IEEE 2024 | VII CONGRESO BIENAL ARGENCON

DEL 18 AL 20 DE SEPTIEMBRE ↗ SAN NICOLÁS DE LOS ARROYOS

San Nicolás de los Arroyos ✳ **UTN** San Nicolás ◆ **IEEE**

Contenido

Mensaje del Presidente del Congreso IEEE ARGENCON 2024

Es un honor darle la bienvenida a la séptima edición del Congreso Bienal IEEE ARGENCON 2024, que se celebrará en San Nicolás de los Arroyos, del 18 al 20 de septiembre. Este congreso, organizado por la Facultad Regional San Nicolás de la Universidad Tecnológica Nacional y la Sección Argentina del IEEE, reúne a profesionales, investigadores y estudiantes de diversas disciplinas de la ingeniería para compartir sus conocimientos, experiencias y avances científicos.

A lo largo de los años, IEEE ARGENCON ha logrado consolidarse como un evento de referencia en la región, permitiendo la discusión y difusión de trabajos en áreas como inteligencia artificial, robótica, aplicaciones industriales, energías alternativas, bioingeniería, y muchas otras, lo que refleja el impacto transformador de la tecnología en la sociedad. Este año, con más de 200 trabajos científicos y la participación de más de 250 profesionales de todo el país y la región, el congreso no solo impulsa el desarrollo académico y profesional, sino que también genera un impacto significativo en la economía y el turismo de la ciudad, consolidando a San Nicolás como un centro estratégico para la innovación y la tecnología.

Destacamos la participación de conferencistas de renombre, quienes compartirán su experiencia en áreas clave del desarrollo tecnológico. El **Ing. Vicente Javier Giorgio** abrirá las actividades con su conferencia sobre los desafíos de la transición energética y el rol crucial de la inteligencia artificial en ese proceso. La **Dra. Natalia López** cerrará el congreso con su charla sobre **neuroingeniería**, explorando cómo la tecnología puede hacernos más humanos. Además, el **Mg. Alberto Sánchez** ofrecerá una conferencia plenaria sobre el preprocesamiento de datos sísmicos, mientras que el **MSc. Ing. Gustavo E. Juárez** nos llevará a reflexionar sobre la **ética en la inteligencia artificial**. También contaremos con la participación del **Dr. Gustavo A. Ramos López**, quien expondrá sobre las redes inteligentes (Smart Grids) y la automatización avanzada en la distribución de energía. La **Mg. Jennifer Castillo** abordará las estrategias tecnológicas para el beneficio de la humanidad, y el **Dr. Pedro Wightman** liderará el taller sobre la **construcción de propuestas para el programa EPICS en IEEE**, una iniciativa que busca fomentar proyectos con impacto social.

Asimismo, durante el congreso se llevará a cabo la **Reunión de Ramas Estudiantiles y Jóvenes Profesionales**, un espacio clave para el intercambio de ideas y el fortalecimiento de vínculos entre las futuras generaciones de ingenieros y profesionales.

Este congreso es también un testimonio del esfuerzo colaborativo entre instituciones, el sector privado y la comunidad local, con el objetivo de promover el desarrollo tecnológico y la educación. Agradezco a todos los que han hecho posible este evento, en especial a los autores y participantes, quienes con su contribución enriquecen este espacio de intercambio.

Les deseo un congreso lleno de aprendizajes, intercambios fructíferos y conexiones que perduren más allá del evento.

Atentamente,

Ing. Sergio D. Ponce
Presidente del Congreso IEEE ARGENCON 2024

CHAIR: Sergio Ponce

VICE CHAIR: Debora Rubio

Integrantes permanentes / institucionales:

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Cordisco, Mario

Doque, Susana

Lencina, Marcelo

Madrid, Francisco

Monje, Marcelo

Piccinini, David

Roberti, Martín

Salguero, Guadalupe

Simonetti, Adriano.

Estudiantes colaboradores:

Cardoso, Milagros

Casella, Camilo

Enciso, Ana Carla

Hamué, Victoria

Keller, Ayrton

Martínez, Emanuel

Porcel Mugliaroni, Manuel

Rodriguez, Agustín

Saucedo, Nicolás.

Mara Misto Macías
Marcela Pallero
Marcelo Arroyo
Marcelo Doallo
Marcelo Errecalde
Marcelo Frias
Marcelo Garcia
Marcelo Guzmán
Marcelo Scavuzzo
Marcelo Uriburu Quirno
Marcial Otero
Marcos Bierzychudek
María de los Angeles Gómez López
María Paula Alvarez
María Perez
María Victoria Marinelli
Mariana del Fresno
Mariana Eandi
Mariano Llamedo
Mariano Real
Mariela Aguilera Sammaritano
Mariela Gonzalez
Mario Bruno
Martín García
Martín Juarez
Martín Roberti
Matías Barber
Matias Gerard
Matias Meira
Matthäus Popov Pereira da Cunha
Mauricio Troviano
Mauro Holzman
Maximiliano Bendinelli
Melisa Romero Asís
Mercedes Salvia
Michelle Lenardón Sánchez
Miguel Chesta
Miguel Estevez
Miguel Angel Larravide
Milton Dacosta
Milton Namur
Nahuel Solavaggione
Natalia Beltramino
Natalia Mastrángelo
Nicolas Alessandroni
Nicolás Facundo De Leonardis
Nicolas Fernandez
Nicolas Javier De Leonardis
Nicolas Marcel
Nicolas Montedoro
Nicolas Pehoda
Nicolas Schtraks

Nicolas Tarditti
Octavio Farias
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Oskar Perera
Pablo Gagliardino
Pablo Giusti
Pablo Martinez
Pablo Scattone
Paola Lopez Bermejo
Paula Chamas
Paula Cortes
Paulo Goncalves
Pedro Vazquez
Priscilla Torres
Quimey Ferrer
Ramiro Alejandro Rucci
Ramiro Velazco
Raul Graña
Raul Monetta
Raul Robles
Raúl Esteves
Raul Gimenez
Raul Josue Ugarte
Raul Rodriguez
Reinaldo Valencia
Ricardo Barrionuevo
Ricardo Becker
Ricardo Gómez
Ricardo Orliac
Ricardo Padula
Ricardo Schneider
Richard Egert
Rita Marin
Roberto Bottasso
Roberto Iturrez
Roberto Martinez
Roberto Ocantos
Roberto Paz
Roberto Pinto
Roberto Quispe
Rodrigo Navarro
Rodrigo Rojas
Roger Granados
Rogelio Franco
Ruben Dario Ibañez
Ruben Isidoro Podda
Ruben Molina
Ruben Parrella
Ruth Victoria Gastiazoro
Ruth Ventura
Salvador Enrique Torrealba
Samuel Costa
Sebastian Almada
Sergio Arce
Sergio Bonanni

Sergio Murillo
Sergio Reales
Silvia Galeote
Silvia Pruzzo
Silvina Thuczek
Sofia De Zorzi
Sol Angel
Sol Chamas
Sonia Soria
Susana Alva Lizarazu
Susana Castiblanco
Tamara Morales
Tania Muso
Tomas Vildoza
Vanessa Albano
Vicente Ariel Cardozo
Victoria Anton
Victor Hugo Veron
Victoria Guiber
Victor Reyes
Viviana Parodi
Waldo Chaves
Wálter Aldo Díaz
Wálter Costa
Wálter Enrique Aguilar
Wálter Gauto
Wálter Manuel Narvaez
Wálter Romero
Wendy Trigo
Wilmer Narvaez
Yanina Gomez
Yesica Tapia
Yolanda Espinoza
Yuliana Raed
Zamira Navarro
Zulma Aguirre

Cronograma

Miercóles 18 de Septiembre

Hora		Duración	Colonial 1	Colonial 2	Los Nogales	Las Magnolias
Inicio	Fin					
08:00	09:30	01:30	Acreditación			
09:30	11:00	01:30	Palabras de Bienvenida / Conferencia Plenaria: Alberto Sanchez			
11:00	11:30	00:30	Coffee Break			
11:30	11:50	00:20	Paper 62	Paper 128	Disertación 1	Paper 230
11:50	12:10	00:20	Paper 85	Paper 149	Paper 40	Paper 125
12:10	12:30	00:20	Paper 241	Paper 26	Paper 120	Paper 212
12:30	12:50	00:20	Paper 213	Paper 182	Paper 216	Paper 244
12:50	13:10	00:20	Paper 236	Paper 209	Panel 1: Papers 47, 93 y 252	Disertación 2
13:10	14:50	01:40	Almuerzo			
14:50	15:10	00:20	Paper 199	Paper 88	Panel 2	Paper 116
15:10	15:30	00:20	Paper 82	Paper 89	Paper 25	Paper 204
15:30	15:50	00:20	Paper 215	Paper 56	Paper 111	Paper 214
15:50	16:10	00:20	Paper 217	Paper 92	Paper 148	Disertación 3
16:10	16:30	00:20	Paper 133	Paper 121	Panel 3: Papers 191, 221, 249	Disertación 4
16:30	17:00	00:30	Coffee Break			
17:00	17:20	00:20	Panel 4	Paper 61	Disertación 5	Paper 115
17:20	17:40	00:20		Paper 86		Paper 180
17:40	18:00	00:20		Paper 207	Panel 5	Paper 64
18:00	18:20	00:20		Paper 167		Panel 6
18:20	18:40	00:20		Paper 42	Entrega premio TRIC / Cierre	
Lugar y horario a definir			Conferencia Plenaria: Natalia López			

BIO	Bioingenieria
GRSS	Geociencias y Sensado Remoto

CIS y VGG	Inteligencia Comp y Videojuegos
CYB	Ciberseguridad y Ciberdefensa

Jueves 19 de Septiembre

Hora		Duración	Colonial 1	Colonial 2	Los Nogales	Las Magnolias
Inicio	Fin					
08:00	09:00	01:00	Acreditación			
09:00	09:20	00:20	Mesa Redonda 1	Paper 35		Papers 33, 246, 229, 139 y 34
09:20	09:40	00:20		Paper 38		
09:40	10:00	00:20		Paper 51		
10:00	11:00	01:00	Conferencia Plenaria: Gustavo Juarez		Actividad 1	M.redonda 2: P 181, 240, 227 y 59
						Mesa redonda 3
11:00	11:30	00:30	Coffee Break			
11:30	11:50	00:20	Paper 54	Paper 134	Paper 20	Paper 28
11:50	12:10	00:20	Paper 72	Paper 132	Paper 43	Paper 74
12:10	12:30	00:20	Paper 114	Paper 113	Paper 83	Paper 65
12:30	12:50	00:20	Paper 186	Paper 163	Paper 118	Paper 58
12:50	13:10	00:20	Paper 223	Paper 166	Paper 160	Paper 41
13:10	14:50	01:40	Almuerzo			
14:50	15:10	00:20	Paper 53	Panel 7: Papers 247, 248, 250 y 253	Paper 32	Paper 24
15:10	15:30	00:20	Paper 117		Paper 81	Paper 68
15:30	15:50	00:20	Paper 126	Panel 8: Papers 185, 110 y 157	Paper 95	Paper 124
15:50	16:10	00:20	Paper 127	Panel 9: Papers 102, 142 y 150	Paper 152	Paper 137
16:10	16:30	00:20	Paper 239		Paper 165	Paper 174
16:30	17:00	00:30	Coffee Break			
17:00	18:00	01:00	Conferencia Plenaria: Gustavo Ramos López			
18:00	18:20	00:20	Paper 112		Paper 101	Paper 19
18:20	18:40	00:20	Paper 243		Paper 136	Paper 27
18:40	19:00	00:20	Paper 193		Paper 147	Paper 138 Paper 145
19:00	19:20	00:20	Paper 205		Paper 192	Paper 146
19:20	19:40	00:20	Paper 140		Paper 231	Paper 190
21:15			CENA DE CAMARADERÍA - Restaurante Alkimya			

IAS	Ap. Industriales y Elec. de Potencia		BIO	Bioingenieria
GRSS	Geociencias y Sensado Remoto		CIS y VGG	Inteligencia Comp y Videojuegos
ACR	Automatización, Control y Robótica		CYB	Ciberseguridad y Ciberdefensa
SPS	Procesamiento de Señales e Imágenes		EDU	Educación en Ingenieria
SEDE	Sistemas Energéticos y Distribución Eléctrica			

Viernes 20 de Septiembre

Hora		Duración	Colonial 1	Colonial 2	Los Nogales	Las Magnolias
Inicio	Fin					
08:00	09:00	01:00	Acreditación			
09:00	09:20	00:20	Paper 50	Paper 87		Paper 98
09:20	09:40	00:20	Paper 189	Paper 22		Paper 237
09:40	10:00	00:20	Paper 21	Paper 144		Paper 238
10:00	10:30	00:30	Coffee Break			
10:30	11:30	01:00	Conferencia Plenaria: Jennifer Castillo			
11:30	11:45		Actividad 2			
11:45	12:05	00:20	Paper 94	Paper 55	Taller EPICS	Paper 31
12:05	12:25	00:20	Paper 206	Paper 63		Paper 45
12:25	12:45	00:20	Paper 44	Paper 69		Paper 100
12:45	13:05	00:20	Paper 183	Paper 104		Paper 103
13:05	13:25	00:20	Paper 37	Paper 224		Paper 123
13:25	15:05	01:40	Almuerzo			
15:05	15:25	00:20	Paper 170	Paper 60	Taller EPICS	Paper 153
15:25	15:45	00:20	Paper 48	Paper 90		Paper 173
15:45	16:05	00:20	Paper 84	Paper 232		Paper 175
16:05	16:25	00:20	Paper 77	Paper 222		Paper 178
16:25	16:45	00:20	Paper 73			
16:45	17:45	01:00	Cierre y entrega de reconocimientos			

IMS	Instrumentación y Mediciones		MW	Microondas, Teoría y Tecnologías	
SPS	Procesamiento de Señales e Imágenes		COM	Comunicaciones	
SEDE	Sistemas Energéticos y Distribución Eléctrica		AES	Aeronáutica y Espacio	

Plenarias, Disertaciones, Paneles y Mesas Redondas

Plenarias		
Plenaria 1	Pre-procesamiento de datos sísmicos para replicación de eventos para analizar el comportamiento estructural del edificio	Mg. Alberto Sánchez
Plenaria 2	Neuroingeniería: cuando la tecnología nos vuelve más humanos	Dr. Natalia López
Plenaria 3	Ética y Pragmatismo en la IA: Navegando el Futuro de las Tecnologías Generativas	Ing. Gustavo Juarez
Plenaria 4	Smart Grids and Advanced Distribution Automation	Dr. Gustavo A. Ramos López
Plenaria 5	Estrategias y tácticas para avanzar la tecnología en beneficio de la humanidad	Mg. Jennifer Castillo

Disertaciones		
Disertación 1	Chatbot: van a ser útiles en algún momento?	Daniela López De Luise
Disertación 2	CiberCrimen	Emilio Zarate
Disertación 3	Ciberdefensa	Olga Cavalli
Disertación 4	Gobierno TI	Fabian Descalso
Disertación 5	Analíticas basadas en incertidumbre	Carlos Cassanova

Paneles		
Panel 1	Papers: 47, 93 y 252	Silvia Aciar
Panel 2	Women in Computacional Inteligence (WCI)	Gilda Romero
Panel 3	Papers: 191, 221 y 249	Silvia Aciar
Panel 4	El rol de la inteligencia artificial en bioingeniería	Diego Comas
Panel 5	Panel de CERTS	
Panel 6	Aspectos de ética y propiedad intelectual en los sistemas ludificados	Mario Bruno
Panel 7	Panel Track Videojuegos: Papers 247, 248, 250 y 253	Silvana Aciar
Panel 8	Papers 185, 110 y 157	Silvana Aciar
Panel 9	Papers 102,142 y 150	Silvana Aciar

Mesas redondas		
Mesa redonda 1	Dynamics of water at the soil-plant interface	Dr. Carlos López Martínez, Professor Yi Liu and Dra. Maria Piles
Mesa redonda 2	Educación en ciberseguridad. Papers 181, 240, 227 y 59	
Mesa redonda 3	CIberLac, Fundación Sadosky	

Actividades		
Actividad 1	Women in Engineering	
Actividad 2	Foto grupal	

Miercóles 18 de Septiembre

Bioingeniería	Sist. energéticos y distribución eléctrica	Instrumentación y mediciones	
Paper 131	Paper 30	Paper 75	
Paper 156	Paper46	Paper 78	
Paper 172	Paper 179	Paper 162	
Paper 211	Paper 226		
Paper 242	Paper 233		
Paper 257			
Paper 129			

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Geociencia y sensado remoto	Aplicaciones Industriales y Electrónica de Potencia	Educación
Paper 29	Paper 52	Paper 235
Paper 67	Paper 119	
Paper 79	Paper 177	
Paper 91		
Paper 106		
Paper 108		
Paper 151		
Paper 154		
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Paper 188		
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Paper 195		
Paper 196		
Paper 197		
Paper 198		
Paper 201		
Paper 203		
Paper 208		

Viernes 20 de Septiembre

Aeronáutica y Espacio	Procesamiento de	Comunicaciones	Automatización, control y robótica
Paper 57	Paper 176	Paper 228	Paper 109
Paper 70	Paper 158	Paper 155	Paper 161
Paper 71			
Paper 143			
Paper 169			
Paper 255			
Paper 256			
Paper 258			
Paper 219			

Programa por Autores

Apellidos	Nombres	ID del trabajo	Track
Abal	Ignacio	242	Engineering in Medical & Biology
Abras	Guillermo N	241	Engineering in Medical & Biology
Aguiar	Antonio L	47	Computational Intelligence
Aguilera	Walter	190	Engineering Education
Aguilera	Facundo	153	Communications
Aguilera	Facundo	114	Industrial Applications and Power Electronics
Aguilera Sammaritano	Mariela L.	188	Geoscience and Remote Sensing
Aguilera Sammaritano	Mariela L.	235	Educación
Aguirre	Omar	161	Automation, Control, and Robotics
Aguirre	Matías A	44	Instrumentation and Measurements
Aguirre Anaya	Eleazar	204	Cybersecurity and Cyberdefense
Aguirre Anaya	Eleazar	214	Cybersecurity and Cyberdefense
Alarcon	Jimmy	161	Automation, Control, and Robotics
Alba	Eduardo	62	Engineering in Medical & Biology
Alberino	Sergio	110	Computational Intelligence
Alegre	Lucas Maximiliano	132	Engineering in Medical & Biology
Alemany	Juan	30	Sistemas Energéticos y Distribucción Eléctrica
Alesandria	Alejo	178	Communications
Aligia	Diego A.	136	Automation, Control, and Robotics
Aligia	Diego A	192	Automation, Control, and Robotics
Almeda	Daniel Alejandro	219	Aeronautica y Espacio
Almeida	Esteban	221	Computational Intelligence
Almeida Serra	Giovany	100	Communications
Almeida Serra	Giovany	173	Communications
Alonso	Nicolás Sebastián	236	Engineering in Medical & Biology
Alva Alcantara	Josmell Henry	81	Automation, Control, and Robotics
Alvarez	María Paula	121	Geoscience and Remote Sensing
Alvarez	Claudia	120	Computational Intelligence
Álvarez	Raúl	127	Industrial Applications and Power Electronics
Amaya	Eduardo	117	Industrial Applications and Power Electronics
Andrenacci	Elian	178	Communications
Andrinolo	Dante C.	196	Geoscience and Remote Sensing
Anoardo	Esteban	206	Instrumentation and Measurements
Antonelli	Sofía L	52	Industrial Applications and Power Electronics
Antonelli	Sofía L	53	Industrial Applications and Power Electronics
Antonielli	Alberto Nicolás NA	229	Cybersecurity and Cyberdefense
Araguás	Gastón	152	Automation, Control, and Robotics
Arballo	Javier	84	Instrumentation and Measurements
Arcamone	Julieta Rocío	121	Geoscience and Remote Sensing
Arellana	Javier E.	128	Geoscience and Remote Sensing
Ares	Guadalupe	167	Geoscience and Remote Sensing
Arguedas Matarrita	Carlos	138	Engineering Education

Arias	Lizardo	106	Geoscience and Remote Sensing
Armentano	Ricardo	82	Engineering in Medical & Biology
Armentano	Ricardo	113	Engineering in Medical & Biology
Armentano	Ricardo Luis	217	Engineering in Medical & Biology
Armentano	Ricardo Luis	242	Engineering in Medical & Biology
Arntzen	Matías Andrés	223	Industrial Applications and Power Electronics
Arroyo	Marcelo	244	Cybersecurity and Cyberdefense
Astengo Noguez	Carlos	247	Video games
Astengo Noguez	Carlos	248	Video games
Astengo Noguez	Carlos	250	Video games
Avila	Lautaro Nicolás	25	Computational Intelligence
Ayo	Alex Mauricio	179	Sistemas Energéticos y Distribucción Eléctrica
Baldeon Calisto	María	93	Computational Intelligence
Baldeon Calisto	María	85	Engineering in Medical & Biology
Baldini	José R	190	Engineering Education
Ballarín	Virginia	213	Engineering in Medical & Biology
Ballarín	Virginia L.	241	Engineering in Medical & Biology
Ballesteros Iglesias	María Yolanda	183	Instrumentation and Measurements
Bank	Valeria	74	Signal & Image Processing
Barber	Matías	182	Geoscience and Remote Sensing
Barbera	Gustavo	177	Industrial Applications and Power Electronics
Barbero	Juan	177	Industrial Applications and Power Electronics
Barbieri	Beatriz	205	Sistemas Energéticos y Distribucción Eléctrica
Barra	Camilo	218	Geoscience and Remote Sensing
Barrientos	Carlos J.	169	Aeronautica y Espacio
Basso	Fabricio	236	Engineering in Medical & Biology
Bayala	Martín I.	149	Geoscience and Remote Sensing
Bayala	Martin I.	182	Geoscience and Remote Sensing
Bellis	Laura Marisa	121	Geoscience and Remote Sensing
Beltramone	Giuliana B	164	Geoscience and Remote Sensing
Beltran	Juan M.	230	Cybersecurity and Cyberdefense
Bengoa Seminario	Juan	81	Automation, Control, and Robotics
Beninato	Sabrina	149	Geoscience and Remote Sensing
Benítez	Diego	109	Automation, Control, and Robotics
Benítez	Micaela Antonella	25	Computational Intelligence
Benítez	Diego	85	Engineering in Medical & Biology
Benítez	Diego	83	Automation, Control, and Robotics
Benítez	Diego	95	Automation, Control, and Robotics
Benítez	Diego	118	Automation, Control, and Robotics
Benítez	Diego	160	Automation, Control, and Robotics
Benítez	Diego	161	Automation, Control, and Robotics
Benítez	Diego	93	Computational Intelligence
Berrios Maturana	Jaime S.	153	Communications
Bertossi	Valeria I	24	Engineering Education
Betarte	Gustavo	59	Cybersecurity and Cyberdefense
Betteta Gómez	Judith	41	Signal & Image Processing
Bierzychudek	Marcos E.	44	Instrumentation and Measurements
Bignotti	Bruno	30	Sistemas Energéticos y Distribucción Eléctrica

Blanco	Gerardo	179	Sistemas Energéticos y Distribucción Eléctrica
Blume	Mario	243	Sistemas Energéticos y Distribucción Eléctrica
Bonansea	Matías	42	Geoscience and Remote Sensing
Bonansea	Matías	198	Geoscience and Remote Sensing
Boni	Roberta	56	Geoscience and Remote Sensing
Bordón Sbardella	Félix Raúl	25	Computational Intelligence
Bossio	Guillermo Rubén	117	Industrial Applications and Power Electronics
Bossio	Guillermo Rubén	126	Industrial Applications and Power Electronics
Bossio	José M.	126	Industrial Applications and Power Electronics
Bossio	Guillermo Rubén	239	Industrial Applications and Power Electronics
Bottinelli	Leandro	176	Signal & Image Processing
Braccia	Lautaro	193	Sistemas Energéticos y Distribucción Eléctrica
Brasca Merlin	Almendra	235	Educación
Bravo	Matías	20	Automation, Control, and Robotics
Bucci	César M.	140	Sistemas Energéticos y Distribucción Eléctrica
Bucciarelli	Agustín G.	232	Sistemas Energéticos y Distribucción Eléctrica
Bulacio	Pilar Estela	215	Engineering in Medical & Biology
Bulacio	Pilar Estela	199	Engineering in Medical & Biology
Bulus Rossini	Laureano A.	100	Communications
Bulus Rossini	Laureano A.	173	Communications
Busada	Claudio	35	Industrial Applications and Power Electronics
Busada	Claudio	38	Industrial Applications and Power Electronics
Buzzio	Christian	114	Industrial Applications and Power Electronics
Caballero	Tadeo T	172	Engineering in Medical & Biology
Caballero del Castillo	Mariella	108	Geoscience and Remote Sensing
Cabral	Juan	168	Geoscience and Remote Sensing
Cabral	Roberto José	223	Industrial Applications and Power Electronics
Cabrera Díaz	Daniel D.	226	Sistemas Energéticos y Distribucción Eléctrica
Cabrera Díaz	Daniel D.	233	Sistemas Energéticos y Distribucción Eléctrica
Caiza	Luis	109	Automation, Control, and Robotics
Caiza	Luis	83	Automation, Control, and Robotics
Calvo	Hiram	214	Cybersecurity and Cyberdefense
Camacho	Oscar	20	Automation, Control, and Robotics
Camacho	Oscar	32	Automation, Control, and Robotics
Camacho	Oscar	160	Automation, Control, and Robotics
Camacho	Oscar	161	Automation, Control, and Robotics
Camacho	Oscar	19	Engineering Education
Camacho	Oscar	83	Automation, Control, and Robotics
Camacho	Oscar	95	Automation, Control, and Robotics
Camacho	Oscar	109	Automation, Control, and Robotics
Camacho	Oscar	118	Automation, Control, and Robotics
Camacho Valdez	Vera	198	Geoscience and Remote Sensing
Campero	Micaela	208	Geoscience and Remote Sensing
Campero	Micaela	209	Geoscience and Remote Sensing
Campillo	Pedro	207	Geoscience and Remote Sensing
Campo	Juan	59	Cybersecurity and Cyberdefense
Canaglia	Rodrigo	242	Engineering in Medical & Biology
Canepa	Víctor M.	55	Aeronautica y Espacio

Canepa	Víctor M.	57	Aeronautica y Espacio
Capraro	Flavio Andrés	207	Geoscience and Remote Sensing
Carbonel Olazabal	Daniel	40	Computational Intelligence
Carbonel Olazabal	Daniel	41	Signal & Image Processing
Carmona	Facundo	182	Geoscience and Remote Sensing
Carrasco	Aylen	86	Geoscience and Remote Sensing
Carvalho Sousa	Ligia Maria	101	Automation, Control, and Robotics
Carvalho Sousa	Ligia Maria	47	Computational Intelligence
Carvalho Sousa	Ligia Maria	102	Computational Intelligence
Casanova	Xavier	185	Computational Intelligence
Casanova	Carlos	191	Computational Intelligence
Casati	Celene	189	Instrumentation and Measurements
Castellino	Ariel Matías	239	Industrial Applications and Power Electronics
Castro	Gastón I	148	Computational Intelligence
Catalano	Nicolás E.	237	Microwave Theory & Tecnology
Chamorro	David	93	Computational Intelligence
Chango	José	165	Automation, Control, and Robotics
Chávez	Danilo	32	Automation, Control, and Robotics
Chávez	Jorge Alejandro	172	Engineering in Medical & Biology
Chávez Espíritu	Tulio	91	Geoscience and Remote Sensing
Ciafardini	Juan Pablo	98	Microwave Theory & Tecnology
Cid	Mariana P	166	Engineering in Medical & Biology
Cigna	Francesca	56	Geoscience and Remote Sensing
Cigna	Francesca	92	Geoscience and Remote Sensing
Ciocci Brazzano	Ligia	189	Instrumentation and Measurements
Cippitelli	Sebastián	249	Computational Intelligence
Clementi	Luis	37	Instrumentation and Measurements
Coello Fababa	José	108	Geoscience and Remote Sensing
Cogo	Jorge	143	Aeronautica y Espacio
Cola Pillicita	Cristhian	62	Engineering in Medical & Biology
Colazzo	Marcelo	154	Geoscience and Remote Sensing
Colombo	Leonardo J.	148	Computational Intelligence
Comas	Diego S	241	Engineering in Medical & Biology
Comes	Leonardo	154	Geoscience and Remote Sensing
Comín	Romina	166	Engineering in Medical & Biology
Contarelli	Daniel	253	Video games
Conte	Federico	243	Sistemas Energéticos y Distribucción Eléctrica
Contreras Soto	Lucas Martín	219	Aeronautica y Espacio
Corach	Julián	189	Instrumentation and Measurements
Corach	Julián	72	Industrial Applications and Power Electronics
Corasaniti	Fabián	205	Sistemas Energéticos y Distribucción Eléctrica
Corcuera Araujo	Carlos	81	Automation, Control, and Robotics
Costanzo	Pablo	100	Communications
Costanzo	Pablo	173	Communications
Cragnolini	Rosanna	163	Engineering in Medical & Biology
Curti	Hugo	64	Cybersecurity and Cyberdefense
Cymberknop	Leandro Javier	82	Engineering in Medical & Biology
Cymberknop	Leandro Javier	113	Engineering in Medical & Biology

Cymberknop	Leandro Javier	217	Engineering in Medical & Biology
Cymberknop	Leandro Javier	242	Engineering in Medical & Biology
da Silva Pinheiro	José Lucas	101	Automation, Control, and Robotics
Dagatti	Mayco Mariano	169	Aeronautica y Espacio
Dagatti	Dagatti	224	Aeronautica y Espacio
Dalmasso	Julieta	182	Geoscience and Remote Sensing
Davila	Pablo	185	Computational Intelligence
Davila	Pablo	221	Computational Intelligence
De Aguiar Minami	Enrique	40	Computational Intelligence
De Angelo	Cristian	136	Automation, Control, and Robotics
De Angelo	Cristian	192	Automation, Control, and Robotics
De Angelo	Cristian	60	Sistemas Energéticos y Distribucción Eléctrica
De Angelo	Cristian	53	Industrial Applications and Power Electronics
De Angelo	Cristian H.	114	Industrial Applications and Power Electronics
De Angelo	Cristian	126	Industrial Applications and Power Electronics
De Angelo	Cristian	239	Industrial Applications and Power Electronics
De Jesús	Sara	214	Cybersecurity and Cyberdefense
de la Barrera	Pablo Martín	117	Industrial Applications and Power Electronics
De Luca	Martín	217	Engineering in Medical & Biology
Defago	María D	208	Geoscience and Remote Sensing
Degano	María Florencia	149	Geoscience and Remote Sensing
Degano	María Florencia	182	Geoscience and Remote Sensing
del Real	Juan Carlos	183	Instrumentation and Measurements
del Valle Asís	Inés	182	Geoscience and Remote Sensing
del Valle Asís	Inés	198	Geoscience and Remote Sensing
Delgado Vargas	Kevin A.	212	Cybersecurity and Cyberdefense
Della Roca	Patricia	84	Instrumentation and Measurements
Desclazo	Fabián	115	Cybersecurity and Cyberdefense
Deymonnaz	Pablo Andrés	137	Engineering Education
Díaz	Juan Gabriel	170	Instrumentation and Measurements
Díaz Lozada	José Manuel	89	Geoscience and Remote Sensing
Díaz Lozada	José Manuel	201	Geoscience and Remote Sensing
Díaz Pace	Jorge Andrés A.	142	Computational Intelligence
Diez	Francisco	167	Geoscience and Remote Sensing
Doallo	Marcelo R	176	Signal & Image Processing
Doallo	Marcelo R.	178	Communications
Domínguez Nimo	Alejo	110	Computational Intelligence
Donolo	Pablo Daniel	52	Industrial Applications and Power Electronics
Donolo	Pablo Daniel	53	Industrial Applications and Power Electronics
Donolo	Pablo	239	Industrial Applications and Power Electronics
Donolo	Pablo	126	Industrial Applications and Power Electronics
Doque	Mirta	190	Engineering Education
Duggan	Liam	176	Signal & Image Processing
Duque	Alejandro	85	Engineering in Medical & Biology
Eche Llenque	José Carlos	91	Geoscience and Remote Sensing
Eche Llenque	José Carlos	108	Geoscience and Remote Sensing
Edrosa	Rodrigo	79	Geoscience and Remote Sensing
Elaskar	Sergio A.	63	Aeronautica y Espacio

Elaskar	Sergio A.	[69](69)	Aeronautica y Espacio
Elaskar	Sergio A.	[70](70)	Aeronautica y Espacio
Elaskar	Sergio A.	[71](71)	Aeronautica y Espacio
Elaskar	Sergio A.	[104](104)	Aeronautica y Espacio
Esarte	Javier	[110](110)	Computational Intelligence
Escobares	Cristhian D.	[195](195)	Geoscience and Remote Sensing
Escoto Velázquez	Claudia Alin	[214](214)	Cybersecurity and Cyberdefense
Escudero	Cristian	[192](192)	Automation, Control, and Robotics
Espinosa Gómez	Edna Lucía	[29](29)	Geoscience and Remote Sensing
Espinoza Quiroz	Lourdes	[108](108)	Geoscience and Remote Sensing
Falco	Cristian	[117](117)	Industrial Applications and Power Electronics
Fallas Monge	Silvia	[138](138)	Engineering Education
Fallas Monge	Silvia	[146](146)	Engineering Education
Fantín	Rodrigo Iván	[25](25)	Computational Intelligence
Fantino	Roberto A.	[38](38)	Industrial Applications and Power Electronics
Farías	Alejandro	[42](42)	Geoscience and Remote Sensing
Farías	Celina A	[56](56)	Geoscience and Remote Sensing
Farías	Celina A.	[92](92)	Geoscience and Remote Sensing
Fernández	Pablo Andrés	[166](166)	Engineering in Medical & Biology
Fernández	Ada	[94](94)	Instrumentation and Measurements
Fernández	Francisco J.	[60](60)	Sistemas Energéticos y Distribucción Eléctrica
Fernández	Francisco J.	[233](233)	Sistemas Energéticos y Distribucción Eléctrica
Fernández	Manuel	[173](173)	Communications
Fernández	Manuel P.	[100](100)	Communications
Fernández Galván	Eriel	[189](189)	Instrumentation and Measurements
Fernández Medina	Eduardo	[116](116)	Cybersecurity and Cyberdefense
Feroldi	Diego	[193](193)	Sistemas Energéticos y Distribucción Eléctrica
Ferral	Anabella	[42](42)	Geoscience and Remote Sensing
Ferral	Anabella	[194](194)	Geoscience and Remote Sensing
Ferral	Anabella	[195](195)	Geoscience and Remote Sensing
Ferral	Anabella	[198](198)	Geoscience and Remote Sensing
Ferrante	Enzo	[67](67)	Geoscience and Remote Sensing
Ferreyra	Lucas	[131](131)	Engineering in Medical & Biology
Fierens	Pablo	[45](45)	Communications
Figueras	Fernando Enrique	[125](125)	Cybersecurity and Cyberdefense
Figueroa	Víctor	[116](116)	Cybersecurity and Cyberdefense
Finda Evaristo	Manuel	[101](101)	Automation, Control, and Robotics
Finda Evaristo	Manuel	[102](102)	Computational Intelligence
Flores Escalobna	David	[204](204)	Cybersecurity and Cyberdefense
Flores Lamas	Alejandro	[215](215)	Engineering in Medical & Biology
Flores Ruiz	William G.	[46](46)	Sistemas Energéticos y Distribucción Eléctrica
Flores Ruiz	William G.	[112](112)	Sistemas Energéticos y Distribucción Eléctrica
Folino	Pablo	[110](110)	Computational Intelligence
Fontana	Juan Manuel	[183](183)	Instrumentation and Measurements
Fontela	Carlos M.	[137](137)	Engineering Education
Franco	Mariano	[128](128)	Geoscience and Remote Sensing
Frank Buss	Elisa	[195](195)	Geoscience and Remote Sensing
Frank Buss	Elisa	[203](203)	Geoscience and Remote Sensing

Frery	Alejandro	65	Signal & Image Processing
Frías	Marcelo J.	63	Aeronautica y Espacio
Frías	Marcelo J.	104	Aeronautica y Espacio
Frieden	Jennifer	94	Instrumentation and Measurements
Furundarena	Fernando	252	Computational Intelligence
Fushimi	Emilia	133	Engineering in Medical & Biology
Gajardo	Vicente	189	Instrumentation and Measurements
Gajardo	Vicente	72	Industrial Applications and Power Electronics
Galetto	Marcos	30	Sistemas Energéticos y Distribucción Eléctrica
Gallardo	Delfina	249	Computational Intelligence
Gallegos García	Gina	204	Cybersecurity and Cyberdefense
Gallegos García	Gina	212	Cybersecurity and Cyberdefense
Gambini	Juliana	65	Signal & Image Processing
Garabito Orosco	Enzo Germán G.	219	Aeronautica y Espacio
Garberoglio	Leonardo	147	Automation, Control, and Robotics
García	Martín S	231	Automation, Control, and Robotics
García	Martín S.	60	Sistemas Energéticos y Distribucción Eléctrica
García	Maximiliano	193	Sistemas Energéticos y Distribucción Eléctrica
García	Martín S.	226	Sistemas Energéticos y Distribucción Eléctrica
García	Martín S.	233	Sistemas Energéticos y Distribucción Eléctrica
García	Marcelo Adrián	180	Cybersecurity and Cyberdefense
García	Carlos Marcelo	89	Geoscience and Remote Sensing
García	Carlos Marcelo	201	Geoscience and Remote Sensing
García Blesa	Hernán Manuel M	22	Signal & Image Processing
García Labari	Ignacio	199	Engineering in Medical & Biology
García Labari	Ignacio	215	Engineering in Medical & Biology
García Redondo	Manuel Elías	219	Aeronautica y Espacio
García Rosado	David	116	Cybersecurity and Cyberdefense
Garelli	Fabricio	133	Engineering in Medical & Biology
Garelli	Fabricio	134	Engineering in Medical & Biology
Gauto	Víctor H	42	Geoscience and Remote Sensing
Gauto	Víctor H.	198	Geoscience and Remote Sensing
Gavier Pizarro	Gregorio	121	Geoscience and Remote Sensing
Giribet	Juan I	147	Automation, Control, and Robotics
Giribet	Juan	148	Computational Intelligence
Glecer	Bruno	94	Instrumentation and Measurements
Gómez Jorge	Sebastián	35	Industrial Applications and Power Electronics
González	Alexander	136	Automation, Control, and Robotics
González	Guillermo Noel	136	Automation, Control, and Robotics
González	Sergio Alejandro	150	Computational Intelligence
González	Martín G	28	Signal & Image Processing
González	Gerardo	64	Cybersecurity and Cyberdefense
González Espinal	César Javier	90	Sistemas Energéticos y Distribucción Eléctrica
González Marino	Gerónimo	119	Industrial Applications and Power Electronics
González Torres	Cornelio	41	Signal & Image Processing
Graffigna	Juan P	213	Engineering in Medical & Biology
Grandi	Tobías	191	Computational Intelligence
Grijalva	Felipe	95	Automation, Control, and Robotics

Grijalva	Felipe	93	Computational Intelligence
Grijalva	Felipe	85	Engineering in Medical & Biology
Grings	Francisco	128	Geoscience and Remote Sensing
Grisales Campeón	Juan Pablo	45	Communications
Gross	Patricio M.	98	Microwave Theory & Tecnology
Gude	Juan J.	83	Automation, Control, and Robotics
Guerrero	Guillermo	59	Cybersecurity and Cyberdefense
Gusberti	Adrián	211	Engineering in Medical & Biology
Gutiérrez	María de los Milagros	24	Engineering Education
Gutiérrez Marcantoni	Luis Felipe	69	Aeronautica y Espacio
Gutiérrez Marcantoni	Luis Felipe	70	Aeronautica y Espacio
Gutiérrez Marcantoni	Luis Felipe	71	Aeronautica y Espacio
Gutiérrez Marcantoni	Luis Felipe	104	Aeronautica y Espacio
Hecker	Rogelio	43	Automation, Control, and Robotics
Heguiabehere	Juan M	181	Cybersecurity and Cyberdefense
Heit	Fernando	120	Computational Intelligence
Henriquez	Daniel	106	Geoscience and Remote Sensing
Henze	Alejandro	48	Instrumentation and Measurements
Henze	Alejandro M	84	Instrumentation and Measurements
Hernández	Juan Carlos	244	Cybersecurity and Cyberdefense
Herrera	Marco	83	Automation, Control, and Robotics
Herrera	Marco	95	Automation, Control, and Robotics
Herrera	Marco	109	Automation, Control, and Robotics
Herrera	Marco	118	Automation, Control, and Robotics
Herrera	Marco	161	Automation, Control, and Robotics
Hervot	Elsa	42	Geoscience and Remote Sensing
Hidalgo Abril	John	95	Automation, Control, and Robotics
Holzman	Mauro	149	Geoscience and Remote Sensing
Holzman	Mauro	167	Geoscience and Remote Sensing
Hulsman	Johannes	94	Instrumentation and Measurements
Husain Cerruti	Santiago	55	Aeronautica y Espacio
Idoyaga	Ignacio	138	Engineering Education
Iglesias	Natalia N	199	Engineering in Medical & Biology
Inthamoussou	Fernando	134	Engineering in Medical & Biology
Ipar	Eugenia	82	Engineering in Medical & Biology
Ipar	Eugenia	113	Engineering in Medical & Biology
Ipar	Eugenia	242	Engineering in Medical & Biology
Issouribehere	Fernando	177	Industrial Applications and Power Electronics
Issouribehere	Pedro	177	Industrial Applications and Power Electronics
Jobbagy	Esteban	89	Geoscience and Remote Sensing
Jobbagy	Esteban	201	Geoscience and Remote Sensing
Juárez	Gustavo Eduardo	216	Computational Intelligence
Juárez Yelamos	Fausto	216	Computational Intelligence
Julca Verastegui	Luis	81	Automation, Control, and Robotics
Jumbo	José	165	Automation, Control, and Robotics
Kamlofsky	Jorge	139	Cybersecurity and Cyberdefense
Kelly	Juan	21	Instrumentation and Measurements

Kupzevich	Carolina	84	Instrumentation and Measurements
Lacerra	Carolina	163	Engineering in Medical & Biology
Laino Baldini	Cristian	167	Geoscience and Remote Sensing
Laiz	Héctor	44	Instrumentation and Measurements
Landa Cavazos	María Raquel	248	Video games
Landa Cavazos	María Raquel	250	Video games
Landioni	Nicolás	217	Engineering in Medical & Biology
Laprovitta	Agustin M	206	Instrumentation and Measurements
Legnani	Walter E	113	Engineering in Medical & Biology
Legnani	Walter E	22	Signal & Image Processing
Legnani	Walter E.	74	Signal & Image Processing
Leibovich	Pablo E.	177	Industrial Applications and Power Electronics
Leiva	Hugo	161	Automation, Control, and Robotics
Lenardón Sánchez	Michelle	56	Geoscience and Remote Sensing
Lenardón Sánchez	Michelle	92	Geoscience and Remote Sensing
Lima	Ricardo	51	Industrial Applications and Power Electronics
Lizano Sánchez	Fiorella	138	Engineering Education
Llanto Verde	Julián	91	Geoscience and Remote Sensing
Llorente	J. Fermín	144	Signal & Image Processing
Lombardozzo	Simón	238	Microwave Theory & Tecnology
López	Ernesto M.	151	Geoscience and Remote Sensing
López	Ernesto M.	143	Aeronautica y Espacio
López	Matías	235	Educación
López	Daniel	247	Video games
López	Daniel	248	Video games
López	Daniel	250	Video games
López Cabrera	Omar	100	Communications
López Cabrera	Omar	173	Communications
López De Luise	Daniela	25	Computational Intelligence
López De Luise	Daniela	120	Computational Intelligence
López De Luise	Daniela	249	Computational Intelligence
López De Luise	Daniela	252	Computational Intelligence
López La Valle	Ramón	238	Microwave Theory & Tecnology
López Lozano	Tristán	163	Engineering in Medical & Biology
López Weibel	Cecilia	89	Geoscience and Remote Sensing
López Weibel	Cecilia	201	Geoscience and Remote Sensing
Lottero	Giancarlo	58	Signal & Image Processing
Loyarte	Ariel S.	222	Sistemas Energéticos y Distribucción Eléctrica
Lucero	Agustín	94	Instrumentation and Measurements
Lucini	Magdalena	65	Signal & Image Processing
Lucini	Magdalena	197	Geoscience and Remote Sensing
Luppi	Patricio	193	Sistemas Energéticos y Distribucción Eléctrica
Luzzolino	Ricardo	50	Instrumentation and Measurements
Machado	Gastón Emmanuel	25	Computational Intelligence
Machado	Federico	26	Geoscience and Remote Sensing
Machado	Federico	79	Geoscience and Remote Sensing
Magalhães de Lima	João Pedro M	101	Automation, Control, and Robotics
Magalhães de Lima	João Pedro	102	Computational Intelligence

Maidana	Rosana Elizabeth	208	Geoscience and Remote Sensing
Manassero	Ulises	222	Sistemas Energéticos y Distribucción Eléctrica
Mancillas López	Cuauhtemoc	212	Cybersecurity and Cyberdefense
Mancino	Chistian	182	Geoscience and Remote Sensing
Manrique	Daniel	139	Cybersecurity and Cyberdefense
Marchand Laynes	Germán	108	Geoscience and Remote Sensing
Marchetti	Zuleica	86	Geoscience and Remote Sensing
Marino B.	Pablo C.	154	Geoscience and Remote Sensing
Marino Belcaguy	Marino Belcaguy	224	Aeronautica y Espacio
Marinucci	Lorenzo	150	Computational Intelligence
Marrero Ponce	Yovani	62	Engineering in Medical & Biology
Martina	Jean	174	Engineering Education
Martínez	Mateo	62	Engineering in Medical & Biology
Martínez	Miren Itsaso	35	Industrial Applications and Power Electronics
Martínez Batista	Frank	114	Industrial Applications and Power Electronics
Martínez Batista	Lorena B	247	Video games
Martínez Batista	Lorena B	248	Video games
Martínez Batista	Lorena B	250	Video games
Martínez Vargas	Emiliano	172	Engineering in Medical & Biology
Mas	Ignacio	148	Computational Intelligence
Masante	Emmanuel Alejandro	43	Automation, Control, and Robotics
Mascheroni	Rodolfo	84	Instrumentation and Measurements
Masino	Nicolás	111	Computational Intelligence
Massari	Chistian	149	Geoscience and Remote Sensing
Masuelli	Sergio	154	Geoscience and Remote Sensing
Masuelli	Sergio	168	Geoscience and Remote Sensing
Mayer	Hugo G.	205	Sistemas Energéticos y Distribucción Eléctrica
Mayer	Hugo G.	177	Industrial Applications and Power Electronics
Mazzoletti	Manuel Armando	126	Industrial Applications and Power Electronics
Mazzoni	Daniel	240	Cybersecurity and Cyberdefense
Medina Ramos	Carlos	40	Computational Intelligence
Medina Ramos	Carlos	41	Signal & Image Processing
Medina Rodríguez	Rosario	91	Geoscience and Remote Sensing
Meijome	Manuel	74	Signal & Image Processing
Meira	Matías	51	Industrial Applications and Power Electronics
Meira	Matías	52	Industrial Applications and Power Electronics
Meira	Matías	127	Industrial Applications and Power Electronics
Mencia	Aramis Oscar	25	Computational Intelligence
Méndez	Fernanda	142	Computational Intelligence
Mendilaharzu	Claudio F.	125	Cybersecurity and Cyberdefense
Mendoza Orbegoso	Elder	81	Automation, Control, and Robotics
Menéndez	Franco D.	216	Computational Intelligence
Merlino	Hernán	137	Engineering Education
Merlino	Hernán	240	Cybersecurity and Cyberdefense
Meschino	Gustavo J	236	Engineering in Medical & Biology
Meschino	Gustavo	241	Engineering in Medical & Biology
Meza	Marta Mabel	68	Engineering Education

Minear	Toby	89	Geoscience and Remote Sensing
Minear	Toby	201	Geoscience and Remote Sensing
Miranda Valiente	Marco	108	Geoscience and Remote Sensing
Molina	Rodrigo	235	Educación
Molisani	Leonardo	183	Instrumentation and Measurements
Monaldi	Lucas	69	Aeronautica y Espacio
Monaldi	Lucas	70	Aeronautica y Espacio
Monaldi	Lucas	71	Aeronautica y Espacio
Monasterios	Guillermo	73	Instrumentation and Measurements
Monasterios	Guillermo	75	Instrumentation and Measurements
Monasterios	Guillermo	77	Instrumentation and Measurements
Monterrubio	MaríaFernanda	172	Engineering in Medical & Biology
Morales	Luis	165	Automation, Control, and Robotics
Morales	John	90	Sistemas Energéticos y Distribucción Eléctrica
Morbidel	Leonardo L.	100	Communications
Morbidel	Leonardo L.	173	Communications
Morel	Eneas N.	31	Communications
Moriello	Khalil A.	34	Cybersecurity and Cyberdefense
Muravchik	Carlos H.	143	Aeronautica y Espacio
Musumano	Matías M	73	Instrumentation and Measurements
Musumano	Matías M	75	Instrumentation and Measurements
Musumano	Matías M	77	Instrumentation and Measurements
Nava Martínez	Rutilio	129	Engineering in Medical & Biology
Neil	Carlos G.	139	Cybersecurity and Cyberdefense
Neis	Rodrigo	163	Engineering in Medical & Biology
Nemiña	Francisco	188	Geoscience and Remote Sensing
Nemiña	Francisco	194	Geoscience and Remote Sensing
Nicolau	Santiago	244	Cybersecurity and Cyberdefense
Nieto Chaupis	Huber	150	Computational Intelligence
Nieto Chaupis	Huber	157	Computational Intelligence
Nieto Chaupis	Huber	156	Engineering in Medical & Biology
Nieto Chaupis	Huber	158	Signal & Image Processing
Nieto Chaupis	Huber	155	Communications
Nieto Chaupis	Huber	175	Communications
Nievas	Martín	152	Automation, Control, and Robotics
Nirino	Felipe	178	Communications
Nolasco	Miguel M.	203	Geoscience and Remote Sensing
Noriega Angarita	Eliana	54	Industrial Applications and Power Electronics
Noziglia Sahores	Julián	74	Signal & Image Processing
Núñez	Federico	147	Automation, Control, and Robotics
Núñez	Ana P	82	Engineering in Medical & Biology
Núñez	Francisco	238	Microwave Theory & Tecnology
Oberg	Kevin	89	Geoscience and Remote Sensing
Oberg	Kevin	201	Geoscience and Remote Sensing
Obregon	Fabricio M	197	Geoscience and Remote Sensing
O'Brien	Ronald	183	Instrumentation and Measurements
Ochagavia	Lara	131	Engineering in Medical & Biology
Oggier	Germán	153	Communications

Oggier	Germán	114	Industrial Applications and Power Electronics
Oggier	Germán Elías	186	Industrial Applications and Power Electronics
Oliveira	Mario	223	Industrial Applications and Power Electronics
Olivera Rodríguez	Paula S.	167	Geoscience and Remote Sensing
Olmedo	Matías Abel	169	Aeronautica y Espacio
Ortiz	Diego	32	Automation, Control, and Robotics
Ortiz	Leonardo	100	Communications
Ortiz	Leonardo	173	Communications
Otero	Lidia Ana	61	Geoscience and Remote Sensing
Ozafrain	Santiago	151	Geoscience and Remote Sensing
Ozafrain	Santiago	196	Geoscience and Remote Sensing
Pacheco	Daniela	207	Geoscience and Remote Sensing
Pacheco	Federico G.	33	Cybersecurity and Cyberdefense
Pacheco	Federico G.	227	Cybersecurity and Cyberdefense
Páez	Cintia	211	Engineering in Medical & Biology
Pafundi	Ricardo D.	154	Geoscience and Remote Sensing
Pagola	Hugo A.	240	Cybersecurity and Cyberdefense
Pallero	Marcela Inés	181	Cybersecurity and Cyberdefense
Palomeque	Lucía Lourdes	150	Computational Intelligence
Paná	Sofía	198	Geoscience and Remote Sensing
Park	Jin Sung	25	Computational Intelligence
Pasapera	José JP.	91	Geoscience and Remote Sensing
Pasapera	José JP.	108	Geoscience and Remote Sensing
Pascal	Andrés	120	Computational Intelligence
Pascal Bruel		63	Aeronautica y Espacio
Pascual	Juan Pablo	87	Signal & Image Processing
Pascual	Ignacio	79	Geoscience and Remote Sensing
Pascual	Juan Pablo	237	Microwave Theory & Tecnology
Passoni	Lucía Isabel	236	Engineering in Medical & Biology
Patat	Gabriela A	218	Geoscience and Remote Sensing
Patino	Klever	32	Automation, Control, and Robotics
Paz	Claudio	152	Automation, Control, and Robotics
Pecker Marcosig	Ezequiel	145	Engineering Education
Pedrozo Roca	Daniela S	213	Engineering in Medical & Biology
Peiretti	Pablo	240	Cybersecurity and Cyberdefense
Peña	Miguel	43	Automation, Control, and Robotics
Perdomo	Mariano M	37	Instrumentation and Measurements
Pereira	Javier	148	Computational Intelligence
Pereira Pinto	Vandilberto	101	Automation, Control, and Robotics
Pereira Pinto	Vandilberto	47	Computational Intelligence
Pereira Pinto	Vandilberto	102	Computational Intelligence
Peretti	Gabriela Marta	206	Instrumentation and Measurements
Peretti	Gastón C.	103	Communications
Peretti	Gastón	178	Communications
Pérez	Noel	83	Automation, Control, and Robotics
Pérez	Noel	95	Automation, Control, and Robotics
Pérez	Noel	93	Computational Intelligence
Pérez	Noel	62	Engineering in Medical & Biology

Pérez	Noel	85	Engineering in Medical & Biology
Pérez	María E	213	Engineering in Medical & Biology
Pérez Mirabal	Rocío	87	Signal & Image Processing
Pérez Pérez	Noel	109	Automation, Control, and Robotics
Pérez Pérez	Noel	118	Automation, Control, and Robotics
Perrina	Chiara	94	Instrumentation and Measurements
Pezzani	Carlos M	53	Industrial Applications and Power Electronics
Pezzani	Carlos M.	126	Industrial Applications and Power Electronics
Pezzani	Carlos M.	239	Industrial Applications and Power Electronics
Piacentini	Rubén	61	Geoscience and Remote Sensing
Pico	Pedro A	192	Automation, Control, and Robotics
Pinilla	Ana María	88	Geoscience and Remote Sensing
Piñeiro	Joaquín	110	Computational Intelligence
Pisarello	María Inés I	68	Engineering Education
Pisarello	María Inés I	132	Engineering in Medical & Biology
Pocasangre	Carlos	106	Geoscience and Remote Sensing
Ponce	Sergio D.	243	Sistemas Energéticos y Distribucción Eléctrica
Ponce Sergio D	Tapia Elizabeth	199	Engineering in Medical & Biology
Poncio	Marcelo	117	Industrial Applications and Power Electronics
Pons	Diego	164	Geoscience and Remote Sensing
Porcasi	Ximena	208	Geoscience and Remote Sensing
Pose	Claudio	147	Automation, Control, and Robotics
Pose	Claudio	145	Engineering Education
Prado	Lucas M	191	Computational Intelligence
Pringles	Rolando	179	Sistemas Energéticos y Distribucción Eléctrica
Proano	Pablo	32	Automation, Control, and Robotics
Pulido	Manuel A.	197	Geoscience and Remote Sensing
Puntano	Lucas A.	51	Industrial Applications and Power Electronics
Puntano	Lucas A.	52	Industrial Applications and Power Electronics
Puntano	Lucas A.	127	Industrial Applications and Power Electronics
Puyol	Dylan	118	Automation, Control, and Robotics
Queiroz	Brenno	174	Engineering Education
Quintana	Ángel	223	Industrial Applications and Power Electronics
Quintana Ortiz	Jesús Miguel	108	Geoscience and Remote Sensing
Quintero Rincón	Antonio	111	Computational Intelligence
Quiroga	Gonzalo	211	Engineering in Medical & Biology
Real	Juan	166	Engineering in Medical & Biology
Real	Mariano A	50	Instrumentation and Measurements
Reiman Azcuy	Alfonso R	67	Geoscience and Remote Sensing
Repetto	Facundo	176	Signal & Image Processing
Rey	Andrea Alejandra	65	Signal & Image Processing
Rey Vega	Leonardo	28	Signal & Image Processing
Reynoso	Facundo	188	Geoscience and Remote Sensing
Rigo Júnior	Luís Octavio	102	Computational Intelligence
Rinaudo	Fabián	30	Sistemas Energéticos y Distribucción Eléctrica
Riofrio	Daniel	93	Computational Intelligence
Ríos	Anahí Ailén	25	Computational Intelligence
Ríos	Emiliano Luis	25	Computational Intelligence

Rivas	Raúl	149	Geoscience and Remote Sensing
Rivas	Raúl	182	Geoscience and Remote Sensing
Rivera Barrón	Isaac Alejandro	204	Cybersecurity and Cyberdefense
Rivero	Gabriel	172	Engineering in Medical & Biology
Riveros	Nahuel Edgardo	25	Computational Intelligence
Robayo Botiva	Diana María	124	Engineering Education
Roca	Agustín	148	Computational Intelligence
Roda	Fernando	194	Geoscience and Remote Sensing
Rodríguez	Leticia	29	Geoscience and Remote Sensing
Rodríguez	Adonnis	106	Geoscience and Remote Sensing
Rodríguez González	Carla	209	Geoscience and Remote Sensing
Rodríguez Sánchez	Miriam	108	Geoscience and Remote Sensing
Rojas	Ramiro	131	Engineering in Medical & Biology
Román	María Dolores	209	Geoscience and Remote Sensing
Romanos	Pablo M.	246	Cybersecurity and Cyberdefense
Romero	Lucila	24	Engineering Education
Romero	Eduardo A.	206	Instrumentation and Measurements
Romero Jure	Paula	168	Geoscience and Remote Sensing
Romo	Raúl	211	Engineering in Medical & Biology
Roncagliolo	Pedro A.	144	Signal & Image Processing
Rossi	Lautaro	222	Sistemas Energéticos y Distribucción Eléctrica
Rubbo	Germán E.	205	Sistemas Energéticos y Distribucción Eléctrica
Rubio	Jorge	194	Geoscience and Remote Sensing
Rubio	Jorge	195	Geoscience and Remote Sensing
Rubio	Jorge	203	Geoscience and Remote Sensing
Rubio	Raúl	169	Aeronautica y Espacio
Ruiz	María	129	Bioingeniería
Ruiz Benítez	Milena A.	219	Aeronautica y Espacio
Rullo	Pablo G.	193	Sistemas Energéticos y Distribucción Eléctrica
Ruschetti	Cristian Roberto	51	Industrial Applications and Power Electronics
Ruschetti	Cristian Roberto	127	Industrial Applications and Power Electronics
Saavedra	Marcos D	134	Engineering in Medical & Biology
Safont Gómez	Celso Leonel	186	Industrial Applications and Power Electronics
Saggese	Arian	151	Geoscience and Remote Sensing
Salinas	Graciela	218	Geoscience and Remote Sensing
Salvatierra	Nancy A	163	Engineering in Medical & Biology
Salvatierra	Nancy A	166	Engineering in Medical & Biology
Samper	Maurico	90	Sistemas Energéticos y Distribucción Eléctrica
Sánchez	Alberto	185	Computational Intelligence
Sánchez	Alberto	221	Computational Intelligence
Sánchez Crespo	Luis Enrique	116	Cybersecurity and Cyberdefense
Sandoval	Diego	221	Computational Intelligence
Sanseverinatti	Carlos I.	222	Sistemas Energéticos y Distribucción Eléctrica
Santamaría Sandoval	José R	138	Engineering Education
Santamaría Sandoval	José R	146	Engineering Education
Santoni	Diego N.	243	Sistemas Energéticos y Distribucción Eléctrica
Santos Olmo	Antonio	116	Cybersecurity and Cyberdefense
Sarao	Jesús A.	129	Bioingeniería

Scapin	Germán Lorenzo	123	Communications
Scavuzzo	Marcelo	194	Geoscience and Remote Sensing
Scavuzzo	Marcelo	203	Geoscience and Remote Sensing
Scavuzzo	Carlos Matías	208	Geoscience and Remote Sensing
Scavuzzo	Carlos Matías	209	Geoscience and Remote Sensing
Scavuzzo	Marcelo	209	Geoscience and Remote Sensing
Schlesinger	Paola L.	68	Engineering Education
Schmets	Diego	163	Engineering in Medical & Biology
Schneider	Guillermo A	50	Instrumentation and Measurements
Schweickardt	Gustavo	140	Sistemas Energéticos y Distribucción Eléctrica
Scolnik	Hugo D.	34	Cybersecurity and Cyberdefense
Segura Ellis	Joaquín S.	89	Geoscience and Remote Sensing
Segura Ellis	Joaquín	201	Geoscience and Remote Sensing
Seijas	Leticia M.	150	Computational Intelligence
Serafini	María Cecilia	133	Engineering in Medical & Biology
Serafini	Guido	205	Sistemas Energéticos y Distribucción Eléctrica
Servidia	Pablo A.	55	Aeronautica y Espacio
Servidia	Pablo A.	57	Aeronautica y Espacio
Sgró	Mario	203	Geoscience and Remote Sensing
Sgró	Mario A	209	Geoscience and Remote Sensing
Silva	Luis I.	60	Sistemas Energéticos y Distribucción Eléctrica
Silva	Luis I.	226	Sistemas Energéticos y Distribucción Eléctrica
Silva	Luis I.	233	Sistemas Energéticos y Distribucción Eléctrica
Silva	Luis I.	231	Automation, Control, and Robotics
Silva	Hernando	48	Instrumentation and Measurements
Silva	Luis I.	232	Sistemas Energéticos y Distribucción Eléctrica
Silvera Otañe	Jimmy	81	Automation, Control, and Robotics
Silvestri	Renata	60	Sistemas Energéticos y Distribucción Eléctrica
Silvetti	Luna Emilce	121	Geoscience and Remote Sensing
Sliafertas	Matías N.	180	Cybersecurity and Cyberdefense
Sliafertas	Matías N.	227	Cybersecurity and Cyberdefense
Smidt	Javier	144	Signal & Image Processing
Smurra	Marcela Viviana	131	Engineering in Medical & Biology
Sobrero	Cecilia	163	Engineering in Medical & Biology
Solorza	Romina	26	Geoscience and Remote Sensing
Solsona	Jorge A.	35	Industrial Applications and Power Electronics
Solsona	Jorge A.	38	Industrial Applications and Power Electronics
Soria	Mauricio	160	Automation, Control, and Robotics
Sorichetti	Patricio	189	Instrumentation and Measurements
Sorichetti	Patricio	72	Industrial Applications and Power Electronics
Spetale	Flavio E	199	Engineering in Medical & Biology
Spetale	Flavio E	215	Engineering in Medical & Biology
Suárez	Federico	94	Instrumentation and Measurements
Susperregui	Ana	35	Industrial Applications and Power Electronics
Suvire	Gastón O.	179	Sistemas Energéticos y Distribucción Eléctrica
Szupiany	Ricardo	89	Geoscience and Remote Sensing
Szupiany	Ricardo	201	Geoscience and Remote Sensing
Tais	Carlos	183	Instrumentation and Measurements

Tapia	Elizabeth	215	Engineering in Medical & Biology
Tapia Farfán	Carlos	46	Sistemas Energéticos y Distribucción Eléctrica
Tapia Farfán	Carlos	112	Sistemas Energéticos y Distribucción Eléctrica
Tapia Otaegui	Gerardo	35	Industrial Applications and Power Electronics
Tauro	Carolina	195	Geoscience and Remote Sensing
Tello	Emanuel B	213	Engineering in Medical & Biology
Tenev	Daniela	42	Geoscience and Remote Sensing
Tenorio Trigoso	Alonso	40	Computational Intelligence
Teverovsky Korsic	Sofía Andrea	26	Geoscience and Remote Sensing
Theiler	Raúl Ibarra	163	Engineering in Medical & Biology
Thibeault	Marc	79	Geoscience and Remote Sensing
Torre	Gabriel	148	Computational Intelligence
Torre Zaffaroni	Paula	89	Geoscience and Remote Sensing
Torre Zaffaroni	Paula	201	Geoscience and Remote Sensing
Torres	Edgar	188	Geoscience and Remote Sensing
Torrusio	Sandra	154	Geoscience and Remote Sensing
Treo	Ana L	211	Engineering in Medical & Biology
Trigo	Santiago José	64	Cybersecurity and Cyberdefense
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Trosero	Sebastián	120	Computational Intelligence
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Uriburu Quirno	Marcelo	88	Geoscience and Remote Sensing
Utgés	Enid	42	Geoscience and Remote Sensing
Valdiviezo	Diego	32	Automation, Control, and Robotics
Valle Seijo	María Fernanda	61	Geoscience and Remote Sensing
Vanni Duvergel	Felix	252	Computational Intelligence
Vanoli Faustinelli	Lucas Gabriel	164	Geoscience and Remote Sensing
Vega	Sebastián A	20	Automation, Control, and Robotics
Vega	Jorge R	37	Instrumentation and Measurements
Veiga	Ricardo A	131	Engineering in Medical & Biology
Vélez	María Delfina	206	Instrumentation and Measurements
Venere	Alejandro J.	237	Microwave Theory & Tecnology
Venghi	Luis	231	Automation, Control, and Robotics
Venturini	Virginia	67	Geoscience and Remote Sensing
Venturini	Virginia	86	Geoscience and Remote Sensing
Venturini	Virginia	89	Geoscience and Remote Sensing
Venturini	Virginia	201	Geoscience and Remote Sensing
Vera	Matías	28	Signal & Image Processing
Vera Panez	Michael	40	Computational Intelligence
Verne	Santiago	119	Industrial Applications and Power Electronics
Vernieri	Julieta Z.	98	Microwave Theory & Tecnology
Verucchi	Carlos	51	Industrial Applications and Power Electronics
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Villanueva	Santiago	163	Engineering in Medical & Biology
Villarroel	Emilia	19	Engineering Education
Villegas	Fernando	43	Automation, Control, and Robotics
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Vorobioff	Juan	[22](#)	Signal & Image Processing
Walker	Alexis	[142](#)	Computational Intelligence
Walker	Elisabet	[67](#)	Geoscience and Remote Sensing
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Walker	Elisabet	[89](#)	Geoscience and Remote Sensing
Walker	Elisabet	[201](#)	Geoscience and Remote Sensing
Wall	Carlos	[205](#)	Sistemas Energéticos y Distribucción Eléctrica
Wamboldt	Matías N.	[72](#)	Industrial Applications and Power Electronics
Westphall	Johann	[174](#)	Engineering Education
Wighman	Pedro	[27](#)	Engineering Education
Yasnikowski	Matías	[223](#)	Industrial Applications and Power Electronics
Yépez	Fabricio	[109](#)	Automation, Control, and Robotics
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Zabala	Leandro	[236](#)	Engineering in Medical & Biology
Zader	Pablo	[194](#)	Geoscience and Remote Sensing
Zader	Pablo J.	[203](#)	Geoscience and Remote Sensing
Zambrano	Camila	[85](#)	Engineering in Medical & Biology
Zbrun Luoni	Juan Pablo	[188](#)	Geoscience and Remote Sensing
Zelada Rodriguez	John	[40](#)	Computational Intelligence
Zerpa	Vanesa	[84](#)	Instrumentation and Measurements
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Zimmermann	Erik Danie	[29](#)	Geoscience and Remote Sensing
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Zumoffen	David	[193](#)	Sistemas Energéticos y Distribucción Eléctrica

Resúmenes

Los resúmenes o Abstracts del presente congreso están catalogados según la siguiente secuencia:

- ➢ Aeronáutica y Espacio
- ➢ Automación, Control y Robótica
- ➢ Ciberseguridad y Ciberdefensa
- ➢ Comunicaciones
- ➢ Educación en Ingeniería
- ➢ Electrónica de Potencia y Aplicaciones Industriales
- ➢ Geociencias y sensado remoto
- ➢ Ingeniería en Medicina y Biología
- ➢ Instrumentación y Mediciones
- ➢ Inteligencia Computacional
- ➢ Procesamiento de Señales e Imágenes
- ➢ Sistemas energéticos y Distribución Eléctrica
- ➢ Teoría y Tecnología de Microondas
- ➢ Video Juegos

ID55

Title: *Trade-Off Analysis for Attitude Control in Highly Elliptical Orbits*

Autores

Víctor M Canepa (CONAE); Santiago Husain Cerruti (CONAE); Pablo A Servidia (CONAE)*

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Resumen

Three-axis attitude stabilization of a satellite using only magnetorquers as actuators defines an underactuated control system problem. This is due to the fact that the magnetic torque is always orthogonal to the magnetic field vector. There are Low Earth Orbits where the magnetic field has enough variation to prove three-axis stabilization on average. We evaluate this type of control for Highly Elliptical Orbits as a preliminary low-cost alternative for inertial attitude pointing. Nonetheless, we show that this solution is not robust under environmental perturbations and limits the practical application of the magnetic control for high altitudes. We conclude with the combination of reaction wheels and magnetorquers, using the latter to unload wheel's momentum on perigee passages.

ID57

Title: *A Comparison between Tightly Coupled INS/GNSS Strategies for LEO Direct Ascent*

Autores

Víctor M Canepa (CONAE)*; Pablo A Servidia (CONAE)

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Resumen

The navigation of launch vehicle trajectories typically uses data fusion between an Inertial Navigation System (INS) and independent external measurements given by a Global Navigation Satellite System (GNSS) receiver. This technique is called INS/GNSS Integrated Navigation and is implemented through a Kalman Filter. In particular, the tightly coupled variant of INS/GNSS uses GNSS receiver's raw measurements, which are the code phase, carrier phase and Doppler shift, and associated satellite's data ephemeris. Here, we evaluate different strategies for tightly coupled navigation using numerical simulations and true GNSS measurements taken by a receiver being developed concurrently. We also compare different nonlinear Kalman filters, including the Extended Kalman Filter and the Unscented Kalman Filter. The launch trajectory is a direct ascent to Low Earth Orbit.

ID63

Title: *Markov Process Applied to the Study of Turbulent Premixed Flames*

Autores

Sergio A. Elaskar (Instituto de Estudios Avanzados en Ingeniería y Tecnología (IDIT), CONICET-UNC)*; Pascal Bruel (CNRS, University Pau & Pays Adour, LMAP, Inria Cagire Team); Marcelo J Frias (Instituto de Estudios Avanzados en Ingeniería y Tecnología, CONICET y Universidad Nacional de Cordoba)

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Resumen

The present work describes the detailed derivation of the mean reaction rate expression within the framework of a flame model for turbulent premixed combustion based on the Reynolds-Averaged Navier-Stokes (RANS) equations. This represents the first important and necessary step from which future activities will be carried out to develop methodologies aimed at adapting this model to a time-filtered large eddy simulation framework. To this end, the concept of a scalar quantity called c is used, which allows the fluctuating thermodynamic state to be described by a bimodal probability distribution function (c = 0 and c = 1). The time evolution of this scalar quantity is represented by a random telegraph signal. This signal is a stationary random function that can be analysed as a Markov process with only two possible states. In addition, before obtaining the frequency, the residence times in each state, the probability functions of each state, the autocorrelation function, the spectral density and the integral time scale of the process are derived.

ID69

Title: *Initial wave structure in a blast tube*

Autores

Lucas Monaldi (Universidad Nacional de Córdoba)*; Luis Felipe Gutierrez Marcantoni (Fundación Universitaria los Libertadores); Sergio A. Elaskar (Instituto de Estudios Avanzados en Ingeniería y Tecnología (IDIT), CONICET-UNC)

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Resumen

In this paper we study the wave structure by an instantaneous release of energy from which a blast wave is formed. The aim is to describe and understand the wave structures in one dimension after a near-instantaneous energy release. Numerical simulations were carried out with the OpenFOAM rhoCentralFoam solver using the Kurganov, Noelle and Petrova scheme. Mesh and CFL sensitivity analyses were performed, where the need for very low CFL values is observed to avoid the presence of spurious oscillations. Different pressure, velocity, temperature and density profiles are studied and described for different times after energy release. It was also observed that there are no differences in using the first order upwind scheme or the TVD Minmod limiter. Finally, the wave structures are compared if the classical shock tube or a blast tube is used, varying the boundary conditions of the simulations.

ID70

Title: *Influence of TVD limiters on wave structure produced by an instantaneous release of energy using OpenFOAM*

Autores

Lucas Monaldi (Universidad Nacional de Córdoba)*; Luis Felipe Gutierrez Marcantoni (Fundación Universitaria los Libertadores); Sergio A. Elaskar (Instituto de Estudios Avanzados en Ingeniería y Tecnología (IDIT), CONICET-UNC)

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Resumen

The paper studies the influence of the Minmod, van Leer and van Albada flux limiters to numerically simulate the formation of a blast wave following an instantaneous energy release. Mesh and CFL sensitivity analyses are carried out using the upwind reconstruction and the Minmod limiter. Important differences are found in the time step sensitivity analysis between the upwind scheme and when a limiter is implemented, where a lower CFL is necessary to properly describe the flow field. Different comparisons of pressure, velocity, temperature and density profiles between the upwind reconstruction and the Minmod, van Leer and van Albada limiters are studied for different times after energy release. It was found that the upwind scheme is highly diffusive due to the nature of the scheme itself and cannot correctly capture some discontinuities. The simulations are carried out using the Kurganov, Noelle and Petrova (KNP) scheme in the rhoCentralFoam solver implemented in the OpenFOAM software.

ID71

Title: *Development of instabilities in internal structures produced by an explosions*

Autores

Lucas Monaldi (Universidad Nacional de Córdoba)*; Luis Felipe Gutierrez Marcantoni (Fundación Universitaria los Libertadores); Sergio A. Elaskar (Instituto de Estudios Avanzados en Ingeniería y Tecnología (IDIT), CONICET-UNC)

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Resumen

The shock wave generated by the instantaneous release of energy in the centre of a closed domain, its subsequent rebound and reflections are studied in this article. Three cases are simulated where the Mach number of the wave is Ms = 2, 5 and 10. As a result of the interactions between a low-density central zone and the shock waves, the Ritchmyer-Meshkov instability is produced, which is manifested by the breaking of the flow symmetry. The results of the simulations are compared with those presented in previously published works (starting point of the symmetry breaking and the reflected pressures on the walls). The Euler equations are solved using the Kurganov, Noelle and Petrova (KNP) scheme with the rhoCentralFoam solver of the OpenFOAM software, due to the fact that in previous works it has been shown to be able to study with adequate accuracy the representation of wave reflection phenomena on straight walls.

ID104

Title: *Iterative model to solve the Rankine-Hugoniot conditions in calorically imperfect gas mixtures.*

Autores

Marcelo J Frias (Instituto de Estudios Avanzados en Ingeniería y Tecnología, CONICET y Universidad Nacional de Cordoba); Luis Gutiérrez Marcantoni (Facultad de Ingeniería y Ciencias Básicas - Fundación Universitaria los Libertadores.); Sergio A. Elaskar (Instituto de Estudios Avanzados en Ingeniería y Tecnología (IDIT), CONICET-UNC)*

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Resumen

In this paper we present a method to calculate the thermo-mechanical conditions behind a normal and stationary shock wave in calorically perfect and imperfect or thermally perfect gases. In both cases the ideal gas equation of state is verified, but in the second case the specific heats vary non-linearly with temperature. In addition, we evaluate the main differences when applying the Rankine-Hugoniot conditions to air under the assumptions of a calorically perfect and imperfect gas, with the aim of determining whether there are significant differences that justify the use of one or the other constitutive model.

Volver

ID143

Title: *GPS-based real-time LEO satellite navigation using kinematic and reduced dynamic filtering approaches*

Autores

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Resumen

Precise onboard real-time satellite navigation based on Global Navigation Satellite Systems (GNSS) is becoming increasingly important for Low Earth Orbit (LEO) missions. Besides obtaining a point solution, statistical filtering techniques allow not only an increase in precision, but also to improve the robustness in the absence of measurements. The system model on which these techniques are based can vary from a kinematic approach, which use only the instantaneous state of the satellite, to a dynamic approach, where the orbital dynamics are exhaustively modeled. A reduced dynamic approach, where a force model is based on dynamic parameters included in the estimation, presents a balance between both.

This work presents the implementation and testing of two orbital navigation systems for LEO satellites. Each system is based on a kinematic and reduced dynamic approach respectively, for the statistical filtering of dual-frequency GPS pseudorange and delta-range measurements. The system model used in each case is described, as well as the details of the implementation in a in-house designed and manufactured GPS receiver. As an evaluation, the results obtained through testing with a GNSS signal simulator in an orbital scenario are presented, comparing the navigation solutions to the simulated orbit.

The results show correct performance of both systems, obtaining a potential position and velocity precision of 1 m and 10 mm/s for the reduced dynamic approach. The computational load of each approach is also analyzed, showing that although the reduced dynamic approach has a higher computational cost, it performs well in the hardware employed and provides greater precision and robustness.

Volver

ID169

Title: *An educational CubeSat mission for detecting algae blooming in coastal and inland water bodies*

Autores

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Resumen

UFSAT-1 is an educational CubeSat mission funded by CONAE with the purpose of training young researchers from CONAE and graduate students currently enrolled in master and doctoral programs taught at Gulich Institute. The mission includes developing a payload consisting on a multi-spectral camera designed for providing applications suitable for performing research and monitoring algae blooms which could occur on water reservoirs, coastal zones and coastline waters; such as those found in Argentina. Specifically, there is especial interest in Harmful Algae Blooms caused by species which can produce toxins that accumulate in food webs and/or because of mass mortality of fauna due to hipoxia caused by the degradation of high microalgal biomass. Being an educational mission, both the graduate students and the young researchers will have hands on involvement on manufacturing, assembling, integrating and testing the payload as well as developing the applications and operating the spacecraft once in orbit.

ID219

Title: *Implementation of Ground Based Synthetic Aperture Radar applying agile methodology*

Autores

Milena A Ruiz Benitez (UNSAM)*; Enzo German G Garabito Orosco (Universidad National of San Martin); Lucas Martin Contreras Soto (UNSAM); Manuel Elías García Redondo (ITeDA); Daniel Alejandro Almela (ITeDA)

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Resumen

This paper presents the implementation and experimental results of a Ground-Based Synthetic Aperture Radar (GB-SAR) system in the C-band, using agile methodologies for hardware and software development. The system, composed of a vector network analyzer (VNA), horn antennas, a linear rail, control and image processing software, was developed over a period of six months, achieving sub-metric resolution SAR images. The work discusses the agile methodology applied and mentions the main radar parameters, the characteristics of the hardware and control software, the SAR image formation algorithm, and the system's calibration and characterization measurements. Additionally, SAR images obtained from field capture tests are presented. This work represents the first minimum viable product (MVP) on the path towards the development of a constellation of low Earth orbit SAR microsatellites for Earth observation.

ID224

Title: *DBF Radar: A Digital Beam-Forming Radar System for Technology Research*

Autores

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Resumen

The national space plan of CONAE includes the development of an active fixed antenna radar system capable of receiving and transmitting signals, based on the concepts of ``planar array antennas'' and ``digital beam-forming'' as part of a mobile radar system. This document summarizes the latest advances in the development of the technological demonstration model of this radar, which is being used in various applications and new developments within the research, development, and innovation area. Building upon previous research in the field of digital beamforming radars, a fully operational mobile prototype was successfully developed.

ID20

Title: *A Dual Adaptive PID Control Approach for Nonlinear Processes with variable parameters*

Autores

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Resumen

This study is a comparison of a proposal for a PID controller, called a dual adaptive PID controller, with existing PID controllers. They are tested on nonlinear systems with variable parameters and looked at how well they handled changes in reference points, disturbances, and noise. To measure how well the controllers performed, they considered how long it took for the system to reach a steady state (settling time), any temporary overpeaks in the output (maximum overshoot), the ISE, and the ISCO.

ID32

Title: *Control of a pH Neutralization Process using Neural Network Approaches*

Autores

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Resumen

This paper explores the application of intelligent control techniques using artificial neural networks to regulate a nonlinear pH process. Through simulations, we evaluate the effectiveness of these methods compared to traditional control strategies. The first approach involves a control scheme in which a neural network collaborates with a classical PID controller to manage the system, while the second approach utilizes an algorithm that performs online training of a feedforward neural network using error backpropagation. We conduct a comparative analysis with a standard PID controller, focusing on their performance in handling setpoint changes and disturbances.

ID43

Title: *Adaptive Sliding Mode Control with a PID Surface to Control a Nanopositioning System Actuated by Piezoelectric*

Autores

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Resumen

Nanopositioning devices are a fundamental part of manipulation systems in areas such as nanotechnology, biotechnology, microfabrication, among others. An effective way to achieve movements with submicrometer resolution is through flexible systems with piezoelectric actuation. These devices present nolinear phenomena and eventually external disturbances that can severely affect the closed loop performance. This work presents an adaptive Sliding Mode Control law with a Proportional-Integral-Derivative sliding surface, designed for a flexure stage with a piezoelectric stack actuator. The system to be controlled is modeled as a second order dynamics to include its high frequency response. Additionally, the hysteresis of the piezoelectric is modeled using the Bouc-Wen model. To suppress the typical chattering of the Sliding Mode Control, the hysteresis is compensated by state variable feedback and an adaptive control technique is implemented to adjust the gain of the robust term of the controller. Determination of the closed loop system stability is presented using Lyapunov theory. To evaluate the performance of the proposed controller, a series of positioning experiments are performed, obtaining submicrometric errors, both in trajectory tracking and in target positioning.

ID81

Title: *Instrumentation and Automation System of a Vacuum Tube Solar Water Heater Based on Industry 4.0 Under Real Operating Conditions*

Autores

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Resumen

Solar collectors allow us to take advantage of solar thermal energy, the energy is transferred from a heat radiation source to the working fluid, one of the most used is the evacuated tube solar collectors. In order to experimentally calculate the efficiency of evacuated tube solar collectors, it is necessary to measure physical parameters in real operating time that have an impact on their thermal performance. The main objective of this research is to instrument and automate an evacuated

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tube solar water heater subjected to real operating conditions, and using industrial components for monitoring and storing temperature, solar radiation, and wind speed in real-time, using the internet of things IoT and cloud computing technologies. For the development, the mechatronic design methodology, a VDI 2206 standard is used. It begins with the solution concept, followed by detailed engineering, selection, and dimensioning of the electrical control panel, instrumentation of the solar water heater, and the implementation of the electrical panel. The algorithm was programmed using the programmable logic controller, PLC, the supervision and control system, SCADA, and the data are stored locally in a SQL server. The developed system allows monitoring of the data through the Internet of Things IoT and cloud computing, industry 4.0. The most important results are to monitor the temperature at 3 levels, both in the collector tank and in the vacuum tube, as well it was monitored the water input temperature, the ambient temperature, the solar radiation, and the wind speed; all these measurements allow having data from a prototype of a commercial evacuated tube collector at real operating conditions.

ID83

Title: *Fractional-Order PID Controller: A Tuning evaluation using Bio-inspired optimization methods*

Autores

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Resumen

This study explores the use of biology-inspired optimization methods to improve the performance of fractional-order PID controllers. By fine-tuning these controllers' parameters with various bioinspired techniques, the research enhances control performance, including stability and transient response.   The study evaluates the effectiveness and efficiency of these optimization methods, providing valuable insights for engineers and researchers working with nonlinear and uncertain systems. In addition, it contributes to the growing body of knowledge on the application of bioinspired optimization in control engineering.

ID95

Title: *Robotic Arm Handling Based on Real-Time Recognition of the Number of Raised Fingers Using Convolutional Neural Networks*

Autores

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Resumen

This paper presents a system for operating a robotic arm based on the number of raised fingers detected in a human hand using a camera mounted on the robot. Leveraging advancements in physical human-robot interaction (pHRI), the system utilizes a convolutional neural network (CNN) to interpret hand gestures for intuitive control. Initially, the system uses the MediaPipe Framework to identify 21 landmarks of the hand, which are then used to define the bounding box of the hand. A convolutional neural network (CNN) processes this bounded hand image to determine the number of raised fingers. Implemented using a Jetson Nano, a Logitech Brio 4K webcam, and Python libraries such as OpenCV, I2C tools, and TensorFlow, the model was trained on 30,000 images, achieving a 92.7% accuracy during training and 94% during real-time testing. A voting strategy ensures robust predictions by considering the most frequent result from ten consecutive predictions, mitigating the impact of minor hand movements. The system demonstrates the potential for advanced applications in hand gesture-based robot manipulation and interaction.

ID101

Title: *Data Acquisition and Monitoring for Photovoltaic Plants Based on Low-Cost IoT Technologies*

Autores

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Resumen

With the significant increase in the installed capacity of photovoltaic plants, especially large plants, challenges related to monitoring generation are becoming increasingly common, mainly due to the high cost of equipment, leaving small companies and even end consumers without a monitoring. For effective management of energy generation, it is important to remotely monitor operational information, daily production and climatic variables that influence generation. However, this task becomes expensive for facilities located in remote areas where physical access is limited. In this context, this project's technological contribution is the development of a monitoring system and a data acquisition prototype capable of sending it to the internet and accessing it from anywhere using simple programming language, such as the Arduino IDE and the board ESP32 development.

ID109

Title: *Fractional Order PID Control Applied to a Pasteurization Plant*

Autores

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Resumen

Milk pasteurization is complex and nonlinear, challenging to manage with traditional controllers such as ON-OFF or PID. This study examines fractional-order PID (FO-PID) control due to its ability to handle numerous variables effectively. The FO-PID controller ensures performance and robustness to maintain the required temperature limits. Using the Armfield Process Plant Trainer, PCT23MKII, a realistic small-scale model of a pasteurizing process is established. This system includes high-/low-level switches and two-way solenoid valves for tank filling operations. The results indicate that FO-PID extends the functionality of classical PID controllers by enhancing the delivery of the control signal.

ID118

Title: *A Comparative Study of Fractional PID and Integer PID: Experimental test results on a Thermal process*

Autores

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Resumen

The fractional integral (FO) is an advanced variant that extends the conventional PID controller by incorporating noninteger (fractional) orders of integration and differentiation. This modification allows for a more flexible response to the error signal, improving stability and efficiency compared to the traditional PID. This paper presents a comprehensive comparative study conducted within Simulink for the Temperature Control Lab (TCLAB). The results show that fractional PIDs perform better than regular PIDs due to the two additional tuning parameters that allow for better tuning in the controller's action.

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ID136

Title: *Estimation of the Torque Exerted by the Cyclist in Electric Bicycles with Pedal Assistance using Disturbance Observer.*

Autores

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Resumen

This paper proposes a strategy for estimating the torque exerted by a cyclist on an electric bicycle using an integral disturbance observer. To achieve this, the longitudinal dynamic model of the bicycle, including the resistant load, was utilized. Based on this model, an estimation strategy is proposed using the available measurements from the Permanent Magnet Synchronous Motor (PMSM), where the angular velocity represents a state variable of the model and is determined from the Hall effect sensors located in the stator of the motor. This estimation strategy offers a novel approach, as it can be applied to a pedal-assist bicycle without the need for a torque sensor, significantly reducing costs while simultaneously increasing the robustness and reliability of the system. Finally, to validate the proposed observer, experimental results are presented using a 26-inch electric bicycle ridden by two riders of different weights and equipped with a torque sensor incorporated into the pedal shaft.

ID147

Title: *Architecture of a fault-tolerant navigation, guidance and control computer*

Autores

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Resumen

This work details the design and construction of a Navigation, Guidance and Control flight controller for small autonomous vehicles. With the objective of achieving fault tolerance in the on-board computer of a small UAV, the necessary considerations are taken for the connection and management of information between three identical units called nodes. A distributed architecture is proposed, where each node receives the data acquired by the others and executes an algorithm to corroborate its consistency. To validate the operation, an experimental test is carried out where the failure of an inertial unit is detected.

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ID152

Title: *Collaborative Robot Mapping via Frequent Encounter-Based Fusion*

Autores

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Resumen

Exploration strategies are essential for a robot team to explore and navigate efficiently in unknown environments. In this study, an exploration strategy designed to coordinate a robot team that experiences frequent encounters and has limited communication is introduced. The strategy takes advantage of these frequent encounters to exchange information and generate a global map by fusing the partial maps of each robot. The locality of the point clouds in the encounters is used to calculate the transformation between robots using the ICP algorithm. Additionally, a method for frontier detection that treats the maps generated by robots as images is proposed, thus facilitating the identification of areas to be explored. Finally, results obtained from both simulations and experiments in real environments are presented.

ID160

Title: *2DOF-PID Adaptive Gain-Scheduling Control for Nonlinear Process with Dominant Delay*

Autores

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Resumen

This paper presents an adaptive PID with two degrees-of-freedom (2DOF-PID) controller with gain scheduling for a non-linear mixing process with a dominant delay. The adaptive controller is compared to a classical PID and other improved PID schemes. A tracking task with external disturbances is carried out for a mixing tank with variable parameters and dominant dead time as a benchmark of a single-input and single-output (SISO) system through Simulink. The results indicate that the adaptive controller shows better conditions in the control challenge against other PID schemes. The efficacy of the controllers was studied by analyzing their tracking and regulatory responses.

ID161

Title: *The Impact of Delays in Actuators and Transmitters on Control System Performance*

Autores

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Resumen

This paper uses Bode's considerations to investigate how delays in actuator channels and transmitters affect the performance of control systems. A PID controller is used to observe the effect of different delays on system performance. The results of this study give a detailed understanding of the small impacts of delays on control systems. This helps improve efficiency and dependability in the design and implementation of future control systems.

ID165

Title: *Liquid Level Control using a Variable Parameter Fuzzy Controller*

Autores

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Resumen

Fuzzy Logic provides an innovative control methodology suitable for both linear and non-linear systems. It can be easily implemented in embedded systems and Programmable Logic Controllers (PLCs), leading to lower development costs, enhanced robustness, and practical application in real industrial environments. This paper presents the design and implementation of a Variable Parameter Fuzzy Controller for liquid level control, programmed on a PLC Modicon M580. The performance of the proposed fuzzy controller is compared to that of a nonlinear PID controller using performance indices such as the Integral of Squared Error (ISE), Integral of Absolute Error (IAE), and Integral of Squared Control Output (ISCO). The main contribution of this work is the enhancement of the response of the fuzzy controller through the nonlinear variation of the scaling gains based on the error. Experimental results demonstrate that the proposed controller significantly outperforms the nonlinear PID controller in both liquid level regulation and disturbance rejection tests.

ID192

Title: *Implementation of an initial rotor position estimation for PMSM drives based on high frequency voltage signal injection*

Autores

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Resumen

In this paper, the analysis and implementation of an initial position estimation method based on high frequency sinusoidal voltage signal injection is presented for an interior permanent magnet synchronous in-wheel motor used for skateboards. The importance of a proper initial position estimation is to control precisely the torque in electric vehicles from the motor start-up. Initially, the high frequency sinusoidal voltage injection method is modeled and analyzed. Secondly, the transfer function of the estimator is analyzed and its gains are calculated. Finally, implementation details and experimental results are shown to verify the effectiveness of the estimation method. It can be seen that the initial position estimation converges correctly, and the transition between using the low and high speed estimation methods occurs smoothly.

ID231

Title: *Modelado y simulación de un cuerpo de siembra con suspensión pasiva por resortes*

Autores

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Resumen

En este trabajo se realiza el modelado y la simulación de un cuerpo de siembra con sistema de suspensión pasivo por resortes. Este sistema se encarga de regular la fuerza vertical que el cuerpo de siembra ejerce sobre el suelo para evitar compactarlo durante el sembrado. Sin embargo, a lo largo de un terreno se encuentran irregularidades tales como ondulaciones, montículos de rastrojos, variaciones de la pendiente y/o la dureza del suelo, frente a las que el sistema de resortes no es suficientemente efectivo. Por lo tanto, para conocer en mayor detalle el desempeño dinámico del cuerpo de siembra y la interacción entre sus partes, se proponen dos modelos matemáticos y se realiza su validación utilizando el entorno de simulación 20SIM.

ID33

Title: *Gender diversity in cybersecurity: gaps, challenges, and proposals*

Autores

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Resumen

This paper explores the gender issue in the field of cybersecurity, a sector that presents a significant gap, under the premise that all transformative action is based on educational issues. The objective is to analyze the representation of women in this industry, identifying the cultural, educational and professional barriers that hinder it. In addition, the impact on work teams is evaluated, highlighting how inclusion can improve effectiveness. From this, recommendations are proposed to improve gender diversity in the sector, offering strategies and practices for governments, organizations and educational institutions. This work seeks to contribute to a deeper understanding of gender dynamics in cybersecurity and to promote a more inclusive and equitable environment, making the issue visible, and considering the scarce literature in Spanish, which highlights the need for more local research.

Volver

ID34

Title: *Malware Detection with AI*

Autores

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Resumen

In this paper, we will present two existing approaches that utilize machine learning techniques for dynamic analysis, as well as an approach that employs deep learning. Additionally, we will propose an enhancement to a previously studied method. For the dynamic analysis of malware, we review various current research directions, focusing on several machine learning techniques used in this context, though without providing experimental results. The aim is to offer the reader a concise introduction to the different techniques and algorithmic formulations. Similarly, the approach involving deep learning will be discussed. Finally, we introduce a modification to an idea previously proposed in the literature and analyze the differences it brings.

Volver

ID59
Title: *Tectonic: An Academic Cyber Range*

Autores

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Resumen

This article introduces Tectonic, an academic cyber range designed to enhance cybersecurity education and training through a comprehensive learning environment. Cyber ranges are platforms that provide environments for networks, systems, and applications that can be used to train users on cybersecurity topics. Key functionalities of our platform include customizable network configurations, real-time monitoring and automated attack simulations. The architecture of the cyber range is described in detail, encompassing the foundational infrastructure, virtualized network environments, and integrated platforms that collectively facilitate realistic cybersecurity scenarios. The article also delineates the pedagogical benefits of utilizing the cyber range, highlighting how it bridges theoretical knowledge and practical skills. The article concludes with reflections on user experiences and feedback, underscoring the cyber range potential and its future development prospects.

ID64
Title: *CII-GUIDE: A Guide for Addressing Cybersecurity Incidents in Critical Industrial Infrastructures*

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Resumen

This article presents a Guide for Addressing Cybersecurity Incidents in Critical Industrial Infrastructures. The guide provides a comprehensive approach to cybersecurity management in critical industrial infrastructures, addressing conceptual aspects, security priorities, and a structured framework for implementing cybersecurity measures.

ID115
Title: *Designing artificial intelligence with privacy at the center*

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Resumen
This article delves into the critical integration of privacy by design in artificial intelligence (AI). As AI evolves and permeates various sectors, it brings unparalleled efficiency and personalization but also significant privacy challenges. The article explores the impacts of AI on data privacy, highlighting issues such as data re-identification, transparency, and data security. It underscores the importance of incorporating privacy from the design phase, following key principles such as proactivity, privacy as a default setting, and user-centric design. By adopting these principles, companies can ensure their AI systems are both technologically advanced and ethically responsible, building trust and ensuring sustainability in the digital age.

ID116
Title: *Towards a Holistic Cybersecurity Framework for e-Governments*

Autores
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Resumen
In the context of the growing cybersecurity challenges for governments, this work presents a holistic cybersecurity framework specifically designed for e-Governments, distinguished by integrating recent advancements in risk management, regulatory compliance, and secure data exchange technologies, with a focus on strategic cybersecurity governance. Building on the MARISMA methodology, an adaptive risk Meta Pattern for e-Governments is developed, enabling dynamic and continuous threat assessment in a diverse governmental environment. Additionally, an extension of X-ROAD is introduced, addressing a limitation of this framework by expanding access to a secure interoperability solution across multiple countries. The framework also incorporates a strategic focus on sustainability, addressing cybersecurity not only from a technical perspective but also from social and economic dimensions. This work advances the construction of a secure and adaptable ecosystem for the e-Governments of the future, providing a comprehensive response to current and emerging cybersecurity challenges.

ID125

Title: *Current and future panorama of Quantum and Post-Quantum Cryptography*

Autores

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Resumen

The protection and security of information have always been and continue to be one of the major challenges we face today. Message encryption, digital signatures, financial and banking transactions, and the emerging cryptocurrency market are all threatened by the advancement of quantum computing and its potential ability to break the keys of current algorithms. Cryptographic environments based on public key encryption and digital signatures could be compromised by a sufficiently powerful quantum computer. Over the last decade, state organizations and companies dedicated to information technologies have made significant progress in the development of quantum and post-quantum cryptography. This article aims to provide an overview of the advancements and evolution of quantum and post-quantum cryptography algorithms, highlighting their importance in creating secure encryption to mitigate the potential threats posed by quantum computing.

ID139

Title: *Application self-protection and its use in SCADA systems in critical infrastructures: a systematic mapping of the literature*

Autores

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Resumen

Context: Industrial systems are facing an increasing number of cybersecurity threats, especially with the rise of Industry 4.0 and the integration of communication protocols. As a result, protecting critical industrial systems and production lines from cyber threats has become an increasing concern. Objectives: it is evident that the development and implementation of self-protection mechanisms for industrial systems play a crucial role in guaranteeing the security and reliability of critical infrastructure, which is why this work shows and analyzes the results obtained by carrying out a systematic mapping of the literature on application self-protection technologies, their use in SCADA (Supervisory Control and Data Acquisition) systems in critical infrastructures and the use of RASP (Runtime Application Self-protection) technology in industrial environments. Method: the creation and execution of a protocol that establishes a set of questions to be answered and the procedure for the search is detailed, and subsequently the application of filters for the selection of articles. Finally, the analysis is carried out in order to answer the questions posed. Results: it can be seen that the so-called self-protection technologies widely used in IT environments can be brought to OT environments, hence solutions such as intrusion detection systems (IDS), web application firewall (WAF) or In-memory software execution protection can be used in both environments. Conclusions: Although various types of self-protection technologies have already been implemented in industrial environments, it was not evident in the articles analyzed that RASP technology is used in them.

CIBERSEGURIDAD y CIBERDEFENSA

ID180

Title: *FIVE STANDARDS MODEL IN INFORMATION SECURITY MANAGEMENT SYSTEMS AND BUSINESS CONTINUITY*

Autores

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Resumen

In the current context of the digital economy, characterized by increasing complexity and challenges in information security management and business continuity, an innovative model for the governance, implementation, maintenance, and continuous improvement of Management Systems (MS) is presented. This model integrates the requirements of international standards ISO 27001 and ISO 22301. Based on a case study, a simple and dynamic documentary structure is proposed, facilitating efficient management and control of the MS. The proposal is supported by specialized committees that operate in a coordinated manner, integrating the areas of Information Technology (IT) and Information Security within the corporate governance framework. The model is flexible and adaptable to various organizational contexts and other Management Systems standards. Its main objective is to achieve significant improvements in document management and MS monitoring, ensuring compliance and integration with the aforementioned regulatory frameworks. This approach also promotes organizational resilience against adversities and crises, aligning the MS strategy with business objectives.

ID181

Title: *Cibersecurity and Academia*

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Resumen

In the last few years and especially since the COVID-19 pandemic, computerization of daily life has increased, and with it cybersecurity incidents have also incremented in number. In this work, we intend to survey the skills required by IT and telecommunications professionals, the work that has been done in other places, and the offer available in the field in graduate courses in the country.

ID204

Title: *Tlaotic: Blockchain-based digital ballot box compatible with Mexican Electoral Processes*

Autores

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Resumen

In recent years, previous research presented digital voting systems based on blockchain, and some used in digital elections. For the present investigation, it is essential to address the ballot box in a unitary manner as a component, to ensure transparency in the receipt and storage of votes. This article presents a prototype of a digital ballot box based on blockchain technology, designed to comply with Mexican regulations and preserve the fundamental characteristics of a ballot box. Blockchain properties were adapted to offer transparency, auditing and monitoring by citizens in the reception and storage of votes. The ballot box is flexible for integration into voting systems, electoral processes and ballots. The design process combined qualitative, quantitative and experimental analysis to determine the technical parameters of the prototype. Performance and resource consumption of blockchain nodes results was obtained from the experimental stage. Finally, implementation recommendations are presented.

ID212

Title: *Implementation of post-quantum cryptographic libraries on ARM architectures*

Autores

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Resumen

The increase in computing power and the advent of quantum computers pose a significant threat to modern cryptographic schemes. As a response, the National Institute of Standards and Technology (NIST) has initiated a process to standardize one or more quantum-resistant public-key cryptography schemes, commonly referred to as post-quantum or quantum-resistant schemes. The scientific community has developed several software implementations for x86 and ARM architectures, for which the compatibility of these developments has also been evaluated. Based on these evaluations, it has been discovered that certain devices, specifically ChipWhisperer boards, exhibit certain limitations. Based on this, this work presents an improvement to the implementation of the PQClean library, focusing on the Kyber512 scheme for integration with ChipWhisperer boards. The implementation is tailored to the specific functionalities and development environment of these embedded devices. Certain libraries claim to provide support for the ChipWhisperer family of devices. However, it has been demonstrated that the pqm4 implementation, despite being partially based on PQClean, is not fully compatible due to the utilization of assembly language in certain functions. This research highlights the challenges and proposes solutions to improve the integration of post-quantum schemes in embedded environments.

ID214

Title: *Taxonomy of Personal Data for Public Organizations in Mexico*

Autores

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Resumen

In Mexico, government organizations process different subsets of personal data, according to their scope or main activity. Although the types of personal data are usually the same, each institution treats them with different names, sizes, or formats. The main contribution of this work is to propose a taxonomy of personal data that is a guide for their identification and classification and for the design of standardized elements that represent them. The proposed taxonomy is dynamic, flexible, and facilitates security from the design of the data in the applications, systems, and computer models of Mexican public organizations, and allows the secure exchange of information. This taxonomy focuses on compliance with transparency and access to public information of the government organizations. The personal data sensitivity and confidentiality criteria were analyzed and defined with a computational implementation perspective not seen in the state of the art.

Volver

ID227

Title: *Minimum parameters for design and implementation of adaptive cybersecurity courses*

Autores

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Resumen

In the creation of new cybersecurity and information security courses, many initial design and implementation decisions remain static or unchanging over the years, which may result in the propagation of inefficient educational practices and the inclusion of obsolete topics within the specialty. This paper puts forth a set of minimum parameters that, when considered as modifiable by design, facilitate an adaptable and flexible implementation of courses in this discipline. These include the body of content, the evaluation methodology, the form of interaction and attendance, the feedback mechanism, the format and modality of delivery, the educational material, and the teaching staff. To illustrate this approach, we present a case study of a university diploma course in information security. Over a ten-year period, the course was reviewed and adjusted to respond to the evolving needs of the context and emerging trends. The results demonstrate the value of an adaptive approach in the design and implementation of courses in this discipline, indicating a positive impact on students when they encounter the challenges of the field.

Volver

ID229

Title: *Portable device for diagnosing computer networks*

Autores

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Resumen

Proposal and development of hardware and software for the creation of an autonomous computing device, with network software tools. The project looks to help in network diagnosis and audit tasks during field work. The device will use a touch screen and graphical interface for audit tools with a simple approach for ease of use and for advanced and beginner users.

ID230

Title: *Real Random Number Generator Hardware by Quantum Decay*

Autores

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Resumen

Construction of a practical hardware quantum random number generator (QRNG), by means of radioactive decay of Am241, extracting on that basis, values from two hexadecimal counters, controlled by a 1 MHz clock. First results obtained and possible utility.

ID240

Title: *Project-Based Learning in Cybersecurity: Methodologies and Scope*

Autores

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Resumen

The project-based learning (PBL) approach effectively develops technical competencies and critical skills in cybersecurity due to the dynamic nature of current threats. This paper analyzes the implementation of PBL at the Faculty of Engineering, University of Buenos Aires (FIUBA). Reviewing the employed methodologies and obtained results, we identify best practices and recommendations for future cybersecurity education. PBL allows students to apply theoretical knowledge in practical

contexts, fostering Deep learning, creativity, autonomy, and responsibility. The transition from traditional exams to project-based evaluations has significantly improved learning quality and academic performance.

ID244
Title: *Systems and Network Security with eBPF*

Autores

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Resumen

eBFP technology allows users to develop special programs that will be executed in the context of an operating system kernel. Initially, the project was aimed at packet filter development but later evolved to enable other operations such as observability, performance and security. This article describes the main concepts of eBPF, development tools and their application in the implementation of system and network security policies in GNU/Linux systems.

ID246
Title: *Cibercrime Investigation and Security Evaluation Framework*

Autores

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Resumen

Wireless WLAN technology offers advantages over other traditional wired technologies. Traditional cable topologies allow physical access to the transmission medium only to registered users, however, in WLAN networks, any person within the range of the WLAN access point will have physical access to the medium.
The present work called CROZONO, presents the idea of remote digital forensics from the use of unmanned aerial vehicles that could facilitate access to the transmission medium, easily overcoming the barriers of physical controls.
The work focuses on the development of a modular framework for the exploration and auditing of wireless infrastructures, which allows the acquisition of digital forensic evidence from the operation of unmanned aerial vehicles (UAVs, robots and remote-controlled prototypes) in an automated way.

ID31
Title: *Low coherence interferometry to generate spatial carriers*

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Resumen
In this work we present the possibility of using low coherence interferometry to generate spatial carriers for optical fiber communication systems. Enabling the augmentation of data throughput within a unique optical fiber, a topic of great interest worldwide. A preliminary experimental result and its post processing are presented

ID45
Title: *Indoor tracking based on time measures under mixed propagation conditions*
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Resumen
Indoor positioning systems are often based on the measurement the time of flight of RF signals. Unfortunately, this measurement is affected by synchronization problems among devices and non-line-of-sight conditions. Thus, it is necessary to take these adverse conditions into account, as it is done in this work. In particular, we manage to track a device with in a realistic indoor environment using an algorithm that also allows synchronization among devices.

ID100

Title: *Robust IQ Imbalance Compensation for Free Space Optics Communications Links*

Autores

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Resumen

In this paper, we propose a robust IQ compensation scheme for optical communication links, which consists of two compensation stages. Through targeted simulations and experimental measurements, we demonstrate that the proposed approach achieves an improvement of over 1 dB in signal-to-noise ratio (SNR) compared to typical single-stage processing. This double-stage IQ imbalance compensation effectively addresses phase and amplitude imbalance effects that degrade the performance of coherent optical communication systems. By mitigating the imbalances introduced by the receiver front-end and the transmitter modulator, our scheme enhances overall system performance. The improvement in SNR underscores the robustness and reliability of our approach, making it well-suited for high-demand optical communication networks.

Volver

ID103

Title: *Implementation of tracking system for Yagi-Uda antenna in satellite ground station*

Autor

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Resumen

In recent years, satellite images have been widely used to study environmental parameters. In our region, climatic factors have an impact on agricultural and livestock production, and a prediction of their impact would enable the implementation of strategies to minimize it. For this reason, through this work we intend to implement a tracking system to facilitate the direction of the Yagi-Uda antenna to be used in a satellite ground station, with the objective of specifically receiving information from meteorological satellites of the NOAA.

Volver

ID123

Title: *Performance Assessment of LoRaWAN DtS-IoT Networks: Operation Modes and Server Placement*

Autor

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Resumen

The number of devices and services implemented on the Internet of Things (IoT) has grown significantly in recent years, creating the need to extend its reach, especially in areas where terrestrial infrastructure is not viable. This is where satellite connectivity becomes important, as it would provide efficient and global connectivity for IoT implementations in remote areas. Consequently, the concept of Direct-To-Satellite IoT (DtS-IoT) networks has emerged, where low-power devices, LPWAN, can connect directly to low-earth orbit (LEO) satellites. These networks pose new challenges for research and development due to the long transmission distances and variable communication conditions. This work evaluates one of the LPWAN technologies most suitable for the DtS-IoT scenario: LoRa and LoRaWAN. LoRa refers to the physical communication layer, while LoRaWAN is the communication network between LoRa devices. The research focuses on a DtS-IoT environment where LEO satellites collect data from multiple end devices on the ground. The medium's behavior is examined, exploring various factors to improve communication efficiency. Additionally, the architecture of the LoRaWAN network is addressed, with a specific focus on the optimal location of the network server, a crucial element for authenticating the data collected from the end devices.

ID153

Title: *SNR Estimation in Wireless Control Systems for Electrical Microgrids Using Wavelet Neural Networks*

Autores

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Resumen

This paper introduces a design for a Wavelet Neural Network (WNN) to estimate the link quality through the signal-to-noise ratio (SNR) between a wireless sensor network. The samples of the received signal strength indicator data are obtained from a wireless link between a low-cost ESP32 microcontroller and a WiFi access point. The SNR is described in a time-varying nonlinear component and a non-stationary random component. Each of these components is processed independently. The configuration and initialization parameters of two WNNs are defined based on the acquired data, and their training is performed. The configuration of the WNN allows for the estimation of the confidence interval in which the SNR values will be contained. Furthermore, a comparison of the algorithm's performance concerning a conventional neural network is presented, demonstrating that the WNN exhibits superior performance due to the estimated confidence interval covering 15 more values than its traditional counterpart.

ID155

Title: *Spurious Photon States at the Quantum Harmonic Oscillator with Glauber-Bessel Hamiltonian*

Autor

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Resumen

Commonly, coherent states can be represented in terms of an exact expansion of Fock's states and a Gaussian distribution. This paper explores the harmonic quantum oscillator through integer-order Bessel functions expected to replace Gaussian profiles. As consequence of having opted Bessel polynomials, the annihilation and creator operators acquire a new mathematical form. This led to construct a kind of Glauber Bessel Hamiltonian that reproduces standard quantum oscillator energies as well as spurious terms that are interpreted as an inherent noise. In praxis, this novel Hamiltonian can be employed to model cases in which there is evidence of spurious pulses in an experimental scenario of photons correlation without any formalism of perturbation theory.

ID173

Title: *Universal Bias Controller Testbed for DP-IQ Modulators in Coherent Optical Links*

Autores

Omar Lopez Cabrera (CONICET)*; Giovany Almeida Serra (Instituto Balseiro); Leonardo Ortiz (CNEA); Manuel Fernandez (CONICET); Laureano A Bulus Rossini (Instituto Balseiro); Pablo Costanzo (Instituto Balseiro); Leonardo L Morbidel (Instituto Balseiro)

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Resumen

This paper presents the design, implementation, and testing of a testbed for the automatic bias controller (ABC) required in dual-polarization in-phase and quadrature (DP-IQ) modulators, like those used in coherent optical communication systems. The importance of controlling and adjusting the modulator bias signals is analyzed, as they directly impact the SNR of the demodulated signal. The operation of the testbed is demonstrated by implementing a bias adjustment algorithm that uses auxiliary signals or dithers. Finally, the performance of the testbed and ABC is experimentally validated by implementing a coherent optical communication system with DP-QPSK modulation at 10, 20, 100, and 128Gb/s data rates.

COMUNICACIONES

ID175

Title: *Theory and Testing of Bayesian Handover*

Autores

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Resumen

Inspired in new paradigms about the advanced engineering and usage of resources in 5G and schemes expected to be applied in prospective wireless systems, the idea that an event of handover (hard or soft) is dictated by Bayesian probabilities, is explored. In essence the entire action of handover is described by the mathematical pieces of Bayes's theorem. It clearly implies to define the prior and posterior probability. Thus, a Bayesian formulation has been developed. The so-called negation probability in a Bayesian scenario has allowed to simulate handover probabilities. It was found that although users are carrying out the completion of call after a successful handover, nonlinearities would emerge as a response to massive connectivity as well as inter-cell interference, among other factors.

ID178

Title: *Work in Progress: Automatic satellite image receiver system for NOAA weather satellites*

Autores

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Resumen

The National Oceanic and Atmospheric Administration (NOAA), an office of the USA government, has deployed low-orbiting satellites in the sky for weather forecasting purposes since the end of XX century. These satellites continuously transmit images of the Earth using a protocol called Automatic Picture Transmission (APT). Many documents are available on the Internet explaining how to receive images from NOAA weather satellites. It is a significant challenge because it requires diverse knowledge in areas such as hardware, software, electronics, and signal processing. It is a multidisciplinary task. To receive an image, you need to know when the satellite passes over your location. At that moment, you have to receive the signal and process it. Typically, these are manual jobs. But, automating the process adds a new level of difficulty. It is necessary to orchestrate or link several processes. This paper describes the advances made in implementing an automatic satellite image receiver system for NOAA weather satellites.

ID19

Title: *Reverse Engineering for a Ball-Plate Control System for Educational Purposes*

Autores

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Resumen

This paper describes the reverse engineering of an embedded ball-and-plate system, focusing on a comparative analysis of stabilization control strategies. The paper aims to deploy a versatile Arduino regulator, allowing adaptability to advanced control schemes. The new Arduino regulator enables the implementation of a classical proportional derivative control (PD) and nonlinear PD controller to evaluate the system's performance on the new board. This expanded the Arduino's usability for customization and research and validated its functionality by successfully applying two controllers, demonstrating increased efficiency with the nonlinear PD. It also highlights the accessibility and quality of the prototype, making it suitable for educational settings.

ID24

Title: *Catálogo-DI: SWRL Rules Definition that Conceptualize Instructional Design Methods for the Development of Learning Objects for Engineering Education*

Autores

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Resumen

To enhance the chances of effective learning, it is appropriate to design learning experiences following the guidelines provided by Instructional Design Theories. Nevertheless, engineering educators are not familiar with such theories. Therefore, a catalogue of Instructional Design methods, Catálogo-DI, is proposed in this work. It will be part of the knowledge base of a recommender agent to assist inexperienced teachers in the process of developing learning objects. Catálogo-DI was defined from rules belonging to the Catalogue of Partial Representations of Instructional Design Theories proposed in the literature, and is implemented in Semantic Web Rules Language. Each catalogue applies to different ontological structures. The first applies to learning object ontology, Onto-OA (own authorship), while the second applies to ontology of learning designs as defined by the IMS-LD specification. For this reason, it was necessary re-write rules presented in this work.

ID27

Title: *Teaching Process Management with an Operating Systems Simulator: The UR-OS Experience*

Autor

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Resumen

Every computer science student must learn about operating systems fundamentals, including topics related to process planning, memory management, etc. Some basic concepts are mostly theoretical and have to be tested by hand because they are not implemented in modern OSs; however, understanding them is critical because they set the basis for all the existing techniques. This paper presents the first version of UR_OS. This new Java-based operating system simulator allows learning about process planning algorithms and the creation of new ones to evaluate their performance. This tool has been used in class and evaluated by the students in terms of how it supported their understanding of the topic and the usability of the tool. In addition, the grades in similar evaluations are compared to a traditional strategy to assess the tool's impact. The results show that the students had a very positive perception of working with the platform and felt that it indeed helped them to learn the concepts. Also, all students felt more motivated to work with a digital platform compared to a paper-based methodology.

ID68

Title: *Transforming Engineering Education: Competency-Based Solutions and a Student-Centered Approach to increase graduation rates*

Autores

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Resumen

The accreditation of Engineering careers requires adjustments in the study plans in order to comply with the standards defined by official organizations. The Electronic Engineering degree at the Faculty of Exact and Natural Sciences and Surveying of the National University of the Northeast must propose a new study plan focused on the student and based on competencies. This opens up several challenges, because three different study plans from 2001, 2006 and the current one, 2012, coexist. This work presents the actions, methodologies, and strategies that were carried out to complete the graduation of 35 engineering students from the plans 2001-2006 and 2012 within two years, in addition to the work proposed since the creation of the new plan based on competencies to clean up the practices that led to hindering the qualification of electronic engineers in our region.

ID124

Title: *Atributos relevantes que definen el desempeño de estudiantes universitarios en el uso de plataformas LMS aplicando algoritmos de aprendizaje automático*

Autores

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Resumen

En este documento se presenta la aplicación de algoritmos de aprendizaje automático para identificar los atributos más relevantes que definen el desempeño de estudiantes universitarios en el uso de sistemas de administración del aprendizaje. Se recolectaron datos de tres fuentes incluyendo la plataforma Brightspace y sistemas ERP de una Universidad Colombiana con más de 60 años en el Mercado para obtener un conjunto de datos de 99,826 registros con 24 atributos. La metodología KDD (Knowledge Discovery in Databases) permitió identificar los atributos más relevantes a partir de la aplicación de los algoritmos selección de atributos y árboles de decisión. Se identificó que los primeros cinco atributos más relevantes son: Nota, días_sin_ingreso_curso, semestre, dias_sin_ingreso_plataforma, nombre_curso. Estos hallazgos favorecen la identificación sobre que la interacción en la plataforma juega un papel preponderante en el desempeño del estudiante, es decir, la interacción frecuente determina la acreditación del curso.)

ID137

Title: *Multidisciplinary Strategy in Final Computer Science Projects to Increase Graduation*

Autores

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Resumen

The Computer Science Final Project is often a challenging requirement for graduation in Argentina. This leads to delays and people leaving.

In the present work, an approach has proven efficient in recovering students who had left or extended their careers by getting the final work started and developed sustainably.

The multidisciplinary approach is based on collaboration among tutors from different disciplines within the Faculty of Engineering. They work together to develop research projects and software for external institutions. Furthermore, the framework of a traditional course provides an organizational structure that facilitates both the generation of the proposal and the planning, execution, and completion of these projects within a reasonable timeframe.

This paper presents the survey's results to validate the effectiveness from the students' perspective, conclusions, and next steps.

ID138

Title: *Snell's law: Remote Laboratory for Telecommunications Engineering*

Autores

JOSE R SANTAMARIA SANDOVAL (UNED COSTA RICA)*; Silvia Fallas Monge (UNED); Carlos Arguedas Matarrita (UNED); Fiorella Lizano Sanchez (UNED); Ignacio Idoyaga (Universidad Buenos Aires)

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Resumen

The Universidad Estatal a Distancia de Costa Rica has extended the use of remote laboratories (RL) to the field of telecommunications engineering. Students pursuing this career path can now gain a deeper understanding of Snell's Law, a fundamental principle in optical communication systems, through the use of an Ultra Concurrent Laboratory. This reinforces the distance education model adopted by the University. A sequential approach to laboratory application has been shown to yield positive results in student learning outcomes. This paves the way for their future introduction to cutting-edge telecommunications technologies, such as FTTx and SDH, among others.

Volver

ID145

Title: *Towards a Hands-On Lab: SISO Plants for Introductory Courses in Automatic Control*

Autores

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Resumen

This article presents a set of experimental plants built as platforms for the design and implementation of SISO controllers. As a premise, the plant should be low cost and easy to be put together by students under the paradigm of take-home-labs, or affordable and using readily available components in order to be built and shared in an engineering course. Each plant represents or emulates common problems found in industrial environments, with a difficulty appropriate to laboratory practices within engineering degree programs. Here, seven plants are built, detailing the requirements for their construction, operating conditions, and possible areas of application. To provide proof of concept, some experimental examples regarding identification procedures and control design and implementation are presented.

Volver

ID146

Title: *Construction of a signal generator: distance laboratory*

Autores

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Resumen

Engineering training requires the development of constructive manual skills and competencies, especially in the field of electronics, electrical and telecommunications. More so, taking into consideration that, in the professional field, the use of both technological and manual tools is mandatory. The Telecommunications Engineering degree at the UNED of Costa Rica under the distance education model has developed a model supported by 95% of ICT. Even so, it does not leave aside the need to create remote experiences where you not only interact with virtual platforms, but also include work with a real team, and where these skills can be created. This article presents the design, implementation and evaluation of a remote laboratory focused on the assembly and testing of a signal generator as an educational tool for the study of electrical networks. The learning objective of this laboratory is that the student can face a real case of circuit assembly, put it into operation and perform measurements to demonstrate its correct operation. These skills are normally acquired in a physical laboratory guided by a teacher, but in the case of the distance education model, it must be adapted to a self-taught model under mediation, but where the student is the central actor. This article shows that teaching and learning process implemented, and where the results obtained at the moment are positive, because there is evidence that the expected significant learning is being achieved. In addition, a b-learning type methodology is used associated with the scientific method of laboratory development, so that the implementation is considered successful.

ID174

Title: *Badges as a Gamification Tool in Higher Education through Tokenization*

Autores

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Resumen

The introduction of blockchain technology in education has brought significant benefits, such as improving the authentication and availability of data related to student's academic trajectories. Tokenization, in particular, offers an additional layer of standardization and facilitates the transfer and sharing of these data, enhancing their utility. This paper presents the development and implementation of badges as Non-Fungible Tokens (NFTs) in the ``Jornada do Estudante'' project using Hyperledger Fabric. These badges represent academic and extracurricular achievements, promoting gamification and increasing student engagement. The results are promising, demonstrating the potential feasibility and benefits of using blockchain technology and NFTs to enhance the management and recognition of academic achievements.

ID190

Title: *Desarrollo de Laboratorio Remoto para Banco de Pruebas de Motores Eléctricos: Una Herramienta Innovadora para la Educación en Ingeniería*

Autores

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Resumen

En este estudio se presenta el desarrollo de un banco de pruebas para motores eléctricos operable de manera remota. Este sistema permite a los estudiantes realizar ensayos prácticos sobre motores eléctricos desde ubicaciones remotas, integrando componentes de hardware y software avanzados. Los resultados preliminares demuestran la efectividad del sistema en la mejora de la comprensión teórica y práctica de los estudiantes en varias disciplinas de ingeniería.

ID235

Title: *Aprender geomática, ¿a distancia? El caso de la DUGA* del Instituto Gulich*

Autores

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Resumen

La Diplomatura Universitaria en Geomática Aplicada (DUGA) represeenta una valiosa experiencia de gestión educativa en línea con foco en la construcción gradual de saberes sobre geomática en el campo de las ciencias aplicadas. Nos proponemos analizar tres dimensiones A) Enseñar a distancia, enseñar con geomática, que nos permite una visión integral del rol docente B) La gestión como oportunidad para la mejora, con el uso de los datos generados, para la toma de decisiones y mejora continua; y C) ¿Desde dónde enseñamos? aportes pedagógicos para entender el caso de análisis.

Electrónica de Potencia y Aplicaciones Industriales

ID35

Title: *Instantaneous Complex Power Controller for a Grid-Tied Inverter Connected to an Unknown Grid*

Autores

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Resumen

This paper proposes a control strategy for injecting complex instantaneous power from a grid-feeding converter into a grid of unknown impedance. Before designing the controller, the steady-state stability and safe operation limits of injecting complex instantaneous power to a grid of unknown impedance are analyzed. This analysis is independent of the control strategy, and applies to all power injection schemes. Then, the proposed control strategy is presented, designed measuring the Point of Common Coupling (PCC) voltage and assuming a low impedance grid, as it is typically done in this kind of controllers. The transient stability of the proposal is then analyzed when in presence of an unknown grid impedance, and it is found that filtering of the PCC voltage is required to guarantee the transient stability of the system. The use of a notch filter is proposed to this end, and a criterion to select the gains of the filter and the controller is derived. Finally, simulation results are presented for validating the proposed method.

ID38

Title: *Control y Desacoplamiento de Potencia sin Sensores de Tensión de Red para un Convertidor Trifásico Operando en una Red Desbalanceada*

Autores

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Resumen

En este trabajo se propone una estrategia de control sin sensores de tensión de red, para un convertidor cc-ca trifásico con conexión a red mediante un filtro LCL. La estrategia permite eliminar el ripple de potencia de segundo armónico en el bus de corriente continua en condiciones de falla de la red, independientemente del método de inyección de potencia utilizado, lo que expande las capacidades de operación del convertidor. La estrategia requiere únicamente tres sensores de corriente y uno de tensión de bus. Se emplean observadores para estimar las variables no medidas necesarias para el control del sistema, así como las componentes fundamentales de secuencia positiva y negativa de la tensión de la red, necesarias para sincronización. La inyección de corriente a la red se controla mediante realimentación completa de estados, mientras que la eliminación del ripple en el bus se realiza utilizando la técnica de linealización por realimentación y posterior realimentación completa de estados. La técnica empleada permite posicionar arbitrariamente todos los autovalores de lazo cerrado de ambos lazos de control, con lo que se puede optimizar la respuesta dinámica del sistema. Se presentan resultados de simulación que corroboran la validez y efectividad de la propuesta.

ID51

Title: *Speed Estimation in Induction Motor Starting Transient using Wavelet Transform*

Autores

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Resumen

The measurement of speed in induction motors is of utmost importance for diagnosing the drive and adjusting its startup method. The use of sensors directly coupled to the motor can be problematic in the industry due to their fragility. In this context, sensorless speed estimation alternatives are of interest. This work tracks the positive sequence spectral components present in the stator current associated with rotor speed. For this purpose, the continuous wavelet transform (CWT) is employed, which allows for the analysis of non-periodic and rapidly varying functions. Results are presented for the startup of a 5.5 kW motor with a duration of 1.5 seconds and a 5.4 MW wound rotor motor with a liquid starter.

Volver

ID52

Title: *Speed estimation strategy during three-phase induction motor starting using Park transform*

Autores

Sofia L Antonelli (UNRC- UTNFRSN- IITEMA- CONICET)*; Lucas A Puntano (INTELYMEC (UNCPBA) y CIFICEN (UNCPBA-CICPBA- CONICET)); Matias Meira (INTELYMEC (UNCPBA) y CIFICEN (UNCPBA-CICPBA- CONICET)); Pablo Daniel Donolo (CONICET - Universidad Nacional de Río Cuarto)

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Resumen

This paper presents a strategy for speed estimation during the starting of three-phase induction motors from the stator current measurement. The estimation is performed by tracking the components at the rotational frequency present in the current Park's vector. This tracking is performed using the Short Time Fourier Transform. Simulation and experimental results of a 5.5 kW induction motor are presented to validate the proposal.

Volver

ID53

Title: *Parameter estimation of induction motor with bioinspired algorithms*

Autores

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Resumen

The identification of induction motor (IM) parameters is crucial for developing accurate models that simulate IM behavior under various conditions. This, in turn, facilitates the optimal design of control systems, early fault diagnosis, and predictive maintenance. Additionally, accurate parameter identification enables the implementation of energy efficiency strategies, reducing consumption and optimizing IM performance. This review article will analyze and elaborate on bioinspired optimization-based methods that have been widely employed in the parameter estimation of IMs.

ID54

Title: *Procedure for assessing and solving electrical power quality issues in industrial electrical systems*

Autores

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Resumen

This article presents a procedure for the integral assessment of electrical power quality in industrial electrical systems. The research is crucial due to rising challenges in power quality arising from increased nonlinear electrical loads in industrial processes. The procedure is structured into sequential steps that consider diagnosis, causes, effects, and solutions to electromagnetic phenomena affecting electrical power quality. The integral approach and its path to continuous improvement significantly distinguish it from existing scientific literature approaches. This procedure serves as a complement to the objectives of national and international standards for electrical power quality.

ID72

Title: *Design and characterization of a radiofrequency applicator for biomass processing*

Autores

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Resumen

Interest on volumetric heating techniques has steadily increased during the last years due to its speed and efficiency. This work presents the design of a radiofrequency applicator with a volume of 0.27 L, apt for biomass processing at the Industrial, Scientific and Medical (ISM) bands of 13.56 MHz and 27.12 MHz. Material selection and design criteria are presented, together with results of electrical characterization and a heating test.

ID114

Title: *Design to Eliminate Frequency Bifurcation in Transformers for Wireless Charging of Electric Vehicles*

Autores

FRANK MARTINEZ BATISTA (Universidad Nacional Río Cuarto); Facundo Aguilera (Universidad Nacional Río Cuarto); Christian Buzzio (GEA-IITEMA-UNRC); Cristian H. De Angelo (Universidad Nacional Río Cuarto); GERMAN OGGIER (National University of Rio Cuarto)*

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Resumen

In this paper, a transformer design method with a compensation network is proposed for a wireless power system for electric vehicles. The objective is to prevent a bifurcation in the frequency response of the transferred power, which causes undesirable resonance conditions in the system. An evaluation using finite element analysis is presented and applied to a case study, from which the number of turns of the primary and secondary windings of the transformer can be established to help reduce the mentioned bifurcation. The results show that lowering the self-inductance of the secondary coil allows the bifurcation of frequency to be reduced. In addition, power transfer can be maximized by optimizing the self-inductance of the primary coil. The proposal is applied in a wireless power transfer system for an electric scooter, in which the transformer is designed to transfer a maximum power of 150 W without frequency bifurcation and with an efficiency greater than 97%.

ID117

Title: *Analytical calculation of spatial harmonics of winding functions for induction machines*

Autores

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Resumen

In rotating electrical machines, the windings are housed in the slots of the cores, resulting in a discrete spatial distribution. The magnetomotive force produced by this distribution can be analyzed using winding functions. The usual procedure for calculating these functions is the Winding Function Approach. In this work, a new method is proposed for the analytical calculation of the spatial harmonics of these functions using Fourier Series. The analytical calculation of these spatial harmonics allows for the analytical determination of the harmonics of the machine's electrical and magnetic variables.

ID119

Title: *Design of an Isolated Excitation Module for Converters with Floating Transistors*

Autores

Geronimo Gonzalez Marino (Instituto de Investigaciones en Electrónica, Control y Procesamiento de Señales (LEICI), Facultad de Ingeniería. UNLP.)*; Santiago Verne (UNLP)

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Resumen

This paper details the design and prototyping of a module for driving floating switching transistors. The module is developed to drive the power switches in multilevel or multi-transistor converters that require independent switching functions and have non-common terminals. The module consists of an isolated DC-DC converter that supplies power to the output stage of an opto-driver. Key design considerations, including the power requirements and the main aspects of the design of the power supply are discussed, as well as its isolated closed-loop compensation.

ID126

Title: *Detection of Stator Faults in Induction Motors Using Pole Voltages*

Autores

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Resumen

This paper analyzes the effects of inter-turn short circuits on the pole voltages of induction motors (IM). Based on these voltages, a strategy is proposed to detect the fault, determine its location in the winding, and quantify its severity. For this purpose, the fundamental component of the difference between the pole voltages is used as a residual. An IM with access to the poles and different numbers of turns for creating short circuits was used to evaluate the proposal. The experimental results show a high sensitivity of the strategy for diagnosing incipient short circuits.

Volver

ID127

Title: *Transformer Leakage Inductance Estimation with Windings Radial Displacement*

Autores

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Resumen

This paper presents an analytical model of three-phase transformers that allows for the estimation of the winding leakage reactance. Unlike other models, this one can be applied to windings that have experienced partial or total deformations in their geometry. Such deformations are common in Transformers when they are subjected to Significant dynamic stresses, for example, due to external faults. The model is validated through experimental testing on a laboratory transformer and is used to estimate changes in the leakage reactance of a power transformer under specific deformations.

Volver

ID177

Title: *Field measurements at an important steelworks and development of a ±250 Mvar Static Reactive Compensator (SVC) model*

Autores

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Resumen

This paper presents measurements performed in an important steelworks in Argentine, equipped with electric arc furnaces, and the development of a complete model of a a ± 250 Mvar SVC. The model includes each of the different components of the SVC (harmonic filters, thyristor controlled reactor (TCR) and control system) and is particularly useful to analyze and evaluate the following aspects of the installed SVC: the dynamic behavior and response speed, the inconveniences associated with the loss of firing pulses in the thyristors (stresses to which the different components of the SVC are subjected), the circulating currents in each of the components of the harmonic filters and the reactors that make up the TCR, the improvement in compensation of the flicker produced by the arc furnaces and its performance under different operating conditions of the electric arc furnaces.

To validate the model's performance, measurements taken at the steelworks were compared with the results obtained from the model under similar operating conditions. In all cases, a good match is observed between measurements and simulation results, both in the waveform of voltages and currents, as well as in their levels and the relative phase shift between them. The main results obtained are documented in this paper."

ID186

Title: *Estrategia Para Detectar la Operación en Modo Isla de Microrredes Eléctricas Trifásicas de Cuatro Hilos*

Autores

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Resumen

Las microrredes eléctricas trifásicas de cuatro hilos permiten alimentar cargas tanto monofásicas como trifásicas. El uso de convertidores electrónicos en estos sistemas, facilitan integrar recursos renovables tanto de CC como de CA, asegurando una elevada calidad de energía. Una de las características de las microrredes es que pueden operar conectadas o desconectadas (modo isla) de la red eléctrica principal, por lo que deben cumplir determinados requerimientos para garantizar la calidad del suministro de energía y la protección tanto de los convertidores como los equipos conectados a la microrred. Este artículo propone un método rápido de detección de modo isla basado en la trayectoria instantánea del vector de corriente de red en el marco de referencia tridimensional αβ0, capaz de detectar e identificar interrupciones en la red eléctrica tanto monofásicas como trifásicas. La propuesta se integra a la estrategia de control de un inversor trifásico de cuatro piernas, lo que permite alimentar cargas no lineales y desbalanceadas en aplicaciones de cuatro hilos. Los resultados de simulación presentados validan el método propuesto, demostrando efectividad y rapidez para detectar una condición de falla de la red eléctrica principal, permitiendo la desconexión del sistema y la operación de la microrred en modo isla."

ELECTRÓNICA de POTENCIA y APLICACIONES INDUSTRIALES

ID223

Title: *Electromagnetic Field Analysis in 132kV Double-Circuit Transmission Lines with ACCC Conductors*

Autores

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Resumen

This paper presents the analysis of the electromagnetic field of a high voltage overhead double circuit transmission line using ACCC type conductors. The distinctive feature of this new technology in conductors is that they are made with aluminum wires arranged in a trapezoidal shape, using a carbon fiber core embedded in a high-temperature thermosetting resin. These construction parameters allow to increase the transmission capacity compared to an ACSR type conductor, reduction of losses, increase the span between structures, and also reduce the sag caused by thermal effects. The simulation of electromagnetic fields is carried out using the two-dimensional finite element analysis software FEMM, analyzing a vertical double-circuit transmission line using insulator strings and rigid insulators under the conductor's thermal limit state and nominal voltage. The results obtained are evaluated based on Argentine environmental regulatory standards.

ID239

Title: *Diagnosis of Coexisting Broken Rotor Bars and Mixed Eccentricity in Induction Motors by Instantaneous Power Analysis*

Autores

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Resumen

This paper analyses the effects of multiple faults in induction motors (IM), particularly mixed eccentricity and broken rotor bar occurring simultaneously are treated. This analysis is carried out by simulation, using a simplified sinusoidal model of the IM, and valeted experimentally by means a prototype of an IM with a high resistance rotor cage.
By both simulation and experiment, the instantaneous active and reactive powers are obtained and their behaviors are compared. The results of this comparation shows that, for a certain range of fault frequencies, diagnosis is Difficult, requiring a more detailed analysis or the use of complementary strategies in this situation."

ID26

Title: *Monitoring of Water Surface Area using optical and SAOCOM SAR data: A Case Study of the Nihuil reservoir, Mendoza, Argentina*

Autores

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Resumen

The present work evaluates the Water Surface Area (WSA) of Nihuil reservoir, located in Mendoza, Argentina employing optical images of different sources (Landsat-8, Landsat-9, Sentinel-2), and Synthetic Aperture Radar (SAR) data of the SAOCOM-1 mission. Thresholding algorithm, morphological operations and segmentation techniques were applied to obtain temporal and spatial variability of Nihuil reservoir in 6 years, from 2018 to 2023. Validation was carried out using WSA provided by DGI (General Irrigation Department of Mendoza province). Final results show a $R2 = 0.97$ and $RMSE = 273.18$ ha between all satellite estimated values and validation data. The proposed methodology facilitates the acquisition of WSA products without the requirements for field or auxiliary data, thereby enhancing the effectiveness of hydrological monitoring.

ID29

Title: *Estimation of vegetation parameters of the VIC model using remotely sensed data*

Autores

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Resumen

This paper presents a methodology for estimating vegetation parameters such as LAI, albedo, and FCANOPY based on remotely sensed data to model actual evapotranspiration (ET) in the Bajos Submeridionales region (Argentina). The data used were available and processed on the Google Earth Engine platform. Those parameters were introduced into the VIC model to simulate the water and energy balance during the period 2000-2019. The focus of this paper is only simulated ET, its annual cycle, and spatial patterns associated with the surface control exerted by different land cover types. Model results indicate that the annual ET cycle is related to the annual cycle of major meteorological forcings, including precipitation and temperature, as well as to the seasonal cycle of LAI, FCANOPY, and other vegetation structure parameters. Forest cover exhibits the highest ET rates, followed by herbaceous vegetation and crops. In poorly gauged regions such as the Bajos Submeridionales, the use of remotely sensed information and hydrologic models proves highly useful in improving the understanding of the hydrological cycle, thus contributing to better water/natural resources management.

ID42

Title: *Remote sensing regression models to estimate water quality indicators in continental waters in North-East Argentina*

Autores

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Resumen

To ensure water preservation is relevant to constantly monitor water quality. To facilitate this task, remote sensing techniques are applied combining water property measurements and spectral information. Two empirical regression models were developed to estimate chlorophyll-a concentration and turbidity from a water body located in North-East Argentina, in the Metropolitan Area of Gran Resistencia, Chaco Province. The spectral platform used was Sentinel-2 MultiSpectral Instrument, and the physicochemical characterization was achieved by multiple field campaigns where water samples were collected. In the training step several candidate models were compared. Performance metrics (coefficient of determination, R^2, and root mean squared error, RMSE) were calculated and used for the final models selection. The obtained algorithms were linear combinations of spectral bands. Chlorophyll-a algorithm validated performance metrics were $R^2 = 0.819$ and RMSE = 13.71 mg/m³. For the turbidity model, $R^2 = 0.968$ and RMSE = 1.62 NTU. Correlation between physicochemical parameters were asserted and maps were created applying the validated models. A correlation between chlorophyll-a and turbidity was observed. Due this, the spatial distribution in the maps of both parameters followed the same trend.

ID56

Title: *Characterization of land subsidence in Ravenna using Sentinel-1 InSAR and geostatistics*

Autores

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Resumen

This study investigates the 2018-2022 evolution of land subsidence in Ravenna, Italy, employing Sentinel-1 C-band Differential Interferometric Synthetic Aperture Radar (DInSAR) displacement time series (TS). Temporal deformation patterns were analyzed by applying an automated classification tool that exploits regression analyses and conditional sequences of statistical tests including ANOVA F, and its performance is evaluated. Mean displacement velocity, acceleration, seasonality and trend classification maps were created, revealing distinct TS behaviors and spatial clusters across the study area. Anthropogenic drivers, including groundwater withdrawal and gas resource management activities, likely act as contributors to the subsidence process. The results indicate subsidence velocities ranging from -5 to -37 mm/year, with notable accelerations in agricultural and industrial zones, and a deceleration process occurring in the southern coastal area. Correlation with geological and land cover layers underscored the role of sedimentcompaction and landscape changes.

ID61

Title: *Spatio-temporal analysis of fire events over the past 10 years in the Central-East region of Argentina and Surrounding Areas*

Autores

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Resumen

Fire events pose significant challenges worldwide due to their impacts on ecosystems and human communities. Satellite remote sensing allows the spatial and temporal analysis of these events. VIIRS (Visible Infrared Imaging Radiometer Suite) is a calibrated instrument that provides fire data with global coverage at a 375 m spatial resolution. This study considers annual and seasonal fire events from January 2013 to December 2022 (10-year analysis) in the central-east region of Argentina. The annual study highlights a peak in fire pixel counts in 2020, with a 113% increase compared to the mean value observed throughout the entire study period. FRP mean annual values range from 9 (2015) to 11.9 (2020 and 2022). During the seasonal analysis, winter exhibited the highest fire pixel counts. As for FRP analysis, Autumn consistently recorded the lowest FRP mean values, ranging from 6.8 MW (2015) to 9.2 MW (2020). Conversely, the highest FRP mean values were observed in winter and spring. Standard deviation values were nearly twice the magnitude of FRP mean values in both annual and seasonal studies. Moreover, when adjusting a linear fit to assess the increase in annual and seasonal mean FRP values over the years, R^2 and p-value suggest that the overall models may not be statistically significant at $\alpha = 0.05$. Overall, this study provides insights to assess fire risks in the region by identifying seasonal trends and recurring fire-affected areas.

ID67

Title: *Machine learning for moisture retrieval using Landsat and SAOCOM images*

Autores

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Resumen

Soil moisture (SM) estimation is crucial for environmental, hydrological, and agricultural applications. The satellite remote sensing technology allows monitoring SM in a consistent and economically viable manner. Thus, the Argentine Microwave Observation Satellite (SAOCOM) mission uses a Synthetic Aperture Radar (SAR) system to monitor SM with high spatial resolutions. Despite the advancement of SAOCOM, this mission was recently launched in 2018, therefore it covers a short period of SM data, i.e. approximately five years. On the contrary, the Landsat program has been monitoring the earth's surface for longer than SAOCOM. The Pampas region is an important productive zone of Argentina, mainly characterized by agricultural land, so monitoring SM in this region results ofparamount importance for agricultural productivity. This study evaluated different machine learning algorithms to reproduce the SAOCOM SM maps using Landsat images in the Cordoba province. Specifically, three machine learning methods were explored: Random Forest (RF), Multilayer Perceptron (MLP), and a deep learning model based on the U-Net architecture. The modelled SM maps were compared with SAOCOM images and their soundness was evaluated using the Mean Squared Error (MSE) and Pearson correlation (r) statistics. Our experiments show that the U-Net model yields the best performance in comparison with SAOCOM SM maps with a correlation of 0.94.

Indeed, U-Net shows a MSE of about 16%, while RF and MLP present errors of about 29% and 28%, respectively. These results suggest that the U-Net architecture with Landsat images can capture the SAOCOM spatial variability and allow monitoring SM with high spatial resolution in an extensive temporal series.

ID79

Title: *Operational crop classification with SAOCOM L-band SAR images in the Pampas region, Argentina.*

Autores

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Resumen

Este trabajo presenta los resultados de calibración/validación del producto de clasificación operacional de la misión SAOCOM (satélite de radar de apertura sintética de banda L), integrando un año de campañas de campo durante el periodo 2019/2020 en una zona central de la región pampeana argentina con precisiones que varían entre el 62% y el 90% dependiendo del cultivo y su fase fenológica. La clasificación de los cultivos es un paso preliminar y necesario para la estimación de la humedad del suelo en la misión SAOCOM. Para ello se utilizaron sistemas de reacción-difusión que emplean distancias estocásticas que permiten reducir el ruido de las imágenes SAR (radar de apertura sintética) y clasificarlas.

ID86

Title: *Assessing prescribed burn severity in the wetlands of the Parana River using drone and satellite data*

Autores

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Resumen

The latest report of the United Nations Environment Program (UNEP) published in 2022, highlights that changes in climate and land use will increase the fire frequency and intensity around the world. In Argentina, fires historically affected highland forests, but since 2004, wetland fires have become a pressing concern. The Paraná River wetlands are not out of the UNEP forecast. The satellite technology is considered a valuable tool for mapping burned areas and fire severity assessment in a consistent and economically viable manner. Indeed, different remote sensing indexes are suitable for these purposes. In this study, the Normalized Burn Ratio (NBR) and the Normalized Difference Vegetation Index (NDVI) were used to evaluate the burn severity of two prescribed burns carried out in a Paraná wetland during 2023. Here, Sentinel 2 and drone images were used to estimate the burn severity with different spatial resolutions. The pre-/post-fire difference indices dNBR and dNDVI showed low severity to moderate low severity for the two prescribed burns using Sentinel 2 satellite images. On the contrary, almost 7% of the parcel burned during the first experiment showed a dNBR of about 0.6 (moderated high) with drone images. Hence, both indexes are suitable for evaluating burn severity, however, the highest spatial resolution of the drone images allows a more detailed assessment, especially in small study areas.

ID88

Title: *Hydrologic performance of GPM-IMERG precipitation estimates in lowland basins*

Autores

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Resumen

One of the main challenges in conducting hydrological studies is the scarcity of in situ precipitation data. The arising question is to what extent remote sensing estimates can overcome this issue, for hydrological applications. Our objective was to explore the use of the IMERG (Late Run) product as input to a hydrologic model and to compare the results with those obtained with in situ data. The study area was a lowland catchment in eastern Argentina: the Feliciano River basin (8,000 km2), a time of concentration of 3 days, and an annual mean flow of 50 m3/s. The basin-wide mean-areal precipitation series was computed for two precipitation sources: IMERG (Late run) and in-situ data from three weather stations of the National Meteorological Service of Argentina. The hydrologic model used was GR4J. Once calibrated with historical data, the model was forced with both precipitation series to obtain discharge time series. The results in the precipitation domain showed a good capability of IMERG to detect the occurrence of rain, but its performance decreased significantly for events of increasing intensity. A probability of detection (POD) of 27% for a threshold of 50 mm was obtained. This probability increased as the threshold decreased, reaching 72% for very light rains. Likewise, the false alarm ratio (FAR) for a high precipitation threshold (50 mm) reached 88%, and 38% for a threshold of 0.1 mm. In the discharge domain, flow quantiles were obtained from hydrological simulation: the IMERG-based quantiles showed a significant overestimation for a wide range of return periods (between 2 and 250 years). This study also shows that hydrological models fed with IMERG (Late Run) data have a satisfactory capability to detect high flow events although they exhibit too high a false alarm ratio, most likely attributable to the IMERG (Late Run) product overestimation.

ID89

Title: *Evaluation of SWOT water surface elevation product along the middle Paraná River*

Autores

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Resumen

Water surface elevation (WSE) estimation is crucial for understanding hydrological processes and managing water resources. Remote sensing observations play a vital role in consistently estimating WSE over large areas. In this context, the new Surface Water and Ocean Topography (SWOT) mission equipped with Synthetic Aperture Radar (SAR) technology, offers the opportunity to monitor WSE and other crucial parameters with high spatial resolutions. The Paraná River stands out because it is the second-longest river system in South America. Hence, the performance of the SWOT product was evaluated using in situ WSE observations in this area. Specifically, SWOT estimates were compared with WSE measurements registered by four gage stations (Paraná, Colastiné, Leyes, and Santa Fe) for 01/2024-04/2024.

The results show that SWOT estimates agree well with the observed WSE data, with uncertainties lower than 6% and a determination coefficient (R2) greater than 0.96. Moreover, the SWOT product accurately reproduces the temporal variation as in situ WSE measurements over the period and selected stations. These initial results are very promising, highlighting the potential of this new mission to accurately monitor WSE with high spatial resolution.

ID91

Title: *Towards a deep learning based approach for semantic segmentation of Coca-Leaf growing regions in satellite images of Perú*

Autores

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Resumen

The use of remote sensing to detect illicit crops is a trend that has increased over time. Regular in-person surveys are labor-intensive, time-consuming, expensive, and potentially life-threatening. Therefore, remote sensing techniques allow a small number of analysts to locate scattered sites of illicit crop production in large areas. The National Commission for Development and Life Without Drugs (DEVIDA), deliver a report on the monitoring of coca cultivation in the country on an annual basis. The report is based on the visual analysis of high spatial resolution satellite images recorded between July and November of the year prior to the submission of the report. The present study shows the first study based on deep learning for the semantic segmentation of coca leaf growing regions in Perú. For this purpose we use a U-Net architecture and SPOT-6 satellite images for the Pichari district – Cusco, Perú. We can conclude that the results are promising achieving an accuracy of 94.10% on the test image from 2019.

ID92

Title: *Assessing long-term land subsidence hazard in Bologna city using PSInSAR data*

Autores

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Resumen

Land Subsidence (LS) poses a significant geological hazard in urban areas worldwide, driven by both natural processes and human activities. In this paper, LS is investigated in the city of Bologna, Italy, focusing on its evolution over the past three decades. The spatial and temporal patterns of LS are analyzed using satellite Synthetic Aperture Radar (SAR) data processed with Persistent Scatterer Interferometry (PSInSAR) algorithms to assess subsidence magnitude, evolution and hazard levels, emphasizing the importance of integrating multi-temporal ground deformation datasets for a comprehensive understanding of LS processes and their induced hazard. The results for Bologna show a notable reduction in LS rates over time from the early 1990s to 2022, along with changes in the distribution of hazard zones. While in the 1990s LS rates reached over 55 mm/year and hazard levels were high or medium across 12 km2 of the 150 km2 administrative area, as of 2022, high hazard levels became null, medium hazard levels reduced to 0.23 km2 and LS rates under 15 mm/year, classified as low hazard, extended across 92 km2.
Overall, this study highlights the importance of monitoring and understanding LS dynamics in urban areas for effective hazard mitigation and urban planning.

ID106

Title: *Identification of thermal anomalies in active volcanoes using Google Earth Engine and multi-spectral satellite image*

Autores

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Resumen

In this work, we applied Landsat 7 satellite images to explore the most active hydrothermal alteration zone of the Ilamatepec volcano during the period of its eruption in October 2005, and used these images together with ASTER sensor data to explore the changes of heat loss in the thermally active area of the Ilamatepec crater from 2005 to 2006. Multiple methods were used to map the hydrothermal alterations in the area including band ratio, principal component analysis, Crosta techniques and color composite. The normalized difference vegetation index (NDVI), emissivity and land surface temperature (LST) values were also obtained, with which the radiative heat flux (RHF) for the study area was derived. The maximum LST values were estimated to be 35 °C, 37 °C and 32 °C for the study dates. The maximum RHF values were 125 W/m2, 137 W/m2 and 104 W/m2 for these same dates. The intensity of thermal unrest in the study area increased due to the eruption but showed a tendency to decrease for the last month of observation.

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ID108

Title: *Identification of the marine coast area affected by oil spill using multispectral satellite and UAV images in Ventanilla - Callao, Perú.*

Autores

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Resumen

The primary objective of this research was to identify the sea and coastal areas affected by the oil spill that occurred on January 15, 2022, near the La Pampilla refinery in Ventanilla, Callao, Peru. High-resolution multispectral satellite images from the Peruvian Satellite System (PSS) and satellite images from the International Charter activation were utilized. Additionally, aerial images were collected using remotely piloted aircraft systems (RPAS) over the coastal zone from Ventanilla beach in Callao to Punta Salinas in Huacho, Huara-Lima. The satellite images were processed at the surface reflectance level, and a classification technique based on object detection was applied to enhance image interpretation by analyzing shapes, sizes, textures, and other features. This method improved the identification of the affected marine areas. For the aerial images, photointerpretation was employed to determine the extent of the area impacted by the oil spill in the coastal zones. The results from the multispectral images revealed estimated affected areas of 10669.90 ha, 7049.19 ha, 1732.10 ha, 502.03 ha, and 972.78 ha on January 18, 19, 25, 27, and February 4, 2022, respectively. For the RPAS images, an estimated littoral area of 390.41 ha was affected by the oil spill from Ventanilla-Callao beach to Cascajo-Chancay beach in Huaral-Lima on January 17 and 26, 2022. The results were validated using data collected during field campaigns conducted by the Environmental Evaluation and Supervision Organization (OEFA), achieving an overall accuracy of 97.98% and a kappa index of 0.56. The information obtained from this study has contributed to the environmental evaluation and monitoring processes carried out by the Ministry of Environment (MINAM) and the supervisory organization (OEFA).

Volver

ID121

Title: *Evaluation of the response of vegetation covers to PolSAR decomposition variables in L - band*

Autores

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Resumen

The accurate detection and characterization of vegetation covers are essential to support monitoring and prevention actions in different fields of application, ranging from agricultural management to environmental conservation. Polarimetric decompositions over L-band SAR data (SAOCOM) were evaluated here to enable it. Cameron [1], Van zyl [2], Generalized

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Freeman Durden [2], Cloud-Pottier [3], Yamaguchi [4], GRVI [5] and Cloude [2] decompositions were explored in two contrasting seasons (winter and summer, dry and rainy seasons in the study area, respectively) to differentiate vegetation cover types in Chaco serrano (Córdoba, Argentina). Differences between vegetation covers were found, particularly between grasslands, shrublands and forests. Specifically, the volume components, which exhibited significant differences between seasons for all vegetation covers, would be suitable for studying vegetation phenology from time series data.

ID128

Title: *VALIDATION OF SAOCOM-ESTIMATED SOIL DIELECTRIC CONSTANT USING A BAYESIAN INFERENCE SCHEME IN AGRICULTURAL FIELDS*

Autores

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Resumen

In this study, we validate the estimation of soil moisture from a single quad-pol Synthetic Aperture Radar (SAR) image from SAOCOM mission along with a physically based interaction model (two-layer version of the SPM model at the second order) with in-situ measured data in the central region of Argentina. The relationship between microwave backscattering and dielectric constant (ϵ) allows for precise estimation of ϵ effectively disambiguating the influence of soil roughness in bare soil conditions. Measured dielectric constants from the study area are used for validation.

ID149

Title: *Soil Moisture: analysis of SMAP satellite products in plain zones*

Autores

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Resumen

Soil moisture (SM) plays a vital role in the water and energy cycles, affecting evapotranspiration, infiltration, and runoff processes. The SM available for evapotranspiration is crucial for food security, especially given the significant interannual variability in the yield of rainfed crops in large agricultural regions. Due to the limited availability of field data, satellite-derived values are essential for studying SM. Therefore, evaluating this information across different surfaces, climates, and soil types is paramount. This study analyzed SMAP data (36 km, 9 km, and rescaled to 1 km) and the SMAP/Sentinel-1 product (1 km and 3 km) concerning field data to understand the behavior of SM products with different spatial resolutions. The study areas include short grass and rainfed crop zones in the Pampean region of Argentina and in Northern Italy, ranging from semiarid to subhumid/humid climates. In both regions, results showed that the 9 km product exhibits errors between 5% and 15% in the Pampean region and 7% in Italy. While the 36 km data behaves similarly, higher spatial resolution data shows increased errors, ranging from 5% to around 20%. Therefore, it is recommended to consider validations for the 1 km and 3 km products and avoid using them directly without prior evaluation.

ID151

Title: *Numerical Optimization for the Simulation of Radio Occultation Events*

Autores

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Resumen

The utilization of Global Navigation Satellite System (GNSS) to atmospheric radio occultation (RO) has been an active remote sensing method for exploring the Earth's atmosphere. The RO products, especially the atmospheric bending angles, have been widely used for climate study. To obtain these parameters, we need a signal model, and given the extensive distances traveled by RO signals, we need to establish a numerical method aimed at resolving the signal's path using ray tracing for real-time applications while optimizing computational cost.

This paper focuses on computational optimization in the simulation of RO signals, primarily for events derived from GPS signals but applicable to any other GNSS system. We apply the Runge-Kutta-Fehlberg method for the signal path integration, with several spatial constraints, referred to as the Planar ray parking (PRP) technique. Additionally, due to the nature of the problem, a shooting method is proposed. Moreover, we will propose a general RO simulation scheme that identifies blocks with potential for improvements in future work.

Subsequently, we compare the performance of this new technique with a fourth-order Runge-Kutta (RK4) integrator, a commonly used algorithm for resolving trajectory of RO signals. The results demonstrate improved performance with negligible errors.

ID154

Title: *CONAE Argentine Airborne L-band SAR System*

Autores

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Resumen

CONAE has built a polarimetric, L-band synthetic aperture radar (SAR) in Argentina, designed to acquire airborne SAR data in H and V linear polarizations, with a range bandwidth of 38 MHz (4 m range resolution) and a 16 km range swath. The system nominally operates at 6200 m. This technological demonstrator model (TDM) was operational during the period 2005-2015 and has been used in a variety of applications. Using dedicated inertial measurement units, the system has been able to fly with great precision. The program began and continues to this moment as an Instrument Incubator Project (IIP) funded by CONAE Technological Management (GGT), in its Research and Development Sub-management.

ID164

Title: *Urban Risk Maps Associated with the Heat Island Phenomenon in the Metropolitan Area of Córdoba*

Autores

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Resumen

The phenomenon and the consequences of the Urban Heat Islands (UHI) in recent years are issues of great importance and transcendence within the studies of urban resilience and habitability. UHIs increase energy consumption, atmospheric, thermal, water, and soil pollution, reducing the life quality of the urban population. For the reasons mentioned above, the mitigation of UHI and the development of adaptation strategies are priorities in every city on the planet. At present, the studies that have been carried out in Córdoba regarding UHIs have focused on characterizing urban temperature changes, without taking into account that the impacts and risks of the ICU are not evenly distributed among the urban population. Using the information available from the 2010 National Population Census, in combination with the Urban thermal field variance index derived from high-resolution thermal satellite images, this study proposed a characterization of the social and environmental vulnerability of the urban population, concerning the hazard of Urban Heat Islands. As a result, risk maps from the Metropolitan Area of Córdoba will be presented, which are essential analysis and management tools to identify priority areas to improve the life quality of the inhabitants and prevent future risk situations, as well as the generation of sustainable urban development strategies.

ID167

Title: *Spatial calculation of the barley green water footprint in southeastern Buenos Aires province*

Autores

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Resumen

The green water footprint (GWF) quantifies the consumptive water use in rainfed crops, i.e. the water consumed through the evapotranspiration process (ETgreen) that will not be available in the catchment area for a certain period. It represents 80% of the water consumption of agricultural activity. Despite its relevance, few studies in Argentina evaluate these water flows, which support production. Barley is the second most important winter crop in the region and has a significant role in grain exports, however, there is a gap in the GWF reference values. The aim of this study was to estimate the GWF in barley crops in the Tandil county, at 250 m spatial resolution. The methodology suggested by the Water Footprint Network was applied. To extend this methodology to the study area, a method based on satellite data (SDM) was applied to calculate the evaporative fraction (EF) and yield (Y). The performance of this method was compared with the widely used grid method (GM). We used field agroclimatic and crop data, as well as MODIS and LANDSAT products to determine ETgreen and Y. The results showed GWF values in barley from 400 m3 t-1 to 550 m3 t-1 in the county plots. The highest values were associated with

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areas where land use changed from livestock to agriculture. SDM had a better correlation with GWF values measured in the plots (R2=0.79), while GM underestimated these volumes in all cases, with no correlation with in situ GWF (R2=0.01). The underestimation was mainly related to the low spatial resolution applied, which does not consider the spatial variability of ETgreen and Y. With these results, we intend to contribute to monitor water management in rainfed crops and to improve the adaptability of these systems to climate variability.

ID168
Title: *A test for systematic defect detection in satellite imagery*

Autores

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Resumen

MODIS images are distorted at the edges due to the nature of the scanning array, which causes stripping and what is denominated as bowtie effect: the edge pixels are wider tan the pixels located at the centre of the scan array. In this work, we produced a test to detect the bowtie effect and filter MODIS images. We have applied the test to a subset of tiles of images from the CUMULO dataset, producing a filtered subset of images. We have uploaded this set into Kaggle. The test developed can be used to detect bowtie and stripping defects in any image, useful to filter datasets for machine learning training.

ID182
Title: *Prospect of L-band to estimate yield in grapevine crops*

Autores

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Resumen

An exploratory work was carried out on the sensitivity of L-band radar waves from satellite platforms on the production of grapes per area of the plantation (yield). SAOCOM images over vine plots located in Estación Experimental Agropecuaria INTA in Luján de Cuyo, Mendoza, Argentina were used. Sixteen yield data distributed in the 2021-2022 and 2022-2023 seasons were compared against a radar index involving the cross-polarized backscatter coefficient HV from radar images acquired before and after harvesting, within a time span of 8 days. The results indicate a sensitivity to yield subjected to the orientation of the

crop rows, which requires an input reference map with the orientation of the rows in order to decouple the effect of these on the radar wave, for near-future development of a satellite product of grapevine yield.

ID188

Title: *Characterization of native vegetation cover in the Serrano Chaco District based on field data and spectral signatures*

Autores

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Resumen

The characteristics of the vegetation cover of the Serrano Chaco District in the Province of San Luis have been described by various authors on different aspects. However, the spectral signatures of the woody plants that make up this landscape have not been developed and analyzed. This study is based on the hypothesis that reflectance is associated with the biophysical characteristics of plants, which in turn respond to the environmental conditions of their occurrence areas. In this context, field data collection was carried out using a spectroradiometer with the main objective of generating this information about the native vegetation. Individuals of the following species were selected: Molle, Espinillo, Tala, Chañar, Algarrobo, Quebracho, and Romerillo. The results configure typical signatures of healthy vegetation with variations in the percentage of reflectance in the SWIR channels (1570 – 1650 nm) that would be related to the moisture conditions characteristic of the occurrence sites of the species. Additionally, a land cover map of the study area was created. The results estimate a predominance of shrubland, grassland, and tree vegetation cover types. Future work aims to incorporate the generated field data in the validation of metrics obtained in the lab about degradation processes that can impact over the cover types mentioned before. It is noteworthy that the original information contained in this study contributes to advancing knowledge in a region with little information in the field of geosciences.

ID194

Title: *Towards a semantic sensor spectral data framework: a case for in-situ water spectroradiometry*

Autores

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Resumen

Spectral data are crucial for optical remote sensing, serving to calibrate and validate satellite data, as well as to generate models for biophysical and geophysical variables. This data, essential for the growing field of hyperspectral geospatial data from sensors like PRISMA, enMAP, and PACE, can be sourced from in-situ measurements, laboratory data, and radiative transfer models. However, without a systematic way for data annotation and sharing, the valuable data generated by different observation missions remain isolated in data silos with few chances to be reused by others stakeholders. In this paper, we present an application ontology for managing observation data considering the full pipeline of the underlying measurement campaigns. The ontology is proposed as a key part of a Semantic Sensor Web (SSW) platform for FAIR-complaint data sharing. The proposal is based on the Semantic Sensor Network (SSN) ontology and meets World Wide Web Consortium (W3C) and Open Geospatial Consortium (OGC) standards like SensorML, O\&M or GeoSPARQL. The presented approach is envisioned to support others observational projects beyond water quality, encompassing vegetation, minerals, and snow, among others, for various spectral data sources.

Volver

ID195

Title: *Automated Detection of Oceanic Slicks with SAOCOM near Mar del Plata's Shoreline*

Autores

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Resumen

This study presents a method for detecting and segmenting ocean slicks using SAOCOM SAR images. It was tested in the coastal area of Mar del Plata, Argentina. The process includes selecting SAOCOM tiles, applying a custom segmentation script, and refining the results through morphological operations such as dilation and erosion. Four SAOCOM images from three different dates were tested, two polarizations were analyzed, VV and HH, and the results were compared with a Landsat image that coincided in date with one of the SAOCOM images acquired. Surface reflectance RGB composite and surface temperature products allowed to confirm the slick. The L-band-based approach successfully identifies and delineates ocean slicks with high spatial resolution. This method has great potential for generating operational ocean slicks monitoring systems from L-band SAR data.

Volver

ID196

Title: *Reflectometry with Galileo Signals: Ocean and Amazon Basin events from CYGNSS*

Autores

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Resumen

Global Navigation Satellite Systems (GNSS) are designed to provide precise positioning, velocity, and timing information through satellite constellations. These satellites transmit signals to GNSS receivers to determine location parameters. Beyond their traditional use, GNSS signals reflected, refracted, and scattered by the Earth's surface and atmosphere have been utilized in remote sensing applications, leading to techniques like GNSS Reflectometry (GNSS-R) and GNSS Radio occultation (GNSS-RO). GNSS-R involves processing signals reflected from the Earth's surface to extract geophysical parameters, employing GNSS-R receivers located on ground stations, airborne platforms, or Low Earth Orbit (LEO) satellites. The Cyclone Global Navigation Satellite System (CYGNSS) mission, led by the University of Michigan and sponsored by NASA, utilizes GPS-R to capture reflections of GPS L1 C/A signals. In this work we use CYGNSS public data to generate a Galileo-R event dataset, focusing on reflections from the ocean and the Amazon Basin. We processed raw intermediate frequency (IF) data to obtain Delay-Doppler Maps (DDMs) from Galileo signals, calculated relevant parameters, and created a public dataset for Galileo-R Ocean and Amazon basin events. This paper details the signal processing methodology, dataset characteristics, and a statistical analysis of the classified events.

Volver

ID197

Title: *Soil Moisture Estimation in the Argentinian Pampas using Data Assimilation of SMAP and SMOS retrievals*

Autores

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Resumen

Soil moisture is a variable of direct interest for agricultural production. However, its high spatio-temporal variability makes estimation difficult. Remote sensors aboard satellites enable for soil moisture measurements over large areas with good spatial and temporal resolution. Despite these advantages, the measurements are limited, biased, and might be spurious, requiring corrections. This work proposes the evaluation of data assimilation based on the Ensemble Kalman filter with perturbed observations to estimate soil moisture in the Argentinian Pampas under the extreme drought conditions of 2022. Two techniques for observational bias correction in soil moisture assimilation are evaluated: cumulative distribution matching and normal deviate correction. Due to the drought-induced moisture anomaly, the cumulative distribution matching corrections result in almost constant corrected observations for the entire dry season in SMAP, and in a less determinant way for SMOS. Despite this, the cumulative distribution matching technique presents the lowest root mean squared error when compared to in-situ measurements.

Volver

ID198

Title: *Modelling of phosphorus and nitrogen delivery in a strategic river basin*

Autores

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Resumen

Human activities like agriculture, industrialization,urbanization, and population growth have increased nutrient inputs in aquatic ecosystems, disrupting natural nutrient cycles.

This study helps to understand how nutrients move in a river basin using the InVEST NDR module in order to model and map total nitrogen and total phosphorus delivery from different land use and land cover (LULC). Identifying non-point pollution sources and evaluating nutrient retention by vegetation allow us to understand how LULC can affect the quality of water in the Suquía River basin by affecting the amount of nutrients that get carried away in the wáter.

ID201

Title: *Evaluation of SWOT products to determine Water Surface Elevation of lakes and lagoons in Cordoba Province, Argentina*

Autores

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Resumen

Monitoring water bodies such as lakes, lagoons, and rivers is essential for sustainable water management, especially when these water bodies go through periods of excess and deficit. In large water bodies, such as reservoirs and lakes, installing automatic limnimetric stations for recording water levels is a common practice. In the case of reservoirs, this information is essential for effective reservoir management and for projecting the available volume into the future. However, some water bodies do not have this type of record, and alternative methods are needed. The Surface Water and Ocean Topography (SWOT) satellite mission, launched in December 2022, will improve the estimation of the levels of these water bodies, which are crucial for water supply, biodiversity, Etc. This work presents the preliminary results of validating SWOT products in the San Roque

reservoir, Córdoba, Argentina, and its potential application to monitor the lagoon Mar Chiquita (Mar de Ansenuza).

ID203

Title: *Performance evaluation of satellite temporal aggregation methods and sample size training data for crop mapping*

Autores

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Resumen

The generation of agricultural land cover maps through remote sensing has expanded in recent years. Having accurate and nearly real-time maps is crucial for decision-makers. However, there are significant challenges in terms of the data required to produce these maps. Firstly, it is necessary to select and summarize the most useful satellite imagery. Secondly, collecting ground reference data from the campaign in the study area is costly in terms of money, time and human resources. The aim of this study was to evaluate and compare the performance of three methods for temporal aggregation of satellite imagery, while extending the training datasets used to map summer agricultural land cover. To achieve this, Sentinel-2 image mosaics were computed using three temporal aggregation methods: one calculating median values, another retrieving data related to maximum NDVI values, and a third a composite selecting the images with the least cloud cover. The ground reference dataset was divided into two independent sets: one for training and the other for validation. To analyze the effect of training dataset size, successive tests were conducted with increasing dimensions of the training dataset. The tests were carried out using a gradient boosting classification model in a purely agricultural area in the province of Córdoba, covering the summer agricultural campaigns of 2015/16, 2016/17, and 2017/18. The results showed that the composites produced by the median and maximum NDVI methods had the highest statistical metrics for assessing the accuracy of thematic maps. For the studied area and seasons, a training set size of 65 samples (plots) per crop class allowed achieving accuracy values of 90%.

ID207

Title: *Characterization of vineyard training systems based on remote sensing and crop indices*

Autores

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Resumen

In the context of precision viticulture, this work presents the implementation of remote sensing techniques to analyze the spatial variability of a vineyard (Vitis vinifera L.). This work seeks to continue a preliminary investigation conducted in 2020; this time, the study area within the vineyard was expanded, and the campaigns of 2023 and 2024 were considered. This trial was conducted in a vineyard located in the province of San Juan, Argentina. The vineyard was divided into three blocks (replicates), and within each block, three training systems were randomly implemented: Free Cordon, Minimal Pruning and Box Pruning. The analysis was mainly based on extracting information from various vineyard maps constructed from high-resolution (2.5 cm pixel size) multispectral and thermographic images. These images were captured using special cameras mounted on an unmanned aerial vehicle (UAV). Vegetation indices NDVI and NDRE were calculated from the orthomosaics. The spatial distribution of each index and the crop temperature (Tc) were studied, and measurements were subsequently recorded in plants within each training system. Based on these measurements, significant differences were identified among the three training systems. The results demonstrated the usefulness of the high-resolution images acquired to assess the vineyard's condition at the plant level, allowing the producer to manage each training system specifically.

ID208

Title: *Applications of geographic information systems in food environments and cardiometabolic diseases: a systematic review*

Autores

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Resumen

Objective: To systematically analyze the scientific evidence related to the contributions of geomatics (remote sensing, spatial analysis, geographic information systems) to the study of cardiometabolic diseases in food environments. Methods: A systematic review of the literature was carried out, using different online scientific databases such as Pubmed/Medline, Google Scholar, Lilacs, and Scielo. Those articles containing the keywords or a combination of them were included during 2015-2023. Each paper was objectively structured and inspected for validity and applicability. The quality of the included studies was assessed using the STROBE guide. Results: 19 articles were analyzed that explain the use of geospatial technologies for the study of cardiometabolic diseases and its risk factors, carried out in different countries and concerning the environment, as well as its risk factors, with priority given to studies on the prevalence of obesity and overweight.

Geographic information systems were the most used tool. Conclusion: Geospatial tools provide valuable insights into how environmental factors influence CMDs, highlighting the need for tailored interventions and policies.

ID209

Title: *Predictive model of the climate change impact on low birth weight, a methodological approach in Argentina*

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Resumen

Introduction: As one of the challenges of this century, climate change has a negative impact on health. The specific application of models to evaluate low birth weight (LBW) in the context of climate change is still limited. Methodology: In 657 urban localities in Argentina, birth weight data of live births from the period 2018-2019 and information on community food environments (CFE) were extracted from various sources of open data and satellite images. Modeling was performed in two stages: 1) using all variables as inputs, and then 2) using only the top 10 most influential variables in predicting LBW. The performance of nine machine learning (ML) models was compared, selecting a final XGBoost model. The models were managed using the MLflow platform. To simulate a possible climate change scenario within 25 years, the annual change rates of the environmental variables included in the top 10 most influential variables were calculated. A spatial autocorrelation analysis was conducted to evaluate clusters, and a hotspot analysis and hotspot comparison were performed to assess the location of clusters and the differences between the original and simulated LBW values. The work was carried out with ArcGIS Pro and QGIS 3.28. Results: The modeling and simulation presented an R2 of 0.88 and 0.87 respectively. Clusters were found in all LBW variables, with high prevalence areas mainly towards the center of the country. The simulated data compared to the original data show a contraction of the high prevalence LBW cluster towards the center. Conclusions: There is an opportunity to apply this methodology for future research that could transform the approach to neonatal health in the context of climate change, providing efficient tools for evidence-based decision-making.

GEOCIENCIAS y SENSADO REMOTO

ID218

Title: *Estudio preliminar de las coberturas y usos del suelo en el secano de San Juan, usando imágenes SAR, SAOCOM*

Autores

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Resumen

El presente estudio se enfoca en el monitoreo de la dinámica en las coberturas del suelo en el secano de San Juan, ubicado en la cuenca baja del Río San Juan y dentro de la provincia fitogeográfica del Monte, la cual se caracteriza por poseer un clima seco y cálido. Los cambios en esta zona se deben a actividades antrópicas. En tal sentido, resulta fundamental contar con información que dé cuenta de los cambios en las coberturas y usos del suelo, ya que ello permitirá gestionar y planificar estrategias, en torno a su uso, manejo y conservación. Se utilizaron imágenes de la constelación SAOCOM, diseñados para satisfacer requerimientos de información de los sectores socio-económicos y productivos, como también para prevenir, monitorear, mitigar y evaluar catástrofes naturales o antrópicas por medio de un radar de apertura sintética (SAR) en banda L. Las técnicas de polarimetría SAR, demostraron proporcionar información valiosa para la clasificación de coberturas de suelo en áreas áridas, debido a la longitud de onda de la banda L y a su penetración en el suelo, permitiendo obtener información de la superficie, la vegetación y estructura del suelo. En este trabajo se identificaron tres tipos de coberturas, la primera asociada a la actividad agropecuaria (campos de pistacho), la segunda, a la vegetación del bosque nativo y la tercera al suelo desnudo. El impacto de las actividades antrópicas, se evidencia a través del avance de la frontera agropecuaria con la implantación de cultivos de pistacho, sobre el bosque nativo de la región Monte. Este cambio en el uso del suelo refleja la presión antrópica sobre los ecosistemas nativos, destacando la necesidad de estrategias de gestión y conservación.

ID62

Title: *Towards a Mixed Learning Strategy for Discovering New Gene Signatures in Breast Cancer Prognosis*

Autores

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Resumen

This work focuses on developing a mixed-learning method that combines a filter-based metaheuristic searcher ith a shallow learning classifier to reduce the feature space while maximizing the breast cancer prognosis classification. The searcher used a genetic algorithm together with the average symmetrical uncertainty (aSU) and ReliefF (aReliefF) filter functions. This modification allowed us to measure the relevance per capita of a group of features (genes). The proposed method was validated on a data set with 396 instances. The most effective classification scheme emerged from the random forest model, utilizing 60 tree predictors and employing the aReliefF objective function. This configuration achieved an average area under the receiver operating haracteristic curve (AUC) score of 0.854 and 0.874 for the training and test stages, respectively. Thus, this classification scheme is the best breast cancer prognosis classification strategy.
In addition, we identified a set of master genes through the intersection of both objective functions regarding feature relevance. Nevertheless, evaluating this subset in the test set using the top-performing classification scheme yielded a comparatively lower performance (AUC=0.829), underscoring the necessity for additional genes to maximize classification effectiveness.

ID82

Title: *Feature Engineering Analysis for Predicting Cardiovascular Aging: An In-Silico Approach*

Autores

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Resumen

Studying non-invasive markers of Cardiovascular Health (CVH) is crucial, considering cardiovascular diseases remain one of the leading causes of mortality worldwide. This study comprehensively explores Cardiovascular Age (CVA) using photoplethysmographic waveforms (PPGW) from an in-silico dataset, highlighting the importance of feature selection in supervised learning algorithms. Through rigorous analysis, robust biomarkers such as PTT and PPGms were identified as potential non-invasive markers for assessing CVH. This research establishes guidelines for optimal feature selection and sensor placement, laying a foundation for accurate CVA estimation using PPGW. Further work with in-vivo data should be performed. The present work contributes to advancing PPG-based CVA estimation and the development of non-invasive tools for CVH assessment.

ID85

Title: *Exploring the Use of Deformable Detection Transformers for Breast Mass Detection*

Autores

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Resumen

This work analyzed the performance of the trans- ferred learning deformable detection transformer (DeTR) architecture in the breast mass detection task on mammography images. Our experiment focused on optimizing the number of queries used by this architecture, given that this hyperparameter significantly influences the detection quality. We found that the deformable DeTR architecture with 50 queries outperformed the remaining models in terms of mAP50 = 0.68 and mAP50:95 = 0.41 metrics, demonstrating its ability to detect

medium-large breast masses in non-high-density mammography images accurately. In contrast, some situations, such as tiny, small, and overlapped mass lesions and high-density mammography images, can limit the model's performance. However, it was also evidenced that these limitations are related to fine-tuning training on a small and unrepresentative mass lesion dataset such as INBreast. The model did not make false positive detections but did experience false negatives. Compared with three state-of-the-art YOLOv8 models, the proposed model outperformed but still produced competitive detection results while training significantly more parameters than the three YOLOv8 models.

ID113

Title: *Mapping Arterial Waveform Fractality: A Comparative Analysis between Fractal and Gold-Standard Vascular Health Metrics in Multiple Arterial Sites*

Autores

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Resumen

Exploring the intricate dynamics of Cardiovascular Health (CVH), this study delves into the relationship between Carotid-to-Femoral Pulse Wave Velocity (PWVcf) and Age, gold-standard metrics for Arterial Stiffness (AS), and fractal analysis. Through a comprehensive analysis of Higuchi's Fractal Dimension (HFD) and Detrended Fluctuation Analysis (DFA) across Aortic Root, Carotid, Femoral, and Digital arterial sites, correlations and variations are systematically uncovered. The findings reveal significant associations between HFD, DFA, PWVcf, and Age, shedding light on the complex mechanisms underlying AS. Notably, HFD and DFA revealed to be candidate biomarkers for AS assessment. These insights not only deepen our understanding of CVH but also underscore the importance of peripheral arteries in AS assessment. Furthermore, they pave the way for novel approaches to CVH monitoring, with potential implications for early detection and intervention strategies.

ID129

Title: *Electrooculogram as a communication alternative for people with different abilities*

Autores

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Resumen

Comunication is an esencial ability for a favorable quality of life and social integration, as it allows the necessities of each individual to be expressed, it establishes relationships and supports the social and personal development. Interpersonal communication is widely recognized as one of the fundamental pillars of human existence. An individual capable of maintaining assertive interpersonal communication contributes significantly to their own well-being and quality of life, as well as that of others. However, certain diseases, such as Multiple Sclerosis (MS), can deprive individuals of the ability to communicate effectively with others.

Globally, approximately two million people are affected by multiple sclerosis. According to data from the World Health Organization (WHO), the estimated average prevalence of multiple sclerosis is 33 cases per 100,000 inhabitants. In 2020, the National Institute of Statistics and Geography (INEGI) in Mexico identified a key component for assessing poverty at both national and state levels, which involves identifying people with disabilities by exploring their levels of limitation across various domains such as economic, social, health, and education. It was found that a significant number of individuals lack access to essential devices for effective communication and interaction.

The objective of this project is to design a medical device that, through a menu controlled by eye movements, offers an alternative means of communication for patients with severe motor disabilities.

ID131

Title: *Sleep Apnea Detection with Neural Networks*

Autores

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Resumen

This work presents a system for detecting sleep apnea using data from a portable polygraph device, enabling studies to be conducted at the home of the patient. The system implements a hybrid neural network composed of a 1D Convolutional Neural Network (CNN-1D) and Long Short-Term Memory (LSTM) for apnea detection. Pre- and post-processing tasks are automated to correct potential errors based on deterministic medical criteria, leading to an estimated rate of respiratory events. This estimate serves as a preliminary diagnosis to assist doctors in evaluating the severity of each case. Additionally, the system incorporates an innovative temporal reconstruction process, generating detailed graphs that visualize the distribution of detected apneas throughout the night.

ID132

Title: *Ambulatory Electrocardiographic Monitoring Prototype*

Autores

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Resumen

Today, wearable devices and mobile phones with advanced data transmission capabilities enable efficient and cost-effective acquisition and monitoring of ECG signals. These devices are crucial in developing countries where medical resources are limited. Therefore, we propose a prototype of a real-time ECG monitoring system using a mobile application or website, which includes hardware and software design and development, thus improving access to cardiac monitoring and allowing more accurate and faster diagnoses. The measurements carried out demonstrate the reliability of the device and the advantages of systems integration. The hardware is compact, ergonomic and efficient, housed in an abdominal case that protects and adapts the device for comfortable use by anyone. The software was designed as an intuitive interface that allows viewing ECG signals in real time through a mobile application or web page.

Volver

ID133

Title: *Reinforcement learning adjustment of conventional insulin therapy for people with type 1 diabetes*

Autores

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Resumen

During the last decades, the use of Automated Insulin Delivery systems (AIDs) for people with Type 1 Diabetes (T1D) has shown great promise and improvement for glycemic control. However, most people with T1D still rely on Multiple Daily Injections (MDI) therapy to regulate their glycemia, especially in developing countries. In this work, a Reinforcement Learning (RL) agent is trained to provide suggestions to adapt the long-lasting insulin dose used in MDI therapies. The proposed RL agent aims to rapidly improve time-in-range while minimizing the risk of hypoglycemia, compared to standard clinical guidelines. The strategy is evaluated in silico using the UVA/Padova simulator and contrasted with Standard of Care (SoC) dosing recommendations. Results show that, even under carbohydrates (CHO) estimation errors, the RL agent is able to adapt the long-acting insulin dosage in less than 3 weeks, while the SoC approach only achieves comparable glucose outcomes after 4 weeks across all virtual patients. These findings suggest that RL-based decision support systems have great potential to empower MDI users to optimize their insulin therapy between clinical visits, leading to improved long-term glycemic control.

Volver

INGENIERÍA en MEDICINA y BIOLOGÍA

ID134

Title: *Data-driven methods for daily glucose prediction in people with Type 1 Diabetes*

Autores

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Resumen

Low-error prediction of glucose levels is fundamental for the effective management of T1D, especially with the variability induced by physical activity. This work performs a detailed comparison of different types of artificial neural networks for the prediction of blood glucose during and after physical exercise. Four neural network architectures were evaluated: two based on static structures with temporal information at the input (classical and convolutional) and two based on recurrent neural networks. Furthermore, for each architecture, two variants were analyzed: one using only historical data from CGM-en and another that incorporates auxiliary signals related to insulin, food intake, and physical activity. The predictive models were trained and validated using the dataset from the T1DEXI-en clinical trial. The evaluation of the methods was carried out using predictive performance metrics and clinical relevance using the Clarke Error Grid tool. The results obtained from this analysis indicate that the incorporation of auxiliary signals and the use of LSTM-en recurrent architectures significantly improve the accuracy of the predictions, highlighting their potential in clinical applications and automatic glucose control systems in the management of T1D.

ID156

Title: *Modeling Transport of Ca2+ in Neural Synapse with Boltzmann Equation and Electrodynamics*

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Resumen

The transport of Calcium 2+ as part of neural synapse is described in terms of Boltzmann equation as well as well-known equations of classical electrodynamics. To accomplish this through a comprehensible treatment the Boltzmann equation has demanded to be integrated term by term.
It is assumed that exists an axes of symmetry so that the axon is seen as a cylinder.
The present study considers that entry of intracellular Calcium 2+ known as neuronal voltage-gated N-type calcium channels in a neocortical pyramidal neuron. Ions into axon produce ionic waves that is responsible for electric interaction with synaptic vesicles until cleft previous to completion of synapse. The present model centers on Ca 2+ ions along their entrance to neuron carry out Boltzmann-like electrodynamics while neurotransmitters are following Coulomb-like behavior, the developed theory yields that Boltzmann's equation reproduces known morphologies of Voltage-gated ion channels versus time.

ID163
Title: *Characterization of cryopreserved and lyophilized Amniotic Membrane allograft*

Autores
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Resumen
The amniotic membrane is a tissue with characteristics and mechanisms of action evidenced by its clinical effects and through studies on its structural and biochemical composition, that turns it a useful tool for the treatment of pathologies and in tissue engineering. The Laboratorio de Hemoderivados (UNC) produces cryopreserved (MAHC) and lyophilized and irradiated (MAHLI) human amniotic membrane allografts with a good biocompatibility profile. The aim of this work was to characterize the composition and cell viability of allografts preserved by two different methods. The results showed that both conservation methods allow obtaining allografts with a high collagen content within the total protein content, resistance to collagenase and with the absence of viable cells.

ID166
Title: *Citocompatibility Assessment of 3D-Printed Collagen Scaffolds with Hyaluronic Acid Crosslinked with Genipin, Dehydrothermal Treatment, and 1-Ethyl-3-(3-Dimethylaminopropyl) Carbodiimide and N-Hydroxysuccinimide*

Autores
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Resumen
This study aimed to produce and evaluate the biocompatibility of 3D-printed collagen and hyaluronic acid scaffolds for soft tissue regeneration. Three different crosslinking methods were tested on the constructs. The first method is a chemical crosslinking with 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide (EDC) and N-hydroxysuccinimide (NHS). The second method, dehydrothermal (DHT) treatment, is a physical approach that applies heat and pressure to induce crosslinking. Lastly, crosslinking with genipin, a natural agent, was also evaluated. Solubility tests in PBS at 37°C revealed optimal conditions for each crosslinking method, minimizing mass loss. SEM analysis demonstrated excellent cell adhesion and proliferation for Vero and BJ cell lines. Live/dead cell assays confirmed biocompatibility, showing high cell viability in contact with the scaffold

extracts. These findings support the potential use of crosslinked collagen and HA scaffolds for soft tissue regeneration, providing a solid foundation for future research and clinical applications in tissue engineering.

Volver

ID172

Title: *Development of a Braille self-learning device with Voice Recognition and Letter Control by encoder and solenoid.*

Autores

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Resumen

The Braille system is an alphabetic code based on raised dots that are perceived by touch, this is used by millions of people with some kind of visual impairment around the world and can represent letters, numbers, punctuation marks, mathematical and musical symbols in different languages. Based on this, an interactive device was created with the purpose of learning the Braille language in an autonomous way. It shares similarities with an encoder, having the 27 letters of the Spanish alphabet, represented in Braille language. Its operation is based on the use of solenoids for the lifting of the keys, this by means of the concepts of magnetic fields for the selection of each letter and also counting with a voice module, in this way the device gives us feedback, thus seeking a process to facilitate this learning. That said, a device was made to promote the learning of Braille language, which has a teaching method that allows the proper knowledge of the feeling that has the relief of each of the different letters of this same system, also providing a voice module, interpreting the user's responses to thus give feedback, from the sound of an alarm if the user has the correct letter, or being another sound in the opposite case. This model is simple and easy to use by any person, without the need of external help.

Volver

ID199

Title: *Isoform Discovery in Long-Read Sequencing: Tuning Computational Pipeline*

Autores

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Resumen

Isoform determination is crucial for understanding the functional diversity of proteins. However, obtaining high-quality sequencing data and optimizing bioinformatics tools for upstream analysis can be challenging. In this study, we present the optimization of a selected software pipeline using the Spike-In RNA Variant (SIRV) standard kit, which contains a diverseset of synthetic isoforms that mimic transcriptome complexity.
SIRV data serves as a gold standard, enabling parameter tuning of software tools based on these synthetic reads. We applied the optimized pipeline to long-read sequencing data generated from the same SIRV molecular biology kit to enhance isoform detection capabilities. Our results highlight the importance of parameter optimization and demonstrate the advantages of

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long-read sequencing in resolving complex isoform structures. This approach offers improved accuracy in isoform identification, contributing to a more comprehensive understanding of protein diversity and function.

ID211

Title: *Development of a protocol for verification test on critical care ventilators*

Autores

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Resumen

Ventilators are used to help patients with respiratory failure, being life support, they should be checked periodically. This article discusses the need for a standardized protocol to verify the correct functioning of mechanical critical care ventilators. To this end, a protocol was developed based on the UNE-EN ISO 80601:2:2021 Standard.
Based on the calculation of the measurement uncertainty, the accuracy and reliability of the fan measurements is guaranteed. The parameters analyzed are tidal volume (VT), respiratory rate (RR), inspiratory time (IT), complacency and pressure (PEEP). The trials were conducted on ventilators currently in use and using an analyzer and a test lung.
Finally, tables were developed to present the measured data in a clear and orderly manner. This protocol is expected to be an aid tool in medical equipment testing laboratories.

ID213

Title: *Web-based medical image repositories: characterization and searching*

Autores

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Resumen

Medical images are essential for diagnosing and treating diseases, as well as for developing AI tools for these purposes. However, obtaining high-quality datasets is expensive and their availability may be limited. Fortunately, the growth of online, open-access repositories provide researchers with a valuable resource for medical image data. The challenge lies in the lack of a unified system to classify these repositories, making it difficult to find the right dataset for a specific research project. This work addresses the aforementioned issue by proposing a tool that analyses existing repositories and defines key characteristics for comparison. Researchers can then leverage this tool to identify datasets that precisely match their needs, considering factors like disease focus, imaging modality, and access restrictions.

ID215

Title: *Transformer-Based Refinement of Pseudoknot Predictions in RNA Secondary Structures*

Autores

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Resumen

Accurate prediction of RNA secondary structures including pseudoknots is crucial for understanding RNA biological functions. However, traditional methods for predicting RNA secondary structures often struggle to capture long-range base-pairing interactions involved in pseudoknots. We propose a novel hybrid framework that accepts noisy predictions of RNA secondary structures and refines them with a transformer-based deep learning model. To make this possible, we first introduce a novel encoding scheme that seamlessly fuses RNA primary sequence and secondary structure information into linear sequences in an expanded alphabet of 28 symbols. In this new language setting, a novel tokenization scheme is further introduced to enable the transformer model to learn and leverage the constraints governing stable RNA folding from the training data. By training on a dataset of experimentally validated RNA structures, we show that our model can correct erroneous predictions, adding missing pseudoknots and removing spurious ones. Furthermore, we compared our approach with the trRosetta tool, obtaining satisfactory results that demonstrate the effectiveness of our method.

ID217

Title: *Multi-Site Photoplethysmography Applied to Arterial Systemic Network Mapping: nFISIO Platform*

Autores

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Resumen

The prevention of cardiovascular diseases requires the implementation of non-invasive studies aimed at identifying vulnerable, asymptomatic individuals with subclinical conditions. In this context, this work proposes the generation of a multi-site arterial map using a portable device that employs photoplethysmography and electrocardiography to evaluate arterial pulse wave morphology, along with biomechanical parameters such as arterial pulse transit time (and its propagation velocity), form factor, and rise velocity. This systemic approach contributes to an integrative understanding of vascular dynamics, leading to a more comprehensive approach to associated pathologies.

ID236

Title: *Assessment of Arterial Stiffness Using Radial Artery Diameter Variation Signals*

Autores

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Resumen

This work presents a proof of concept for the development of a predictive model of arterial stiffness evolution with age, using arterial diameter variation (VDA) records as a non-invasive biomarker, acquired in the radial artery. A record storage system is proposed that considers the extraction of images of the wave of each cardiac cycle and consults a deep learning model based on convolutional neural networks (CNN). A model was trained to estimate age from the images of the cardiac cycles and its performance was evaluated on training datasets (randomly selected records) and test (records of other patients). Heatmaps were used to visualize the regions of the cardiac cycles that the model considered relevant for prediction. The results showed an average absolute error, considering the estimations of the cycles) of 7.78 years in the estimation of age for the complete records. The cause of this error is analyzed. The limitations of the study, such as the size and selection of the sample, are discussed and future improvements are proposed, such as training with more cases and patient selection. The potential of the system to assess cardiovascular health and estimate other relevant descriptors is highlighted.

ID241

Title: *Transformaciones globales en imágenes y funciones de pertenencia generadas automáticamente para el descubrimiento de conocimiento: un estudio en resonancia magnética de cerebro*

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Resumen

La segmentación de imágenes es un proceso de suma importancia en el contexto médico. Si el método utilizado no sólo resuelve la segmentación, sino que también permite generar algún tipo de interpretación expresada en lenguaje natural, puede conducir a contribuciones significativas para el estudio y la solución de ciertos problemas médicos. En este trabajo se presenta un método para la interpretación de imágenes de resonancia magnética (IRMs) basado en la generación automática de funciones de pertenencia valuadas en intervalos (IVMFs) y su interpretación a partir de medidas sobre dichas funciones. Se amplía sustancialmente el análisis realizado en trabajos anteriores. Se propone un conjunto de nuevas medidas sobre las IVMFs que permiten interpretar imágenes de resonancia magnética en términos de las intensidades de los píxeles en diferentes secuencias. Se realiza un análisis exhaustivo sobre IRMs de cerebro en secuencias T1, T2 y PD. Se consideran transformaciones globales sobre las imágenes, incluyendo estiramiento de contraste, aumento y disminución de brillo, ecualización de histograma y adición de ruido, y se demuestra que las IVMFs generadas y las medidas propuestas reflejan y explican los cambios esperados. Se concluye que el método propuesto, basado en lógica difusa, resulta adecuado para la interpretación de IRMs y se propone su extensión a otro tipo de imágenes o su aplicación en otros tipos de datos como trabajo futuro.

INGENIERÍA en MEDICINA y BIOLOGÍA

ID242

Title: *Generation of a Synthetized Database Based on Real Data for Vascular Age Estimation Through a Machine Learning Approach*

Autores

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Resumen

Several studies have established reference values for the relationship between "healthy aging" and the evolution of arterial biomechanical variables, such as blood pressure, intima-media thickness, and pulse wave velocity. This study investigates the feasibility of estimating vascular age, defined as the chronological age of a normotensive, non-pathologic individual based on specific arterial biomechanical variable values. To achieve this, a synthetic database (n=60,000) was created from relevant publications that included real data exclusively from healthy patients. This database was then utilized to estimate individual vascular age using different supervised machine learning models. The models demonstrated promising performance, as indicated by the coefficient of determination (0.77), root mean square error (8.24 years), and mean absolute error (6.43 years), when assessed for their ability to predict chronological age in healthy individuals, where chronological age and vascular age are assumed to be equivalent. These results support the development of more personalized and accurate preventive measures, enabling early and potentially modifiable interventions in vascular health.

ID21

Title: *Characterization of surge suppression devices in a single non-destructive measurement process using a pulse transmission line tester*

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Resumen

A non-destructive testing method is described to evaluate in a single measurement process two parameters of protection devices against surge transient (SPD): the parasitic capacitance and the protection voltage. This simple test allows to evaluate the effectiveness of the protection system designed for a specific network, as well as executing periodic maintenance tasks to check the status of the SPD. These tests are performed using a transmission line pulse tester (TLP), giving a new application to this instrument mainly used to evaluate the behavior of integrated circuits under electrostatic discharges.

ID37

Title: *Recurrent autoencoder for fault detection in a train of polymerization reactors*

Autores

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Resumen

Detecting, identifying, and diagnosing faults in industrial processes is crucial for preventing poor process control, raw material wastage, and economic losses due to quality issues in the final product. Early detection and accurate diagnosis of faults are essential for redirecting processes and minimizing their impact. This work develops a fault detection module that includes fault interpretation to facilitate identification and diagnosis. The module is specifically designed for a continuous production process of latex for styrene-butadiene rubber, which is prone to a wide variety of faults with different characteristics. The proposed methodology requires only normal operation process data for model training, thus avoiding the complex task of obtaining a representative dataset of all possible process faults. Given the process's complexity, dynamic nature, non-linearity, and numerous measured variables, a methodology based on recurrent autoencoders is adopted. The results generally show an acceptable performance of the model. Faults that significantly deviate from the normal operation state of the plant are effectively detected. However, some faults with small magnitudes, which do not significantly differ from the normal operation state, can cause delays or temporary omissions in detection.

ID44

Title: *Virtualizing arc fault and thermal tests for virtual experiments and digital twins*

Autores

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Resumen

This paper explores the use of virtual experiments and digital twins to complement or replace standardised tests. A straightforward methodology is proposed to obtain an equivalence between virtual and physical tests. A key step in this method is to virtualize the standard requirements. This analysis is applied to two relevant tests for the electrical industries, the internal arc test and the temperature rise test. All the required test conditions were classified into three groups, those that can be represented in the simulation, those that must be modified to be represented in the virtual environment, and those that are inapplicable in a virtual context. Results for the temperature rise test are presented. The virtual experiment was performed by Monte Carlo simulation with the finite element method.

ID48

Title: *Loading Effect Influence in Bandwidth Measurements for High Input Impedance Oscilloscopes*

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Resumen

The influence of the loading effect in a bandwidth calibration setup for high input impedance oscilloscopes is described in this paper. First, a comparison between specified RC model input impedances versus actual measured values up to 300 MHz is done. Later in this paper, in order to avoid systematic errors in bandwidth measurements, different generator voltage corrections are considered depending on the measurement setup adopted. Also an improved measurement technique using a power meter is introduced in this paper. Finally, three oscilloscopes having nominal bandwidths of 60 MHz, 100 MHz and 200 MHz are measured using proposed correction methods against a typical bandwidth measurement where no voltage correction is applied at all. Results show that there is a bandwidth underestimation in the latter case, which varies in function of the oscilloscope under test.

ID50

Title: *Application of LSTMs recurrent neural networks to characterize a digitizer using a quantum voltage standard*

Autores

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Resumen

This work studies an application of Long-Short Term Memory (LSTM) recurrent neural networks to characterize a digitizer using measurements performed with a quantum voltage standard based on the Josephson effect. Digitizers are fundamental instruments in electrical measurements, particularly in quantum-based metrology applications, where accuracy is important. Exploiting the LSTM's capability to learn temporal dependencies in sequential data, a methodology for characterizing a digitizer's performance is proposed. By training classification LSTM models using quantum voltage standard measurements, patterns inherent to the system behavior, like the transient that appears due to the quantum voltage steps transitions, can be detected. After eliminating these transient points, a fitting can be made using weighted least squares to calculate the digitizer's gain and offset. The results show the potential of advanced machine-learning techniques to optimize measurements in quantum-based systems.

Volver

ID73

Title: *X-Ray Computed Tomography For 3D Characterization Of High-Frequency Standards*

Autores

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Resumen

This paper presents a non-contact method for the characterization of coaxial air-dielectric transmission lines used as S-parameter standards. The use of computed tomography for measuring the diameter of the outer conductor of a line is introduced. The proposed method utilizes 3D reconstruction to obtain a mean diameter by fitting small cylinders into the object. This result is necessary to calculate the characteristic impedance of the line and derive its S-parameters. The procedure is traceable to the SI base unit of length and, due to its advantages, can serve as a complement to other established methods of measurement.

Volver

INSTRUMENTACIÓN y MEDICIONES

ID75

Title: *Scanning Electron Microscopy Applied to RF Primary Reference Standards*

Autores

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Resumen

A novel method for characterizing the diameter of inner conductors in high-frequency coaxial air lines is presented. It is based on scanning electron microscopy and can be seen as a complement to the use of laser micrometers, offering its own distinct advantages. The proposed method was implemented and tested in an international comparison as part of an EMPIR project.

ID77

Title: *Sensitivity Analysis of SEM Parameters for Dimensional Calibration of Coaxial Air Lines*

Autores

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Resumen

A method for processing SEM images to determine the diameter of the inner conductor of coaxial air lines is described. Additionally, a thorough sensitivity analysis of SEM parameters that may impact the value estimated is presented. One specific parameter stands out as the main contributor of systematic error that must be corrected to avoid excessive bias. This bias diminishes its influence as the device diameter gets smaller, which happens toward higher frequencies of operation.

ID84

Title: *Development of Complex Permittivity Measurement Technique in Foods at Microwave Frequencies using S-Parameters*

Autores

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INSTRUMENTACIÓN y MEDICIONES

Resumen

The characterization of dielectric properties in foods at high frequencies is crucial for the development of processing techniques such as cooking, pasteurization, dehydration, among others, allowing the prediction of dielectric losses as a function of temperature, humidity, and composition. This work presents the development and construction of a complex permittivity measurement system at microwave frequencies using scattering parameters for foods involved in dehydration and drying processes. The conversion algorithm and calibration and measurement procedure are also presented. The developed and calibrated method showed satisfactory results, validating the measurements with existing publications and highlighting the importance of homogeneous sample conditions to obtain accurate data. This system allows predicting the thermal response of foods irradiated with electromagnetic waves up to 4 GHz.

ID94

Title: *Simultaneous Irradiation and Testing for Radiation Damage Evaluation in Actively Biased SiPMs and Other Devices*

Autores

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Resumen

A portable opto-electronic device test bench together with a neutron irradiation setup at Reactor Argentino 1 (RA-1) facility in Buenos Aires (Argentina) is presented. The irradiation with neutrons is performed to reproduce the expected damage the devices would experience while operating in outer space. Silicon photomultipliers (SiPMs) have been irradiated in this setup with an Am-Be source while measurements of key parameters have been taken to better evaluate the damage progression. The objective of this irradiation setup is to expose SiPMs or any other electronic device to neutron doses equivalent to those encountered during an entire space-borne mission, with the additional feature of irradiating while the devices operate in a more similar operating condition than the final application in terms of biasing or any other environmental variable. As the irradiation degrades the silicon lattice of the devices, damage is observed through the increment of dark current due to the increase in thermal dark pulses generated by the lattice imperfections. Preliminary results obtained from a Hamamatsu S13552-10 128-channels SiPM array, irradiated and measured concurrently, also show some step changes in dark current while irradiating instead of only smooth increments. These results are presented to demonstrate the functionality and some of the capabilities of the test and irradiation setup described.

INSTRUMENTACIÓN y MEDICIONES

ID170

Title: *Automatic Gain Control on FPGA for Multi-Antenna GNSS Receivers*

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Resumen

In this work an Automatic Gain Control (AGC) for Global Navigation Satellite System (GNSS) receivers with multiple antennas is presented. The implementation was done in an FPGA and it was integrated with the embedded system of the receiver digital processing stage. The implementation directly in hardware allows one to control all the channels in a simultaneous way, which is a basic requirement for some GNSS applications. The AGC module was coded in VHDL and it includes a bus interface to communicate with the receiver microprocessor. The AGC functioning is completely autonomous but this interface lets one monitor and change some algorithm parameters in real time. A custom SPI interface was also integrated with the AGC module in order to program the compatible Variable Gain Amplifiers (VGA). The validation process was done in two stages. In the first one, an open loop test was carried out using a simulated signal. In the second stage, a real GNSS receiver was used to do a closed loop validation with a synthetized signal. The open loop validation stage was useful to test the main configuration parameters of the implementation while the closed loop tests were used to validate the end-to-end AGC algorithm. The complexity analysis of the design showed a few logic resources required which helps the implementation in almost any modern FPGA.

ID183

Title: *Damage Clasification In Composite Materials Using Neural Networks*

Autores

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Resumen

Composite materials are widely employed in critical industrial applications, where their use has surged due to their numerous advantages over traditional materials. However, these benefits can be compromised if adequate quality control techniques are not implemented, particularly for detecting structural damage. Acoustic emission is a non-destructive technique commonly used for damage detection. By leveraging artificial intelligence tools to efficiently process emitted signals, the detection and classification process can be automated. This study utilizes sound pressure levels to diagnose failures in fiberglass-reinforced (GFRP) epoxy composite beams. A pattern recognition system based on Artificial Neural Network (ANN) algorithms is employed for diagnosis. To ensure data variability, the classifier was trained and validated using preprocessed acoustic signals from multiple healthy and damaged beams in various locations. Testing was conducted using test results from specimens not used for training and validation, ensuring the ANN's robustness. The results demonstrate a high fault detection percentage, confirming the reliability of the ANN.

INSTRUMENTACIÓN y MEDICIONES

ID189

Title: *Broadbands complex permittivity sensor for liquids*

Autores

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Resumen

This work presents the design, construction and electrical characterization of a broadband permittivity sensor for liquids, apt for use in industrial environments. It is made of plated steel, bronze and aluminum, which guarantees compatibility with many liquids. The characterization of the sensor is carried out in the frequency range between 1 MHz and 200 MHz, for liquids with permittivities ranging from 2 to 80. The results are satisfactory in terms of sensor construction, being easy to build and to clean, robust, low-cost, and versatile. From the characterization, it is verified that its electrical losses are very low, and that its first self-resonance frequency is well above the frequency operating range.

Volver

ID206

Title: *Frequency domain test scheme of a current source for nuclear magnetic resonance*

Autores

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Resumen

Nuclear magnetic resonance techniques in magnetic metrology applications require the generation of a highly homogeneous field. This is achieved by exciting a magnet with a high-stability variable current source or feeder. One way to improve the source's reliability is by employing periodic field testing strategies. This work proposes a structural-type test for a feeder based on a three-phase converter with Cuk topology that employs low-complexity measurements. In test mode, the open-loop circuit under test is exercised with a stimulus that causes a step variation in the output current. The current signal is analyzed using a fast Fourier transform. It is assumed that a fault will cause a variation in the magnitude of selected spectrum components, making it observable. The test performance is evaluated through a fault injection and simulation procedure on the Matlab Simscape platform, employing models of single catastrophic faults. The work includes an analysis of the detection capacity of the method under conditions of variability in the power supply of the source. The fault injection and simulation campaign results show that the method's efficiency is very good, with only a single undetected fault.

Volver

INSTRUMENTACIÓN y MEDICIONES

ID25
Title: *Image Detection in Low-quality Videos*

Autores

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Resumen

This article aims to describe recent findings on a prototype for assisting blind people. To improve its functioning the main approach is to build an intelligent system composed by Machine Learning several models to detect and recognize multiple objects. The scope of this activity includes efficiency assessment, video data compilation, image segmentation, Data Mining processing, and tagging. This work also evaluates and depicts certain techniques and approaches to be applied to create models with high pattern detection efficiency. The algorithm must be light as well as quick, in order to be used in standard cell phones to assist blind people and provide meaningful information to the user as well as a small analysis of the results. This study outlines specific methods and strategies employed to develop highly efficient models for pattern recognition.

ID40
Title: *Object Detection Algorithms Identifying Ceratitis Capitata Fruit Fly*

Autores

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Resumen

This study aims to obtain an artificial intelligencemodel for monitoring the fruit fly Ceratitis Capitata. Last artificial intelligence technologies are proposed to solve this task. So, this research utilizes deep learning object detection using YOLO algorithm to identify, detect, and count male flies on Jackson Trap images. The above model integrates modelbased and data-driven tuning methods such as automated hyperparameter tuning, data augmentation, image processing, and synthetic data generation to improve the score. This study is significant due to the global threat of this fly to cro ps and expensive current monitoring methods. Institutions deploy networks of Jackson Traps to monitor flies. But, this manual process is labor-intensive. The challenge of expensive technique was solved by implementing the model studied, and promising results were achieved. So, this model exhibited a mean average precision of 0.86 for training and 0.84 in validation.

ID47

Title: *Cooperative Task Allocation for Multi-UAV Systems Based on ACO, A* and DWA*

Autores

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Resumen

This paper addresses the efficient cooperative task allocation of multiple unmanned aerial vehicles (UAVs) using a hybrid algorithm based on the Ant Colony System, integrating the A* algorithms and the Dynamic Window Approach to avoid fixed and moving obstacles, respectively. The research highlights the importance of efficient coordination in missions with multiple collaborative robots, emphasizing the need to integrate navigation and sensing to avoid collisions and plan routes efficiently. A mathematical model is proposed, considering various constraints, such as the UAVs maximum travel distance and reward collection capacity. Finally, the proposed algorithm proves to be effective in planning routes in complex scenarios, can be used to analyze the feasibility of carrying out missions and can indicate the ideal number of UAVs.

ID93

Title: *On the use of YOLOv8 for Detection and Classification of Mammals Species in Wildlife Environments in the Ecuadorian Amazon*

Autores

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Resumen

The preservation of global biodiversity has become a critical issue in recent decades, with significant increases in endangered species due to human activities. The use of Deep Learning models for the automation of animal monitoring plays a fundamental role in species conservation. This study aims to develop a robust classifier to detect six mammals of the Ecuadorian Amazon (Alouatta seniculus, Leopardus pardalis, Panthera onca, Puma concolor, Tayassu tajacu, and Tapirus terrestris) using the YOLOv8 computer vision model. A dataset of 11,708 images was collected from the iNaturalist repository, ensuring high-quality data through a rigorous cleaning and annotation process. To achieve a model that maximizes trade-offs between detection speed, accuracy, and computational burden, various versions of YOLOv8 were experimented with. The YOLOv8m model with data augmentation emerged as the best performer, with a 4.5% improvement in accuracy over other models.

ID102

Title: *Solar Irradiance Forecasting For Photovoltaic System Optimization: An Approach Using Neural Networks*

Autores

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Resumen

This study developed and evaluated LSTM recurrent neural network models for medium-term solar irradiance forecasting in the Redenção-CE region. Using historical solar irradiation data collected by a local weather station, three LSTM models with different architectures and hyperparameters were trained. The results demonstrated the models' ability to capture complex temporal patterns and produce accurate forecasts, with Model 003 standing out for achieving the lowest values of loss, MAE (Mean Absolute Error) and MSE (Mean Squared Error). Analysis of the forecast graphs revealed the models' ability to reproduce the daily seasonality and patterns present in the real data. These promising results pave the way for the application of LSTM models in the optimization of photovoltaic systems in the region.

ID110

Title: *Learning Quadrupedal Motion through Multi-Objective Soft Actor-Critic*

Autores

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Resumen

This paper presents a study on teaching a simulated quadruped with twelve joints to walk using the Soft Actor-Critic (SAC) algorithm. Furthermore, we introduce a multi-objective approach to efficiently integrate diverse and conflicting reward functions, enabling adaptive gait generation under different sets of preferences from a single training session. Leveraging SAC's adaptability and the efficiency of multi-objective integration, the presented approach is capable of generating locomotion without explicit model requirements while allowing for goal-oriented gait adaptations.

Volver

ID111

Title: *Effect sizes as a statistical feature-selector-based learning to detect breast cancer*

Autores

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Resumen

Breast cancer detection is still an open research field, despite a tremendous effort devoted to work in this area. Effect size is a statistical concept that measures the strength of the relationship between two variables on a numeric scale. Feature selection is widely used to reduce the dimensionality of data by selecting only a subset of predictor variables to improve a learning model. In this work, an algorithm and experimental results demonstrate the feasibility of developing a statistical feature-selector-based learning tool capable of reducing the data dimensionality using parametric effect size measures from features extracted from cell nuclei images. The SVM classifier with a linear kernel as a learning tool achieved an accuracy of over 90%. These excellent results suggest that the effect size is within the standards of the feature-selector methods.

Volver

ID120

Title: *Advanced Variable Tuning and Biases in Chatbot Models*

Autores

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Resumen

Most of the current work done in the field of chatterbots. But there is scarce information about the evolution of the prototypes after the startup, where the stable exploitation of the system make evident the engine performance and bias. This paper presents the tuning and evolution of PTAH, an AI system that interacts in natural language with a precise combination of linguistic processing tools. This analysis aims to introduce not only a methodology but also to show and compare how certain parameterization considerations impact on the results despite the sophistication of algorithmic. Results allow to affirm that the post-deployment treatment is critical for the correct parameterization of NLP systems using AI approaches, due the bias and entropy speed required to feed the intelligent learning of the optimized model in chatter contexts.

ID142

Title: *Identifying duplicate customer records using blocking and supervised learning techniques*

Autores

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Resumen

Identifying duplicate entities in databases is crucial for many organizations and often requires automated processing due to the volume and complexity of records. Blocking techniques can help here by reducing the number of comparisons between records, although they might miss some duplicates based on their configuration. Furthermore, manual review by analysts is still needed to confirm duplicates. To mitigate this problem, we propose an approach that combines blocking techniques with a supervised classification model to simplify duplicate detection. To account for different configurations, we apply hyper-parameter optimization to the entire approach. Our experiments on synthetic and real customer data showed that, despite having an imbalanced dataset, the proposed approach effectively distinguished duplicates from non-duplicates when appropriately trained. These initial results are promising, suggesting potential for a practical implementation in organizational contexts.

ID148

Title: *Efficient Endangered Deer Species Monitoring with UAV Aerial Imagery and Deep Learning*

Autores

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Resumen

This paper examines the use of Unmanned Aerial Vehicles (UAVs) and deep learning for detecting endangered deer species in their natural habitats. Leveraging high-resolution aerial imagery, we apply advanced computer vision techniques to automate the identification process of deer across two distinct projects in Buenos Aires, Argentina. The first, Pantano Project, involves the marsh deer in the Paraná Delta, while the second, WiMoBo, focuses on the Pampas deer in Campos del Tuyú National Park. We developed a tailored algorithm using the YOLO framework, which was trained on extensive datasets compiled from UAV-captured images. Our findings demonstrate that the algorithm effectively identifies marsh deer with a high degree of accuracy and provides initial insights into its applicability to Pampas deer, although with noted limitations. This study highlights the potential of integrating AI with UAV technology to enhance wildlife monitoring and management practices.

ID150

Title: *A Predictive Deep Learning Model to Estimate the Power Generated by a Photovoltaic Plant*

Autores

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Resumen

This work presents a predictive model based on deep learning to estimate the electrical power generated by a photovoltaic rooftop plant in the very short term. LSTM and GRU models and variants were implemented in the predictive system as a basis for their excellent performance. The relationship between the variables in the database was analyzed to define an architecture that takes into account both weather and relevant physical input variables, including the electric power generated 24 hours before the moment to be predicted. The final model consists of a LSTM architecture with 3 layers and sequence length of size 50, which has improved the results of models such as NARX and SVR, with respect to previous published results based on a CNN-GRU architecture on the same dataset.

ID157

Title: *Global Pandemics Dictated by Noncommutative Algebra*

Autor

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Resumen

The apparition of a global pandemic commonly seen as a random, is unpredictable in both geographic location as well as time. For example, Monkeypox disease 2022 could have emerged rather before than Corona virus disease 2019 (Covid-19), so that not any sequence leading to a rule might be established. Similar reasoning can be applied to the morphological characteristics of Covid-19 statistics. Along the period 2020-2023, that global pandemic has exhibited various waves and up to two large peaks. This paper explores the relation between the apparition of these peaks and a kind of algebra by which pandemic might be mathematically correlated to it.

When model is applied to data, it is found that exists there a kind of correspondence at the sense that apparition of peaks are dictated by noncommutative operations of operators that act onto data.

ID185

Title: *Embedded Deployment for Real-Time Road Sign Detection and Identification*

Autores

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Resumen

This article reports on the design and deployment of a Deep Neural Network (DNN) in a hardware platform for real-time detection and identification of road signs. A YOLOv3 DNN is trained using the Keras framework and deployed into an AMD Kria KV260 development board using the Vivado, Vitis IDE and Vitis AI tools. The DNN is implemented in a Deep Learning Processing Unit (DPU) core and the software application is developed at an operating system level using the Python Productivity for Zynq (PYNQ) framework from AMD.

ID191

Title: *Metrics for the Evaluation of Optimization Methods in Dynamic Problems: application to Vehicle Routing using Ant Systems*

Autores

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Resumen

Solving dynamic optimization problems is always a challenging task. For this purpose, heuristic and metaheuristic methods are the preferred ones, especially in the context of real-time decision making. In this sense, it is necessary to have evaluation mechanisms for such methods, in order to assist in the selection of one of them to be applied in a particular reality. In this paper we propose metrics for the evaluation of methods that solve real-time dynamic problems that do not require complete knowledge of the search space. These metrics can be used to compare methods quantitatively in various ways. Besides, the application of the proposal on variants of Ant Systems in a classical combinatorial optimization problem such as the Vehicle Routing Problem (VRP) is studied.

ID216

Title: *Detection and Identification of Diaphorina Citri through Neural Networks in Tucumán-Argentina*

Autores

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Resumen

The agricultural industry is one of the economic pillars of Argentina. In the province of Tucumán, citrus cultivation is one of the main productive activities, however, pests represent a constant threat, affecting the yield of crops and production, to the point of losing it completely due to this. There are different methods for detecting and monitoring pests, which adapt to the plantation, terrain, climate; one of the most used tools for monitoring and controlling pests are yellow chromotropic traps, which attract and capture flying insects. Through the use of Convolutional Neural Networks, a system that allows the detection of Diaphorina citri and Drosophila melanogaster in yellow chromotropic traps was developed. The aim of this system is to allow the detection of pests through images of yellow chromotropic traps.

ID221

Title: *On the Design of a AI Enabled Edge Workplace Environment Monitoring Station*

Autores

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Resumen

This paper reports on the design of an AI enabled edge workplace monitoring system. The system measures fluctuations in temperature, humidity, CO2 levels and human traffic. The project integrates a Raspberry Pi 4 unit with sensors for measuring variables. A camera and an Intel Neural Compute Stick 2 are incorporated for image processing for future investigation of how human traffic impacts environmental variables and likewise how these variables affect human behavior. Notably, the system is self-powered by a solar panel to enhance sustainability and portability.

ID249

Title: *Prospective Healthcare Systems for AI in Well-being*

Autores

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Resumen

Non-communicable diseases are considered of high impact on health and the economy, due to the high number of deaths and severe expenses they produce. This paper introduces Prospective Healthcare Systems (PHS), a new type of systems architecture combining advanced technologies to model and track health individual status and to be able to diagnose certain diseases in advance. PHS intend to be healthcare systems based on traditional medicine, using a sort of specific devices, communications, and Intelligent systems to both reduce the risk of becoming ill and prevent as much as possible loss of life. As part of the scope of this paper, there is a short description of the problem, an overall sketch of the proposal, an applicability analysis, and perspective. Implementation and any other technical details are out of the scope of the current text.

ID252

Title: *LUMIERE a Digital Artist of Feelings*

Autores

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Resumen

Lumiere is a virtual artist that aims to help understand psychological susceptibility to reactive artistic intelligent systems and people feelings progressions at certain circumstances. This study is carried out specifically on those interacting people who observe personalized works of art at the time of interaction according to predefined patterns of behavior. The prototype captures the evolution not only of a created artistical canvas but also the facial expressions of joy, sadness, and loneliness among others. After them it assimilates both concepts and produces a new version with techniques that may bias next reaction of the user. Prelimminary results indicates that stimuli within this context, could be used to generate a tool that allows not only to provide recreation or virtual companionship to people who need it, but also a systematic method of non-invasive and natural treatment for possible patients with specific disorders at an emotional level.

Procesamiento de Señales e Imágenes

ID22

Title: *New methodology for differentiating noisy signals of different colours using geometric features*

Autores

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Resumen

This work focuses on the differentiation of signals coloured by noise such as pink noise, red noise, blue noise, violet noise, white Gaussian noise and uniform white noise. For this purpose, an algorithm based on the sweeping technique has been used, defining two input values: a embedding dimension and a discretisation factor. Classification is performed by extracting geometric features such as amplitude, and two new parameters: Zenit angle and a shape factor. The process creates three-component vectors in a systematic way, reducing redundant information. As a new result, the model generates a reduced feature space containing unique vectors that can be visualised and used for further processing. The cardinal of this space, i.e. the number of vectors it contains, is the main parameter used to perform the classification. The proposed algorithm showed a significant differentiation of the processed signals using this parameter.

ID28

Title: *Using spatial diffusions for optoacoustic tomography image reconstruction*

Autores

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Resumen

Optoacoustic tomography image reconstruction has been a problem of interest in recent years. By exploiting the exceptional generative power of the recently proposed diffusion models we consider a scheme which is based on a conditional diffusion process. Using a simple initial image reconstruction method such as Delay and Sum, we consider a specially designed autoencoder architecture which generates a latent representation which is used as conditional information in the generative diffussion process. Numerical results show the merits of our proposal in terms of quality metrics such as PSNR and SSIM, showing that the conditional information generated in terms of the initial reconstructed image is able to bias the generative process of the diffusion model in order to enhance the image, correct artifacts and even recover some finer details that the initial reconstruction method is not able to obtain.

ID41

Title: *Genocchi Polynomials in Volterra Model to Identify Non-Linear Systems, Case of World Ocean Fishery*

Autores

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Resumen

This study aims to model non-linear systems by Genocchi polynomials and the Volterra series as approximation functions of dynamic systems. So, expressing the Volterra kernels by Genocchi Polynomials represents the cornerstone of the study to obtain models without involving huge parameter numbers. Moreover, results show the fast convergent approximation of this model gives a helpful characteristic onsystems identification, mainly on systems noisy data and reduced-time-interval dynamic. The Genocchi polynomials and the Volterra model studied the ocean fishery as proof of the technique. Using the pH index of ocean water, the global temperature anomaly, the carbon dioxide emission, and the ocean heat content as independent variables, the math model provides forecasts for world ocean fishery with an error of lessthan 2.5% for the last fifty years. The results, reveal model robustness, for this identification technique is a reliable proposal modeling non-linear systems.

ID58

Title: *Exploratory Analysis of Electric Demand Using Informational Tools*

Autor

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Resumen

An original analysis proposal is presented to detect relevant characteristics and particular events of the electric power demand signal in the Argentine Interconnected System (in Spanish, Sistema Interconectado Argentino, SADI). In this sense, permutation entropy has been used to analyze the degree of uncertainty of a signal. As a result, it is possible to findcertain patterns in the SADI hourly electricity demand records, which contribute to make the data exploration task faster, more efficient and easier to implement. The simple observation and interpretation of this metric allows an improvement of the prediction of future values by 7 %. Together with the inclusión of temperature data, by means of a polynomial model of order two, it represents an overall improvement of 19 % over a simple linear regression model on the original signal data. This result has great economic implications, since it allows a better management of generation, and environmental implications since it would optimize the dispatches of electric power demand.

PROCESAMIENTO de SEÑALES e IMÁGENES

ID65
Title: *Despeckling Filter based on the Tsallis Entropy of the $\mathcal{G}_I^0$ distribution*

Autores

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Resumen

Speckle noise is a phenomenon that occurs in the acquiring image process with coherent illumination, such as synthetic aperture radar, ultrasound, or laser systems. It is tough to eliminate due to its stochastic and multiplicative nature. In this work, a despeckling filter is proposed based on modeling the data using the distribution $\mathcal{G}_I^0$ and applying a hypothesis test built from the Tsallis entropy. The present proposal is applied to synthetic and real images and, in both cases, the efficiency in removing speckle noise is evaluated using standard metrics. Furthermore, its quality is compared with the FANS filter, obtaining encouraging results.

ID74
Title: *Study of information flow among ECG leads*

Autores

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Resumen

The main scope of this research is to analyze the flow of information of ECG signals of 12 leads. This study examines the information provided by each electrocardiography (ECG) lead, in order to reveal which of them offers greater information to contribute to the diagnosis and treatment of cardiovascular diseases. The results highlight the importance of identifying the most informative leads, which could improve accuracy in detecting cardiac conditions, guide more informed clinical decisions and contribute to the design of future diagnostic devices. In order to achieve this, two mathematical tools such as mutual information and transfer entropy were applied. For the study, two independent databases were employed to made all the calculations and obtain repeatability of patterns as a kind of confirmation of the results. The conceptual simplicity of the used tools makes this proposal simple to implement, computationally efficient and practically straightforward to interpret.

ID87

Title: *Impact of pulse compression on Doppler weather radar products*

Autores

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Resumen

Pulse compression applied to the transmitted waveforms in weather radars represents an alternative to the use of low power transmitters used in these systems based on antenna arrays. These techniques allow transmitting long duration pulses without affecting the range resolution. However, these waveforms usually present significant sidelobes, which affect the range weight function and degrade radar product estimates. In this paper we analyze the impact of pulse compression on Doppler weather radar products. The novelty of the analysis lies in the signal generation process that combines a statistical signal model, which takes into account the waveforms, with real measurements, including contributions from meteorological targets and clutter. The result is a platform to validate the design of new waveforms. The waveform study includes linear frequency modulated and phase modulated signals based on Barker codes. The generated data are used in the estimation of reflectivity and mean Doppler velocity. It is verified that the sidelobes of these signals affect the estimates, increasing the regions corresponding to the clutter with respect to the one that really exists.

ID144

Title: *The Effect of Modeling Clock Dynamics on Kalman Filter Based GNSS Signal Tracking*

Autores

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Resumen

Tracking loops are the most popular scheme to carry out carrier phase and frequency estimation in real-time Global Navigation Satellite System (GNSS) receivers. This is in part because of their very low computational complexity, but new architectures have emerged as a consequence of increasing capability of embedded systems to perform high-cost computing. This enables the implementation of tracking schemes that make the modeling of new error sources easier. This work presents a Kalman Filter based tracking architecture and the modeling of clock dynamics in the formulation. The most common way to characterize clock dynamics is modeling the Allan variance of the oscillators, on which this work focuses. The importance of clock dynamics modeling in GNSS signal tracking is analyzed through simulations and results show that tracking sensitivity and estimation error increase in the presence of clock errors. The simplicity of adding new error models to a Kalman Filter formulation is showed. The dynamic model of the filter is designed considering the clock dynamics and a simulation performance is presented in a high dynamics scenario such as a space vehicle launch. The same algorithm was run feeding it with samples obtained from a GNSS receiver front-end to analyze its behavior under real clock effects, with good results.

PROCESAMIENTO de SEÑALES e IMÁGENES

ID158

Title: *Theory and Simulation of Perceptron Through Quantum Mechanics Formalism*

Autor

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Resumen

Inside field of Machine Learning or ML one finds the formulation of artificial neural networks or ANN as a robust method to predict data under minimal bias. It constitutes a key procedure inside field of Artificial Intelligence that has demonstrated to be fast, efficient and autonomous in some cases.
A deeply understanding at the usage of ANN would lead to construct advanced as well as robust tools to predict behavior of systems. Mathematically speaking, once data has been trained, ML emerges as a powerful algorithm to predict unseen data but with a certain probability. Inspired in Quantum Mechanics being a theory fundamental in physic based at probabilities one can wonder if ANN based at the concept of perceptron might be improved through a mathematical methodology by using the formalism of Quantum Mechanics. The aim of paper is to explore novel mathematical mechanisms that would allow to fine the probabilities of prediction inside ML.

ID176

Title: *Work In Progress: Baseband Arbitrary Function Generator Integrated with GNU Radio*

Autores

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Resumen

This paper describes the advances made in implementing a Baseband Arbitrary Function Generator integrated with GNU Radio. This project is the second version of a previous one with enhancements. It will operate as an arbitrary generator, powered from a personal computer, and will additionally serve as a Pulse Amplitude Modulator (PAM). This last function is useful for teaching Pulse Code Modulation (PCM) through laboratory exercises in introductory communication system courses. The major improvements include higher operation frequency, integration of a communication protocol with GNU Radio, expanded availability of sample rates for operation, and dual output capability. Two outputs are necessary to synthesize complex signals (real and imaginary parts), which are commonly used with GNU Radio. All these hardware modifications require updating the GNU Radio block built for the previous version. Currently, two hardware prototypes of the new version have been made and are undergoing testing.

Sistemas Energéticos y Distribución Eléctrica

ID30

Title: *Evaluacion de Escenarios de Carga con el Despliegue Masivo de Vehıculos Electricos en Subestacion de Distribucion*

Autores

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Resumen

El despliegue masivo de vehículos eléctricos de uso particular será en un mediano plazo un verdadero desafıo disruptivo para las redes de distribución eléctricas en argentina. El objetivo de este trabajo es analizar, mediante diferentes escenarios, el impacto de la carga domiciliaria simultánea y nocturna de autos ele´ctricos en la red de distribución eléctrica. En este trabajo se desarrolla un modelo de optimización que permite evaluar la factibilidad de carga de autos eléctricos para una subestación transformadora estándar considerando el uso de los vehículos, las necesidades de los usuarios y las restricciones técnicas de la red. Los resultados demuestran que con el esquema tradicional de operación de las redes dedistribución será prácticamente imposible dejar que los usuarios decidan los niveles de carga de sus vehículos eléctricos debido a que la simultaneidad de carga de gran potencia haría actuar recurrentemente a los sistemas de protección por sobre carga de los transformadores de distribución. Por lo tanto, será necesario la incorporación de un modelo de gestión inteligente de cargas para todos los usuarios de vehículos eléctricos que permita satisfacer sus necesidades energéticas sin perjudicar a la infraestructura eléctrica que los interconecta. No obstante, para implementar un sistema asi será necesario un importante despliegue de tecnología de telecomunicaciones, análisis de datos, algoritmos de optimización, desarrollo informático, entre otras cosas.

ID46

Title: *Shielding Angle Effectiveness Analysis on 220 kV and 500 kV Transmission Lines Against Lightning Strikes, Including Hillside Considerations*

Autores

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Resumen

This study analyzes the effectiveness of shielding angle in 220 kV and 500 kV transmission lines as a protection system against direct lightning strikes on phase conductors. Specifically, it focuses on the impact of decreasing the shielding angle (to negative angles) on the line outage rate compared to the backflashover rate. To this end, two transmission line sections of each voltage level are taken as case studies. The electro geometric model is used, and lightning strike simulations are performed using ATPDraw software, considering flat terrain and hillsides up to 30° slopes. Finally, recommendations and strategies to improve the reliability of transmission systems are presented.

ID60

Title: *Thermal Characterization of a Building of the Facultad de Ingeniería de la UNER from simulations with EnergyPlus*

Autores

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Resumen

In this work, the thermal characterization of the Center for Innovation, Entrepreneurship and Linkage (CiEV) of the Facultad de Ingeniería de la Universidad Nacional de Entre Ríos (FI-UNER) was developed, with the objective of evaluating the thermal behavior and energy consumption of the building taking advantage of natural lighting and ventilation resources. This model has been developed through the modeling and simulation programs SketchUp®, OpenStudio® and EnergyPlus; which allowed us to simulate different behaviors by modifying conditions of the construction structures. This tool is very useful for analyzing the thermal behavior of the different components of the envelope, constituting a base of information applicable to other buildings with similar construction characteristics in the area, and contributing to raising awareness about the reduction of energy consumption in buildings.

ID90

Title: *Outage Detection and location in electrical energy distribution networks*

Autores

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Resumen

Electrical systems often face unexpected failures due to various unpredictable causes. These failures, if not properly managed, can negatively impact the economic efficiency of electric companies and the quality of service for consumers. Since most consumers directly depend on electrical distribution networks, it is crucial to develop effective methods for detecting, classifying, and locating faults, thus avoiding prolonged interruptions in the electricity supply. This article presents an ensemble learning-based approach to identify outages and their locations in electrical distribution systems. Fault simulations were carried out to determine the outages and thus acquire current values at the substation to determine the load that has been affected. The results are recorded in a database and used to train a multilayer perceptron neural network capable of determining, with an average accuracy of over 90%, the fault location among the possible zones determined by the protection and switching equipment that delimit the mentioned zones.
The model evaluation is carried out using data related to different types of faults, their locations, and various operating conditions in a test network, the IEEE 13-node network, by separating the circuit into zones. The proposed approach can determine the type of fault and its location using MLP neural networks.

ID112

Title: *Analysis of Electrical Risks by Electromagnetic Induction on Parallel High Voltage Overhead Transmission Lines*

Autores

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Resumen

This study investigates the electrical risks associated with electromagnetic induction in parallel transmission lines that share the same right of way but have different voltage levels. Specifically, it is focused on scenarios involving maintenance work, voltage level changes, and operator contact. To address induced voltage and current risks, a case study involving a 220 kV transmission line running in parallel with a 500 kV line was analyzed using ATPDraw software for simulations and exploring three scenarios that involves temporary ground connections and earthing switch at extremes of the line together with the opening and closing of jumpers. Finally, recommendations for effective risk mitigation strategies are provided.

ID140

Title: *A Reasoning-based Hyper-heuristic Model for Reliability Optimization in Medium Voltage Power Distribution Systems*

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Resumen

In this work a new Hyper-heuristic Model based on reasoning to solve the Reliability Optimization problem in Medium Voltage Electrical Distribution Systems (MV PDS) is presented. The problem focuses on the optimal location of various types of sectioning /protection equipment (s/p), introducing a new economic assessment for the Cost of Failure, considering not only the Expected Non-Supplied Energy (EENS) but other Reliability Indices based on Customers. If only a single type of s/p equipment were considered, the problem can be solved by applying Possibilistic Dynamic Programming (PDP). However, this approach collapses when there are several types of s / p devices. The solution using single Meta-heuristics has convergence drawbacks, prematurely generating sub-optimal solutions. For this reason, a Model based on a Multi-objective Hyper-heuristic Algorithm is proposed as a general solution, applying it to a real MV PDS to analyze and discuss the results obtained.

SISTEMAS ENERGÉTICOS y DISTRIBUCIÓN ELÉCTRICA

ID179

Title: *Technology and Trends for Flexible Operation in Energy Power Systems*

Autores

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Resumen

Global concerns about climate change and carbon emission reduction have accelerated the transition towards the use of renewable energy sources, which are considered clean and low-carbon. For the power sector to swiftly adapt to this transition while maintaining its security and reliability characteristics, several infrastructure updates are necessary. Traditionally, these incorporations are studied in system expansion plans, where reconfiguration and effective system response are contemplated based on market-enabling tools.

However, the dispatch of solar and wind renewable energy has increased the need to enhance the flexibility of power system management and operation due to the inherent uncertainty and variability of these sources. To efficiently harness renewable energy, various technologies in generation, transmission, and demand have been deployed to address operations focused on resolving events of uncertainty and variability. This work reviews the technological solutions being developed for flexible operation in generation, storage, transmission, and demand. Furthermore, it examines the different flexibility options within the system and how they influence system operation and planning, highlighting the importance of flexible operation to achieve a sustainable energy transition.

ID193

Title: *Diseño de estructuras de control basadas en combinaciones lineales de variables para la regulación tensión en redes de distribución activas*

Autores

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Resumen

La inclusión en las redes eléctricas de recursos energéticos distribuidos basados en energías renovables trae aparejado un alto grado de intermitencia e incertidumbre. Esta característica, inherente a la propia naturaleza de las fuentes de generación, sumada a la posibilidad de aparición de flujos bidireccionales en las líneas, puede generar dificultades en cuanto a la calidad de energía. En este marco, la definición de un adecuado sistema de control resulta crucial para hacer frente a los múltiples desafíos que este nuevo paradigma impone sobre las redes de distribución. En este artículo se propone un enfoque integral para el control de tensión en Redes de Distribución Activas (RDA) a partir de la integración de las áreas de Ingeniería de Sistemas de Procesos (ISP) y Sistemas de Potencia. Se presenta una metodología de diseño de control multivariable basada en una estrategia descentralizada complementada con un módulo de Asignación de Control (AC) y un bloque de Combinación de Mediciones (CM). Los módulos AC y CM realizan una reducción dimensional del espacio de variables de entrada-salida, permitiendo utilizar conjuntos de variables latentes como acciones de control y variables controladas. El procedimiento propuesto se implementa a través de un problema de optimización multiobjetivo no lineal mixto entero de doble nivel (BMINLP). El problema principal se basa en la minimización de tres funcionales costos que

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incluyen: i) el índice de suma de desviaciones cuadráticas (SSD) de las variables de salida, ii) el SSD de las variables manipuladas, y iii) el número de variables manipuladas y mediciones seleccionadas. La estrategia propuesta proporciona una metodología sistemática para el proceso de toma de decisiones en el diseño, operación y control de RDA con generación renovable distribuida. La metodología propuesta contribuye con el desarrollo de estrategias más efectivas para la gestión de ADN al explorar el potencial de un enfoque interdisciplinario novedoso.

ID205
Title: *Puesta a tierra de una Sub-Estación Transformadora*

Autores

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Resumen

El sistema de Puesta A Tierra (PAT) debe estar diseñado principalmente para proteger a las personas cercanas de una falla a tierra dentro y fuera de una Sub-Estación (SE) Transformadora y, conjuntamente a esto, asegurar el correcto funcionamiento de los equipos dentro de esta.
En este artículo se presenta una comparación entre las mediciones de tensiones de paso realizadas a una malla de PAT de una SE correspondiente a un parque eólico y la simulación de la misma malla de PAT con el software ETAP adecuado para este tipo de estudios. Para esta simulación se usa el Método de cálculo de Elementos Finitos (MEF) se calcularon las tensiones de paso en el área publica fuera del cerco perimetral

ID222
Title: *Localización de Protecciones en Redes de Distribución Mediante Optimización por Enjambre de Partículas*

Autores

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Resumen

Los interruptores de protección en redes eléctricas de distribución y topología radial permiten despejar fallas por cortocircuito en el sistema. Asimismo, otros dispositivos de maniobra suelen destinarse a reconfigurar la red en escenarios de post-falla, permitiendo disminuir el número de usuarios afectados. Esta estrategia busca reducir el lucro cesante para la empresa distribuidora, como así también las penalizaciones económicas que debe afrontar motivo de la energía no suministrada (ENS) en estas condiciones. En este trabajo se propone la implementación de un algoritmo de optimización por enjambre de partículas (PSO) para determinar la mejor locación de nuevos interruptores de protección a ser incorporados en el sistema, con la finalidad de minimizar la ENS total anual, sin transgredir restricciones operativas habituales. Para ello, se combina con otros procedimientos diseñados para simular fallas sobre un modelo matemático de la red, determinar la

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protección actuante y la mejor reconfiguración posible. Las aplicaciones se realizan sobre una red de la provincia de Santa Fe (Argentina), a partir de la cual se demuestra que una ubicación inadecuada de las nuevas protecciones puede devenir en situaciones contraproducentes en términos de la ENS obtenida. Por otra parte, las pruebas demuestran que la metodología desarrollada converge a la solución óptima con tiempos de cómputo sustancialmente inferiores a los demandados por otras alternativas evaluadas, como la búsqueda directa de soluciones y las simulaciones de Monte Carlo. Para mejorar el desempeño de la PSO, se combina con una técnica de clustering que fracciona el espacio de soluciones en subdominios más reducidos, favoreciendo una exploración más efectiva por parte del algoritmo.

ID226

Title: *Proposal and validation of energy indicators on University Campuses*

Autores

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Resumen

The objective of this paper is to analyze the energy consumption in the new campus of the National University of Rafaela (UNRaf). The university, located in the central region of Argentina, is in a process of expansion that resulted in the construction of a new campus. The article validates the methodology used, which consists of using the first building already constructed as a reference. Energy consumption and space use patterns were surveyed for a whole year. With the data collected in this building, energy efficiency indicators are obtained, and with them, an estimate is made of the electrical energy that will be consumed by the new building under construction. Finally, an indicator is corrected, and the conclusion is reached that the methodology used is not ideal for estimating the consumption of electrical energy per month. In view of this disadvantage, a series of steps to improve the estimates are proposed as future work.

ID232

Impact of the Inverter Sizing in Photovoltaic Systems Considering Solar Irradiance Characteristics

Autores

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Resumen

The article analyzes the impact of inverter sizing in photovoltaic systems taking into account the local solar resource behavior. The assessment is performed using real generation data of a photovoltaic system located in the National University of Rafaela, Argentina. The study highlights the importance of considering the local solar resource behavior in order to size more judiciously the inverter. By means of the experimental data, it is possible to provide a well-grounded estimation of the energy not generated due to undersizing the inverter in a photovoltaic system located in Rafaela.

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ID233

Title: *Evaluación del Criterio de Diseño de Plantas Fotovoltaicas instaladas en un Campus Universitario*

Autores

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Resumen

El artículo evalúa el criterio con el que fueron diseñadas tres plantas fotovoltaicas instaladas en los edificios del Campus de la Universidad Nacional de Rafaela. El mismo apunta a generar el 20 % de la energía eléctrica total consumida a mediante fuentes renovables. El período evaluado comprende los años 2022 y 2023. Primeramente, este trabajo detalla las edificaciones del Campus y las plantas fotovoltaicas instaladas en ellos. Luego, desarrolla el diseño de cada una de ellas a través de la estimación del consumo y, a partir de datos experimentales obtenidos en una planta instalada en el 2017. Finalmente, se calculan los porcentajes de generación respecto a la energía consumida, evaluando el cumplimiento del criterio de diseño.

ID243

Title: *Development and Implementation of a Verification Protocol for Regulatory Compliance of Electrical Systems in Critical Hospital Areas*

Autores

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Resumen

Electrical safety in critical hospital areas is paramount for protecting patients, medical personnel, and biomedical equipment. This work presents a verification protocol for hospital electrical installations based on Asociación Electrotécnica Argentina (AEA) regulation 710. The protocol aims to identify and rectify deficiencies that could jeopardize healthcare environment safety. Applying the protocol revealed significant shortcomings in critical areas like operating rooms and Intensive Care Units (ICUs) categorized under application group 2b. Alarming issues were found, such as the lack of isolation transformers in the IT network, crucial for safeguarding against accidental electrical discharges. This work proposes corrective measures and improvements to ensure compliance with current regulations and guarantee electrical safety in critical areas. Systematic implementation of the verification protocol will contribute to preventing electrical accidents, protecting the lives of patients and medical staff, and ensuring the uninterrupted continuation of medical care under safe conditions.

ID98

Title: *Optimization of Patch Antennas Feeding Point for Circular Polarization Applying the Theory of Characteristic Modes*

Autores

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Resumen

The circular polarization of patch antennas or square patches can be achieved with a single feeding point, which, according to the state of the art, is located on the diagonal of the patch, without indicating more precision in its location. An analysis by means of the Theory of Characteristic Modes allows to corroborate this hypothesis, but at the same time, by testing several feeding points on the diagonal, it is possible to easily optimize its location achieving an appropriate circular polarization. Simulations are performed with the FEKO program.

Volver

ID237

Title: *Direct RF sampling receiver front-end for a ground station based on an antenna array*

Autores

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Resumen

This paper presents a direct RF sampling receiver front-end implemented for a UHF satellite communications ground station based on an antenna array. It consists of a low-noise amplification and filtering stage, followed by a power amplification stage with anti-aliasing filtering. Prototype measurements within the 435 MHz to 438 MHz frequency range demonstrate a combined stage gain of approximately 80 dB and a noise figure of 2.3 dB.

Volver

ID238

Title: *A Simple Microwave Power Combining Amplifier with Enhanced Linearity and High Out-of-Band Rejection*

Autores

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Resumen

We present the design and implementation of a power combining amplifier that has a bandpass response, providing high rejection to spurious frequencies and intermodulation products that are usually generated in transmission systems. The proposed architecture consists of two identical power amplifiers interconnected with compact microstrip filtering power dividers and combiners. A prototype capable of operating at 2.3 GHz was fabricated to validate the design. The obtained measurement results demonstrate that high out-of-band rejection is achieved, while the 1 dB compression point is enhanced about 1.6 dB with respect to the individual amplifiers. In addition, thanks to the low insertion loss of the combining components, the total gain of the system is not considerably reduced.

ID247

Title: *Unveiling the Secrets of Successful Game Design*

Autores

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Resumen

The MDA (Mechanics-Dynamics-Aesthetics) framework is a well-known but often misunderstood methodology in game development. Independent game developers frequently encounter challenges in game design due to unclear understanding of core mechanics and dynamics, and often neglect the emotional journey and aesthetic design of the game. This article introduces a successful methodology that has been taught over the past two years. By providing a structured approach to the MDA framework, we aim to address common pitfalls in indie game development and enhance the overall design process. The methodology emphasizes the importance of clearly defining game mechanics, dynamics, and aesthetics, and analyse how well-designed video games engage players through thoughtful and immersive experiences. By presenting detailed practical examples, this article provides valuable insights and strategies for indie developers. These insights will help refine their game design practices and create more compelling and cohesive gaming experiences.

ID248

Title: *Primeros pasos en FX: Sincronización de animaciones en objetos*

Autores

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Resumen

Animating in Unity is not inherently complicated, but understanding the underlying algorithms can be challenging. However, achieving simple yet striking special effects is only possible through a deep comprehension of the fundamentals. This article presents the outcomes and insights gleaned from several semesters of implementing basic FX techniques in the multi-agent systems course. Specifically, it highlights how focusing on minor details can produce spectacular effects in animations. Through a detailed examination of various approaches and practical examples, this article aims to demonstrate the importance of foundational knowledge in creating visually impressive animations. The findings underscore the potential of leveraging simple techniques to achieve remarkable results, providing valuable guidance for both novice and experienced developers in the video game industry.

ID250

Title: *¿Qué #!*&% es unShader y cómo se implementa en UNITY?*

Autores

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Resumen

Shaders are often perceived as esoteric and daunting, but their fundamental role in computer graphics and the video game industry is both accessible and essential. This article aims to demystify shaders, providing a comprehensive overview from their basic definition to practical implementation in Unity. We will explore the different types of shaders, such as vertex and fragment shaders, and their respective functions in transforming 3D models into 2D images. By breaking down the concepts and explaining the parallel processing advantages of GPUs, we will illustrate how shaders perform complex calculations swiftly and efficiently. Furthermore, the article will guide readers through the steps of creating and implementing shaders within Unity, one of the most popular game development platforms. We aim to equip developers with the knowledge and confidence to leverage shaders in their projects, enhancing visual effects and overall game quality. This holistic approach will make shaders more approachable, empowering both novice and experienced developers to harness their full potential in the video game industry.

ID253

Title: *Cartografía planetaria en No Man's Sky*

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Resumen

Este artículo forma parte de una investigación sobre la función narrativa de los mapas en videojuegos de mundo abierto, centrándose en No Man's ky, un juego que carece de un sistema de mapas planetarios. Se examina cómo los mapas en juegos funcionan como elementos estructurales y narrativos, destacando la ausencia de cartografía planetaria en No Man's Sky y proponiendo un sistema de navegación. Se analizan las herramientas cartográficas existentes dentro del juego, como coordenadas planetarias, brújulas y escáneres, y se discuten las limitaciones y posibilidades de mejorar la cartografía mediante MODs. La solución actual más viable es el mapeo manual de la superficie planetaria, combinando herramientas del juego y software de cartografía digital. Se concluye con la propuesta de estandarizar un método cartográfico y desarrollar un MOD que integre un sistema de mapas en el juego.

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