

2020 XIV Technologies Applied to Electronics Teaching Conference (TAEE 2020)

**Porto, Portugal
8 – 10 July 2020**



**IEEE Catalog Number: CFP20TAE-POD
ISBN: 978-1-7281-6733-6**

**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:	CFP20TAE-POD
ISBN (Print-On-Demand):	978-1-7281-6733-6
ISBN (Online):	978-1-7281-6732-9

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

Table of Contents

Paper Title	PG (#ID)
<i>Design of an Augmented Reality System for Immersive Learning of Digital Electronic</i> , Sergio Martin, Gerardo Parra, Joaquín Cubillo, Blanca Quintana, Rosario Gil, Clara Perez, Manuel Castro	1 (1)
<i>Towards a Man - Machine Interaction in Programming Robotic Subject</i> , Moises Diaz, Jose J. Quintana, Raúl Santiago, Miguel Ferrer and Ana González	7 (3)
<i>An educational remote laboratory for controlling a signal conditioning circuit with an LDR sensor</i> , Ricardo Costa, Paulo Bastos, Gustavo Alves, Carlos Felgueiras and André Fidalgo	13 (8)
<i>Modular Battery Management System for Power Electronics Practical Laboratory Lessons</i> , Jose Cabrera, Samuel Ortega, Eduardo Quevedo, Himar Fabelo and Gustavo Marrero	19 (17)
<i>Regulated Power Supply with High Power Factor for Hyperspectral Imaging Applications</i> , Jose Cabrera, Noemí Falcón, Aythami Yáñez, Samuel Ortega, Sonia León, Himar Fabelo Gómez and Gustavo Marrero	25 (18)
<i>Teaching experiences. Developing the transversal skill of entrepreneurship in the classroom</i> , Catalina Rus-Casas, Leocadio Hontoria, Gabino Jiménez-Castillo, Francisco José Muñoz-Rodríguez and Juan Domingo Aguilar-Peña	32 (19)
<i>Remote sensors for monitoring generation and use of renewable energy</i> , Gaston Saez de Arregui, Miguel Angel Plano, Federico Lerro, Juan Manuel Marques, Jorge Luis Lassig, Sonia Concari and Susana Marchisio	38 (20)
<i>IMAX+ camera prototype as a teaching resource for calibration and image processing using FPGA devices</i> , Eduardo Magdaleno Castelló, Manuel Rodríguez Valido, David Hernández Expósito, Basilio Ruiz Cobo, María Balaguer, David Orozco Suárez and Antonio López Jiménez	45 (23)
<i>Training Equipment for Automatic Control Systems and Industrial Automation subjects in Engineering Degrees</i> , Sebastián García, Antonio Parejo, Alvaro Ariel Gómez, Francisco Javier Molina, Diego Francisco Larios and Carlos León	52 (24)
<i>Workshops in Electronic Engineering and Information Technology (TEeTI): a tool to encourage vocations</i> , Oscar Ruiz, Albert Cornet, Manuel Carmona, Christophe Serre and José Bosch	58 (25)
<i>Living-Lab for Smart Grid technologies teaching</i> , Antonio Parejo, Sebastian Garcia, Enrique Personal, Antonio Garcia, Juan Ignacio Guerrero and Carlos Leon	64 (26)
<i>Monitoring of Soil Moisture and Atmospheric Sensors with Internet of Things (IoT) Applied in Precision Agriculture</i> , Alessandra Coelho, Wanderson Assis, Bruno Dias, Fernando Martins and Rogério Pires	70 (28)
<i>Internet of Things Applied to Hydraulics</i> , Alessandra Coelho and Wanderson Assis	78 (29)
<i>Virtual Laboratory for Digital Signal Processing</i> , Javier Antonio Guerra, Samuel Dominguez-Cid, Juan Ignacio Guerrero, Antonio Garcia, Diego Francisco Larios and Carlos Leon	82 (30)
<i>Project-based learning in Engineering of Electronic Systems: Portable Video Console</i> , Jesús M. Hernández-Mangas and Jesús Arias Álvarez	88 (34)
<i>Enhancing practical skills in the electronics classroom with portable labs</i> , David Valiente, Fernando Rodríguez, Juan Carlos Ferrer, José Luis Alonso and Susana Fernández de Ávila	95 (37)

<i>Laboratory for Industry 4.0</i> , Samuel Dominguez-Cid, Javier Antonio Guerra, Francisco Javier Molina, Álvaro Ariel Gómez, Miguel Ángel Leal and Alejandro Gallardo	103 (40)
<i>Arduino-compatible microcontroller module for electronics practices and environmental monitoring</i> , Javier Diz-Bugarin and Rafael Rodriguez-Paz	109 (41)
<i>Class Attendance and Academic Performance in the Subject Digital Electronics</i> , Rafael De Jesús Navas-González	115 (42)
<i>Incorporation of E-textile into the textile engineering master and doctorate program</i> , Eduardo Garcia Breijo, Ana Rodes Carbonell, Eva Bou Belda, Luis Gil Sanchez and Ignacio Montava Seguí	123 (43)
<i>Using Simulink HDL Coder to implement a Fingerprint Recognition Algorithm into an FPGA</i> , Rosario Arjona and Iluminada Baturone	130 (44)
<i>How to Implement a Fingerprint Recognition Algorithm into a Wearable Device</i> , Rosario Arjona, Javier Arcenegui and Iluminada Baturone	137 (45)
<i>Learning tools in Electronic Engineering. Content Curation and Personal Learning Environments</i> , Juan Domingo Aguilar-Peña, Catalina Rus-Casas, Gabino Jiménez-Castillo, María Dolores La Rubia-García and Dolores Eliche-Quesada	144 (47)
<i>WebLabs: Remote Access Experiments for Teaching Process Control in Engineering Courses</i> , Wânderson O. Assis, Alessandra D. Coelho and Hugo S. B. Gonçalves	151 (49)
<i>Design of a teaching computer with floating point unit for Computer Architecture</i> , Andrés Gersnoviez, María Brox, Carlos Castillo-Márquez, Miguel Angel Montijano-Vizcaíno, Manuel Agustín Ortiz-López and Francisco Javier Quiles-Latorre	158 (50)
<i>Learning VHDL through teamwork FPGA game design</i> , Carlos Jesús Jimenez-Fernández, Carmen Baena-Oliva, Pilar Parra Fernández, Alejandro Gallardo Soto, Francisco Eugenio Potestad Ordóñez and Manuel Valencia	166 (54)
<i>Development of an experimental micro smart grid with renewable sources and energy storage through final Electronics Engineering projects</i> , Sergio Junco, Daniel Alba, Joaquín Ezpeleta and Javier Cabello	171 (55)
<i>FPGA-Based Remote Laboratory for Digital Electronics</i> , Óscar Oballe-Peinado, Julián Castellanos-Ramos, José Antonio Sánchez-Durán, Rafael Navas-González, Alberto Daza-Márquez and Jesús Alberto Botín-Córdoba	181 (58)
<i>CompSim: An Integrated Environment for Learningand Designing of Embedded Computational Systems</i> , Guilherme Esmeraldo, Edson Lisboa, Mário Santos, Cícero Samuel Mendes, Camila Ribeiro, Luiz Fernando Morato, Lucas Fontes, Pedro dos Santos and Milena Do Nascimento	186 (60)
<i>Project based learning via solving a real business need by a multidisciplinary group of students</i> , Silvia Satorres-Martínez, Diego Martínez-Gila, Pablo Cano-Marchal, Anneli Kakko, Juan Gómez-Ortega and Javier Gámez-García	190 (68)
<i>Education in smart grids: a perspective from the field of engineering</i> , Angeles Verdejo Espinosa, Catalina Rus Casas, Macarena Espinilla Estevez, Carmen Martinez Cruz and María Dolores Ruiz Lozano	196 (69)
<i>Application of the EMONA TIMS platform for the Telecommunications Engineering career at UNED Costa Rica</i> , Jose Roberto Santamaria Sandoval and Esteban Chanto Sanchez	204 (76)
<i>Teaching Electronics Subject in Different Post-Secondary Courses</i> , Frederico Jacob and António Alberto	210 (78)

<i>A Portable Lab for the Practical Study of Modern Computer Engineering</i> , Tiago Dias, Pedro Sampaio and Pedro Miguens Matutino	218 (81)
<i>Teaching Hardware/Software Co-Design Using a Project-Based Learning Strategy</i> , Pedro Miguens Matutino, Tiago Dias and Pedro Sampaio	225 (82)
<i>A PBL approach for teaching Electronics Fundamentals by Developing Robotics Projects</i> , Ana Luna and Mario Chong	231 (86)
<i>Acquisition of transversal skills in university studies through participation in robotics competitions</i> , Julio Pastor Mendoza, Emiliano Pereira González, Ángel Javier Álvarez Miguel, Cristina Alén Cordero, Ana Jiménez Martín, Pedro Gil Jiménez, Ángel Llamazares Llamazares, José Luis Martín Sánchez, Enrique Santiso Gómez, José A. Jiménez Calvo, Hilario Gómez Moreno, Manuel Ocaña Miguel, Pedro Alfonso Revenga de Toro, Elisa Rojas Sánchez and Ricardo Mallol Poyato	238 (87)
IMPLEMENTATION OF PROBLEMIZING PEDAGOGIES IN THE AUTOMATION AREA OF THE ELECTRONIC ENGINEERING PROGRAM , Luis Fernando Rico Riveros, Víctor Hugo Bernal Tristánchó and Erika Johana Ruiz Suárez	246 (88)
<i>Experiential Learning through “Tangible” Lab Assignments for an Undergraduate Course in Electrical Circuits-I</i> , Atousa Hajshirmohammadi, Zhendong Cao and Ling Zhu	254 (89)
<i>Integration of online Laboratories in Learning Platforms</i> , Ildefonso Ruano, Elisabet Estévez, Alejandro Sánchez García, Juan Gómez and Javier Gámez	259 (90)
<i>An enhanced methodology to improve a basic electrical and instrumentation laboratory session</i> , Noemí Pérez, Ainhoa Rezola, Damián Caballero, José Francisco Macayo and Héctor Solar	267 (96)
<i>Continuous Summative Assessment Sessions in Vocational STEM Education</i> , Gordan Durovic, Martina Holenko Dlab and Natasa Hoic-Bozic	272 (97)
<i>Mnemojitechnic: a teaching method for learning support applied to Electronics subject</i> , Pedro Manuel Martínez Jiménez, Diego Sales Lérida and Clemente Cobos Sánchez	278 (99)
<i>A low-cost development platform to design digital circuits on FPGAs using open-source software and hardware tools</i> , Albert Saiz-Vela, Pau Fontova, Tomàs Pallejà, Marcel Tresanchez, Juan Antonio Garriga and Concepció Roig	284 (101)
<i>Starting flipped classroom method with iPad and Apple Pencil in the Analog Electronics Course</i> , Diego Sales Lérida, José María Guerrero Rodríguez, Clemente Cobos Sánchez and Pedro Manuel Martínez Jiménez	292 (102)
<i>Educational platform for modeling and control</i> , Ramiro Barbosa	298 (103)
<i>Design of a Fuzzy-Controller for a Magnetic Levitation System using Hall-Effect sensors</i> , Jesús Sergio Artal-Sevil, Matilde Santos, Carlos Bernal-Ruiz and Antonio Bono-Nuez	307 (111)
<i>Control of a Bionic Hand based on Neural Networks and improved Gesture Recognition Techniques using multiple EMG sensors</i> , Jesús Sergio Artal-Sevil, Andrea Pascual-Acón, José Antonio Domínguez-Navarro and Francisco J. Pérez-Cebolla	316 (112)
<i>Satellite and aircraft communications through SDR as an introduction to Telecommunications and Electrical Engineering</i> , Gonzalo Belcredi, Martín Randall, Claudina Rattaro and Pablo Belzarena	324 (115)
<i>Encouraging Girls in STEM: workshops on analog electronics, sensors and robotics</i> , Claudina Rattaro, Isabel Briozzo, Mariana Siniscalchi, Florencia Blasina and Mariana del Castillo	331 (116)

<i>Household Appliances Identification: An integrative workshop for the Electrical Engineering degree</i> , Alvaro Gómez, Pablo Massaferro, Camilo Mariño, Ignacio Irigaray, Andrés Cardozo and Alicia Fernández	336 (117)
<i>FPGA remote laboratory: experience of a shared laboratory between UPNA and UNIFESP</i> , Cándido Aramburu, Ana Lucía da Silva Beraldo, Luis Rodriguez-Gil, Wilson F. Moreira de Souza Seron, Aitor Villar-Martinez and Pablo Orduña	346 (120)
<i>Simulator of mobile robots controlled by Artificial Neural Networks to learning courses in robotics</i> , Lucas Favi Bocca, Jônatas Bóas Leite and Sueley Cunha Amaro Mantovani	354 (122)