

Chapter 12

When Control Education is the Name of the Game

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ABSTRACT

This chapter is about a serious game named ITS PLC, an interactive simulation tool aimed at control systems education and training that includes the latest technologies from the video and computer games industry; namely, real-time 3D graphics, physics and sound. The goal of the game is to make five virtual industrial plants work correctly by using an external and real programmable logic controller (PLC) running the proper software, which the trainee must develop. The main purpose of the chapter is to testify the excellent properties of ITS PLC as an educational tool throughout a collection of three success stories: the first one shows how virtual scenarios can be used to investigate real problems; the usage of ITS PLC in an “edutainment” scenario is the theme of the second story; the third case testifies the benefits of ITS PLC in introductory automation programs.

INTRODUCTION

Video games are fascinating, and probably inescapable, attracting kids to consoles as bees to honey. In a way or another, video games have impacted many kids' lives during the last decades, and presently, playing computer games is a favourite leisure activity for most young (and

not so young) people. Whilst recreation activities extremely immersive and addictive are a natural and understandable worry for parents and educators, computer games can teach young children to read and count, as well as help middle school students to learn about science and technology (Underwood, 2009), (The Entertainment Software Association, 2010) and (Kuo, 2007). Moreover, computer games are also enabling the creation of “synthetic environments” from where scientific

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research, education and training, career development and life-long learning are possible and effective. Thus, computer games technology is getting an increasing importance in the development of valuable professional tools for scientists, engineers and educators (Chryssolouris, Mavrikios, Fragos, Karabatsou & Pistiolis, 2002), (Irawati, Hong, Kim & Ko, 2008) and (Callaghan, McCusker, Losada, Harkin & Wilson, 2009).

Software applications similar to computer games but explicitly designed to serve educational or training purposes, instead of entertainment, are commonly referred as “serious games” (Barnes, Encarnação & Shaw, 2009). Serious games are not new. For instance, a professional training flight simulator is a classical example of a serious game. In here, a trainee pilot using a real cockpit interface interacts with a computer based system representing a real world scenario (Shutao, Qitao, Jun & Junwei, 2009) and (Menendez & Bernard, 2001). Until recently, highly realistic but extremely expensive simulation systems, such as flight simulators, were only common in training environments where risk and cost are major concerns; for instance, in aerospace, military and nuclear plants scenarios (Karr, Reece & Franceschini, 1997) and (Gaskell, Husman, Collier & Chen, 2007). However, the great advances and the reduced costs of computing technologies and of the supporting hardware are making serious games common training tools (Chittaro & Ranon, 2009). For instance, light vehicles, trucks and bus simulators are increasingly being used for training in driving schools all over the world. Less mundane synthetic scenarios, concerning serious games in middle and high school education as well as professional skills training can be found in (Arango, Aziz, Esche & Chassapis, 2008), which is a very interesting survey on serious games in education and training.

Any serious game is a very specific product, since it is oriented to a particular and sometimes uncommon subject or training procedure, and to a certain, probably restricted, class of users.

This means that mastering computer science and modern computer games technology, together with being a great digital artist and having funny ideas, are necessary skills for developing a successful serious game, but they do not suffice. For developing a training application, programmers have to rely on a considerable guidance from experienced trainers to meet a whole set of important user requirements; namely, trainee motivation, easy to get effective tutoring, a natural interface, some form of gratification and room for experiment and creativity (Wong et al., 2007).

Hence, the effective value of a serious game is mainly predicted by a small group of trainers at its development stage. Yet, in practice, this parameter, and the overall interest of the application, is judged by another, usually very different (Prensky, 2001), group of people, accepting or rejecting the developed game: the group of trainees. If trainees found the application uninteresting, then even the most technologically powerful and great digital art based serious game is condemned to not being voluntarily played anymore, ending up in the stack of boring stuff in CD format. Therefore, not surprisingly, most computer games producers consider “serious games” as a restricted, odd, non-predictable and thus not particularly interesting market, concentrating their professional interests, business investments and research activities in “entertainment games”. Fortunately, this attitude leaves room, scientific matter and business opportunities to proficient enough multidisciplinary teams who want to grasp the opportunity.

This chapter is precisely about “grasping the opportunity” in the context of the serious games business market; more specifically, in the context of designing and producing serious games for logic control training. Central to the chapter is the “ITS PLC Professional Edition” software package (Real Games, 2010) – hereafter commonly referred as ITS PLC –, an Interactive Training System (ITS) engineered and produced by a multidisciplinary team and aimed at Programmable Logic Controllers (PLCs) programming education and training.

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