

Development of Engineering and Innovation in the Scenarios of the 4th Industrial Revolution (EXPOTECNOLOGIA 2020)

IOP Conference Series: Materials Science and Engineering
Volume 1154

Cartagena, Colombia
4 - 6 November 2020

Editors:

**Cesar Gomez Sierra
Yesid Tarriba Lezama**

ISBN: 978-1-7138-4622-2
ISSN: 1757-8981

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

This work is licensed under a Creative Commons Attribution 3.0 International Licence.
Licence details: <http://creativecommons.org/licenses/by/3.0/>.

No changes have been made to the content of these proceedings. There may be changes to pagination and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2022)

For permission requests, please contact the Institute of Physics
at the address below.

Institute of Physics
Dirac House, Temple Back
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481
Fax: 44 1 17 920 0979

techtracking@iop.org

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
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Expotecnología 2020	
Peer review declaration	
Robotics in Shared Service Centers in Emerging Economies	1
<i>James Pérez-Morón, Lina Marrugo-Salas</i>	
Analysis of the Economic and Environmental Feasibility of a Home Automation System	19
<i>G. Pico, Y. Llosas, P. Maques, E. Mendoza, R. Nuñez, N. Castro, J. Nuñez</i>	
Recognition of Colombian Alphabeth in Sign Language Using Deep Learning Techniques.....	33
<i>E Arrieta-Rodríguez, R E Monterroza-Barrios, P L Torres-Alvarez, G E Castro-Lozano</i>	
Tools for the Implementation of an Inmotic System in the Imperial Hotel in Santiago de Cuba, Cuba	41
<i>José Nuñez, Bryan Torres, Israel Benítez, Celene B. Milanés, Eliana Noriega</i>	
Development of a mobile application for Early Warning Systems and risk management in Cuba	53
<i>CeleneB. Milanés, Ángel R. Batista, Ricardo A. Núñez, Humberto T. Yero</i>	
Framework to Manage Software Quality on IIoT Apps	66
<i>Yair Rivera Julio, Bertha Hernández Contreras, Samir Castaño Rivera, Clara Colón López, Angel Dario Pinto Mangonez, Harold Bula Herazo</i>	
Bi-objective routing model with speed variation and consideration of emissions: Case study of solid waste collection in Coveñas, Sucre.....	80
<i>J Ruiz-Meza, J R Montoya-Torres, D Mejía-Ayala, S Navaja</i>	
Big Data and Artificial Intelligence in the Development of Industry 4.0; A Bibliometric Analysis	91
<i>E González-Sarmiento, J Roa-Perez, L Ortiz-Ospino</i>	
Energy savings in compressed air systems a case of study	102
<i>H Hernández Herrera, D Patiño Villalba, E Noriega Angarita, J I Silva Ortega, C A Caraballo Echavarría</i>	
The discharge and shell temperatures in hermetic compressors during its operation in tropical weather conditions.....	110
<i>K.J. Arencibia Avila, J.M. Mendoza Fandiño, J.J. Cabello Eras, A. Sagastume Gutiérrez, F. Fernández Periche</i>	
Mathematical modeling for collaborative planning of two-echelon in the pineapple supply chain: A case study in San Marcos, Colombia.....	118
<i>J Ruiz-Meza, Y Cárdenas-Díaz, M K Royeth-Angulo, D Mejía-Ayala</i>	
Proposal for an automated greenhouse to optimize the growth of hydroponic vegetables with high nutritional content in the context of smart cities.....	130
<i>S A Sánchez, A D Morales, J C Castillas, C A Martínez, A Z Meza</i>	
Artificial intelligence model for the prediction of malignant tumors using a set of medical images from mammography studies	141
<i>S A Sánchez, A D Morales, M F Arroyo, y H D Asís</i>	

Application of 316L stainless steel coating by Directed Energy Deposition process.....	154
<i>G A Barragan, F Mariani, R T Coelho</i>	
Designing a system with machine learning to formative research projects management.....	161
<i>C. Pineda, A. Morales, L. Lopez, C. Benitez, S. Sanchez</i>	
Airfoil Shape Optimization: Comparative Study of Meta-heuristic Algorithms, Airfoil Parameterization Methods and Reynolds Number Impact	170
<i>JoséD Hoyos, Jesús H Jiménez, Camilo Echavarría, Juan P Alvarado</i>	
Use of augmented reality technology and GPS to encourage tourism in the Sucre department.....	183
<i>D. Salgado, D. Benitez, A. Morales, M. Gonzalez, N. Huertas</i>	
Design of a telemedicine system for the provision of primary health care (PHC) services.....	193
<i>D. Jaramillo, M. Mondragon, A. Morales, S. Sanchez, H. Romero</i>	
Evaluation of a virtual learning object with augmented reality technology for teaching of the computer parts	206
<i>I J Romero, H J Romero, K A Sierra, A D Morales, S A Sánchez</i>	
Bibliometric review of emerging technologies in Gas Insulated Substations SF6	216
<i>K Y Gómez-Sandoval, I A Marriaga-Márquez, J I Silva-Ortega, J W Grimaldo-Guerrero, H Hernandez-Herrera</i>	
Recommendation system with graph-oriented databases for repository of open educational resources	229
<i>A. Morales, J. Gonzalez, K. Alquerque, J. Reyes, S. Sanchez</i>	
Operation of a Dish Stirling Heliothermic System with Directly Illuminated Tube Receiver	237
<i>G E Carrillo, Y Cárdenas</i>	
Exergetic Analysis of a Parabolic Trough Collector System Operating with Different Heat Transfer Fluids.....	245
<i>G E Carrillo, Y Cárdenas</i>	
Analysis of the behavior of a parabolic trough collectors' plant for weather conditions of Cartagena - Bolívar.....	252
<i>V Lopez, Y Cárdenas, G E Carrillo</i>	
Electronic distiller to improve learning processes in natural science laboratories	260
<i>C P Chamat-Torres, G E Romero Cabarcas, G Bracho Tovar</i>	
Simulation-aided walking pattern generation for a humanoid robotic platform.....	269
<i>Sergio Zapata Velásquez, Iván Darío Mora Orozco, Gustavo Suárez Guerrero, Wuitman Garrafa Jara</i>	
Computational analysis of the mechanical behavior of carbon nanotubes in a rail-wheel system	283
<i>Carlos García, Mateo Echeverri, Jesus Carlos, Gustavo Suárez</i>	
Prototype virtual assistant as a tool to support research activities at CORPOSUCRE	291
<i>C M Pineda-Pertuz, H J Romero, J A Vergara, A D Morales, A Sánchez</i>	
Topology optimization and additive manufacturing in the building and construction industry	299
<i>G A Barragan, J Perafan, G Urrea</i>	
Discrete event simulation: Case study in an extractive sector company	306
<i>R Quintana-Londoño, A García-Pérez</i>	

Generation and Capture of Electric Energy Using Piezoelectric Materials: A Review	317
<i>A D Rincón-Quintero, C L Sandoval-Rodriguez, N D Zanabria-Ortigoza, C G Cárdenas-Arias, J G Ascanio-Villabona, M A Durán-Sarmiento</i>	
A bibliometric analysis of the uses of the cocoa pod shell	327
<i>A D Rincón-Quintero, L A Del Portillo-Valdés, C G Cárdenas-Arias, B E Tarazona-Romero, W L Rondón-Romero, M A Durán-Sarmiento</i>	
AISI SAE 1045 steel tenacity variation evaluation subjected to corrosion process by chloride using the Charpy pendulum machine	338
<i>C G Cárdenas-Arias, A D Rincón-Quintero, C L Sandoval-Rodriguez, B E Tarazona-Romero, J S Muñoz-Gutierrez, J L Jiménez-Rueda, O A Acosta-Cárdenas</i>	
Implementation of a prototype water electrolysis system as an alternative to produce hydrogen	350
<i>B E Tarazona-Romero, C L Sandoval-Rodriguez, J G Ascanio-Villabona, A Quintero-Ruiz, R E Páez-Castro, O A Acosta-Cárdenas</i>	
Electromechanical Hand Prototype for the Simulation of the Opening and Closing Movement	365
<i>C L Sandoval-Rodriguez, E Y Veslin-Díaz, B E Tarazona-Romero, J G Ascanio-Villabona, C G Cárdenas-Arias, C A Angulo-Julio</i>	
Development of A Station for The Measurement of Environmental Conditions in The Unidades Tecnologicas De Santander (UTS), Using Telemetry and Database Management with Raspberry Pi.....	373
<i>A Quintero Ruiz, C L Sandoval-Rodriguez, A D Rincon-Quintero, B E Tarazona-Romero, C G Cárdenas-Arias, J G Ascanio-Villabona</i>	
Risk indicators of mass removal phenomena according to the Mora - Vahrson method, applied in Pitalito and Campoalegre municipalities	384
<i>L Pedreros, S Rivera</i>	
Analysis of Envelopes Applied To Bioclimatic Architectures	399
<i>J G Ascanio-Villabona, C L Sandoval-Rodriguez, A D Rincon-Quintero, B E Tarazona-Romero, C G Cárdenas-Arias, A Quintero Ruiz, K T Jaimes-Quintero</i>	
Matrix design for guided bend tests under the codes AWS D1.1, AWS D1.5, ASME Section IX and standard NTC 523 for specimens with thicknesses equal to or less than 3/8 inches	412
<i>Manuel Pinzón Candelario, Germán Torres Bermúdez, Yhon F Soto Serna, J N Zuleta</i>	
Sizing of a sustainable condensation system for the production of sweet water through the use of photovoltaic panels in La Mesa de los Santos, Santander, Colombia.....	420
<i>B E Tarazona-Romero, A-J Rodriguez Nieves, C L Sandoval-Rodriguez, J G Ascanio-Villabona, M-A Duran-Sarmiento, A-D Rincon-Quintero</i>	
Synthesis of starch powder from different organic wastes: A green approach to a valuable material.....	436
<i>D P Sanabria, H I Farfán, D N Quintana, I V Abril, H F Castro, R A Paredes, K L Roa</i>	
SEPIC - MPPT controller with photovoltaic energy for groundwater extraction.....	444
<i>C L Corzo, R A Núñez, J I Flórez, P A Rodríguez, K J Plata</i>	
Preparation and morphological and physicochemical characterization of pillared clays from bentonite	457
<i>A C Padilla, J Castro-Suarez, F Colpas-Castillo</i>	
Extraction of Humic Acids from Different Origins: A Review.....	463
<i>H Quiroz-Urzola, J R Castro-Suarez, F Colpas-Castillo</i>	

Portable Device for Continuous Measurement (DIPORMEC).....	471
<i>H.A. Rodriguez-Arias</i>	
Radial distribution Systems solving in GAMS - Practice Implementation	483
<i>L A Rojas-Martinez, OD Montoya, J A Martinez-Trespacios, C. Rojas, C. Pacheco, John R. Castro-Suarez</i>	
Design and development of a PWA - Progressive Web Application, to consult the diary and programming of a technological event	499
<i>C J Gómez-Sierra</i>	
Approximation of Cross-tier interference in HETNET using Stochastic Geometry	507
<i>Y Tarriba-Lezama, L Valdez-Cervantes</i>	
Teaching equipment of Newton's second law.....	515
<i>Hugo Armando Gallego Becerra, Sebastián Martínez García, Luis Guillermo Henao Melo</i>	

Author Index