EEG ANALYSIS DURING AUGMENTED REALITY EXPERIENCE (POSTER)

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Abstract
The aim of this research is to investigate the effectiveness of Electroencephalographic (EEG) signal processing as a method for evaluating user experience (UX) within an Augmented Reality (AR) application. Our research focus on the AgrotourAR application, a key component of the AGROTOUR project. AgrotourAR is purpose-built with the primary aim of fostering interest in mountain trekking, utilizing the Microsoft Hololens 2 head mounted display device.

Keywords
EEG, Augmented Reality, Microsoft Hololens 2, Tourism

Introduction
AR is a technological innovation that superimposes digital data or virtual objects onto the physical world, enriching the user's perception and engagement with their immediate environment [1]. Within the framework of the AGROTOUR research project, the AgrotourAR app is developed to present Western Macedonia's scenic mountains as appealing destinations for hiking tourism. Integrating tourist routes with AR can provide visitors with a unique immersive experience, while simultaneously boosting tourism in a given area.
User experience (UX) is pivotal for AR app evaluation, usually assessed via subjective surveys. However, an increasingly promising objective evaluation method explored in recent years is the use of EEG [2]. In this study, EEG signal analysis is employed to assess user experience as participants immerse themselves in the app, displayed through the head mounted device.

Materials and methods
The AgrotourAR application is developed using Unity Engine. The AgrotourAR application is designed for Microsoft Hololens 2. A lightweight wearable EEG acquisition device was used to capture brain activity. The application starts with users selecting one point of interest on a map of mountain routes in the region of Western Macedonia and include locations of historical importance, landscapes of natural beauty, geolocation etc. For each point of interest of the predefined route AR materials have been developed, including buildings (Fig. 1), mountain view, drone video scenes, etc.

Figure 1. Building Augmentation

Results
The analysis of EEG recordings, reveals increased beta rhythm band power, that is directly correlated with the user's cognitive and emotional states during their immersion in the AR application. The findings establish a method for objectively evaluating UX using non-invasive bio-signal recording equipment. However, it is essential to conduct the experiment with a larger number of participants in order to strengthen the research findings.

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