Chapter 1

Advanced Visualization Systems in Industrial Environments:
Accessible Information in Any Factory Place

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ABSTRACT

Today’s advanced visualization systems will revolutionize the way information is perceived in industrial environments. This will help the different industrial workers to interact more efficiently with the machines, equipment, and systems installed in the industrial plant. The display devices will provide operators with all the information they need to perform their work more efficiently, as well as inform them of all the hazards and safety in their environment. Also, screen operators, thanks to the use of a single 2.5D/3D screen, will possess exhaustive knowledge of the state of the industrial process. This increases the amount on quantity and quality of information that is offered to the operator and it avoids the superfluous navigation between operation screens. This chapter explores advanced visualization systems in industrial environments.

INTRODUCTION

Industrial visualization systems have evolved because new computer display devices are being developed. The first industrial display systems were introduced with the birth of the DCS (Distributed Control System). This was and is a control equipment used principally in the continuous process industry (steel, cement, paper, etc.). This type of industry is characterized because it has a critical production process, in which any failure or stop can create very dangerous situations, both for the environment and for people. 40% of these faults are attributable to errors or failures of operation (McMahon, 2015), which implies that the efficiency of the operators becomes a critical element of this industry. This transforms the information offered to the operator in a fundamental area of improvement and any innovation that helps in the development of his/her work will generate an increase in the safety of the industrial process.

This paper takes a tour through the various types of industrial display systems. This journey begins with the primitive screens of the first DCS, a summary of the current industrial visualization systems, it continues with the imminent possibilities that will result from adapting of the new technologies of computer visualization to the industrial systems, watching them as Internet of Things, that are them at the end.

The first section of this document details the historical evolution of the DCS operating screens. The following section describes the state-of-the-art of current DCS operation screens. The next section examines the uses of Monocular AR (Augmented Reality) glasses in industrial environments. Next, different functions are analysed that can be done by the use of systems with binocular Augmented Reality glasses, when applied to the different industrial areas. The antepenultimate section explores the uses of virtual reality in today’s industrial world. The penultimate section examines some innovative industrial management applications in 2.5D/3D environments. This type of interface increases the quantity and quality of information that is perceived by the operator; as it displays on a single 2.5D/3D graphic display the contents of a set of old 2D DCS operator displays. The last section describes the experiences of the operators who tested this interface.

EVOLUTION OF DCS OPERATOR SCREENS

DCS are devices that manage several thousands of analogic and digital signals; and also, have a distributed architecture, which increases considerably their reliability and availability. However, its essential feature is the intensive interaction with the operator, since he/she is the one who has to do the key decisions about the operation of the process under his/her control.
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