kumar Mahato, S Surya, Mohit Bajaj, Francisco Jurado and Salah Kamel. <i>Design of an Automatic Sorting Machine on the Conveyor Belt System Based on Product Temperature</i>
		Conveyor belt dynamics and stability have significantly improved in recent years. Still, the conveyor belt system necessitates a great deal of human intervention. This paper describes an advanced form of conveyor belt system that employs automation to sort the products on the belt. This automated conveyor belt system can sort objects based on their temperature and count the number of objects from the belt. The system which is presented in this paper uses Arduino, temperature sensor and ultrasonic sensor for automating the work done by humans on the conveyor belt system. This will help the ...
14:50	1883	Pedro Duarte and Federico Fernandez. <i>Automation of a LAG (Liquefied Petroleum Gas) plant</i>
		Liquefied Petroleum Gas (LPG) is one of the most widely used energy sources in the world, both domestically and industrially, and its use is constantly increasing. Its handling represents a complex and delicate process, which on many occasions the stages of provision of the product lead to errors. For this reason, it is necessary to minimize the operations and controls under human supervision, taking into account that the variables that influence their handling and that depend on the control devices must be continuously verified, such as product levels, pressure and temperature in the ...
15:10	2465	Gabriel Salazar, Francisco Rossomando and Oscar Camacho. <i>An Adaptive Neuro-Fuzzy PID Controller Approach for thermal Systems: An Experimental Validation</i>
		The current work includes an experimental evaluation using a device known as TCLAB as a benchmark. A NARX neural network is used to identify the thermal process in a broad operation region and can be considered the model of reference. The control scheme employs a neuro-fuzzy adaptive control. The controller systems work by comparing the neural network model to the actual process, and from this comparison a model error can be obtained; if the modeling error is different from zero, a fuzzy system adjusts the PID tuning parameters to get the best performance in the operating point. The ...
15:30	3408	David Amores, Javier Villagómez, Jacqueline Llanos and Diego Ortiz. <i>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</i>
		This research, models, virtualizes, and controls an integrated cascade system for the production of aluminum chloride, based on the implementation of a boiler, which aims to produce constant steam at a certain temperature, the same that is coupled to the jacket of a continuous stirred reactor, which aims to produce aluminum chloride by the entry of hydrochloric acid inside which is deposited aluminum. Once the two processes are coupled, control strategies are designed based on traditional PID algorithms, one to control the steam temperature at the boiler outlet, and the other to control the ...

ROOM 4 Tuesday October 25, Session Chair: MANUEL DUARTE, CHILE		
Session 16 / Track CONTROL Papers-ID: 3639, 7000, 8113		
Time	ID #	Authors/Title
16:00	3639	Andres Prieto, Ivan Rodriguez, Jorge Rodas, Enrique Paiva, Raul Gregor, Enrique Chaparro and Eduardo Prieto-Araujo. <i>Image Processing Technique Applied to Electrical Substations Based on Drones with Thermal Vision for Predictive Maintenance</i>
		Damage detection in electrical substations (ES) is vital to prevent breakdowns of devices. One of the main mechanisms of detecting failures and overloads in ES is the heat sources, which are concentrated in small areas with higher temperatures due to malfunctioning components or operating over from its current or voltage limits. Using drones equipped with a thermal camera is an exciting option to conduct technical inspections of ES to capture the zones with heat sources faster, safely, and efficiently. This paper proposes a practical and optimized procedure using thermal images based on ...
16:20	7000	Amirreza Kosari, Yousef Hajisayari and Vahid Bohlouri. <i>Modification of an On-off Modulation for Thruster Actuators with Differential Evolution Algorithm in an Optimal Docking Maneuver</i>
		In this paper, an innovative approach is proposed to enhance the performance of a spacecraft docking maneuver. The docking maneuver is considered in a circular orbit using on-off thruster actuators. The minimum energy problem of the spacecraft docking maneuver is solved based on optimal control using the direct multiple shooting method. In this docking maneuver, it is assumed that the target spacecraft is uncontrollable and is not tumbling. It is needed to use algorithms to modulate the continuous outputs of the multiple shooting method for the thrusters. Here, a modification algorithm is ...
16:40	8113	Amirreza Kosari and Reza Janipour. <i>Using Differential Evolution Algorithm for Finding On-Off Behavior of Electrical Propulsion System of a Geostationary Satellites in Station Keeping Maneuvers</i>
		In this paper a synthetic methodology aims to investigate the optimum switching time issues of electrical thrusters, arising in station-keeping maneuvers of a geostationary satellite has been proposed. In particular, the first level of the solver includes an optimal approach for finding the continuous thrust profile based on the satellite translational motion affected by environmental perturbations considering the thrust limitations. Then differential evolution algorithm is utilized to find the optimal on-off time program of the thrusters based on the control actuators performance ...

IEEE ICA-ACCA 2022

Technical Sessions. Wednesday, October 26

ROOM 1

ROOM 1 Wednesday October 26, Session Chair:		
Session 17 / Track INDUSTRY Paper-IDs: 0691, 4748, 6229		
Time	ID #	Authors/Title
17:00	0691	Miquéias Silva Filho, Júlia Cabral and Carlos Souza Filho. <i>Detection of glass' position using computer vision for the automation of the waterjet cutting machines</i>
		This work presents the development of a solution for the detection of the position of glass plates and sheets, through computer vision and image processing techniques. This position information is intended to be used in Computer Numeric Control (CNC) waterjet cutting machines, so that the cutting region can be determined. This solution was built using the Python language, using the computer vision library, OpenCV and the mathematical manipulations library, Numpy. To verify the performance of the proposed solution, a test platform was set up, carrying out experiments with glass samples of ...
17:20	4748	Renan A. Travi and Claudio Garcia. <i>An Evaluation of the Diverse Actuation System in Nuclear Power Plants</i>
		The increasing importance of nuclear energy and the generation of electricity from nuclear plants make it necessary to enhance the safety and reliability of these plants. To meet these requirements, redundant digital systems are used and with that, the possibility of Common Cause Failure arises. In order to mitigate this occurrence, an alternative is the implementation of the Diverse Actuation System (DAS), which has been shown to be very effective in achieving this objective. There are not many publications on the DAS, as the subject is relatively new in the nuclear industry and there is ...
17:40	6229	William Gutierrez, Jesus Alfonso Lopez Sotelo and Jesus Hamilton Ortiz. <i>Information model for the digital transformation of manufacturing systems in small and medium-sized companies.</i>
		This article proposes the development of an information model that allows starting the digital transformation of a small or medium-sized company (SME) using the OPC UA protocol. The model is made up of a hardware component made up of the process plant and the control equipment, as well as a software component where the information model is implemented. As an application case, the proposed information model is developed in a unit process plant, a filtration plant. The process carried out in this plant is through a filter to remove ...

ROOM 1 Wednesday October 26 Session Chair:		
Session 18 / Track EDUCATION/INDUSTRY/ROBOTICS Paper-IDs: 8799, 7032, 9209		
Time	ID #	Authors/Title
18:30	8799	Alfredo Reyes, Luisa Navarro, Ariday Conde and Karina Reyes. William Gutierrez, Jesus Alfonso Lopez Sotelo and Jesus Hamilton Ortiz. <i>Preparation of automatic plastic extruder with support of emerging technology</i>
		The budget for research in public universities in Mexico is scarce, when some equipment fails within these institutions, it usually takes a long time before it can be repaired, causing it to be set aside and pieces of the equipment are taken for another project. At the Autonomous University of Coahuila, the intention is to coerce different faculties as support in this regard. In this work, a plastic injection process is prepared to obtain filaments that can be used in a 3D printer. In this first stage, the elements that already exist are verified, the electrical engineering of the process ...
18:50	7032	Nahur Manuel Meléndez Araya, Manuel H. Ruiz Ulloa, Jenny G. Pizarro Ruz and Pablo O. Cruzat Pacheco. <i>Blue Ocean Strategy: A look from the literature</i>
		While companies apply various strategies and management instruments spending time, energy, resources to survive and compete for their position in the market. Porter points us to competitiveness, with the application of its generic strategies, such as competitive strategies in the markets. The Blue Ocean Strategy (BOS), addresses competition from a new perspective based on innovation, seeking a free market (Ocean), free from competitors, unexplored markets, easily conquered and/or fast growing. There are blue oceans that have nothing to do with current industries, although most arise from red ...
19:10	9209	Irais Zavala, Alfredo Reyes, Luisa Navarro and Narda Reyes. <i>Educational Processes Automation with Support in Digital Design and 3D Printing</i>
		The main complaint of people who start in the automation area is usually that what is seen in an educational classroom is usually far from reality, it starts with simulations, and some educational units have little material and prefer not to risk it to make modifications that may damage the cell or control equipment. In this work, a low-cost manufacturing cell is taken, engineering is carried out such as electrical and pneumatic plans, the arrangement of the cell is reorganized, various components are added or replaced to make the most similar to what that might be found in an ...

ROOM 2

ROOM 2 Wednesday October 26 Session Chair:		
Session 19 / Track CONTROL I Paper-IDs: 1298, 8546, 8753		
Time	ID #	Authors/Title
17:00	1298	Alain Nascimento Guimarães, Claudio Garcia and Eduardo Lorenzetti Pellini. <i>Architecture of the Low-Level Flight Controllers for the 3D Trajectory Motion in a Quadcopter</i>
		This paper presents a simplified architecture of the low-level flight controllers for the 3D trajectory motion in quadcopters. The approach is based on the division of higher order controllers in cascaded with proportional controllers as a way to obtain this goal. The overall result is displayed with the help of a software-in-the-loop simulator used to tune the control parameters.
17:20	8546	Seada Hussien, Frie Ayalew, Mohit Bajaj, Naveen Kumar Sharma, Francisco Jurado and Kamel Kamel. <i>An Overview of Recent Advances in Energy Storage for Solar Power Systems</i>
		Renewable energy sources and technologies have the potential to bring answers to energy-related challenges in developing nations such as Ethiopia. PV systems generate clean, dependable electricity without the need of fossil fuels and are employed in a broad range of applications. Clean electricity is one approach for increasing capacity, improving energy security, and addressing environmental problems. Since, energy storage is one of the components of standalone system to holds all energy and electrical energy storage is advantageous to balance between fluctuating generation and varying ...
17:40	8753	Daniel Leonardo Barrera Esparta, Pável Axel Mc Campos Peña, Jose Omar Aliaga Yauri and Manuel Ronald Gomez Casasola. <i>Performance Comparison between LQR, GPC and ANFIS controllers for Load Frequency Control in a Small Hydro Power Plan</i>
		For hydroelectric power plants, it is essential to generate power at constant frequency. Frequency variations in generator sets reduce their efficiency and reliability. Conventional controllers, such as Proportional Integral Derivative (PID) controllers, applied to speed governors do not have good enough performance to keep a constant frequency when there are load increments. This paper presents the design of a Linear Quadratic Regulator (LQR) controller and a Generalized Predictive Controller (GPC) that includes load variation as a measurable disturbance. Furthermore, Sugeno fuzzy architecturebased ANFIS models were trained with these controllers to create fuzzy controller models of each one. A performance comparison analysis using performance indexes like IE, ISE, IAE, ITAE and ITSE is performed in order to compare the control algorithms. All the designed controllers were tested with the model in order to find the controller with the best performance

ROOM 2 Wednesday October 26, Session Chair:		
Session 20 / Track CONTROL II Paper-IDs: 1264, 2712, 6436		
Time	ID #	Authors/Title
18:30	1264	Reinier López Ahuar, Angel L. Cedeño, Manuel Olivares, Juan Agüero and Cesar Silva. <i>Model Reference Adaptive Control for Ball-and-Plate System</i>
		In this work, an adaptive control through state feedback is designed to control the position of the ball in the ball-and-plate system. The adaptive law is designed using the direct adaptive control technique based on a reference model. Using this model, the reference signal, and the system measurements, it is possible to adapt the control parameters. The proposed controller is tested in Matlab/Simulink, where the good performance of the proposed control scheme is shown.
18:50	2712	Salustiano Vega, Osvaldo Vega and Eduardo Ortozo. <i>Solving the equation of the physical pendulum by some numerical methods of differential equations</i>
		The pendulum problem is one of the most studied topics in the field of Physics, in fact, in most cases the simplest case is analyzed, so that in the less complex techniques given to describe the harmonic motion, small oscillation amplitudes are considered. However, the analysis of large oscillations presents a greater complexity and numerical methods are required to solve in an approximate way the nonlinear differential equations that describe this type of problem. In this work the nonlinear differential equations describing the damped oscillations of a rigid pendulum rotating on a pivot ...
19:10	6436	Ivan Velasquez, Boris Pavez, Roberto Moncada, Valentina Yañez and Jorge Sandoval. <i>Modeling of a Photovoltaic Panel and Solar Tracking Control</i>
		Generating energy from the sun is a trend of the last decades. In general, most of the electrical energy generated from solar radiation is generated by photovoltaic panels. Normally the performance of these systems depends on the position in which they are installed. Hence the importance of knowing the equations that govern the phenomenological relationships of the system, such as voltage, current and power. This paper describes the model of a photovoltaic panel and the equations that govern it. In addition, two simulations of algorithms for controlling the position of a photovoltaic panel ...

ROOM 3

ROOM 3 Wednesday October 26 Session Chair:		
Session 21 / Track RENEWAL ENERGY Papers: 6570, 7061, 7461, 8395		
Time	ID #	Authors/Title
17:00	6570	Eduardo Ortigoza, Victorio Oxilia, Fernando Ferreira, Juan Carlos Cabral and Diego Coronel. <i>Application of the Perceptor Hierarchical Model un negotiations on the cost of electricity service of a binational hydropower plant: the case of ITAIPU</i>
		In 2023, the partners of the ITAIPU Binational Entity, Paraguay and Brazil, will have to review Annex C of the ITAIPU Treaty, which relates to the conditions of the tariff structure and commercialization of the energy produced by the power plant. In order to sit down to negotiate, the governments must know what the companies want from these developments. Given the location and importance of ITAIPU for the region, the negotiation to be held should devote considerable effort to the revision of Annex C of ITAIPU. This article evaluates the implications of the components of the Cost of ...
17:20	7061	Daniel Caravantes, Juan Diego Carbajal and Daniel Marcelo-Aldana. <i>Estimation of Green Hydrogen production potential in the Piura region from water electrolysis</i>
		In this study, the potential of green hydrogen production from water electrolysis in the Piura region has been analyzed and estimated. Three major renewable resources were considered: wind energy, solar energy, and biomass. For the wind power estimation, wind speeds collected from the NASA POWER Data Access Viewer were used, whereas for the solar power potential, solar radiation data from the PHOTOVOLTAIC GEOGRAPHICAL INFORMATION SYSTEM (PVGIS) was obtained. Finally, for the biomass potential estimation, the most recent data from the Ministry of Agriculture and Irrigation has been used. To ...
17:40	7461	Elder Mendoza Orbegoso, Luis Delgado, Raúl La Madrid and Daniel Marcelo-Aldana. <i>Peruvian Rural Jaggery Making Process: Heat Transfer Coefficients Determination in Pool Boiling Pans</i>
		This paper presents two approaches to calculate the overall heat transfer coefficients in different open heat exchangers used in the jaggery-making process. These coefficients can be used in order to improve the design methodologies of jaggery furnaces. The most important results are the calculation of the heat transfer coefficients: for forced convection and radiation from the flue gas to the heat exchanger, and for juice boiling inside the open heat exchanger. Temperature, flow velocities, gases concentration, and environment conditions were measured in order to develop the methodologies. ...
18:00	8395	Andrés Ortiz Salazar, Daniel Carlos De Carvalho Crisóstomo, Glauco George Cipriano Maniçoba, Evandro Ailson De Freitas Nunes and Elmer Rolando Llanos Villarreal. <i>Analysis and Modeling of an Electromagnetic Speed Regulator for Wind Energy Conversion Systems</i>
		Nowadays, the growing increase in energy demand worldwide intensifies the search for clean and renewable energy sources used and, among the current technologies, wind energy has been highlighted like one of the most promising. This work presents a new proposal for a wind turbine conversion system using a Frequency Electromagnetic Regulator (FER) that replace gearbox functionalities and improve mechanical transmission system performance due to the high reliability and reduction of mechanical losses and maintenance costs. Besides, FER can be useful in several transmission systems wherein ...

ROOM 3 Wednesday October 2 Session Chair: SERGIO TOLEDO		
Session 22 / Track RENEWAL ENERGY Paper-IDs: 1248, 1927, 3655, 5789		
Time	ID #	Authors/Title
18:30	1248	Jose Suarez, Marcia Silva, Marco Rivera and Patrick Wheeler. <i>Trends and Challenges in Sustainable Energy Management Models for Public Health Services</i>
		Hospital facilities are characterized by continuous operation, where the availability and reliability of the electrical energy supply is essential to guarantee patient safety. The level of hospital's requirements depends on the coverage and capacity of the facility. Establishing that the energy demand will be greater in more complex hospital buildings, as a result of the increase in critical equipment and the systems used. Critical equipment often requires a stable and high quality electrical supply. In order to reduce the carbon footprint of hospital facilities there is a need to develop ...
18:50	1927	Magno Ayala, Sergio Toledo, Guadalupe Ramirez, Antonella Prado, David Caballero, Marco Rivera, Patrick Wheeler and Raul Gregor. <i>A review of solar and wind energy in Paraguay</i>
		In recent years, non-conventional renewable energies (NCRE) has increased substantially due to its abundance and advancement of support technologies. This paper describes a review of solar and wind energy in Paraguay, which includes its matrix energy, its potential to harness solar and wind power, the current installed technology and future projects.
19:10	3655	Fernanda Skewes, Julián Cortés, Óscar Guzmán and Marco Rivera. <i>Management Instruments in the New Climate Change Framework Law</i>
		The recently published Climate Change Framework Law requires an analysis of its different contents. This paper focuses on the climate management instruments contained in the law and the way in which they are linked to the instruments of the Paris Agreement and the already existing public policies on the matter at the national level, now elevated to the legal rank and with their minimum contents and elaboration procedures regulated. It also analyzes the new management tools created by the law and the reasons why the adoption of this law was necessary, given the limited binding nature of the ...
19:30	5789	Vicente Sepúlveda and Carlos Benavides Farias. <i>Carbon Neutrality Scenario Projection Model under Uncertainty</i>
		The purpose of this paper is to project carbon neutrality scenarios considering uncertainty. For this purpose, it is proposed the design and implementation of a new methodology that allows to recognize a wider representation of the possible future scenarios, representing in a finite number of simulations what could happen when simulating all possible combinations, considering the uncertainty ranges. The methodology developed in this report was applied to a case study and the results were compared with a previously developed methodology. The results obtained consist of an increase in the ...

ROOM 4

ROOM 4 Wednesday October 26 Session Chair: FELIPE BESOAIN		
Session 23 / Track VIRTUAL REALITY Paper-IDs: 0196, 2192, 6169, 8673		
Time	ID #	Authors/Title
17:00	0196	Liza Jego, Nicolas A. Barriga and Felipe Besoain. <i>A Virtual Reality System for Fruit Processing Line Personnel Training: A Usability Study</i>
		Labour in most agro-industrial plants accounts for a significant part of the cost structure. Even though fully automated processing facilities can be built, a lower initial cost solution involves training the personnel to increase their efficiency in the plant. Advances in VR technologies enables the creation of immersive virtual environments that simulates different contexts. A VR experience is proposed in order to simulate the work environment for fruit processing line personnel. In this manner, the workers can be trained without using the physical resources of the processing plant. A ...
17:20	2192	Felisa Córdova, Fernando Cifuentes and Hernán Díaz. <i>The Hilbert-Huang Transform as a method and tool to support the analysis of non-linear and non-stationary electroencephalographic signals</i>
		The analysis of non-stationary and non-periodic signals has long been restricted to Fourier decomposition in the frequency domain. However, when bringing the frequency content to the time domain (STFT), harmonics appear that do not correspond to reality. A second attempt at temporary decomposition of the signal is by means of the Wavelet transform, which does not fully adapt to the interpretation of the original signal. In the two previous cases, both transforms start from a normative base of sines and cosines in Fourier and wavelets in Wavelet. As an alternative to these methods, an ...
17:40	6169	Roman Osorio-Comparan, Fausto Osorio, Hector Kaschel, Cristian Ahumada, Sergio Cordero and Gaston Lefranc. <i>Virtual Monitoring of the 3D Movement of a Mobile Object, using UNITY</i>
		This article presents the design of a real-time graphic representation system using UNITY, this is a graphic engine for the development of multiplatform video games in 2D / 3D, its potential to work in real time make it ideal for this application as a means of representation and monitoring in virtual reality, the main objective is to monitor the position and activities of one or more moving objects in a house, hospital, building, school, etc. The applications are diverse, the goal of this article as an initial stage is to obtain the monitoring of the position in real time of the activities ...
18:00	8673	Roman Osorio-Comparan, Alan Mariscal, Roberto Tovar, Victor Lomas, Ginno Millan and Gaston Lefranc. <i>Android App to Monitor the Position of a Group of Robots in a Hospital</i>
		This article presents the design of an Application in Android operating system, with the aim of monitoring movements in real time through a 2D graphic representation system, in a portable and economical way of a group of Mobile Robots with medical assistance capabilities, in addition to providing information about their position in Cartesian coordinates, percentage of current battery of the robots and state of operation during their navigation, the above linked between the group of robots and the Android mobile device through wireless communication in MQTT or WiFi protocol, depending on the ...

ROOM 4 Wednesday October 26 Session Chair:		
Session 24 / Track INFORMATICS Paper-IDs: 1301, 3780, 4012, 6267		
Time	ID #	Authors/Title
18:30	1301	Luis Carlos Torres Vega, Andrea Paola Ardila Sanchez, Ghiordy Ferney Contreras Contreras, Sergio Alexander Castro Casadiego, Byron Medina Delgado and Dinael Guevara Ibarra. <i>DCAEAD: Denoising system for assisted driving images applying an autoencoder architecture</i>
		The purpose of this research work is to develop a system to correct the noise present in images, using computer vision and automatic learning tools, specifically, focused on processing images used by assisted driving systems, in which the presence of noise represents a loss of information, directly affecting the efficiency of such systems. To achieve the above, a methodological process of analysis, design, and evaluation was followed, thus obtaining a neural network model capable of responding to the proposed task, which was verified by performing tests and applying metrics such as PSNR and ...
18:50	3780	Guillermo Becerra, Marco Mora Cofre, Veronica Aubin and Ruber Hernandez. <i>Off-line Writer Identification based on Small Segments of Handwritten Text and Convolutional Neural Networks</i>
		This paper proposes a new method for writer identification based on small fragments of handwritten text randomly obtained from a paragraph. The main contribution of this work is to show that small fragments carry enough biometric information for writer identification. A second contribution is the creation of 2 repositories of images of handwritten text from 50 writers. The first one is made up of 4 text paragraphs of 64 words in high resolution per writer. The second one contains more than 700 thousand fragments of text per writer. Experiments were conducted with different Convolutional ...
19:10	4012	Aleksei Portnov. <i>Evaluation of characteristic points distribution for linear terrain objects to calculate the optimal parameters of coordinate reference systems in terms of the Republic of Chile</i>
		The article focuses on the need to evaluate the distribution of coordinates of the objects characteristic points and their filtering (discharge) in order to implement algorithms for calculating the optimal parameters of projection coordinate systems. To solve this task, it is proposed to use the uniform distribution function, the value of which characterizes the concentration degree of characteristic points that form the contour of linear objects. At the same time, the Chi-square criterion, as an estimation indicator, allows implementing iterative procedures for combining nodes and ...
19:30	6267	Lucrecia Llerena, Darlyn Buenaño, Carlos Almeida and John W. Castro. <i>Identification of Ethical Issues in the Phases of the Software Development Life Cycle: A Preliminary Secondary Study</i>
		The principles of ethics are not a new topic in the area of Software Engineering; this term emerged in the 90s after the rise of computers due to incorrect practices in software development. The purpose of this research is to classify the ethical problems arising in the software development life cycle, for which a preliminary secondary study (PSS) was conducted. As a result of the PSS, 27 primary studies were obtained. These studies propose methodologies and solutions for some ethical issues in a specific phase. Therefore, we classified the ethical issues, but due to the variety of problems, ...

IEEE ICA-ACCA 2022

Technical Sessions. Thursday, October 27

ROOM 1

ROOM 1 Thursday October 27 Session Chair: SERGIO CORDERO		
Session 26 / Track AGRICULTURE Paper-IDs: 3159, 3379, 3600, 5613		
Time	ID #	Authors/Title
15:10	3159	Jhonatan Paolo Tovar Soto, Mateo Orrego González and Jonathan Antonio Sierra Sánchez. <i>Digital agriculture for urban crops: design of an IoT platform for monitoring variables.</i>
		This article presents the design of the hardware and software architecture of a monitoring system for some agroclimatic variables through a set of technologies based on the Internet of Things (IoT). First, the general architecture of the project is presented, making a description of the hardware and software used in it. Then, the information is broken down into the layers of the architecture, such as: perception layer, network layer and application layer, and the operation of each layer is detailed. Finally, some recommendations are presented on future developments and what is expected to be ...
15:30	3379	Hector Kaschel, Sergio Cordero, Pablo Adasme and Cristian Ahumada. <i>Smart Agriculture 4.0: Technology Recommendations and Interoperability of Devices, Sensors and Data Management using Blockchain</i>
		Currently the protocols associated with wireless technologies applied to wireless sensor networks (WSN) is a great alternative that will allow the control, monitoring and of course the marketing of plant products. In the context of intelligent agriculture, since it is intended to obtain a higher degree of productivity, allowing great benefits that are associated with crops and harvests. It also describes the parameters of each wireless communication protocol, which are classified according to coverage, as well as how Blockchain interacts in data management in different activities in smart ...
15:50	3600	Andres Flores. <i>Classification of organic quinoa crops using multispectral aerial imagery and machine learning techniques</i>
		Crop mapping is an essential tool for agricultural management and food security for which remote sensing data can be used. This study focuses on the use of machine learning techniques to classify quinoa crops from multispectral aerial images. Spectral reflectance of five optical bands are used for determining classification models which are evaluated for different phenological stages of quinoa. Decision Trees, Discriminant Analysis, Support Vector Machines, K nearest Neighbor, Random Forest, Adaboost, deep learning methods Segnet and Unet were explored. Training datasets were obtained from ...
16:10	5613	Camilo Riveros-Burgos and Catalina Pinto. <i>Towards the automatic simulation of fruit trees phenology: assessment of weather forecast data for calculating thermal time</i>
		Changes in the occurrence of meteorological events directly affect agricultural production. In fact, the increase in temperature has been linked to phenological changes in grapevines, which could have an impact on the cultural practices of several crops/cultivars, as well as on fruit production. Then, the application of phenology models using the growing-degree days (G.D.D.) has emerged as an easily accessible alternative for scheduling practices throughout the growing season. This study assessed weather forecast data from an ensemble of three global numerical models with weather stations, ...

ROOM 1 Thursday October 27 Session Chair: SERGIO CORDERO		
Session 27 / Track AGRICULTURE Paper-IDs: 2844, 3103, 7527, 9150		
Time	ID #	Authors/Title
17:00	2844	Gustavo Cevallos, Javier Pinzon and Oscar Camacho. <i>A Microclimate Greenhouse Multivariable Control: A Guide to use Hardware in the Loop Simulation</i>
		The design of a Hardware-in-the-loop test for simulation and control of greenhouse microclimate is presented in this work. This test sets and tunes the MIMO controller system for achieving preferred greenhouse conditions. Firstly, a mathematical greenhouse model using differential equations to describe the dynamic aspects of the greenhouse climate and the interaction between the elements is presented. Next, the greenhouse is simulated with the software Simulink® MATLAB®. Then, the fundamental of the MIMO control system is described. Next, all the steps necessary to implement the MIMO ...
17:20	3103	Danilo Pastrana, Fabián G. Pierart and Ernesto Rubio. <i>Identification of a reduced order model for greenhouse control based on CFD model results and experimental validation</i>
		The use of numerical models in the agricultural industry is becoming more common to solve different issues, for example design optimization or model based control design. Nevertheless, such numerical models are computationally expensive and impractical for control design. This work shows a methodology for obtaining a reduced order model that predicts the thermal behavior of a greenhouse, in order to design control systems to regulate the behavior of the internal microclimate of greenhouses. This model is obtained through system identification applied to the data obtained from a numerical ...
17:40	7527	Fabián G. Pierart, Daniel Vergara Sanhueza and Santiago Riquelme. <i>Greenhouse Parametric Computational Fluid Dynamic model</i>
		In the present work, a parametric study of the influence of external ventilation in the behavior of the thermal characteristics of a real greenhouse is developed by using a numerical model implemented in the computational fluid dynamics software Ansys Fluent 2019R3. Such model allows to correctly design an automatic control of thermal properties in greenhouses. Two different models are presented, the first one uses natural ventilation and the second model uses forced ventilation by using 22 fans of 40 cm of radius each. Only the first model includes the external fluid domain. The cultivated ...
18:00	9150	Paulo Cañete-Salinas, Diego Romero, Jaime Venegas, Cristian Espinosa, Khristopher Ogass and César Acevedo-Opazo. <i>Proposal of water status monitoring of adult Populus commercial stands using satellite imagery</i>
		The Mediterranean climate of central Chile is being strongly affected by a significant reduction in rainfall, which is a major problem in poplar wood production, due to its highwater consumption. To optimize water use, it is essential to have tools for monitoring water status, which is complex in poplar, due to the complexity of its field operation and the large areas of these plantations. This research proposes the development of a predictive model of water status, using satellite images, which allows online monitoring of water status of poplar plantations. Among the models evaluated, the ...

ROOM 2

ROOM 2 Thursday October 27, Session Chair:		
Session 28 / Track ROBOTICS Paper-IDs: 1734, 2721, 3941, 5160		
Time	ID #	Authors/Title
15:10	1734	Carlos Calderon Cordova, John Robles, Sulay Morocho and Roger Sarango. <i>Convolutional Neural Network (CNN) and Industrial Robot Arm applied to an automatic coffee bean selection system</i>
		The objective of this project is to design and implement an automatic coffee bean selection system, based on the integration of a Scara Epson robot arm with a Convolutional Neural Network based classifier. The implemented system extracts the elements that were identified as coffee beans with shape and color alterations. The hardware architecture consists of: Epson Scara LS10 robot arm, RC-90B controller, 4 megapixel webcam, an extraction end effector, and white illumination. The software architecture consists of: image acquisition, segmentation and preprocessing algorithms, training and ...
15:30	2721	Armando Uribe, William Gutierrez and Ian Mateo Rodriguez. <i>Methodologies for optical character recognition using convolutional neural networks and open source tools applied to industrial production lines.</i>
		This project proposes three optical character recognition (OCR) methodologies, where a comparison and performance analysis were carried out, all implemented in an embedded system, applied to industrial lines, whose products belong to the Snacks type classification and seek to recognize data General information such as expiration date, batch, and type of product according to company parameters. The comparison between three algorithms is proposed, one of them corresponding to an own development that corresponds to a classifier-type convolutional neural network, written in Python language. ...
15:50	3941	Gaston Lefranc, Roman Osorio-Comparán, Mario Mario Peña-Cabrera and Ismael Lopez-Juarez. <i>Cobots in automation and at home</i>
		This paper presents the trends of cobots (collaborating robots), the impact on automation and in real life. The impact of applications using cobots is analyzed from the economic, philosophical, and human point of view. Current models of cobot use are presented and illustrated with examples of Cobot use today and what it might look like in the future. Finally, it is believed that cobots could be the opportunity for developing countries and small manufacturing companies.
16:10	5160	Luis Pantoja Garcia, Rodolfo Garcia Rodriguez and Vicente Parra Vega. <i>A Novel Adaptive Actor-Critic Reinforcement Learning Controller for Constrained Robots</i>
		Force-position control for robot manipulators has become a basic control regime for advanced applications such as interaction or cooperative tasks that imply contact to environment or external object. Thus, for many applications environmental information is evaluated continuously to generate adequate control actions to complete the task. There has been proposed techniques such as adaptive or intelligent control to cover some of these requirements, however it seems insufficient given the uncertainty involved when dealing with the environment. The emergence of deep learning has recently ...

ROOM 2 Thursday October 27 Session Chair:		
Session 29 / Track ROBOTICS Paper-IDs: 5526, 5997, 8391		
Time	ID #	Authors/Title
17:00	5526	David Zabala-Blanco, Axel Quinteros, Marco Mora, Ruber Hernández-García and Marco Flores-Calero. <i>Fingerprint Classification with the Extreme Learning Machine Algorithm for Multilayer Perceptron</i>
		Fingerprint classification comes to be a relevant guarantee for efficient as well as accurate fingerprint identification, in particular in the case of dealing with one-to-many fingerprint identification. Nevertheless, owing to massive intra-class variability, insignificant inter-class variability, and perturbations, the current fingerprint classification methods still need to enhance the accuracy without increasing the computational cost. In this paper, we introduce a novel method that combines the best extractor of features reported in the literature (Hong08) with multilayer extreme ...
17:20	5997	David Zabala-Blanco, Ruber Hernández-García, Ricardo J. Barrientos and Roberto Ahumada-García. <i>PVEIN-MLELM: a novel palm vein identification approach through multilayer extreme learning machine</i>
		Biometric identification systems play an essential role in multiple application areas, such as banking services, e-government, and public security, among others. Particularly, palm vein recognition is considered an emerging technology from the last decade, avoiding forgery possibilities and presenting high identification reliability and accuracy. State-of-the-art in palm vein recognition has improved its results in recent years from different approaches based on deep learning. Models based on convolutional neural networks reported in the literature have achieved high recognition rates in ...
17:40	8391	Bryan Díaz, Nicolás Pacheco and Leonardo Vines. <i>Integration of a robotic arm Lynxmotion to a Robotino Festo through a Raspberry Pi 4</i>
		The robotic mobile system Robotino, developed by FESTO, is a robotic platform oriented towards research and education, which is why it has a reduced amount of actuators of limited real functionality. This article proposes the integration of a Raspberry Pi 4 to a Robotino FESTO with the purpose of expanding the number of digital inputs this robot has, in addition to allow the input of analog signals by serving as a communication interface between devices through an ethernet connection. In this way, the installation of robotic arm Lynxmotion AL5 with 5 degrees of freedom to the Robotino ...

IEEE ICA-ACCA 2022

Technical Sessions. Thursday, October 27

ROOM 3

ROOM 3 Thursday October 27 Session Chairs: JOSÉ SUÁREZ y GUILLERMO CATUOGNO		
Session 30 / Track RENEWAL ENERGY Paper-IDs: 6128, 6151, 6514, 7915		
Time	ID #	Authors/Title
15:10	6128	Manuel Bravo-Lopez, Samuel Marin, Jhon-Ronald Terreros-Barreto, Alejandro Garcés, Alexander Molina, Marco Rivera and Patrick Wheeler. <i>An Overview of the Colombian Power System</i>
		The Colombian power system is facing a transition from a hydro-thermal system to a diversified mix of hydro, solar, and wind energies. This paper presents an overview of the current situation and the challenges of transitioning to a more sustainable system. This review includes public data up to June 2022 about renewable power generation and the introduction of modern technologies such as hydrogen and electric vehicles.
15:30	6151	Matias Alborno, Marco Rivera, Roberto Ramirez, Felipe Varas and Patrick Wheeler. <i>Water Splitting Dynamics of High Voltage Pulsed Alkaline Electrolysis</i>
		The application of pulses of high voltage and extreme short duration in alkaline electrolysis, unveil the characteristics of a new type of water splitting dynamics. Pulses of a width in the nanosecond range had open the study of the double layer formation of the H ₂ O molecules in the interface electrode/electrolyte, corresponding to a capacitive effect depending on the geometry of the electrolysis cell. Varying the frequency, voltage, electrode separation and ionic density of the electrolyte, show responses on the system that introduces the participation of a new type of capacitance in ...
15:50	6514	Gaston Frias, Guillermo Catuogno, Marco Rivera, Pat Wheeler and Guillermo Garcia. <i>Electrodependent Patients: Regulations, Possible Technical Solutions and Case Study</i>
		This article discusses the energy poverty of electrodependent patients and their struggle for the rights of uninterrupted and quality electrical services. A review of regulations in different South American countries is carried out, different support systems are compared to ensure continuous service and finally, as background, a case study implemented by the Laboratory of Appropriate Technologies (LabTA) to an electrodependent patient, is presented.
16:10	7915	Pablo Cossutta, Milagros Moutin, Alan Mechoulam, Santiago Barbero and Miguel Aguirre. <i>Climate Change in Argentina, Renewable Energies and their Implications</i>
		Argentina offers a great possibility for renewable energy generation facilities in order to reduce carbon emissions to help mitigate climate change. Wind, solar and biomass power is available in a major part of the country. Unfortunately most of the loads are concentrated close to the big cities which complicates electricity transmission. This work presents an analysis of the actual status of the actions to mitigate climate change in Argentina. The information provided is gathered from the government and the associated report agencies.

ROOM 3 Thursday October 27 Session Chairs: JOSÉ SUÁREZ y GUILLERMO CATUOGNO		
Session 31 / Track RENEWAL ENERGY Paper-IDs: 8076, 8254, 8994		
Time	ID #	Authors/Title
17:00	8076	Oscar Guzmán, Fernanda Skewes, Julian Cortes, Marco Rivera and Guillermo Catuogno. <i>Trends and Challenges for Access to Energy in Electro-dependent People</i>
		Electrodependent patients require a constant electrical supply at adequate voltage levels to power the equipment that, by medical prescription, is essential for them to live. Throughout this article, the concepts of electrodependency and the right to access energy will be introduced, thought of as a universal right to ensure the health and decent life of these patients. The legislation and regulations adopted by the countries are analysed with special emphasis and detail in the cases of Chile and Argentina.
17:20	8254	Guillermo Catuogno, Gaston Frias, Carlos Catuogno, Guillermo Garcia, Marco Rivera and Patrick Wheeler. <i>Appropriate Technology as an Alternative to Mitigate Energy Poverty in Rural Communities</i>
		The living conditions and levels of development of rural communities are largely related to access to energy, since it directly impacts education, health and entrepreneurship. In this sense, the Laboratory of Appropriate Technologies (LabTA) proposes an alternative method to mitigate energy poverty in rural communities based on the development of technology from the scientific community. This article shows the work methodology developed by LabTA in recent years in electrification projects in rural communities based on the design of appropriate technologies, STEM ...
17:40	8994	Julián Cortés, Paz Araya Jofré, Cristian Flores Fernández, Fernanda Skewes, Óscar Guzmán and Marco Rivera. <i>Right to energy and vital minimum: repercussions in the Chilean constitutional debate</i>
		In this paper we seek to outline some premises related to the issue of energy and its transition, not only looking at it as a process of transformation towards "cleaner" ways of obtaining energy, but through questions such as: the conditions of possibility to conceive energy as a human right, and its potential contribution as a tool for energy justice, all within the framework of the current Chilean constitutional debate where energy was a relevant topic.

ROOM 4

ROOM 4 Thursday October 27 Session Chair:		
Session 32 / Track COMMUNICATION Paper-IDs: 1232, 3783, 3825, 7401		
Time	ID #	Authors/Title
15:10	1232	Tomas De la Cuadra, Pablo Adasme, Claudio Valencia and Skarlett Cáceres. <i>Strategy Based on Game Theory to Reduce Total Latency in The Location of Controllers in a Software Defined Network</i>
		Software-defined networks are a set of techniques related to the area of computational networks that resolve the separation between the data plane and the control plane, the controller is the brain of the network. This article develops a strategy to solve the Controller Placement Problem (CPP) in a Software Defined Wide Area Network (SDWAN) with low overall latency. The strategy has been implemented in Python. To measure the effectiveness of the strategy, it has been compared with a traditional K-means code. The result is that the strategy has a similar execution time and a similar overall ...
15:30	3783	Andres Viveros, Hector Kaschel and Pablo Adasme. <i>Optimization of QoS Parameters in Software-Defined Networks</i>
		The ever-increasing needs and heterogeneity of end users in 5G and beyond networks are a real challenge for service operators. As an enabling architecture to achieve these ends, software-defined networking (SDN) separates the data plane from the control plane providing greater flexibility when managing the network. But with the implementation of this architecture, new challenges arise, such as being able to guarantee the service experience, having accepted levels of latency, an alternative to address this problem is to be able to manage multiple controllers in SDN, resulting in the ...
15:50	3825	Andres Viveros, Pablo Adasme and Enrique San Juan Urrutia. <i>Minimizing Latency and Number of Controllers in Software Defined Networking</i>
		In this paper, we propose models of mathematical programming for the placement problem of controllers (CPP) in wireless software-defined networks (SDNs). This problem consists of locating controllers in a wireless network in such a way that each switch node can connect to at least one of the controllers with minimum latency cost. In particular, we minimize the worst latency between switch and controllers and between controllers themselves. In the objective function of our models, we further consider the minimization of the quantity of controllers in the grid. For this purpose, we assume ...
16:10	7401	Cristian Ahumada, Hector Kaschel, Sergio Cordero and Roman Osorio-Companan. <i>Flexible Microstrip Antenna for IoT and 5G Wireless Systems</i>
		The proposed textile antenna is flexible, low-cost, and portable for wireless systems. The textile antenna is useful for various applications, such as 5G, IoT, and WBAN. To meet the portable antenna requirements, properties such as flexibility, cost, and data rate must be taken into account. The article details the design, simulation, and fabrication of a rectangular antenna by using an electromagnetic simulator (CST), as well as analyzing its performance with a flexible substrate. The antenna is designed with a flexible textile substrate material for a frequency of 3.5 GHz. Parameters, ...

ROOM 4 Thursday October 27 Session Chair:		
Session 33 / Track INFORMATICS/COMMUNICATION Paper-IDs: 3283, 8288, 7935, 8237		
Time	ID #	Authors/Title
17:00	3283	Manuel Meléndez Araya, José Gallardo and Nahur J. Meléndez Castillo. <i>Tool for the selection of software development methodologies for small projects and small equipment</i>
		There is no single, universal software development methodology that applies to all cases. However, there is one that is better adapted to each type of project, the particularity of each of them requires a detailed arrangement of the activities, whether they are associated with traditional, agile or hybrid methodologies. Considering that small projects and small teams are the ones that mostly lack a methodological framework to guide them, the article presents a methodological tool that helps the project manager of small groups of developers to visualize which methodology to apply, to better ...
17:20	8288	Marcelo Tobar, Marco Mora Cofre, Fabian Silva-Pavez, Italo Torres and Pedro Barria. <i>Fast Tuning of Extreme Learning Machine Neural Networks based on Simple Optimization Algorithms</i>
		Extreme Learning Machine (ELM) is a neural network training paradigm that is characterized by simplicity, speed and high level of accuracy. The tuning of the network parameters is normally carried out with non-linear optimization algorithms that break this principle of simplicity and reduced execution time. This article shows that ELM network tuning can be performed efficiently by simple optimization algorithms, consistent with its basic philosophy. Experiments with 8 optimization algorithms are shown, considering 6 widely used databases in training algorithm benchmarks. The numerical ...
17:40	7935	Hector Kaschel and Cristian Ahumada. <i>Design of Triband Microstrip antenna for WLAN/WiMAX applications</i>
		Triband antenna is useful for various applications, such as WLAN, WiMAX and WBAN. To meet the requirements of the portable antenna, properties such as flexibility, cost and data rate must be considered. The paper details the design and simulation of a rectangular triband antenna using an electromagnetic simulator (CST), as well as the analysis of its performance with an FR-4 substrate. The antenna is designed with a dielectric constant material of 4.3 substrate for 2.4 GHz, 3.5 GHz and 4.4 GHz frequencies. Parameters such as reflection coefficient, path loss, gain and cost of the ...
18:00	8237	Felipe Maturana, Maria Constanza Estela and Pablo Adasme. <i>Precoder optimization for interference channels with interference alignment</i>
		Interference alignment is a novel technique that aligns interference in each receiver using half of the signal space and leaving the other half for the desired signal, independent of the number of users that share the channel. Most of the research focuses on the channel's capacity, degrees of freedom or throughput. In this paper we work with the error probability. For this purpose, we consider the pairwise error probability using a particle swarm optimization to optimize the precoders of a threeuser interference channel with interference alignment. Simulations show that using this ...

IEEE ICA-ACCA 2022

Technical Sessions. Friday, October 28

ROOM 1

ROOM 1 Friday October 28 Session Chair: SERGIO TOLEDO		
Session 34 / Track POWER ELECTRONICS Paper-IDs: 0404, 1694, 6709, 8918		
Time	ID #	Authors/Title
14:00	0404	Alfredo Renault, Julio Pacher, Leonardo Comparatore, Jorge Esteban Rodas Benitez, Raul Gregor and Marco Rivera. <i>Modulation (SV-PSPWM) in combination with current predictive control applied to three-phase active power filter based on cascaded H-bridge converters.</i>
		In this paper, a modulation proposal is presented in combination with the current predictive control strategy applied to the three-phase Active Power Filter in parallel based on 7-level cascade H-bridge converters, with the aim of compensating the harmonics of the network. electrical. The proposed technique uses the voltage vectors in the vector space based on a system of three voltage levels, in such a way as to extrapolate the same selected vectors for the following voltage levels. The modulation technique combines the advantages of space vector modulation (SVM) and phase shift PWM ...
14:20	1694	Vijayaraja L, Yanusha N, Ganesh Kumar S and Marco Rivera. <i>Performance Evaluation of 13-Level Inverter with Reactive Load</i>
		Multilevel inverters (MLI) are becoming increasingly significant in high-power medium voltage applications. The MLI architecture was developed with the intent of lowering the number of dc voltage sources and the number of switches while increasing the output's level count. Due to its excellent efficiency, low cost, and simplicity of control for outputs with a greater number of levels, MLIs with a reduced switch count are popular. Using asymmetric DC sources, the suggested architecture delivers output voltage of 13-level with four dc voltage sources and 10 switches. To get a better output ...
14:40	6709	Rodrigo Romero, Sergio Toledo, Carlos Romero, David Caballero, Edgar Maqueda, Alfredo Renault, Ever Quiñonez, Sergio Eduardo Núñez Aquino, Raul Gregor and Marco Rivera. <i>Fault-Tolerant Predictive Current Control with Input Reactive Power Minimization in Six-phase Generation System Driven by a Multi-Modular Matrix Converter</i>
		Multiphase generation systems are emerging as a promising technology for power generation under the distributed generation framework. These systems employ converters that present high levels of reactive power at the input, due to the switching of power switches, thus increasing losses. In this work, a strategy based on model-based predictive control using a weighted cost function is proposed to achieve the desired current and mitigate the reactive power at the input. The proposal shows a 55.72% and 29.10% reduction of THD on the generator side, without fault and when the system presents ...
15:00	8918	Sergio Núñez, Sergio Toledo, Magno Ayala, Rodrigo Romero, Ever Quiñonez, Carlos Romero, Julio Pacher, Alfredo Renault, Raúl Gregor and Marco Rivera. <i>Fault-tolerant coupled predictive current control applied to multi-modular DC-AC converter</i>
		This paper presents the implementation of a multi-modular DC-AC converter with fault-tolerant coupled predictive current control. The proposed approach is suitable for applications that require high power transfer with lower size and volume, and it also offers more availability due to the fault-tolerant capacity. Simulation results are presented to validate the proposed control scheme.

ROOM 1 Friday October 28 Session Chair: SERGIO TOLEDO		
Session 35 / Track POWER ELECTRONICS Paper-IDs: 8942, 9039, 9704		
Time	ID #	Authors/Title
15:50	8942	Juan Escarate, Reinier Lopez, Angel Cedeño, Cesar Silva, Juan C. Aguero and Gonzalo Carvajal. <i>FPGA Implementation of ADMM for Model Predictive Control in a DC/AC Converter</i>
		This work reports the design and evaluation of an implicit Model Predictive Control (MPC) scheme tailored for regulating the output voltage of Distributed Energy Resources (DERs) implemented on a Field Programmable Gate Array (FPGA). Traditionally, the perceived complexity of the design and development stages for implementing optimization algorithms in hardware has precluded the use of implicit formulations of MPC schemes for the control of DERs. In this work, we show that the use of modern High-Level Synthesis (HLS) paradigms facilitate the development and evaluation of cost-effective MPC ...
16:10	9039	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. <i>Space Vector Modulation applied to a Multi-Modular Matrix Converter for Current Control in Six-phase Generation Systems</i>
		Multiphase generators allow redundant conversion topologies to be applied by organizing sources into three-phase groups, this document presents a way to take advantage of this feature in conjunction with 3x3 matrix converters and SVM modulation, which allows not only control of the output signal, it also allows control of the input current phase. For this, a current PI control is applied. System performance is verified by reference tracking and THD with satisfactory transients for amplitude and frequency step in current applied to load.
16:30	9704	Álvaro Garay and Marco Fernández. <i>Primary Control with Virtual Impedance for a Highly Resistive Autonomous Microgrid</i>
		Microgrids are an important topic in the energy systems of the future. One of the goals of the energy systems is the decentralization, to decarbonize, and democratize. The investigation in this topic has gone too far in many aspects, but there still things the research doesn't count. For example, the differences in grid profile in different countries, in terms of frequency and voltage of the utility grid. Other issues is that most of the research its done in English, leaving behind a group of learners that wants to enter in the topics of microgrids.

ROOM 2

ROOM 2 Friday October 28 Session Chair:		
Session 36 / Track CONTROL II Paper-IDs: 2716, 2949, 3551, 6273		
Time	ID #	Authors/Title
14:00	2716	César Sandoval, Pablo Adasme and Claudio Urrea. <i>Design, simulation and comparison of control strategies for the optimal positioning of mobile Wireless Sensor Networks</i>
		With the development of the Wireless Sensor Network, positioning has taken on a relevant role, either because of the low costs of the technology or because of the ease of implementation. As far as we know, the application of positioning control strategies has not been deeply developed. The present investigation compares three control strategies applied in the positioning of a sensor node, by means of spherical trilateration. First, the analysis scenario was established, the PD controller was used as a comparative base and then a Fuzzy PD controller, Kalman Filter and a Neural Network were ...
14:20	2949	Angel L. Cedeño, Reinier López Ahuar, Manuel Olivares, César Silva and Juan Agüero. <i>Partial Feedback Linearization and Reference Signal Tracking Control for Ball-and-Plate System</i>
		In this paper, we address the problem of controlling the Ball-and-Plate system using a hybrid control approach. A double-feedback-loop structure is applied, which consists of two control loops. For the inner control loop, a partial feedback linearization technique for the nonlinear plate dynamics is used with a Proportional-Derivative controller. For the outer control loop, a Taylor-based linearization for the nonlinear ball dynamics is considered. For this external loop, which includes both the nonlinear plate and ball dynamics, we design a two-degree of freedom Reference Signal Tracking ...
14:40	3551	Angel L. Cedeño, Rodrigo Carvajal and Juan Agüero. <i>A Gaussian Sum Smoothing algorithm for Hammerstein-Wiener State-Space Systems</i>
		In this paper, we develop a novel Bayesian smoothing method for obtaining the smoothed probability density functions of Hammerstein-Wiener state-space systems and the corresponding state estimation. The proposed smoother is designed using the two-filter approach, based on the Gaussian sum filtering algorithm and a backward filtering method. In this work, this backward filter is obtained using an approximation of the probability function of the non-linear output conditioned to the system state. Both the forward filter and the backward filter are used to obtain the Gaussian sum smoothing ...
15:00	6273	Kelyn Botina, Juan Gonzalo Álvarez and Edinson Cortes. <i>PI and PID Controller Tuning with Deep Reinforcement Learning</i>
		In this work, two controllers, a PI and a PID, are tuned through the twin delayed deep deterministic policy gradient or TD3 algorithm, a reinforcement learning technique that can be applied to systems with continuous action states. For configuring the training environments, two mathematical models are identified, one for a temperature loop and the other for a flow loop, obtaining a first-order model and a FOPDT model, respectively. Furthermore, classical tuning methods are used as a reference to evaluate the performance of controllers tuned by means of an RL agent. The results show that, the ...

ROOM 2 Friday October 28 Session Chair:		
Session 37 / Track CONTROL II Paper-IDs: 7752, 9346, 9909		
Time	ID #	Authors/Title
15:50	7752	Nicola Di Teodoro, Diego Ochoa-Toeachi, Hanna Aboukheir and Oscar Camacho. <i>Sliding-Mode Controller Based on Fractional Order Calculus for Chemical Processes</i>
		This study uses a fractional FOPDT model of the actual process to create a fractional sliding mode controller. Nonlinear chemical processes may be studied using the new methodology. The real chemical systems are described and represented by the controller design using the power of fractional order calculus as a reduced order model. From this model, the controller is developed using the sliding mode control process. An SMC based on FOPDT and the new method are compared using a higher order plus deadtime model. Lastly, some performance indicators are used to evaluate performance and ...
16:10	9346	Carlos Calderon Cordova and Roger Sarango. <i>Realization and comparative analysis of Fractional Order Controllers for different discretization methods</i>
		This article presents some methodologies for the realization of fractional order controllers. Three methodologies are developed to obtain the integer approximations and each integer transfer function is discretized with three methods (Tustin, Backward, FOH), in the same way, three direct discretization methods were used (PSE, CFE/Al-Alaoui, CFE/ Tustin) for the integrator and differentiator of a FOPID controller. To show the usefulness of the integer approximation and discretization of the proposed schemes, simulations of a closed-loop DC motor speed control system are performed with the ...
16:30	9909	Eduardo A. Elgueta and Juan I. Yuz. <i>Robust Control of Continuous-time Systems with Pole Uncertainties</i>
		Modeling errors are always present when dealing with control strategies for continuous-time systems. In this paper, we propose a high-bandwidth robust control law for continuous-time systems with pole uncertainties. The strategy relies on the system relative degree and high-frequency gain leading to plant model given by a multiple integrator. Then the control design is parameterized in terms of the closed-loop bandwidth. The second order case is studied analytically developing a lower bound for the bandwidth closed-loop and then the application to a third order system is shown for a real ...

IEEE ICA-ACCA 2022
Technical Sessions. Friday, October 28
ROOM 3

ROOM 3 Friday October 28 Session Chair:		
Session 38/Track SEP Paper-IDs: 0236, 1635, 2034, 4181		
Time	ID #	Authors/Title
14:00	0236	Felix Fernandez, Francisco Barreto, Jazmin Sanabria and Eduardo Origoza. <i>Multi-criteria decision making for prioritization of Distribution System alternatives in 23 kV</i>
		The Paraguayan electricity system in recent years has experienced a marked acceleration in the growth of demand, attributing it to industries, commerce and, above all, to population growth. In this sense, the Paraguayan electricity company ANDE has a program of works for the Generation, Transmission and Distribution of electricity, described in the ANDE Master Investment Plan, required by the National Interconnected System (SIN), which are necessary to meet the current requirements of electrical energy and the vegetative growth of the country. Particularly, for the Distribution system, new ...
14:20	1635	Renato Andrade Mosqueira Furtado and Ivo Silva Junior. <i>Static Planning of the Expansion of Electrical Energy Transmission Systems Using Intelligent Algorithms</i>
		This article aims to explain the application of a recent intelligent technique (2021) that is supported by the four basic operations of mathematics (addition, subtraction, multiplication, division) whose name is Arithmetic Optimization Algorithm (AOA). When talking about power systems, this algorithm wasn't used so much what motivates its application. So, the recent method is used, in this work, in order to solve the static planning of the expansion of electric power transmission systems, which is a complex issue, since it is a problem of Mixed Integer Linear Programming (MILP), presents ...
14:40	2034	Edgar Maqueda, Sergio Toledo, David Caballero, Magno Ayala, Ever Quiñonez, Rodrigo Romero, Raul Gregor and Marco Rivera. <i>Speed Control of a Six-Phase IM with Reactive Power Minimization for a Multi-Modular Matrix Converter Using an Inner PTC</i>
		This paper presents the speed control of a six-phase induction machine (SPIM) fed by a multi-modular matrix converter (M-MMC) with input source reactive power minimization, using predictive torque and electromagnetic flux control (PTC). This new system inherits the advantages of both multiphase machines (i.e fault tolerance and better power distribution per phase compared to three-phase machines) and those of M-MMC (i.e smaller size and weight, and no bulky storage elements). In addition, with the M-MMC topology it is possible to use two power generation sources of different characteristics ...
15:00	4181	Kidmo Kaoga Dieudonné, Mohit Bajaj, Kitmo Bahn, Olena Rubanenko, Francisco Jurado and Salah Kamel. <i>Hydropower Potential Assessment of Four Selected Sites in the North Interconnected Network Zone of Cameroon</i>
		Hydropower potential that could trigger economic growth and develop the energy sector in general and that of the electricity in particular, if properly harnessed. This potential is a prerequisite to the implementation of energy-intensive projects, as outlined in the upcoming master plan of renewable energy development in Cameroon. This study revisits hydropower potential of four selected sites in the northern regions of Cameroon, by assessing available data for the development of hydropower. Furthermore, this paper highlights hydrologic data, prospective useful hydropower plants sizing parameters as well as energy production and investment costs

ROOM 3 Friday October 28 Session Chair:		
Session 39 / Track SEP Paper-IDs: 6563, 7778, 8420		
Time	ID #	Authors/Title
15:50	6563	Pablo Parra, Ervin Solano and David Gomezcoello. <i>Reliability of Electrical Service in Medium Voltage Aerial Distribution Networks, Applying an Automatic Restoration Scheme Through Reclosers (Loop Automation)</i>
		This article describes the technical proposal for a loop automation scheme, with distributed intelligence, between two medium voltage three-phase distribution networks 13.8kV, which serve a part of the cantons Daule and Samborondón of the Corporación Nacional de Electricidad Unidad de Negocio Guayas Los Ríos, CNEL EP GLR; in order to improve the reliability of the electrical service, isolating faults efficiently and reducing interruption times, through the installation of automatic reclosers at specific points of each feeder (Feeder, Mid-Point, Tie-Point), without affecting the ...
16:10	7778	Ali Selim, Salah Kamel, Mohamed Abdelkader and Francisco Jurado. <i>Optimal Placement of PMUs Using Henry Gas Solubility Optimization for State Estimation of Power System</i>
		All power system sectors, such as protection, wide-area monitoring, and network control, necessitate the use of smart tools such as phasor measurement units (PMUs), which provide full observability while also minimizing state estimate errors for the main network. Because the allocation of PMU is regarded as an optimization problem (OPP), observing all buses with the least number of units while taking into account System topology and zero injection buses (ZIBs) is a significant difficulty. Therefore, this paper presents a state estimation depending on utilizing the optimal placement of PMU. ...
16:30	8420	Mateus Lima, Ranielli Pombo, João Passos and Othon Ávila. <i>Impact of ancillary services in the steady-state security region in distribution systems</i>
		This paper investigates the change in the Steady-State Security Region (SSR) of distribution systems when subjected to voltage regulation by distributed generation (DG) sources. Thus, a simulation was performed using the IEEE 13 bus system, and its safety region was constructed regarding different considerations. Initially, the region was created considering that all distributed energy resources (DER) in the network operate with a unitary power factor, and therefore, without reactive power contribution for voltage regulation of the grid. In the following, it was considered that part of the ...

IEEE ICA-ACCA 2022

For the development of sustainable Agricultural Systems

KEYNOTE SPEAKERS

Invited		Talk	Speaker	Institution	Face-to-Face and Online Broadcast Transmission GMT-3	Online Broadcast on Demand
Keynote Speaker	1	<i>Adaptive Control.</i>	Dr. Manuel Duarte	Universidad Central, Chile	Keynote Speaker	1
Keynote Speaker	2	<i>Vertical farming: trends and challenges.</i>	Dra. Gilda Carrasco	Universidad de Talca, Chile	Keynote Speaker	2
Keynote Speaker	3	<i>Remote sensing tools for monitoring water requirements and water stress in vineyards and fruit trees.</i>	Dr. Samuel Ortega-Farias	Universidad de Talca - CITRA, Chile	Keynote Speaker	3
Keynote Speaker	4	<i>Achievements and Opportunities of Unmanned Aerial Vehicles in Precision Agriculture.</i>	Dr. Alfonso F. Torres-Rua	Utah State University, USA	Keynote Speaker	4
Keynote Speaker	5	<i>Mapping Evapotranspiration and Crop Stress with Unmanned Aerial Vehicles: cost-effective approach.</i>	Dr. Héctor Nieto	Institute of Agricultural Sciences, Spain	Keynote Speaker	5
Keynote Speaker	6	<i>Advances in Soft Computing and Applications</i>	Dra. Valentina Balas	Aurel Vlaicu University of Arad, Romania	Keynote Speaker	6
Keynote Speaker	7	<i>AI enable decision support systems: an effective and efficient</i>	Dr. Janusz Kacprzyk	Polish Academy of Sciences	Keynote Speaker	7
Keynote Speaker	8	<i>Control design for cyber-physical systems</i>	Dr. Márcio J. Lacerda	Fed. University of São João del-Rei, Brazil.	Keynote Speaker	8
Keynote Speaker	9	<i>Introduction to Extreme Learning Neural Networks</i>	Dr. Marco Antonio Mora C.	Universidad Católica del Maule, Chile	Keynote Speaker	9
Keynote Speaker	10	<i>Current Trends in Multi-Objective Search in Artificial Intelligence</i>	Dr. Carlos Hernández	Universidad San Sebastian (USS), Chile	Keynote Speaker	10
Keynote Speaker	11	<i>The top-down approach in systems engineering and education</i>	Dr. Marius Balas	Aurel Vlaicu University of Arad, Romania	Keynote Speaker	11

KEYNOTE SPEAKER 1

Honorary President of IEEE ICA ACCA2022

Adaptive Systems



Dr. Manuel Duarte, Ph.D.

ABSTRACT

The concept of Adaptive Systems can be traced back to the early fifties and they can be understood as systems with partially known characteristics. All natural and artificial dynamical systems exhibit, up to some extent, certain degree of unknown behavior expressed in terms of parameters uncertainty, external or internal perturbations and time varying properties. On the other hand, having all the necessary knowledge on a system for analysis, design, and control purposes is quite unusual. All natural and artificial systems present some kind of unknown behavior whose effects on the system could cause abnormal behaviors or even its destruction.

In this talk we summarize the main techniques developed along the time for analysis, identification and control of adaptive systems, presenting the most important results developed by the control community and our contributions to the field. Beside we present some interesting applications in the engineering field where these techniques have been applied. The talk starts with the case of simple linear dynamical systems of integer order up to the most recent results obtained which involve concept of fractional order and nonlinear dynamical systems.

BIOSKETCH

Manuel A. Duarte-Mermoud has obtained title of Civil Electrical Engineer at University of Chile (1977), M.Sc. in Electrical Engineering, December 7, 1985, Yale University, New Haven, Connecticut, USA (1985), M.Phil. in Electrical Engineering, December 8, 1986, Yale University, New Haven, Connecticut, USA (1986), Ph.D. in Electrical Engineering, December 3, 1988, Yale University, New Haven, Connecticut, USA (1988). He was Full Professor at Department of Electrical Engineering, University of Chile, until 2019. Research, teaching and industrial applications on automation and control. Full Professor: department of Electrical Engineering, Universidad Tecnológica Metropolitana, March 2019 – Dec. 2019. Research, teaching and industrial applications on automation and control. Full Professor and Director of Research and Graduate Studies Institute: Facultad de Ingeniería y Arquitectura, Universidad Central de Chile, March 2021 – at Present. Research, Teaching and Administration of Research and Graduate studies at the Facultad de Ingeniería y Arquitectura. His papers in journals WoS (ISI) and their citations updated to September 27, 2020, are as follows: 93 papers WoS (ISI) with 1.577 cites in total; 16.7 average cites/paper and 56.32 average cites/year; H-Index=17. The seven most cited papers have 515; 278; 66; 58; 47; 46 and 44 cites, respectively. In Research gate it possesses in total 2,079 cites and 13,667 lectures. Finally, in Google Scholar his papers have 2,733 cites and it has an H-index of 21. He has had several international and Chilean research projects. He has been President of IEEE Chile Section, President of Asociación Chilena de Control Automático y CChair and organizers the several conferences in Chile. His interest is on Adaptive Systems (Linear/Nonlinear; Ideal/Robust; Integer Order/Fractional Order), System Identification and Parameter Estimation, Control and Systems Theory, Control Applications to Mining and Chemical Processes, Electric Power Systems, Electrical Machines and Drives, Medical Devices, Technology for Automation. Honorary President of IEEE ICA ACCA2022

IEEE ICA-ACCA 2022

KEYNOTE SPEAKER 2

Vertical Farming: Trends and Challenges



Dra. Gilda Carrasco, Ph.D.

ABSTRACT

Traditionally, vegetables are mostly grown outdoors in areas suitable for certain species and on a seasonal basis, which has resulted in the transport of large volumes of vegetable products to urban centers, and therefore with a high carbon footprint.

Protected horticulture is another way to cultivate horticultural crops, especially using greenhouses, with and without soil. The soilless culture technologies, hydroponics, or substrates cultivation have facilitated the vegetables growth with high commercial value. Also, this has been adopted in areas where the climate is benign, and a very efficient use of water is required. In recent years, the recurrent inclement weather, and the scarcity of water due to climate change have given rise to other green technologies, such as vertical farms, which combine the use of soilless cultivation with digital agriculture with the aim of cultivating horticultural species independently of the external climate. For this, vertical farms have been built using abandoned warehouses, recycled shipping containers or even skyscrapers with a high investment cost. However, having trained operators, technicians, and professionals both in the cultivation and management of plants and in the use and control of sensors, automation and other key aspects of digital agriculture constitutes one of the great challenges we face to achieve sustainable development and production.

BIOSKETCH

Agricultural Engineer (Pontificia Universidad Católica de Chile), Ph.D. (Wye College, University of London, United Kingdom). She is associate professor (Universidad de Talca, Chile). Her main research areas are food safety in vegetables crops, soilless culture, and vertical farms. She carried out different research projects with national and international funds in urban and suburban horticulture (north and center of Chile) with more than 40 articles, 6 books. Prof. Carrasco has lectured different classes related to vegetable production, protected horticulture and soilless cultivation, and has trained over 40 undergraduate and graduate students in sustainable techniques to grow vegetables and soilless cultivation technologies. She has been invited as a guest editor in *Frontiers in Plant Science and Horticulturae* in the areas of vertical farming and soilless culture. She has been distinguished as a corresponding member of the Chilean Academy of Agricultural Sciences. Also, she has also been Pro-Rector, Vice-Rector for Academic Affairs, General Secretary and Dean of the Faculty of Agronomic Sciences, Universidad de Talca. She is currently the director of a national project on vertical agriculture as an alternative for the development of a sustainable agricultural system.

KEYNOTE SPEAKER 3

Remote Sensing Tools for Monitoring Water Requirements and Water Stress in Vineyards and Fruit Trees



Dr. Samuel Ortega-Farías, Ph.D.

ABSTRACT

The main agricultural areas of Chile will face a significant reduction of rainfall (between 20-40%) due to global climate change. Also, Chile is periodically affected by the climatic phenomenon of "La Niña" (ENSO), which has produced important droughts and economic losses in most of the agricultural areas. Under these conditions, sophisticated irrigation water management will be required to optimize water productivity (kg m^{-3}) and to maintain sufficient levels of yield and quality of wine and fruits. In this regard, the objective of this paper is to describe remote sensing tools for monitoring water requirements (or evapotranspiration, ET) and plant water stress in vineyards and fruit orchards. The description includes the evaluation of METRIC (mapping evapotranspiration at high resolution with internalized calibration) model to generate maps with the spatial distribution of crop coefficients (Kc) and ET of vineyards and fruit orchards using satellite images. In this case, validation indicated that METRIC was able to estimate ET and Kc with errors of 9 and 10%, respectively. Also, the presentation includes the validation of a remote sensing energy balance (RSEB) algorithm for estimating vine ET using multispectral and thermal sensors placed aboard an Unmanned Aerial Vehicle (UAV). Results indicated that RSEB algorithm overestimated ET by about 13%, with a root mean squared error (RMSE) and mean absolute error (MAE) of 0.43 and 0.29 mm d^{-1} . Finally, the presentation will describe a preliminary study about the estimation of vine and fruit tree water status using spectral indices obtained from a six-band multispectral camera placed aboard a UAV. This technology is a suitable decision-making tool for digital agriculture.

BIOSKETCH

Dr. Samuel Ortega-Farías obtained a Bachelor's degree in Agronomy Science (viticulture and enology) at the Catholic University (Chile). He obtained both Master and Ph.D. degrees from Oregon State University (USA) with a major area in bio-mathematical modeling and soil-water-plant-atmosphere relationship. He is currently working as a professor at the Agronomy School, Faculty of Agricultural Sciences, University of Talca (Chile). Furthermore, he is the Director of the Research and Extension Center for Irrigation and agroclimatology (CITRA). His research has focused on regulated deficit irrigation, sustainable water management, and mapping evapotranspiration and plant water status using remote sensing imagery obtained from unmanned aerial vehicles (UAV) and satellite remote sensing platforms. Finally, Dr. Ortega-Farías is the Editor-in-Chief of the Journal *Irrigation Science* (Springer Nature).

IEEE ICA-ACCA 2022

KEYNOTE SPEAKER 4

Achievements and Opportunities of Unmanned Aerial Vehicles in Precision Agriculture



Dr. Alfonso Torres-Rua, Ph.D.

ABSTRACT

Increasing challenges in water supply access and reliability, as well as the need for improved productivity per land unit, is encouraging the development of technologies such as Unmanned Aerial Vehicles (UAVs), as a means to capture detailed information on vegetation conditions within and across farms to inform management decisions. UAVs have been available for more than a decade and past and ongoing research is showing a wide range of applications where this technology is proving of great value. This is especially true in the areas of consumptive water use and stress, where UAVs have shown significant advances and accuracy. Nevertheless, UAVs are seldom used in commercial agriculture due to challenges towards the "last mile problem" or the seamless integration of UAV products into farming activities. This presentation will provide a summary of the UAV research being conducted by the Utah State University groups: The Agrícola Research Team and the AggieAir UAV Program, in conjunction with different United States' federal and states water agencies to advance the use of UAVs in water management in agriculture, as well as discuss the detected roadblocks limiting wider use of UAVs that need to be addressed as regulation, technology, and science evolve in the next years.

BIOSKETCH

Doctor in Philosophy Civil and Environmental Engineering Utah State University, 2011.

Master of Science Biological and Irrigation Engineering Utah State University, 2006.

Bachelor of Science Agricultural Engineering La Molina National Agrarian University, 2000.

Expertise: My research and teaching focus on water management from a spatial perspective. Therefore, my efforts are in remote sensing technology, applications, and solutions for natural, urban, and agricultural environments. For technology, using ground, unmanned aerial vehicles, and satellites to understand water-related processes. In applications, understanding and accurate estimation of water balance components and abiotic stressors influence. Lastly, physical, data-driven, and hybrid solutions are needed due to weather and climate, crops, and soil human management variability and interactions.

IEEE ICA-ACCA 2022

KEYNOTE SPEAKER 5

Mapping Evapotranspiration and Crop Stress with Unmanned Aerial Vehicles: A Cost-effective Approach



Dr. Héctor Nieto, Ph.D.

ABSTRACT

The growing population is facing crucial challenges for ensuring current and future food production, which is exacerbated by the current scenario of climate change, with overall higher temperatures and more extreme drought and flood events. Agriculture is the most water demanding sector, with ca. 70% of total freshwater consumption worldwide, as it requires ensuring population food's security. For that reason, as part of UNESCO's Sustainable Development Goals, increasing water use efficiency is targeted. The use of Unmanned Aerial Vehicles (UAVs) for evapotranspiration (ET) and crop stress monitoring is one of the most promising digital tools in agriculture. Indeed UAVs can carry, in a cost-effective manner, remote sensing sensors and cameras that can provide the required inputs for spatially detailed evaluation of crop water status at field scale.

The thermal infrared based Two Source Energy Balance (TSEB) model has proven to be a robust modelling framework for monitoring ET that can be applied to a wide variety of climates, crop types and remote sensing platforms. In particular, we present here how TSEB was adapted for row crops and agroforestry systems, in which their uneven canopy distribution forces a very distinct radiation partitioning and turbulent exchange between soil, canopy and the atmosphere. In the case of UAV-based applications, specific costs due to purchase, maintenance, operation and post-processing could limit their feasibility and profitability, particularly for small-scale farmers or in crops with low marginal benefits. To reduce these constraints, we also evaluated and developed low-cost and automatic solutions for image capture and postprocessing, including the use of open-source image mosaicking and coregistration.

The thermal infrared based Two Source Energy Balance (TSEB) model has proven to be a robust modelling framework for monitoring ET that can be applied to a wide variety of climates, crop types and remote sensing platforms. In particular, we present here how TSEB was adapted for row crops and agroforestry systems, in which their uneven canopy distribution forces a very distinct radiation partitioning and turbulent exchange between soil, canopy and the atmosphere. In the case of UAV-based applications, specific costs due to purchase, maintenance, operation and post-processing could limit their feasibility and profitability, particularly for small-scale farmers or in crops with low marginal benefits. To reduce these constraints, we also evaluated and developed low-cost and automatic solutions for image capture and postprocessing, including the use of open-source image mosaicking and coregistration.

BIOSKETCH

Héctor Nieto is Tenured Scientist at CSIC's Institute of Agricultural Sciences (ICA-CSIC) since December 2021. Before then he has held several positions working in both public research/academic institutions (University of Alcalá, University of Copenhagen, IRTA, and the Agricultural Research Service) and the private sector (COMPLUTIG SL). His research has been focused in developing new knowledge in evapotranspiration modelling, focused on remote sensing applications at different scales from proximal sensing to airborne and satellite platforms. He has also been WP leader in international projects, such as ET4FAO and SENET both funded by the European Space Agency and lead by DHI, to evaluate Copernicus data for near-real time monitoring of evapotranspiration and water use at different spatial and temporal scales. These two projects have resulted in a freely open source tool for producing ET maps with Sentinel images (<https://www.esa-sen4et.org/news6>) and demonstrated to FAO the utility of Copernicus data for water accounting (<https://et4fao.dhigroup.com/#/>). His H-index is 25 with more than 70 publications registered in Scopus from which he has more than 1800 citations. Besides the dissemination to the scientific community he also shares his models/algorithms in public open-source repositories at (<https://github.com/hectornieto>). Finally he has been co-supervisor of 4 graduated PhD students and is currently co-supervising another PhD student. He participated as well in high-education teaching, at either BSc, MSc and PhD levels, and capacity building activities, for which he distributes teaching material using the latest technologies that combine open source repositories, interactive notebooks and containerized software (<https://mybinder.org/v2/gh/hectornieto/curso-WUE/HEAD>).

IEEE ICA-ACCA 2022

KEYNOTE SPEAKER 6

Advances in Soft Computing and Applications



Dra. Valentina Emilia Balas, Ph.D.

ABSTRACT

The presentation is focusing on soft computing methodology used in designing of complex systems. Nowadays, computers are doing many tasks on two-digit numbers which seeks precision, certainty, and rigor by following conventional rules. But there are tasks which require natural intelligence, that are best handled by human brains. While conventional computers are suitable for handling task sequentially, other tasks that required natural intelligence, past experience, self-improvements, probabilistic reasoning is best handled using parallel processing. Researchers are working to mimic human brains, so in the realm of artificial intelligence emerged the field of Soft Computing. This topic was introduced by Professor Lotfi Zadeh who showed that computation, reasoning, decision making should exploit the tolerance for imprecision and uncertainty and said that soft computing techniques uses the human brain as a role model. Professor Zadeh is a legend in fuzzy logic, known as a root of Artificial intelligence. Soft computing represents a collection of methodologies like fuzzy logic, neural networks, genetic algorithms, which exploit the tolerance for imprecision and uncertainty to achieve robustness and low-cost solutions. Fuzzy logic and expert systems are considered good approaches to solve control problems in many applications. We introduced methodologies and some applications in the case of different complex systems, where we provided elements of deterministic knowledge about the processes and assisted the design with simulations. We will also introduce some recent regulations on Artificial intelligence.

Biosketch

Valentina E. Balas is currently Full Professor in the Department of Automatics and Applied Software at the Faculty of Engineering, "Aurel Vlaicu" University of Arad, Romania. She holds a Ph.D. Cum Laude, in Applied Electronics and Telecommunications from Polytechnic University of Timisoara. Dr. Balas is author of more than 400 research papers in refereed journals and International Conferences. Her research interests are in Intelligent Systems, Fuzzy Control, Soft Computing, Smart Sensors, Information Fusion, Modeling and Simulation. She is the Editor-in Chief to *International Journal of Advanced Intelligence Paradigms (IJAIIP)* and to *International Journal of Computational Systems Engineering (IJCSysE)*, member in Editorial Board member of several national and international journals and is evaluator expert for national, international projects and PhD Thesis. Dr. Balas is the director of Intelligent Systems Research Centre in Aurel Vlaicu University of Arad and Director of the Department of International Relations, Programs and Projects in the same university. She served as General Chair of the International Workshop Soft Computing and Applications (SOFA) in nine editions organized in the interval 2005-2020 and held in Romania and Hungary. Dr. Balas participated in many international conferences as Organizer, Honorary Chair, Session Chair, member in Steering, Advisory or International Program Committees and Keynote Speaker. Recently she was working in a national project with EU funding support: BioCell-NanoART = Novel Bio-inspired Cellular Nano-Architectures - For Digital Integrated Circuits, 3M Euro from National Authority for Scientific Research and Innovation. She is a member of European Society for Fuzzy Logic and Technology (EUSFLAT), member of Society for Industrial and Applied Mathematics (SIAM) and a Senior Member IEEE, member in Technical Committee - Fuzzy Systems (IEEE Computational Intelligence Society), chair of the Task Force 14 in Technical Committee - Emergent Technologies (IEEE CIS), member in Technical Committee - Soft Computing (IEEE SMCS). From 2021 she is member of IEEE European Public Policy Committee Working Group on ICT. Dr. Balas was past Vice-president (responsible with Awards) of IFSA - International Fuzzy Systems Association Council (2013-2015), is a Joint Secretary of the Governing Council of Forum for Interdisciplinary Mathematics (FIM), - A Multidisciplinary Academic Body, India and recipient of the "Tudor Tanasescu" Prize from the Romanian Academy for contributions in the field of soft computing methods (2019).

IEEE ICA-ACCA 2022

KEYNOTE SPEAKER 7

AI-enabled Decision Aid for Solving Complex problems in a Judge-advisor Setting



Dr. Janusz Kacprzyk, Ph.D.

ABSTRACT

Decision making, the most common and frequent human activity, tends to proceed in more and more complex problem settings and environments, with many stakeholders, much uncertain, imprecise and missing information, a high changeability of characteristics and parameters, multiple criteria, goals or aspects, etc. Moreover, in virtually all non-trivial systems a crucial role is played by the human being in the decision process.

In many, of not most cases of complex problems an effective and efficient approach is to assume the decision making to proceed in a setting in which there is a domain expert, the so-called judge, who has a deep expertise in his domain, e.g., city transportation, but not in the solution tools, e.g. optimization, and an additional expert, the so-called advisor, who has a deep expertise in the solution methods but not necessarily in the domain. Then, the so-called judge-advisor paradigm can be applied as shown in the presentation with an analysis of advice giving, taking, and rejecting. These processes can be amplified by a wide use of AI tools and technique leading to the co-called AI-enabled approaches.

The above issues will be considered, mainly from the point of view of decision aid but with some remarks on decision support and recommendation. Some examples will be mentioned.

BIOSKETCH

Janusz Kacprzyk is Professor of Computer Science at the Systems Research Institute, Polish Academy of Sciences, WIT - Warsaw School of Information Technology, and Chongqing Three Gorges University, Wanzhou, Chongqing, China, and Professor of Automatic Control at PIAP - Industrial Institute of Automation and Measurements in Warsaw, Poland. He is Honorary Foreign Professor at the Department of Mathematics, Yli Normal University, Xinjiang, China. He is Full Member of the Polish Academy of Sciences, Member of Academia Europaea, European Academy of Sciences and Arts, European Academy of Sciences, Foreign Member of the: Bulgarian Academy of Sciences, Spanish Royal Academy of Economic and Financial Sciences (RACEF), Finnish Society of Sciences and Letters, Flemish Royal Academy of Belgium of Sciences and the Arts (KVAB), National Academy of Sciences of Ukraine and Lithuanian Academy of Sciences. He was awarded with 6 honorary doctorates. He is Fellow of IEEE, IET, IFSA, EurAI, IFIP, AAIA, I2CICC, and SMIA.

His main research interests include the use of modern computation computational and artificial intelligence tools, notably fuzzy logic, in systems science, decision making, optimization, control, data analysis and data mining, with applications in mobile robotics, systems modeling, ICT etc.

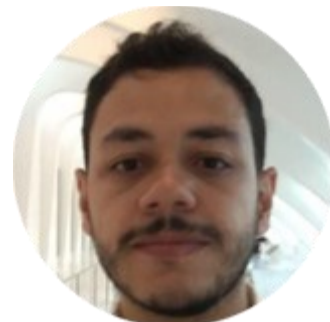
He authored 7 books, (co)edited more than 150 volumes, (co)authored more than 650 papers, including ca. 150 in journals indexed by the WoS. He is listed in 2020 and 2021 "World's 2% Top Scientists" by Stanford University, Elsevier (Scopus) and ScieTech Strategies and published in PLOS Biology Journal.

He is the editor in chief of 8 book series at Springer, and of 2 journals, and is on the editorial boards of ca. 40 journals. He is President of the Polish Operational and Systems Research Society and Past President of International Fuzzy Systems Association.

IEEE ICA-ACCA 2022

KEYNOTE SPEAKER 8

Control Design for Cyber-physical Systems Under Attacks



Dr. Márcio J. Lacerda, Ph.D.

ABSTRACT

With the advance of computation and communication systems, the control design for dynamic systems has become even more challenging. In this context, the class of cyber-physical systems (CPS) has emerged. In a CPS, devices communicate with each other and the physical world through sensors and actuators, allowing the integration of computation with physical processes. Security and privacy are key factors that must be taken into consideration in the design, development, and operation of CPS. The existence of malicious agents that intend to degrade the system's performance through cyber attacks is a reality in this scenario. The denial of service (DoS) attack is one of the most common and easy to implement. It consists of launching a large amount of information in the communication channels to block the ability of the systems to send and receive data, essential for the correct operation of the CPS. This talk will discuss the main security issues in CPS systems, with particular attention to DoS attacks. Linear Matrix Inequalities will be employed to present the design conditions for CPS in the presence of cyber-attacks. At the end of this talk, we will discuss some perspectives for future research on this topic.

BIOSKETCH

Márcio J. Lacerda received his Ph.D. in Electrical Engineering from the University of Campinas, UNICAMP, Brazil, in 2014. He has held postdoctoral research positions at UNICAMP, and at the Aerospace Engineering and Mechanics Department, University of Minnesota, Minneapolis, USA. From October 2012 to April 2013 he was a visitor in the Laboratoire d'Analyse et d'Architecture des Systèmes, Toulouse, France. Currently, he is a professor in the Department of Electrical Engineering, Federal University of São João del-Rei, UFSJ, Brazil, which he joined in 2016. He is an IEEE senior member and an IEEE Control Systems Society member. He serves as an Associate Editor for IEEE Latin America Transactions and Mathematical Problems in Engineering. He also served as a Guest Editor for the Journal of the Franklin Institute, Special Issue on "High Fidelity LPV systems under constraints". His main research interests include constrained control, switched systems, and cyber-physical systems.

IEEE ICA-ACCA 2022

KEYNOTE SPEAKER 9

Fruit-Scan: System to Automatically Detect Raspberry Quality Using Computer Vision Techniques



Dr. MARCO MORA, Ph.D.

ABSTRACT

Chile ranks tenth among the countries that export raspberries. In the Maule Region there are approximately 1,200 families who obtain their economic livelihood based on raspberry production. Raspberry exporting companies carry out quality control of the fruit through a human expert. The quality test consists of visually analyzing a small sample of fruit and determining the percentages of healthy fruit and fruit with defects. This talk presents the results of the Fruit-Scan project: System to automatically detect raspberry quality using computer vision techniques. The developed technology uses convolutional neural networks to analyze images of raspberry trays and count healthy and defective raspberries. The research was financed by the Innovation Fund for Competitiveness FIC of the Regional Government of Maule through the Transfer Project for the Development of the Raspberry Quality Estimation Equipment code 40.001.110-0.

BIOSKETCH

Marco Mora received the B.S. degree in Electronics Engineering and the M.S. degree in Electrical Engineering from Department of Electrical Engineering, Universidad de Concepción, Concepción, Chile, in 1998 and 2004, respectively; and the Ph.D in Computer Science from Polytechnical National Institute of Toulouse (INPT), University of Toulouse, Toulouse, France, in 2008. He is a Full Professor in the Department of Computer Science and Industry at Universidad Católica del Maule, Talca, Chile. He is Head and Senior Researcher of the Laboratory of Technological Research in Pattern Recognition (LITRP), Universidad Católica del Maule. His research interests are digital image processing, neural networks, biometrics, and industrial applications of pattern recognition.

IEEE ICA-ACCA 2022

KEYNOTE SPEAKER 10

The top-down approach in systems engineering and education



Prof.habil. Dr. Marius Balas, Ph.D.

Abstract

This presentation introduces a thesis on the actuality and necessity of the top-down approaches in System Engineering (with emphasis on Digital Electronics and Greenhouse technology) and in Education (with emphasis on visual techniques), as a fundamental response to the exponential growth of our knowledge' volume and complexity. The following applications will be presented as examples for the top-down approach: • The Fuzzy-Interpolative Systems, as emulators of the utopic Universal Controller; • The Passive and Closed Rooftop Greenhouses, able to be applied in remote regions with no infrastructure and in arid or desertic regions; • The Integrated and Intelligent Rooftop Greenhouses connected to the underneath building with flows of air, energy, and water. Such way the buildings' metabolism improves as well as their carbon offset capacity.

Biosketch

Marius M. Balas, IEEE Senior Member, is a Habilitated Professor at The Engineering Faculty of Aurel Vlaicu University of Arad, Romania. His research topics are in Systems Engineering, Electronic Circuits, Intelligent and Fuzzy Systems, Adaptive Control, Modeling and Simulation. He is the author of 16 books and book chapters, 120 indexed papers and 7 invention patents. His main scientific contributions are the fuzzy-interpolative systems, the passive greenhouses, the intelligent rooftop greenhouses, the constant time to collision traffic optimization, the imposed distance braking, PWM inverter for railway coaches in tropical environments, the rejection of the switching controllers' instability by phase trajectory analysis and the Fermat neuron. Coordinator for several research projects and student competitions, co-organizing the Control Engineering and Industrial Software Branch of the Engineering Faculty of Aurel Vlaicu University.

IEEE ICA-ACCA 2022

KEYNOTE SPEAKER 11

Current Trends in Multi-Objective Search in Artificial Intelligence.



Dr. Carlos Hernández, Universidad San Sebastian (USS), Chile

Abstract

In many real-world problems, it is necessary to optimize more than one criterion or objective function. Some examples are the planning of electric vehicle trips (which involves minimizing energy consumption and travel time, among other objectives), the planning of electric transmission lines (which involves optimizing the cost of energy transmission and the impact in communities, among other economic, social or environmental objectives), and last-mile delivery (which involves customer satisfaction and delivery costs, among others). In this talk, the algorithms of state of the art to solve this type of problem developed by our research group will be presented. In addition, experimental evidence that supports our research, and is part of the current and future work, will be given.

Biosketch:

CARLOS HERNÁNDEZ received the bachelor's degree from the Universidad de Concepción, Chile, and the Ph.D. degree in computer science from the Universidad Autónoma de Barcelona, Spain. He is currently a Professor in the Faculty of Engineering, Universidad San Sebastian (USS). His research interests include heuristic search, automated planning, and knowledge representation, with a focus on real-time, on-line, and multi-objective problems. He is the President of the Chilean Association of Computer Science (SCCC) from 2019 to 2022.

IEEE ICA-ACCA 2022

For the development of sustainable Agricultural Systems



More information in https://controlautomatico.org/ica_acca2022 and https://controlautomatico.org/ica_acca2022/contact