

2024 IEEE Colombian Conference on Communications and Computing (COLCOM 2024)

**Barranquilla, Colombia
21-23 August 2024**



**IEEE Catalog Number: CFP2452S-POD
ISBN: 979-8-3315-0473-1**

**Copyright © 2024 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

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

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

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

IEEE Catalog Number:	CFP2452S-POD
ISBN (Print-On-Demand):	979-8-3315-0473-1
ISBN (Online):	979-8-3315-0472-4
ISSN:	2771-5671

Additional Copies of This Publication Are Available From:

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

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

Cloud Framework for Precision Agriculture: Applying 'Kernel Trick' Techniques in Support Vector Machines Via MQTT and IoT	1
<i>Yair Rivera Julio, Elmer Vega Ramírez, Jorge Villegas Jimenez, Gustavo Chacón, Carlos Fabregas Rodado, Angel Pinto Mangones, Nelson A. Pérez García, Fabrielo Jimenez</i>	
Understanding Digital Transformation in Colombian States: A Machine Learning-Based Approach.....	7
<i>Valentina N. De La Hoz L, Christian G. Quintero M</i>	
Realidad Aumentada Y Geolocalización Para Difundir El Patrimonio Cultural De Sucre, Colombia	13
<i>Alex Morales, Daniel Benitez, Duvan Salgado, Sergio Sanchez, Héctor Urzola, Martha Gonzalez</i>	
Leveraging the EPICS Environment to Enhance Design Skills in Electronics Engineering Students: A Continuous Improvement Approach Under ABET Accreditation.....	18
<i>Mauricio Pardo G, Jesús D. Ariza R, José A. Giraldo M</i>	
Design of an IoT-Based Machine-Learning Model to Improve Harvest Performance on a Farm	24
<i>Galo Valverde, Kevin Barreiro</i>	
Use of Machine Learning Algorithms for Diagnosis and Treatment of Psychological Pathologies	30
<i>Galo Valverde-Landívar, Karen Charcopa Lajones, Freddy Fariño Rosemberg</i>	
Comparative Analysis of State-Of-Art Pre-Trained Human Pose Estimation Models in Underwater Condition.....	37
<i>Mauricio Rivera, Deyby Huamanchahua, Christian Flores</i>	
Ground Harvesting and Gathering Robots in Agriculture: A Systematic and Technological Review	43
<i>Deyby Huamanchahua, Franklin Soncco, Alessandro Lugo-Figueroa, Daniel Chirinos-Castillo, Bruno A. Rojas</i>	
Literature Review on the Impact of Hypertension and Type 2 Diabetes on Teachers in Mexico: A Complex Thinking Approach and ENSANUT Data.....	49
<i>Héctor Alejandro Acuña-Cid, Eduardo Ahumada-Tello</i>	
Exploring the Social Implications of Data Usage: A Review of the Data Trust Concept in Colombia – Current State and Discussions	54
<i>Jorge Mario Londoño Pelaez, Diana Patricia Giraldo Ramirez, María Alejandra Echavarria Arcila, Laura Orozco Salazar, Leonardo Betancur Agudelo</i>	
Transforming Higher Education: The Role of ICT in Baja California Before and After the COVID-19 Pandemic	60
<i>Juan Antonio Meza-Fregoso, Eduardo Ahumada-Tello, Ricardo Fernando Rosales-Cisneros, Nora Del Carmen Osuna-Millan, Carlos Alberto Flores-Sanchez, Josue Miguel Flores-Parra</i>	
Use of Wearable Devices for Body Monitoring: An Innovative Review.....	66
<i>Jaime Huaytalla-Pariona, Jonathan Pillaca-Ccasani, Carla De La Sota-Shicshe, Fabiola D. Villanueva-López, Suni Escobar-Baquerizo, Jhomerson Salcedo-Huamani, Deyby Huamanchahua</i>	
Advanced Algorithm for Automated Red Rose Counting Using Image Processing Techniques.....	72
<i>Carlos Carangui, Juan Inga-Ortega, Esteban Ordoñez, Roger Clotet, Kelman Belloso, Jose-Ignacio Castillo-Velazquez, Mónica Huerta</i>	

Educational Data Mining: Inverted Classroom as a Teaching Strategy for Empowering Student Autonomy	78
<i>Wilson Chango Chango, Patricio Sailema, Estefania Jativa, Hugo Sanchez</i>	
Regularization and Dimensionality Reduction Techniques for Pattern Detection in GitHub Repositories.	84
<i>Wilson Chango, Geovanny Silva, Pamela Buñay-Guisñan, Santiago Logroño</i>	
Open-Source WAF Virtualization Solutions Comparison Using the OWASP Framework.....	89
<i>Aldrin Reyes Narváez, Tulia Nohemí Vaca Sierra, Edison Patricio Reyes Narváez, Fernando Lara, Hernan Barba Molina</i>	
Ad-Hoc Vehicular Network to Optimize Vehicular Mobility	95
<i>Wilson Chango, Geovanny Silva, Nestor Estrada, Hugo Sanchez</i>	
Estimación Del Tiempo Perdido Para La Movilidad Sostenible En Entornos Urbanos	100
<i>Jessica Rojas, Lina Cuta, José Martínez, Lina Pedraza, Paola Ortega, Herman Fernández</i>	
Enhancing Accuracy in Glass Bottle Manufacturing in the Context of Industry 4.0: A Proposal for Improvement Through Virtual Measurement Technology for Molded Part Dimensional Precision	105
<i>Franklin Mauricio Landeta Pineda, Tania Rojas Párraga, Jhoanna Belén Benítez Jerez, Hernan Lara-Padilla</i>	
Optimizing Linear Antenna Arrays with Genetic Algorithms	111
<i>Libis Valdez, Cesar Viloria-Nuñez, Lácides Ripoll-Solano, Bethsy Guerrero-Granados</i>	
Barriers to AI Adoption and Their Influence on Technological Advancement in the Manufacturing and Finance and Insurance Industries.....	115
<i>Jessica Lopez-Garcia, Esperanza Manrique Rojas</i>	
Predicting Academic Performance of Undergraduate Students in Blended Learning	121
<i>Wilson Chango, Geovanny Silva, Hugo Sanchez, Santiago Logrono</i>	
Modelling and Control of a Photovoltaic-Powered Fast Charging System for Electric Vehicles.....	128
<i>Miriam Lucero-Tenorio, Jeann-Carlos Barragan-Villa, Walter Mariscal, Roberto Idrovo-Toala</i>	
Optimising the Design and Control of an Ultra-Fast Charger for Electric Vehicles.....	135
<i>Miriam Lucero-Tenorio, Walter Mariscal, Juliana Espinoza-Ortiz</i>	
Filtering Techniques Comparison in Gait Analysis Using Depth Cameras	141
<i>Andres Navarro C, Nicolás J. Salazar E, Juan E. Gallo P, Beatriz Munoz, Patricia Madrinan, Jorge Luis Orozco</i>	
Monitoring of the UV Radiation Index Inside Cars Over LoRa in Archaeological Capital of America, Cusco	147
<i>Reencarnación Quispe Achahuanco, Jorge Luis Arizaca Cusicuna</i>	
Adjustment of the ITU-R Model for the Rainfall Attenuation Prediction in Satellite Links, by Applying Industry X.0 Base Technology	153
<i>Angel D. Pinto-Mangones, Nelson A. Pérez-García, Jordi J. Castillo-Rondón, Jesús A. Castillo-Sánchez, Juan M. Torres-Tovio, Frank A. Ibarra-Hernández, Yair E. Rivera-Julio, Jorge A. Yepes Escobar</i>	
Implementation of a NOMA Downlink with SIC Receiver for 2 Users Over SDR and GNU Radio	159
<i>Miguel Angel Champi Castro, Jorge Luis Arizaca Cusicuna</i>	

Enterprise Cybersecurity Investment Priorities. a Framework for Executives	163
<i>Jeimy J. Cano M</i>	
Recognizing the Silent Enemy: Evaluation Program for Early Detection of Arterial Hypertension	169
<i>Juan Sebastián Sánchez-Gómez, Isabel Cristina Agreda Sobrino, Anne Lizbeth Carrillo Chuyes, Hector Alonso Garcia Paz</i>	
STEM Vocations for Industry 4.0	175
<i>Juan Sebastián Sánchez-Gómez, Carmelina Cadenas Anaya, Victoria Eugenia Peters Rada, Sandra Milena Rojas Tolosa</i>	
Proposal for a Model of Smart Agriculture Based on the Application of Ancestral Knowledge in the Cultivation of Medicinal Plants	181
<i>Estefanía Pilamunga, Edith Tubón, Franklin Tigre, Freddy Lema, Luis Morales, Carlos H. Sánchez, Cesar Rosero-Mantilla, Lorena Siguenza-Guzman, Patricio Córdova</i>	
Model of Production for the Utilization of Byproducts from the Processing of Medicinal and Aromatic Plant Tea Based on the Principles of Industry 5.0	187
<i>Erick Vega, Edith Tubón-Núñez, Franklin Tigre, Freddy Lema, Luis Morales, Carlos H. Sánchez, Cesar Rosero-Mantilla, Lorena Siguenza-Guzman, Patricio Córdova</i>	
Coexistence Studies Between 5G and Fixed Service in the 26GHz Band in Colombia.....	193
<i>J. Santiago Franco Orozco, Pavel W. Torres Maldonado, Gerardo Martínez-Pinzón, Leonardo Vargas, Andres Navarro, Dinael Guevara, Narcís Cardona</i>	
Wheeze and Crackle Discrimination Algorithm in Pneumonia Respiratory Signals.....	199
<i>Jaewon Seong, Bengie L. Ortiz, Jo Woon Chong</i>	
Animal Care Application in Rehabilitation and Captivity Using Machine Learning for Emotion Recognition	205
<i>Washington Velasquez, Guillermo Sanchez-Guzman, Joshua Taranto-Usey</i>	
Designing a Movie Recommendation System Through a Transformer-Based Embeddings Space.....	211
<i>Oscar I. Iglesias R, Carlos E. Pardo B, José Oñate López, Christian G. Quintero M</i>	
On the Feasibility of Using an Encoder-Only Model for Anomaly Detection: The BERTAD Approach	217
<i>Juan F. Chaves-Tibaduiza, Angela I. Becerra-Muñoz, Angel Robledo-Giron, Oscar M. Caicedo</i>	
Hybrid Portable Power Station Enhanced with IoT Monitoring.....	223
<i>Ryan I. Rodríguez-Tirado, Gregory J. Vega-Carrasquillo, Daniel E. Mera-Romo, Diego A. Aponte-Roa, Miguel A. Goenaga-Jiménez</i>	
Photovoltaic Water Storage Monitoring for Plant Irrigation System Using IoT.....	228
<i>Santiago A. Goenaga-Buelvas, Brian R. Luquis-Morales, Génesis K. Placeres-Negrón, Miguel A. Goenaga-Jimenez, Joel A. Diaz-Goenaga, Milton A. Martinez-Solano</i>	
Modification of a Circular Monopole Antenna UWB for the Design of a Patch Antenna Optimised Multiresonant Antenna at 2.45GHz and 5GHz.....	234
<i>Jean M. Romero-Romero, Luis F. Guerrero-Vasquez, Bryan P. Vasquez-Luna, Angel R. Tenemea-Vele, Jorge O. Ordoñez-Ordoñez, Paul A. Chasi-Pesantez</i>	
Orthomode Transducer in Waveguide Technology Using E-Field Rotators	241
<i>Raul Haro-Baez, Carlos G. Romero, Fabián G. Sáenz, Rodolfo Gordillo-Orquera, Diego S. Benítez</i>	

Development of a Low-Cost Interface Based on Artificial Vision for Conditioning an Industrial Robot with Parallel Communication	246
<i>Cristian G. Jiménez-Quevedo, Joan D. Encarnación-Díaz, Paul A. Chasi-Pesantez, Luis F. Guerrero-Vasquez, Jorge O. Ordoñez-Ordoñez</i>	
A Miniaturized Fractal Antenna Based on Square Sierpinski Model for Super-Wideband Applications.....	252
<i>Maria B. Iñiguez-Añazco, Luis F. Guerrero-Vasquez, Edgar E. Ochoa-Figueroa, Jorge O. Ordoñez-Ordoñez, Paul A. Chasi-Pesantez, Juan D. Armijos-Goercke</i>	
Advancing Energy-Efficient IoT Management in Human-In-The-Loop and Intelligent Systems.....	258
<i>Soraya Sinche, Jefferson Acán, José Fernandes, Duarte Raposo, André Rodrigues, Fernando Boavida, Jorge Sá Silva</i>	
Interference Reduction Factor Evaluation for Cylindrical and Parallelepiped Antenna Arrays in Massive MIMO Systems	264
<i>Fernando Lara, Daniel Altamirano, Aldrin Reyes Narváez, Felipe Grijalva, Hernan Barba Molina</i>	
Printed Yagi-Uda Antenna for Directivity Reconfiguration Using Ring Resonators.....	269
<i>Aldrin Reyes Narváez, Paúl Panchi, Fernando Lara, Felipe Grijalva, Hernan Barba Molina</i>	
Unveiling the Barriers to E-Business Adoption in Venezuelan Public Enterprises: A Multiple Correspondence Analysis Approach	273
<i>Erika Severeyn, Alexandra La Cruz, Cheryl Puente, Jesús Velásquez, Mónica Huerta</i>	
Leveraging Support Vector Machines for Enhanced Diagnosis of Diabetes and Prediabetes	279
<i>Erika Severeyn, Alexandra La Cruz, Jesús Velásquez, Mónica Huerta</i>	
TENSER: An IoT-Based Solution for Remote Capture and Monitoring of Environmental Variables for Decision Making in Crops	284
<i>Angel Rodríguez-Petit, Angie Marriaga Barroso, Nicolas Polo Villarreal</i>	
Beamforming Network in Square Waveguide Technology for 5G Communications	289
<i>Raul Haro-Baez, Carlos G. Romero, Fabián G. Sáenz, Danny Sotomayor, Diego S. Benítez</i>	
Revealing User Behavior Trends Through Time-Series Analysis of Google Analytics Data	295
<i>Alexandra La Cruz, Erika Severeyn, Jhon Salguero, Jesús Velasquez, Roberto Matute, Mónica Huerta</i>	
Assessing Network Communication Metrics in Cloud-Based BCI Performance for Remote Wheelchair Training of Novice Users	301
<i>H. Rivera-Flor, C. D Guerrero-Mendez, D. Delisle-Rodriguez, R. Mello, T. F. Bastos-Filho</i>	
Development of an Autonomous Solar Charging System for Electric Vehicles with Self-Consumption in Puerto Rico	307
<i>Jaime Martinez-Ortiz, Cathyria Marrero-Serra, Miguel A Goenaga-Jimenez, Samira Ortiz-Rodriguez, Daniel Mera-Romo, Diego A. Aponte-Roa</i>	
Optimizing Waste Collection Routes with QPSO-LR Algorithm and IoT Sensors	313
<i>Washington Velasquez, Javier Dillon-Jimenez, Danny Medina-Moncayo, Manuel S. Alvarez-Alvarado</i>	
Fog Computing: A Systematic Review from the Perspectives of Architecture, Business Models, and Research Developments	319
<i>Erwin J. Sacoto-Cabrera</i>	

Enhancing Urban Water Management: A Novel LoRaWAN Platform Based on ChirpStack Integration with Node-Red for Efficient Data Hosting on the Google Cloud Platform.....	325
<i>Erwin J. Sacoto-Cabrera, David Sarumeño-ávila, Alexander Cuji-Torres, Christian Salamea-Palacios</i>	
Improving LoRa BER Performance by Increasing Sampling Rate	331
<i>Luz E. Marquez, Maria Calle</i>	
Prototype of a Text to Ecuadorian Sign Language Translator Using a 3d Virtual Avatar	337
<i>Christian Salamea-Palacios, Karen Arias Salcedo, Michael Peralta-Marin, Erwin J. Sacoto-Cabrera</i>	
Evaluation of Geocoding Algorithms for Generalization-Based Location Privacy	342
<i>Pedro Wightman, Paul Sanmartin-Mendoza, Augusto Salazar</i>	
Proposal for the Implementation of a System Based on Augmented Reality for the Monitoring of an Industrial Process in Real Time	348
<i>Joan D. Encarnación-Díaz, Cristian G Jimenez-Quevedo, Paul A. Chasi-Pesantez, Luis F. Guerrero-Vásquez, Félix A. Torres-Torres, Jorge O. Ordoñez-Ordoñez</i>	
Implementación De Prototipo De Chaleco Háptico Guiado Por Vibración.....	353
<i>Juan Camargo-Jimenez, Sebastian Lizarazo-Díaz, Margarita Narducci-Marin</i>	
Revolutionizing In-House Digital Marketing with End-To-End Marketing Automation Powered by AI and SaaS	358
<i>Praveen Gujar, Gunjan Paliwal, Sriram Panyam</i>	
Optimized Dual-Band Rectangular Patch Antenna for WiMAX and WLAN Applications	365
<i>Juan D. Armijos-Goercke, Luis F. Guerrero-Vasquez, Paul A. Chasi-Pesantez, Jorge O. Ordoñez-Ordoñez</i>	
A Development of a Rover for Precision Agriculture.....	371
<i>Mateo Muñoz Nova, Sebastián Lizarazo Díaz, Jesús Ariza Rodríguez, Sthefany Morales Ramos, Jorge Ortega Anillo, Christopher Cabana Durango, Diana Rueda-Delgado</i>	
A Method Based on Deep Learning for the Detection and Characterization of Cybersecurity Incidents in Internet of Things Devices.....	377
<i>Jhon Alexander Parra-Jiménez, Sergio Armando Gutiérrez-Betancur, John Willian Branch-Bedoya</i>	
IoT Based Weather Station for Smart Cities	383
<i>Edgar Orlando Ladino Moreno, Luini Leonardo Hurtado Cortes, José David Cely Callejas, Henry Alberto Hernández</i>	
AIoT-Based Cybernetic Framework for Environmental Risk Management in Mining Regions	388
<i>John Alexander Taborda, Miguel E. Iglesias Martínez, Pedro Fernandez De Cordoba</i>	
Reflection on the ICT Adoption Pillar in the Departmental Competitiveness Index in Colombia: The Case of Atlántico	394
<i>Cesar Vilorio-Nuñez, Alexandra Tapias-Meza, Diego Gomez-Ceron</i>	
Accelerating Time-To-Market: The Role of Generative AI in Product Development	400
<i>Gunjan Paliwal, Anujkumarsinh Donvir, Praveen Gujar, Sriram Panyam</i>	
Propagation Models for VHF Conventional Land Mobile Radio Systems in Cauca and Valle Del Cauca Colombia	409
<i>Victor Quintero, Claudia M. Hernández, Diego F. Galvis, Alfonso Bahillo, Carmen Martin G</i>	

Looking for Operational Efficiency in Itinerary Assignment Optimization: A Comparison of Different Optimization Approaches.....	415
<i>Adrián Pabón Mendoza, José Oñate López, Christian G. Quintero M</i>	
Proposal for an Interoperability Model for Clinical Information Systems	421
<i>Cesar Chevel, Paul Sanmartin-Mendoza, Vladimir Quintero</i>	
Transforming Supply Chain Management with Industry 4.0: Post-COVID-19 Digital Advancements	425
<i>Mobashar Mubarik, Saule Maciukaite Žvinienė, Muhammad Faraz Mubarak, Morteza Ghobakhloo, Richard Evans</i>	
Intelligent Elderly Monitoring System Using Computer Vision	431
<i>Diego Gómez Cerón, María C. Gómez Medina, Jesús Quiróz Rojas, Juan Inga-Ortega</i>	
Coherence Analysis Applied on a Steady-State Visual Evoked Potentials (SSVEP) Based Brain-Computer Interface (BCI).....	437
<i>Cristian Y. Olivares, Norelli Schettini, Jaime F. Delgado</i>	
Body Shadowing in an Indoor Positioning System Based on UWB	443
<i>Nathalia Isabel Guerrero López, Santiago Yangana Montoya, Victor Manuel Quintero</i>	
Global Trends and Iberoamerican Contributions to the Academic Production of Artificial Intelligence Applied to Engineering Education	449
<i>Jose-Ignacio Castillo-Velazquez, Rafaela-Blanca Silva-Lopez</i>	
Performance Analysis of a Location System Based on the Direction of Arrival of the Radio Signal	455
<i>Fabián Alexander Pérez Jiménez, Mauricio Peña Bambague, Víctor Quintero</i>	
Exploring the Potential of V2G Integration for Grid Optimization in Colombia	461
<i>Ingrid Oliveros, Jose Soto, Luis Lopez, Elvin Jimenez</i>	
The Role of ChatGPT and Artificial Intelligence in Education	467
<i>Miguel-Angel Quiroz-Martinez, Dylan-Sebastian Tumaille-Quintana, Alexis-Dustin Moran-Burgos, Monica Gomez-Rios</i>	
Design and Study of Machine Learning Model Based on Bagging for Breast Cancer Diagnosis.....	473
<i>Miguel-Angel Quiroz-Martinez, William-Xavier Alejandro-Vergara, Monica Gomez-Rios, Maikel-Yelandi Leyva-Vázquez</i>	
Architecture of an Augmented Reality Application for Coding and Labeling UML Class Diagrams.....	477
<i>Monica Gomez-Rios, Lester Arnot-Hurtado, Luis Salazar-Gallegos, Miguel-Angel Quiroz-Martinez, Maximiliano Paredes-Velasco</i>	
Software Prototype for a Virtual Tour at the Corporación Universitaria Antonio José De Sucre Using 360° View Technology.....	483
<i>Alex Morales, Camilo Domínguez, Héctor Olivera, Sergio Sanchez, Hector Urzola</i>	

Author Index