DOCTORAL THESIS ABSTRACT

Use of psychophysiological factor detection algorithms to enhance participant engagement in computer games

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Computer games, especially among younger gamers, are becoming increasingly popular and influencing their daily lives. Many different genres of computer games have different design features that influence player engagement. It is important to identify the point at which the level of player engagement changes, which can be useful for game developers. However, to achieve this, tracking the player's behaviour and emotions during gameplay is necessary. Tools, such as Unity Analytics, can help monitor player engagement levels, but further research is needed to develop more accurate methods for studying player engagement in computer games.

The main objective of the presented dissertation was to develop algorithms for detecting selected psychophysiological characteristics of the player to increase participant engagement by modifying the content of computer games using cognitive neuroscience techniques.

The study developed a methodology to investigate the degree of player engagement with computer games. The first stage consisted of determining player preference, using various mini-games and cognitive neuroscience methods (EEG, eyetracking) and a questionnaire. The second stage consisted of selecting an engagement index based on research in a platform game, which made it possible to improve the static and dynamic elements of the game. The third stage concerned the verification of the results obtained, which was carried out in a platform game containing seven levels of varying difficulty. The results of the analyses made it possible to identify the elements determining the low level of player engagement and to decide on the need to modify the game content. Cognitive neuroscience equipment and a questionnaire were used in the implementation of the study, and the signal analysis procedure was adapted to the specifics of the study. The engagement index values were subjected to a normalisation procedure, and comparison with the standard deviation allowed the influence of the ICA component and artefacts to be identified.

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