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DEVELOPMENT OF A SUSTAINABLE POWER ELECTRONICS LABORATORY WITH REMOTE ACCESS AND CONTROL VIA THE INTERNET

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Abstract

In the past few years, our society has faced an unprecedented challenge that has endangered basic human rights and freedoms, the COVID-19 pandemic. Consequently, institutions worldwide have been seeking solutions to minimize the limitations faced by society and enhance individual safety. One area greatly affected by the pandemic is education, particularly in disciplines that require people of different age groups to be physically present, posing a high risk of SARS-CoV-2 transmission. As a result, there has been a significant surge in the number of participants in digital courses, particularly Massive Open Online Courses (MOOCs). However, MOOCs have struggled with finding a practical solution to replace or offer alternatives to hands-on labs in engineering fields. These labs play a crucial role in engineering education and research as they allow students to apply and validate theoretical concepts taught in their courses. To address this challenge, two innovative types of labs have been developed as substitutes for traditional, physically present labs, virtual laboratories and distance laboratories. These new lab formats have demonstrated several advantages in terms of sustainability. They help reduce electricity consumption, prevent waste and environmental pollution associated with teaching materials like electronic components, eliminate the need for substantial space requirements for lab equipment and setups used in experiments, and lower maintenance costs. Sustainability has become a pressing concern in society, particularly when it comes to the use of labs for educational purposes. Therefore, the objective of this article is to describe the utilization and development process of a sustainable power electronics lab that can be accessed and controlled remotely via the internet.

Key words: engineering education, power electronics, Red Pitaya, remote laboratory, sustainability

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