

**2022 Congreso de Tecnología,
Aprendizaje y Enseñanza de la
Electrónica (XV International
Conference of Technology,
Learning and Teaching of
Electronics) (TAEE 2022)**

**Teruel, Spain
29 June – 1 July 2022**



**IEEE Catalog Number: CFP22TAE-POD
ISBN: 978-1-6654-2162-1**

**Copyright © 2022 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:	CFP22TAE-POD
ISBN (Print-On-Demand):	978-1-6654-2162-1
ISBN (Online):	978-1-6654-2161-4
ISSN:	2573-4059

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

Driving-Assistance Device Based on Raspberry Pi and Neural Networks: An Opportunity to Learn Aspects of Programming, Machine Learning and Hardware.....	1
<i>J. Sanchez Millan, F. J. Torcal-Milla, A. M. Lopez-Torres</i>	
LightHDL: Light Environment for Learning HDLs.....	6
<i>Ramon Gallardo-Caballero, Horacio M. Gonzalez-Velasco, Carlos J. Garcia-Orellana, Antonio Garcia-Manso, Miguel Macias-Macias</i>	
Raspberry Pi-Based Cluster Network for the Emulation of Sensor Networks in Remote Teaching.....	11
<i>Antonio Parejo, Sebastian Garcia, Diego Francisco Larios, Alejandro Gallardo, Joaquin Luque, Carlos Leon</i>	
Teaching Electronics to Chemical Engineers: The Pandemic Opportunity.....	16
<i>Sebastian Garcia, Antonio Parejo, Carlos Leon, Joaquin Luque</i>	
Fall Detection System Based on Far Infrared Images.....	21
<i>Jesus Gutierrez, Victor Rodriguez, Sergio Martin</i>	
Evaluation of the Impact of the Use of a Robotic Platform as a Teaching Tool.....	28
<i>A. Suarez, D. Garcia-Costa, R. Fayos-Jordan, P. A. Martinez, J. Perez, A. Amaro, J. Torres, A. Menendez, J. Soret, R. Garcia-Olcina, D. Esperante</i>	
Using Software-Defined Radio Learning Modules for Communication Systems.....	34
<i>Luis A. Camunas-Mesa, Jose M. De La Rosa</i>	
A Methodological Proposal for the Digital Electronics Subject Laboratory.....	40
<i>Isabel M. Gomez-Gonzalez, Jorge Juan-Chico, Juan A. Castro-Garcia, Manuel Merino-Monge, Alberto J. Molina-Cantero</i>	
Contribution to the Design of Wearable and Environmental Sensors for Measuring Respiration and Vertical Jumping.....	45
<i>Erik Vanegas, Raul Igual, Inmaculada Plaza</i>	
A Configurable DC-DC Step-Down Converter for Practical Education.....	54
<i>Camilo Quintans Grana, Maria Dolores Valdes Pena, Marta Gomez Fernandez, Pablo Fernandez Ojea</i>	
Problem-Based Learning Applied to the Course Electronic Programmable Systems.....	62
<i>Eduardo Gil, Jesus Lazaro</i>	
Use of ICTs to Promote the Personalization of Learning in a Module of Basic Sciences for Engineering.....	66
<i>Ana Irene Ruggeri, David Zurita, Mauricio Ramirez, Sergio Silvestri, Manuel Caceres</i>	
Renewing an Electronics Course at University with Support of ICT Resources After the Pandemic Context.....	71
<i>David Valiente, Fernando Rodriguez, Abraham Ruiz, Juan Carlos Ferrer, Jose Luis Alonso, Susana Fernandez De Avila</i>	
Remote Lab Access: A Powerful Tool Beyond the Pandemic.....	79
<i>Sebastian Garcia, Alejandro Gallardo, Diego Francisco Larios, Enrique Personal, Javier M. Mora-Merchan, Antonio Parejo</i>	

An Online Modbus Device Simulator for Remote Teaching Scenarios	84
<i>Sebastian Garcia, Antonio Parejo, Enrique Personal, Javier M. Mora-Merchan, Joaquín Luque, Carlos Leon</i>	
Virtual Reality Applications Based on Activities of Daily Living (ADL) for Cognitive Diagnosis and Rehabilitation.....	89
<i>Jorge Buele, Jose Varela-Aldas, Guillermo Palacios-Navarro</i>	
Support Materials for Teaching Electromagnetism	94
<i>A. M. Lopez-Torres, J. Lobera, C. Sanchez-Azqueta, F. J. Torcal-Milla</i>	
Digital Electronics Mobile App.....	99
<i>Sergio Martin, Africa Lopez-Rey, Clara Perez, Blanca Quintana, German Carro, Manuel Castro</i>	
Development of Remote Laboratory of the FPGA iceZUM Alhambra.....	103
<i>Maria Hernaiz-Perez, Sergio Martin</i>	
Building Criteria for the Validation of Remote Laboratory Management Systems	108
<i>Federico Lerro, Susana Marchisio, Miguel Plano, Claudio Merendino</i>	
Frequency Detection of Experimental Errors Through Learning Analytics Techniques.....	113
<i>Heverton Marcos Costa, Gustavo R. Alves, Juarez Bento Da Silva, Joao Bosco Da Mota Alves</i>	
Design of an Internet of Things Project for Electronic Instrumentation Training of Industrial Engineers.....	119
<i>Angel Maria Andueza Unanua</i>	
The Approach to the Concept of Measurement Error in the Textbooks of Electronic Instrumentation	127
<i>Carlos Medrano-Sanchez, Javier Martinez-Cesteros, Francisco Arcega-Solsona, Inmaculada Plaza-Garcia</i>	
Remote Laboratory Platform for Microcontroller Practices	134
<i>Carlos J. Garcia-Orellana, Miguel Macias-Macias, Eugenio Abengoza-Garcia, Horacio Gonzalez-Velasco, Ramon Gallardo-Caballero, Antonio Garcia-Manso</i>	
PSoC 4 Line-Follower Robot for Engineering Mixed Signal Electronics Course.....	139
<i>Cristian Torres, Jose Manuel Blanes, Ausias Garrigos, David Marroqui, Pablo Casado, Carlos Orts</i>	
Google Colaboratory: A Teaching Tool for PV Education	144
<i>Alvaro Fernandez-Solas, Leonardo Micheli, Florencia Almonacid, Eduardo F. Fernandez</i>	
Implementation of a Sensorized Home Alarm Prototype on an FPGA Platform	151
<i>Javier Vazquez, Alfonso Parreno Torres, F. Javier Lopez Alcolea, Emilio J. Molina Martinez, Pedro Roncero-Sanchez</i>	
Development of a Digital Factory Using Automation Simulation Tools	158
<i>Andres Garcia Lopez, Miguel Damas Hermoso, Claudia Villalonga Palliser, Oresti Banos Legran</i>	
Learning About Nanodevices Using Experimental Characterization Equipment.....	163
<i>Luis A. Camunas-Mesa, Macarena C. Martinez-Rodriguez</i>	
Graphic User Interface for Learning Communications Physics	169
<i>Macarena C. Martinez-Rodriguez, Luis A. Camunas-Mesa</i>	

Performance Study of an IoT-Integrated Solar Tracker	174
<i>Aitor Garcia-Blanco, Carlos J. Garcia-Orellana, Eugenio Abengozar-Garcia</i>	
Pandemic Evolution in Basic Control Courses for Undergraduate Engineering Students	179
<i>Diego Fco. Larios Marin, Enrique Personal Vazquez, Antonio Martin Montes, Julio Barbancho Concejero, Francisco Javier Fernandez De Canete, Joaquin Luque</i>	
25 Years of REXLAB and Its Experience with Remote Laboratories Throughout the Years.....	184
<i>Isabela Nardi Da Silva, Juarez Bento Da Silva, Joao Bosco Da Mota Alves, Simone Meister Sommer Bilessimo, Leticia Rocha Machado</i>	
Low-Cost JTAG Debugger with Wi-Fi Interface	187
<i>Jose Manuel Cano Garcia, Jose Borja Castillo Sanchez, Eva Gonzalez Parada</i>	
Practice Projects in Biomedical Instrumentation with Tinkercad Arduino	197
<i>Rafael De Jesus Navas-Gonzalez</i>	
Hardware Project Development Using Scrum in the Interactive Technologies Degree	201
<i>Asun Perez Pascual, Jose Fco. Toledo Alarcon, Jose Marin-Roig Ramon, Elias Azulay</i>	
Virtualization Environment for IT Labs Development and Assessment	207
<i>Julian Viejo-Cortes, Paulino Ruiz-De-Clavijo-Vazquez, Enrique Ostua-Aranguena, German Cano-Quiveu, Jorge Juan-Chico</i>	
Learning and Design of Computational Systems: Integrating the CompSim Simulator to FPGAs.....	212
<i>Guilherme Alvaro Esmeraldo, Eduardo Carlos Proto, Edson Barbosa Lisboa, Edna Natividade Da Silva Barros</i>	
Electronics Laboratory Workstation for On-Site and Remote Use.....	217
<i>Horacio M. Gonzalez-Velasco, Ramon Gallardo-Caballero, Carlos J. Garcia-Orellana, Miguel Macias-Macias, Antonio Garcia-Manso</i>	
Competition Supported by Information Technologies Including IoT Scenarios	225
<i>Pedro J. Munoz-Merino, Pedro Manuel Moreno-Marcos, Carlos Delgado Kloos</i>	
Multi-Platform Application for Learning English Phonetics: Serious Game	230
<i>Alfonso Lago Ferreira, Maria De Los Angeles Gomez Gonzalez, Anxel Fragueiro Agrelo, Martin Llamas Nistal</i>	
Parallel Computing Learning in Electronic Engineering Based in the Treatment of Images	236
<i>Miguel Rodrigo, Alejandro Liberos, German Ramos, Joaquin Cerda</i>	
Educating in Robotics and Producing Experimental Resources Through Final Engineering Projects	241
<i>Sergio Junco, Matias Nacusse, Martin Crespo, Mauro Carignano, Daniel Ades</i>	
M3CVME: Supporting Tool for Electric Vehicle Speed Controller Supervision	247
<i>Juan Cerezo Sanchez, Sonia Leon Del Rosario, Jose Cabrera Pena, Aurelio Vega Martinez</i>	
TCPConex: Library to Create TCP/IP Communication Applications	253
<i>Juan Cerezo Sanchez, Sonia Leon Del Rosario, Carlos Vega Garcia, Aurelio Vega Martinez</i>	
Low-Cost IoT Gas Concentrator System Prototype	257
<i>Alicia Montoro-Lendinez, Jose Luis Lopez-Ruiz, F. Charte, Macarena Espinilla-Estevez, Javier Medina-Quero</i>	
Use of Sysquake as an Interactive Tool in the Teaching of Automation Systems	264
<i>Javier Esteban-Escano, Jose Manuel Diaz Martinez</i>	

Integration of the Electronic Engineering Course by Using Technologies Associated with Hydrogen.....	270
<i>Ignacio Zaradnik, Leandro Jaimes Soria, Diego Brengi, Rodrigo Spano</i>	
Visibilising Women in Technology: Strategies for Working in Telecommunication Engineering	275
<i>Ana M. Barbancho, Isabel Barbancho, Lorenzo J. Tardon, Alberto Peinado</i>	
Didactic Bench to Support Automation Learning - Industry 4.0 Education.....	281
<i>Filipe Pereira, Rogerio Lopes, Ruben Sarmento, Carlos Felgueiras</i>	
Towards a New Approach to the Computer Architecture Lab	286
<i>Martin Llamas-Nistal, Manuel J. Fernandez-Iglesias, Juan M. Santos-Gago, Luis E. Anido-Rifon, Fernando A. Mikic-Fonte, Martin Liz-Dominguez, Moises R. Pacheco-Lorenzo</i>	
Hardware Test Subjects in Academic Education.....	290
<i>Ruben Sarmento, Filipe Pereira, Carlos Felgueiras</i>	
Design of a Radio Telescope for the Observation of Background Radiation at 1.42 GHz Based on Software Defined Radio	295
<i>Francisco Gimenez-Cordellat, Candid Reig, Enrique Navarro-Camba</i>	
Digital Electronics Practice Projects for an FPGA-Based Remote Laboratory	300
<i>Rafael De Jesus Navas-Gonzalez, Oscar Oballe-Peinado, Julian Castellanos-Ramos, Daniel Rosas-Cervantes, Jose A. Sanchez-Duran</i>	
Teaching Based on Proposed by Students Designs: A Case Study	306
<i>Carlos Jesus Jimenez-Fernandez, Carmen Baena Oliva, Pilar Parra Fernandez, Manuel Valencia Barrero, Francisco Eugenio Potestad Ordonez, Erica Tena Sanchez, Alejandro Gallardo Soto</i>	
Mixed Signal Electronics Project Based Learning Approach for Engineering Students	311
<i>Jose Manuel Blanes, Ausias Garrigos, David Marroqui, Cristian Torres, Carlos Orts, Pablo Casado</i>	
Accelerating Applications with Vitis Unified Environment. Case Study: Vitis Vision Library	317
<i>Manuel Jesus Rodriguez Valido, Eduardo Magdaleno Castello, Patricia Sanchez Medina, Argelio Mauro Gonzalez</i>	
The Practices of Digital Electronic Systems Subject in Pandemic Times	322
<i>Eduardo Magdaleno Castello, Manuel Rodriguez Valido, Beatriz Rodriguez Mendoza, Jose Miguel Delgado Hernandez</i>	
ICs Tester Design and Its Effect on Application in Electronics Laboratories	328
<i>F. E. Potestad-Ordonez, C. J. Jimenez-Fernandez, A. Gallardo-Soto, M. Valencia-Barrero, C. Baena-Oliva, P. Parra-Fernandez, E. Tena-Sanchez</i>	
Methodology and Comparison of Evaluation Methods in Electronic Laboratories.....	332
<i>E. Tena-Sanchez, F. E. Potestad-Ordonez, J. I. Guerrero-Alonso, D. F. Larios-Marin, J. Luque-Rodriguez</i>	
OPALS, Open Platform Applied to Learning Digital Control Systems	337
<i>Barbancho Julio, Alarcon Bartolome, Dominguez-Cid Samuel, Lora Pedro, Luque Joaquin</i>	
Promoting Interest in STEM Through the Use of ICT	342
<i>Miguel Torres Hornero</i>	

Designing an Arithmetic Logic Unit (ALU) in Virtual Laboratory in 3D.....	347
<i>Nestor Rodriguez, July Mora, Ivan Nieto, Jose Santamaria, Esteban Chanto</i>	
Virtual Laboratories Development for PAM/PCM Learning	351
<i>Silvia Patricia Fallas Monge, Jose Roberto Santamaria Sandoval, Esteban Chanto Sanchez</i>	
Challenge-Based Learning in a University-Industry Environment.....	356
<i>Rosalino Rodriguez-Calderon</i>	
Wind Tunnel: Construction of Didactic Material as Learning Strategy	361
<i>Rosalino Rodriguez Calderon, Daniel Barriga Flores, Sergio Roman Lopez</i>	
Open Source Didactic and Programmable Humanoids	366
<i>Rosalino Rodriguez-Calderon, Ruben Belmonte-Izquierdo</i>	
Tools for Teaching Electronics Workshop in a Virtual Academic Setting.....	371
<i>Silvano R. Rossi, Roberto C. Leegstra, Franco E. Deber, Roberto J. De La Vega</i>	
Teaching Innovations for Analog and Digital Electronics	376
<i>Roberto J. De La Vega, Franco E. Deber, Raymond G. Brinks, Adriana L. Rocha, Silvano R. Rossi</i>	
Remote Laboratory for System on Chip Design Based on FPGAs	380
<i>Raul Mateos-Gil, Pedro Alfonso Revenga De Toro, Slavka Madarova</i>	
Final Work in Digital Electronics. Robotic Vehicle Control.....	385
<i>Luis Gil Sanchez, Javier Ibanez Civera, Roberto Capilla Lladro, Cristian Olguin Pinatti, Nicolas Laguarda Miro</i>	
Electronics Leveling Subject in the Master's Degree in Mechatronics Engineering	391
<i>Luis Gil Sanchez, Javier Ibanez Civera, Roberto Capilla Lladro, Nicolas Laguarda Miro</i>	
Educational Synthesis for LCL Filter Design and Performance Analysis for a 20-KW, 25-KHz SiC Inverter	398
<i>Susana Martin-Arroyo, Miguel Garcia-Gracia, Alvaro Llamazares, David Canete Lopez, Jorge Herrero Ciudad</i>	
Digital Twins, Didactic Strategy for Teaching Industrial Automation.....	404
<i>Luis Fernando Rico Riveros, Victor Hugo Bernal Tristancho, Juan Emilio Sanabria Sanabria, Holman David Vasquez Amado</i>	
Development of a Clinical Simulator for Taking Arterial Gas Samples Based on Mixed Reality	408
<i>Luis Fernando Rico Riveros, V. Ruth Jannett Zamora, Juan Emilio Sanabria Sanabria, Victor Hugo Bernal Tristancho</i>	
The University in the Metaverse. Proposal of Application Scenarios and Roadmap Model.....	414
<i>Gustavo Alberto Moreno Lopez, Hernando Recaman Chaux, Ferney A. Chica Alvarez</i>	
Influence of Inherent Parameters Within Virtual Systems on Cognitive Rehabilitation	423
<i>Marlon Santamaria-Villacis, Jose Varela-Aldas, Guillermo Palacios</i>	
Automatic Lab System for Optical, Electrical, and Thermal Inspection of PCBs.....	427
<i>Carlos Vega, Aurelio Vega, Irene Merino, Oscar Perez</i>	
LabPcb: Graphical Tools for Learning PCB Manufacturing, Assembly and Testing	433
<i>Aurelio Vega, Carlos Vega, Juan Cerezo-Sanchez</i>	

Expanding Frontiers Through Marketing Actions in a Master's Degree in Technology and Health.....	439
<i>Elena Del Val Noguera, Raul Igual Catalan, Eduardo Gil Herrando, Guillermo Azuara Guillen, Mariano Ube Sanjuan, Jesus Gallardo Casero, Inmaculada Plaza Garcia</i>	
Smart Bed Sensor for Detection of Sleep Disorders in Patients with Parkinson's Disease	444
<i>Roberto Onate-Lopez, Guillermo Palacios-Navarro, Ivan Garcia-Magarino</i>	
Teaching Image Processing and Artificial Neural Networks in Engineering - A Case Study in Medicine.....	448
<i>Wanderson De Oliveira Assis, Alessandra Dutra Coelho, Jonatan Marques Dos Santos, Pedro Henrique Palauro, Cesar Abraham Flores Cisneros Filho, Danilo Argollo Pirutti Silva, Alexandre Cesar Fioretti, Bruno Oliveira Cardelino, Robson Barbosa De Miranda</i>	
Remote Implementation of a Discrete Temperature Control by Hysteresis	455
<i>Ever Cifuentes Norena, Guillermo Tejada Munoz</i>	
Immersive Virtual Classroom Model for a Synchronous Blended Learning Environment.....	459
<i>Juan Fernando Florez Marulanda</i>	
Power Electronics in Smart Grids	465
<i>Angel A. Bayod-Rujula</i>	
Battery Management Lab Practice with Rpi and Evaluation Boards.....	470
<i>Salvador Rodriguez-Bolivar, Juan Jose Cutino, Juan Antonio Lopez-Villanueva</i>	
An Analysis Method for the Bandwidth Range in CMOS Technologies	475
<i>Antonio D. Martinez-Perez, Pedro A. Martinez-Martinez, Diego F. Paredes-Paliz, Francisco Aznar, Santiago Celma</i>	
A Contour-Map Approach to MOS Transistor Design.....	481
<i>Antonio D. Martinez-Perez, Pedro A. Martinez-Martinez, Diego F. Paredes-Paliz, Francisco Aznar, Santiago Celma</i>	
Digital Competences. the Challenge of Their Acquisition and Verification in the University Degree	487
<i>Ana Lucia Esteban Sanchez, Luis Mariano Esteban Escano, Martin Orna Carmona, Monica Remacha Andres, Javier Borraz Mora, Cristina Belloso Olave</i>	
Design of a DAQ System Using Arduino.....	493
<i>David Asiain Ansorena, Jesus Ponce De Leon Vazquez</i>	
Smart Industry Electric Power Emulator	499
<i>Pedro Plaza, Felix Garcia-Loro, Elio Sancristobal, Sergio Martin, Blanca Quintana, Francois Julien, Mamadou Kaba Traore, Manuel Castro</i>	
A Systematic Review on the Use of AR/VR Techniques in Remote Laboratories	503
<i>Isabela Nardi Da Silva, Javier Garcia Zubia, Unai Hernandez Jayo</i>	
Innovation, Research and Development in Engineering Education. Activities of the Spanish Chapter of the IEEE Education Society.....	506
<i>Oscar Martinez Bonastre, Cristina Fernandez, Lluís Vicent, Francisco Mur, Manuel Castro, Gabriel Diaz, Jose Carpio, Elio Sancristobal, Sergio Martin, Jose Sanchez, Francisco Javier Arcega Solsona, Juan Suardiaz Muro, Manuel Caeiro-Rodriguez, Martin Llamas, Inmaculada Plaza, Baltasar Fernandez Manjon, Pedro Munoz-Merino, Edmundo Tovar, Telmo Zarraonandia Ayo, Javier Garcia Zubia, Jose Antonio Delgado Penin</i>	
A New Power Supplies Course: From Problem-Based-Learning to Research.....	510
<i>Hector Sarnago, Oscar Lucia, Ignacio Alvarez-Gariburo</i>	

Educational Project Eurobot Spain.....	514
<i>Julio Pastor-Mendoza, Ana Jimenez Martin, Angel Llamazares-Llamazares, German Ros Magan, Cristina Losada Gutierrez, Pedro Gil-Jimenez, Ana Belen Garcia-Varela</i>	
Network for the Continuous Monitorization of Environmental Quality in Educational Buildings	520
<i>Javier Diz-Bugarin, Jose L. Rodriguez-Fernandez, Manuel Martinez-Mendez, Montserrat Rodriguez-Paz, Alberto Perez Rodriguez</i>	
Finite-Element Simulation and Hands-On Learning Activities for Teaching Wireless Power Transfer Systems	528
<i>Jesus Acero, Claudio Carretero</i>	
Improving a Digital Electronics Remote Laboratory with a Raspberry Pi 4	535
<i>Oscar Oballe-Peinado, Julian Castellanos-Ramos, Jose Antonio Sanchez-Duran, Rafael Navas-Gonzalez, Jose Antonio Hidalgo-Lopez</i>	
Study of the Implementation of Photovoltaic Self-Consumption Systems in Educational Centres	539
<i>J. J. Garrido-Garcia, C. Rus-Casas, F. J. Munoz-Rodriguez, J. I. Fernandez-Carrasco, G. Jimenez-Castillo</i>	
Low-Cost Commercial Circuit Boards for Internships with Engineering Students.....	545
<i>J. D. Aguilar-Pena, C. Rus-Casas, L. Hontoria, J. I. Fernandez-Carrasco, F. Baena</i>	
Training in Sustainable Entrepreneurship. Experience in Higher Education	552
<i>M. D. La Rubia, C. Rus-Casas, D. Eliche-Quesada, S. Bueno-Rodriguez, J. D. Aguilar-Pena</i>	
End-Of-Degree Project as an Initiation to Research.....	558
<i>C. Rus-Casas, F. J. Munoz-Rodriguez, P. Roncero-Sanchez, J. I. Fernandez-Carrasco, J. D. Aguilar-Pena</i>	
A Challenge for the Beginning of Research: Sensors and Their Experimental Data	564
<i>Anastasiia Snytko, F. J. Munoz-Rodriguez, C. Rus-Casas, J. I. Fernandez-Carrasco, G. Jimenez-Castillo</i>	
Intelligent Hybrid Model for Detecting and Reporting Drowsiness in Motor Vehicle Drivers (Cargo and Passengers) in Colombia.....	570
<i>Andres Ceballos Pino, William S. Puche</i>	
Enhancing Student Learning with Domotics Projects	581
<i>Michelle Rodriguez-Serra, Paola Garcia-Vasquez, Christian Fernando Libaque-Saenz</i>	
From Analysis to the Product. How to Start the Telecommunications Engineering Degree with a Global Perspective in Electronics.....	588
<i>Josu Etxaniz</i>	
Self-Guided Lab Lesson to Estimate a Robot's Position Using Distance Sensors.....	595
<i>Jose Juan Quintana, Hector Rodriguez, Lucas Gonzalez, Moises Diaz</i>	
Impact of the Modality -Onsite or Online- on the Students Performance in the MSc in Electrical Engineering	601
<i>Lluis Vicent, David Badia</i>	
Microprocessor and PICS Courses Planning for Engineering Students Based on Blended Learning	607
<i>Mirtha Irizar Mesa, Rene J. Diaz Martinez</i>	

SPICE Models for Electrical Simulation of Commercial MOSFET Arrays ALD1105/06/07	612
<i>Jacob E. Meza-Aguilar, Jesus E. Molinar-Solis, Ivan Padilla-Cantoya, Juan J. Ocampo-Hidalgo, Rodolfo Z. Garcia-Lozano, Sergio Sandoval-Perez</i>	
Impact of the Tutoring Program on Engineering Student Dropout	617
<i>Erik Vanegas, Yolocuauhtli Salazar, Pedro Lerma, Inmaculada Plaza</i>	
Sucre4Stem: Internet of Things in Classrooms.....	622
<i>Sergio Trilles, Aida Monfort-Muriach, Enrique Cueto-Rubio, Carlos Granell, Pablo Juan</i>	
Didactic Model for the Optimization of Ventilation in Rooms with the Presence of CO2	626
<i>Jose Luis Rodriguez-Fernandez, Javier Diz-Bugarin, Montserrat Rodriguez-Paz</i>	
Electronics in Maintenance Engineering	633
<i>Rene Lastra Cid, Miguel Ramon Diaz-Cacho Medina, Alejandro Pereira Dominguez, Jorge Marcos Acevedo</i>	

Author Index