

# **2020 IEEE International Conference on Engineering Veracruz (ICEV 2020)**

**Boca del Rio, Veracruz, Mexico  
26 – 29 October 2020**



**IEEE Catalog Number: CFP20AIF-POD  
ISBN: 978-1-7281-7475-4**

**Copyright © 2020 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:	CFP20AIF-POD
ISBN (Print-On-Demand):	978-1-7281-7475-4
ISBN (Online):	978-1-7281-7474-7

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com



## Author Paper Index

Juan C. Olivares-Rojas, Enrique Reyes-Archundia, Noel E. Rodríguez-Maya, José A. Gutiérrez-Gnecchi, Ismael Molina-Moreno and Jaime Cerda-Jacobo, "Machine Learning Model for the Detection of Electric Energy Fraud using an Edge-Fog Computing Architecture", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....1

Gerardo M. Ortigoza Capetillo, Alberto P. Lorandi Medina, and Iris Neri, "Modeling and simulating urban afforestation: an alternative for urban climate change mitigation", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....7

Alberto P. Lorandi Medina, Gerardo M. Ortigoza Capetillo, Guillermo Hermida Saba, Miguel Angel Hernández Pérez, Pedro J. García Ramírez, "A Simple Way To Bring Python To The Classrooms", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....11

Jorge Uc-Martín, Asur Guadarrama-Santana, Augusto García-Valenzuela, "Detecting the presence of nanoparticles in suspension in droplets with a coplanar differential capacitive sensor", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....17

Jorge Álvarez Ramírez, and Ana María Villarreal Bueno, "Learning organic chemistry with virtual reality", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....22

Carlos Gómez-Rosas, and Rogelio de J. Portillo-Veléz, "Bilateral teleoperation system with BLDC motor applying the wave variable approach", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....26

Ilse Hernández-Hernández, Everardo Gutiérrez-López, José Valencia-Moreno, Karina Caro-Corrales, Jose Magaña-Magaña, "Redesign of the ISESALUD Ensenada patient referral process supported with the development of a prototype of a web system", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....33

Jose Cruz Núñez Pérez, Vincent Ademola Adeyemi, Sergio Eduardo Gutierrez Osuna, Yuma Sandoval Ibarra, Esteban Tlelo Cuautle, "Secure Communication System Based on Synchronized 3D Spherical Chaotic Systems", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....40

Jose Cruz Núñez Pérez, Miguel Angel Estudillo Valdez, Fernando Salas Medina, Yuma Sandoval Ibarra, Vincent





*Ademola Adeyemi, Francisco Javier Pérez Pinal, "Design of a Spherical Chaotic Oscillator and its Application in Four Cases of Celestial Mechanics", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....48*

*Juan P. Toledo-González, Jaime Martínez-Castillo, Agustín L. Herrera-May, Diego Cardenas, "Implicit FEM set up for evaluating FDA mechanical performance parameters on Balloon Expandable Stent", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....55*

*Luis A. I. Cabrera-Sosa, Luis E. Lopez-Garcia, Alejandro Diaz-Sanchez, Jose M. Rocha-Perez, Victor H. Carbajal-Gomez, and Gregorio Zamora-Mejia, "Design and Implementation of a White-Cane Based on the Vibration-Distance Sensing Technique for Blind People", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....60*

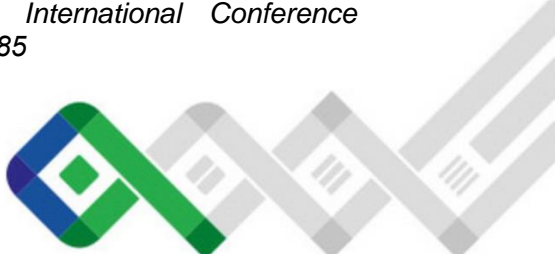
*Andrea Lopez-Castro, Angie Marroquin-Jacobo, Anna Soto-Amador, Elias Padilla-Davila, Mario O. Castañeda-Ramos, and Josue A. Lopez-Leyva, "Design of a Vineyard Terrestrial Robot for Multiple Applications as Part of the Innovation of Process and Product: Preliminary Results", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....68*

*Santiago del Muro Alvarez, Sebastian Gutierrez, "Mechatronics Class through Virtual Platforms under COVID-19", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....72*

*Gerson A García-Rodríguez, Primavera Argüelles-Lucho, Rosa M Woo-García, Jaime Martínez-Castillo, Luis H Porrugas-Beltrán, Francisco López-Huerta, "Detection of volatile organic compounds using a commercial gas sensor embedded in a mobile robot", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....77*

*J.A. Lopez-Leyva, A. Cortes-Ruiz, M.F Hernandez-Serrano, L. F. Sarmiento-Leyva and I. Sanchez-Castro , "Determination of the Energy Consumption Trend of a Wine Company as a Key Element for Sustainable Innovative Development", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....81*

*Gloria Cruz-Ahumada, César Ramírez-Dolores, Gerardo Alcalá-Perea, Fernando Chavarría-Domínguez, Manuel Ramírez-Cabrera, "Assessment of new statistical models to determine foundry temperatures in region L+Fe3C in the ironcarbon phase diagram", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....85*





*Gazca Herrera Luis A., Gasca Herrera Ángel E., Morales Martínez Martha E., Hernández Lozano Minerva, Culebro Castillo Karina, "Implementation of the Dual Training Model at the University of Veracruz", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....90*

*Jesús Antonio Camarillo Montero, Perla Esmeralda Castillo Tadeo, Alfredo Ramírez Ramírez, Roberto Cruz Capitaine and Francisco Ricaño Herrera, "Study of energy behavior of an induction motor at low load regimes", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....96*

*Lidilia Cruz-Rivero, Francisco Osorio-Cruz, Daniel Angeles-Herrera, and Nicolás Francisco Mateo-Díaz, "Statistical analysis for a non-invasive methane gas and carbon dioxide measurer for ruminants", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020)..... 101*

*Eli G. Pale-Ramon, Luis J. Morales-Mendoza, Sonia L. Mestizo-Gutiérrez, Mario González-Lee, René F. Vázquez-Bautista, and Consuelo I. Morales-Santiago, "Air quality analysis in critical zones of Mexico using unsupervised machine learning", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....108*

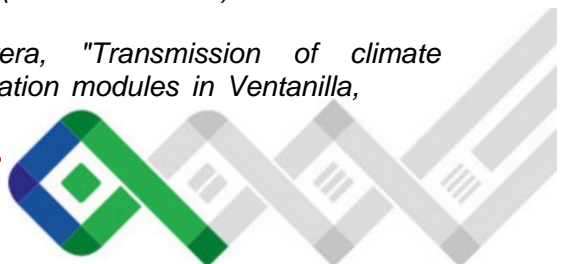
*Camacho Ceballos Mónica Abigail, Del Ángel Ramos Jorge Arturo, Arenas Del Ángel Jorge Luis, Marín Hernández Juan José, and Rivera Peña Yazmín, "The use of exergetic skills to design a trigeneration system (CCHP) in a hotel complex in Xalapa, Veracruz", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020)..... 113*

*Jorge A. Vélez-Enríquez, Jafet E. Capistrán Barradas, Simón Leal-Ortiz, Alfredo Ramírez-Ramírez and Jesús García-Guzmán, "Methodology Step-by-Step-minimum in Programmable Logic Controller with Function Block Diagram", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....117*

*Bryan. A. Aguilar-Figueroa, Primavera Argüelles-Lucho, Rosa M Woo-García, M. A. Hernández-Pérez, and Francisco López-Huerta, "Electromagnetic Levitation System Based on a PID Controller", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020)..... 122*

*Joseph Marin-Alvarez, and Juan Lara-Herrera, "Monitoring of marine litter collection device using LoRaWAN on the Peruvian coast", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....127*

*Joseph Marin-Alvarez, and Juan Lara-Herrera, "Transmission of climate parameters using low budget wireless communication modules in Ventanilla,*





Callao, Peru", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020)..... 131

J. Garrido, E.R. Rodríguez-García, F. Rueda-Martínez, and Q. Hernández-Escobedo, "Speed estimation of an induction motor by current signature analysis", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020)..... 136

Sebastián Gutiérrez, Hiram Ponce, and Ricardo Espinosa, "An Intelligent Water Consumption Prediction System based on Internet of Things", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020)..... 141

Carlos Tealdo, and Jorge Alex Deutsch, "Emissions of a direct injection diesel engine by adding hydrogen to the inlet manifold", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020)..... 147

Juan Lara-Herrera, and Luis Pimentel-Manrique, "Establishment of the maintenance and review processes of meteorological equipment at the international airport of Cuzco, Peru", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020)..... 152

Diego A. Rozas Llontop, José Cornejo, Ricardo Palomares, and Jorge A. Cornejo-Aguilar, "Mechatronics Design and Simulation of Anthropomorphic Robotic Arm mounted on Wheelchair for Supporting Patients with Spastic Cerebral Palsy", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020)..... 156

Magdiel Omar Mercado Carrillo, Alan de Jesús Ramírez Valencia, Ángel Daniel López Vázquez, "Insecurity Perceiver on Android", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020)..... 161

Arantxa A. Arguello-Mora, Rosa M Woo-García, Primavera Argüelles-Lucho, Armando Campos-Dominguez, Mónico Linares-Aranda, and Francisco López-Huerta, "Design of an RLC oscillator based on CMOS technology for gas sensor applications", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020)..... 165

Norberto Martínez García, Mariano Azzur Hernández Contreras, Mariana Silva-Ortega, Verónica García Valenzuela, and Teresita de Jesús Olivares, "Creation of Virtual Environment for Teaching Mechanical Maintenance on a Tug Ship", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020)..... 169





*Uriel G. Zapata-Rodriguez, Jaime Martinez-Castillo, Jonathan Santiago-Fernandez, Alejandro Diaz-Sanchez, Armando Cortes-Ordoñez, and Gregorio Zamora-Mejia, "A 1.65V Indirect-Compensated Class-AB OTA for Low-Power Low-Voltage Applications", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020)..... 175*

*A. Vázquez, M. Rodriguez, A. Castro-Carranza, J. Martínez-Castillo, J.L. Maldonado, J. Gutowski and J.C. Nolasco, "Numerical simulation of a bilayer organic solar cell based on boron chromophore compounds as acceptors", 2020 IEEE International Conference on Engineering Veracruz (IEEE ICEV 2020).....181*

