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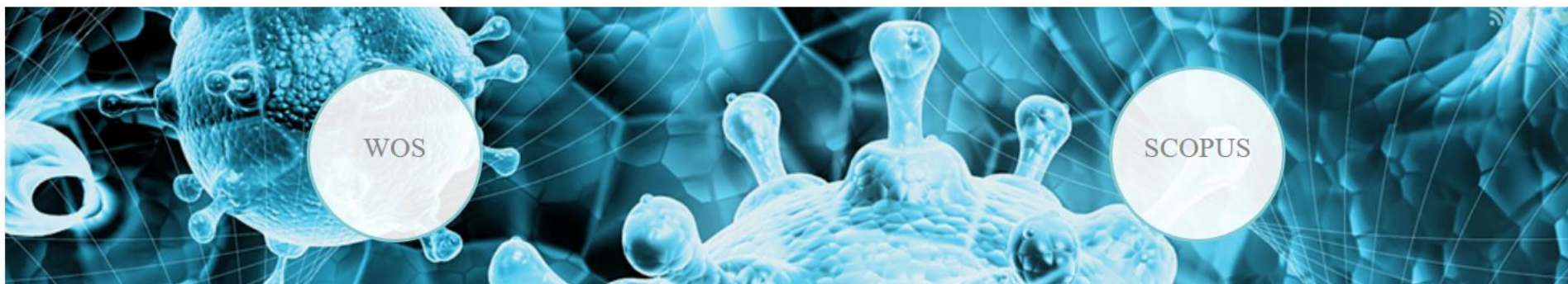


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Abstract

This article presents a new software tool for **electronic instrumentation** teaching. The software is concerned with the main concepts underlying instrumentation systems. It is based on Java applets and organized as a tutorial. It acts as a visual tool for interactive simulations. The tool covers, in a practical manner, all the stages of a basic **electronic instrumentation** system, the sensor, the signal conditioning, and the analog to digital conversion. It must be meant as a complement to classical teaching methodologies based on lectures, not as a substitute of such pedagogical strategies. The software helps students in learning principles of measurement systems, to improve the teaching-learning process in the discipline. (c) 2011 Wiley Periodicals, Inc. Comput Appl Eng Educ 21:E62-E72, 2013

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A web-based software educational tool for electronic instrumentation teaching

Poncela, Alberto

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“ This article presents a new software tool for electronic instrumentation teaching...”

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A Web-Based Software Educational Tool for Electronic Instrumentation Teaching

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ABSTRACT: This article presents a new software tool for electronic instrumentation teaching. The software is concerned with the main concepts underlying instrumentation systems. It is based on Java applets and organized as a tutorial. It acts as a visual tool for interactive simulations. The tool covers, in a practical manner, all the stages of a basic electronic instrumentation system, the sensor, the signal conditioning, and the analog to digital conversion. It must be meant as a complement to classical teaching methodologies based on lectures, not as a substitute of such pedagogical strategies. The software helps students in learning principles of measurement systems, to improve the teaching-learning process in the discipline. © 2011 Wiley Periodicals, Inc. *Comput Appl Eng Educ*; 21:E62-E72, 2013; View this article online at wileyonlinelibrary.com/journal/cae; DOI 10.1002/cae.20564

Keywords: electronic instrumentation; interactive software; educational tool; Java applets

INTRODUCTION

Teaching in Higher Education has been traditionally based on lectures. This strategy has also been applied to teaching in electronic instrumentation. However, lecturing has a number of drawbacks, mainly because students are not sufficiently motivated to acquire their knowledge actively [1]. On the other hand, information and communication technology (ICT) has emerged as an indispensable part of modern education, since it becomes a useful tool in addressing changes and new paradigms. The application of ICT to the educational process is usually referred to as e-learning. It is defined as the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration [2]. Although online learning has many advantages, for example, interactivity and immediate feedback [3], it also has some drawbacks like poor retention, that is, the continuous participation of students in the course until its completion. Thus, nowadays, a new form of methodological strategies has appeared to take advantage of both face-to-face teaching and virtual environments. These strategies are commonly denominated as blended learning [4,5]. It must be borne in mind that blended learning assumes both benefits in face-to-face instruction and advantages when using virtual training [6]. Such a combination aims at providing the most efficient and effective instruction experience [7]. In fact,

blended learning is becoming an increasingly popular form of learning [1], since it has proven its effectiveness when improving the teaching-learning process [8,9].

When face-to-face instruction is complemented with e-learning, one of the main aspects regarding the design of pedagogical strategies is the inclusion of new materials and resources [10–15]. In this sense, it must be pointed out that web-based software tools have already demonstrated that they can help in clarifying concepts, and have proven the benefits for students [11,16].

In this context, this work proposes a new web-based software educational tool to help in teaching electronic instrumentation. Software tools have been previously applied to teaching in electronic instrumentation, as it is shown in Refs. [17] and [18]. In these cases, LabView was chosen to implement a modular virtual data acquisition chain [17] and different data acquisition projects [18]. Hardware tools can also be reported for teaching electronic instrumentation courses [19,20], even for integrating experimental boards, and experimental instrumentation to be used in real-time via Internet [21].

The proposal which is presented in this article is considered for the Electronic Instrumentation course of the Telecommunications Engineering degree at the University of Málaga. Thus, before dealing with the software tool, the course context is presented. Then, the design of the software, which is based on the technology of Java applets, is described. Next, some



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