Telemetry-based Optimisation for User Training in Racing Simulators

Francois Buhagiar

Today

1 Introduction

2 Literature Review

In the following section an explanation will be given for the ground work on which this final year project is based upon. The areas which will be covered include video games and serious games focusing on the differences between the two, which will be used to introduce the idea of using serious games as a training mechanism. Motorsport circuit car racing will also be discussed, describing what it involves from a formal point of view by defining the tasks which a racing driver is required to carry out in order to get a good lap time.

2.1 Video games and Serious Games

Baranowski and colleagues defined games as a physical or mental contest with a goal or objective, played according to a framework, or rule, that determines what a player can or cannot do inside a game world the definition covers the setup of a game, while "a physical or mental contest, played according to specific rules, with the goal of amusing or rewarding the participant" [5].

Video games are built on top of these core values with the difference of having the game world confined into some sort of digital media. According to historians video games started with William Higinbotham who created a tennis game to be played on a television set [4]. From the early days of video games, their main aim was always to provide some degree of entertainment. The entertainment value is achieved in various ways depending on gaming platform, game genre and the audience the video game is targeted to. According to Electronic Arts chief creative officer at the time, modern video games are simply made up of three fundamental components, story, art and software [6].

The definition of serious games has been redefined multiple times. The first formal definition appears to have been introduced by Abt in his book from 1970 which stated a serious game to be simulations and games to improve eduction [1]. Several years later, a white paper written by Sawyer in 2002 proposed an updated definition to be based on the idea of connecting a serious purpose to knowledge and technologies from the video game industry [3]. Moving on to nowadays definitions such as the ones from Chen and Michael in 2005 [3] and from Zyda also in 2005 [6] seem to stem from Swayer's influence. The boundaries of serious games are debated, mostly due to the fact that serious game attract multiple domains making it hard to come up with a common boundary. However, the common denominator across all domains seems to be "Serious Game designers use people's interest in video games to capture their attention for a variety of purposes that go beyond pure entertainmnet" [2].

From the above one stands to reason the main contrast between video games and serious games involve the use of pedagogy activities that aim to educate or instruct knowledge or skill - [6] in serious games. These activities are given preference over entertainment value, hence the amusement aspect which are custom to video games might not be found at all in a serious game [6].

2.2 Consumer sim racing games as a serious game

Consumer available sim racing games such as Asseto Corsa and Project Cars provide a sim racing experience within the average cost of other consumer games. The aim of these games is to replicate real life race car dynamics and physics with the aim of providing entertainment and amusement to the player. The challenge expect is achieved by paring the user against other AI players or multiplayer online races played against other human players. These points make the mentioned games fit the previous definition of what a video game is however fail to meet the requirements of a serious game, they miss the pedagogy activities. Most of the modern sim racing games do aid the player to improve buy means of implementing aids. Such aids might include showing the racing line to which the player is expected to drive on, while also showing the braking and acceleration points. Other aids include anti lock brakes, traction control and stability control. The problem with their implementation is of having it in a passive way, with the exception of the racing line, the player is not told when and what is being done wrong. The result is having users having to figure their own mistakes out by means of practicing without any guidence This final year project aims to implement a system which is plugged into an off the shelf racing simulator which trains users by letting them know what is being done wrong, when it's being done wrong and most importantly how to avoid making the same mistake.

[Show image of racing line red / green ?] [In appendix, we might need to explain what ABS, TCS AND STC are]

2.3 Racing, getting near the optimal lap time

3 Methodology

References

[1] Clark C. Abt. *Serious Games*. Viking Press, 1970.

[2] Damien Djaouti, Julian Alvarez, and Jean-Pierre Jessel. Classifying serious games: the g/p/s model. *Handbook of research on improving learning and motivation through educational games: Multidisciplinary approaches*, pages 118–136, 2011.

[3] David R Michael and Sandra L Chen. *Serious games: Games that educate, train, and inform*. Muska & Lipman/Premier-Trade, 2005.

[4] R. Stanton. *A Brief History Of Video Games: From Atari to Xbox One*. Little, Brown Book Group, 2015.

[5] Chien Yu, Jeng-Yang Wu, and Aliesha Johnson. Serious games: Issues and challenges for teaching and training.

[6] Michael Zyda. From visual simulation to virtual reality to games. *Computer*, 38(9):25–32, 2005.