


Chapter 2

Emerging Technologies and Educational Requirements in Engineering Education for the Fourth Industrial Revolution

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ABSTRACT

Higher education institutions and their engineering departments have a vital role in fulfilling the new requirements and opportunities of the information and communication technologies (ICT). Therefore, understanding the guidelines to adapt to the new ICT innovations in relation with the Fourth Industrial Revolution such as the internet of things, cloud computing, virtual reality, and artificial intelligence is vital to determine the emerging patterns in their development, delivery, implementation, and assessment. This study aims to define the new educational requirements in engineering education based on the developments of the Fourth Industrial Revolution. Conducting an in-depth analysis of the current literature revealed that although these emerging technologies have been widely used, there are some challenges being faced for their effective use in engineering education. Therefore, the authors provide some guidelines and discuss possible research directions for the use of these technologies in near future.

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INTRODUCTION

The use of Information and Communication Technologies (ICT) and other emergent technologies have steadily increased in the last few years. This increase led to the emergence of the Fourth Industrial Revolution (FIR), which includes the use of Internet of Thing (IoT), robots, Artificial Intelligence (AI), c-Cloud Computing and Virtual Reality (VR). For example, Cisco experts predict that within the next ten years, IoT devices will reach more than 50 billion at a rate of six devices per person (Cisco, 2013). What distinguishes these devices is the ability to identify, monitor and control every device. Therefore, public and private academic institutions must develop their work settings, keep up their sustainability and efficiency with these advances, and determine the emerging patterns in the delivery of new education. The effect on the engineering education sector is expected to be enormous due to the market demand and curriculum restructure to prepare the next generation students who should deal efficiently with the new emerging technologies.

The main objective of this chapter is to explore the current state of emerging technologies and their educational requirements in engineering education in relation to the FIR developments. It comprises of systematic and detailed review of the current literature in terms of the use of emergent technologies in engineering education, cases and experiments of such technologies in daily educational practices .It also includes the guidelines for the adaptation and the new educational requirements in engineering education.

METHODOLOGY OF THE LITERATURE ANALYSIS

In this section, we report the results of our meta-analysis study, through which we achieve the research objective, and elaborate on the interesting results emerged from the extracted data.

The in Depth Review Approach

The in depth analysis of the literature was conducted in this research to:

1. Provide an overview of the influence of emerging technologies on engineering education.
2. Develop an understanding of these technologies that allow students, teachers and institutions to assess and improve engineering education.
3. Develop an approach that can make these emerging technologies to develop engineering education.

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