Chapter 7
Enhancing Electronics Engineering Laboratory With Experimental Learning Using Virtual Reality

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ABSTRACT

This chapter investigates the potentially transformative implications of integrating virtual reality technology into the field of electrical and instrumentation engineering to enhance the educational experience and change the traditional way that students study and experiment with electronic instrumentation by utilizing the future possibilities of virtual reality. Electronics and instrumentation have consistently been at the center of modern technological development, powering industry, health care, and scientific study. However, considering its important function in developing this world of teaching, taking complicated topics related to instrumentation remains a difficulty. As a student in this specialization, the author has personally faced and encountered the restrictions of the traditional laboratory environments in universities, where most physical components are frequently in short supply, costly, or even unreachable.

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1. INTRODUCTION

This title investigates the potentially transformative implications of integrating virtual reality technology into the field of electrical and instrumentation engineering to enhance the educational experience and change the traditional way that student's study and experiment with electronic instrumentation by utilizing the future possibilities of virtual reality. Electronics and instrumentation have consistently been at the center of modern technological development, powering industry, health care, and scientific study. However, considering its important function in developing this world of teaching, taking complicated topics related to instrumentation remains a difficulty. As a student in this specialization, I have personally faced and encountered the restrictions of the traditional laboratory environments in universities, where most physical components are frequently in short supply, costly, or even unreachable.

There is a clear need for new educational solutions that solve this problem, and the introduction of virtual reality gives a transformative possibility. This technology provides an interactive setting that can connect theoretical and practical knowledge gaps. (Kamińska, 2019). Finally, virtual reality technology will assist students and professors in describing and teaching the experiment outside of the educational establishment. Students and teachers may connect with and control technological gadgets while also feeling as if they are communicating with actual educational institutions. The laboratory equipment's and components can be simulated in the VR environment which can provide a safe and cost-effective way to teach and train students to use the laboratory equipment. Furthermore, virtual reality technology can make the laboratory more flexible and accessible to students who may not have a physical laboratory like students who are in remote areas or have disabilities (i3-Technologies, 2023).

In order to address the flaws of conventional teaching methods, the notion aims to revolutionize education by introducing an immersive laboratory augmented by virtual reality. use the Unity platform, it is possible to create a virtual reality laboratory that is interactive with students and can be viewed through an "Oculus Quest 2 Headset," all while improving student engagement, knowledge, and retention through practical, hands-on learning experiences. The strategy entails democratizing access to education enabling remote distance learning and developing an extensible user-friendly platform by using the Unity engine which helps to design virtual reality environments that's suits any program in VR technology. Moreover, the integration will be between 3D Max or SketchUp and Unity software, then to transfer this program to "Oculus Quest 2 Headset" which is the main device to create the laboratory environment. The Unity software has button called C# language which is required to program the design (Program-ace, 2022). Furthermore, the virtual reality environment allows professors and students to live in the same area at the same time and