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The Impact on Player Experience in Augmented Reality Outdoor Games of Different Noise Models

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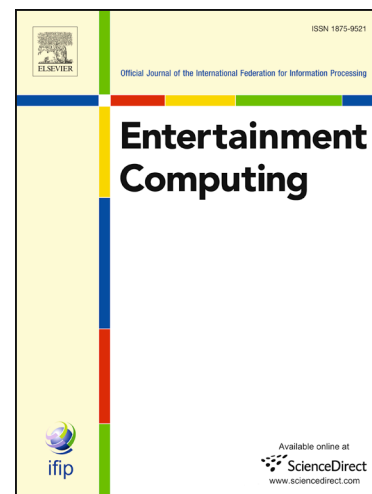
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# The Impact on Player Experience in Augmented Reality Outdoor Games of Different Noise Models

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## Abstract

Augmented Reality (AR) gaming is leaving the lab and entering the general population with a combination of high-end systems from the likes of Microsoft and Facebook as well as magic window AR games for commodity smartphones like Pokemon Go. Unlike traditional video games, AR games must solve the registration problem to map objects in the real world to the screen via the camera. Sensors are typically employed to provide the real world pose of the physical camera. However, like all sensors, the location and orientation sensors are subject to noise processes. While the interaction between noise processes and player enjoyment has been studied in networked games, limited work has been done examining the impact of sensor noise on player enjoyment in AR games and that work has been largely confined to simple noise models. In this paper, we present an empirical analysis of the impact on location based AR games of GPS noise on player experience. Our analysis shows that different games are impacted differently by noise. Multimodal noise processes can have a lower impact on player experience than equivalent unimodal processes, when players can time their interactions.

*Keywords:* Augmented Reality Games, Sensor Noise, Player Experience

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## 1. Introduction

Augmented Reality (AR) is a technology where digital artifacts are superimposed on a real world view to provide a more engaging, useful, or enjoyable merging of the digital and real. With the advent of high-end consumer technologies such as Microsoft's HoloLens [1], or the Oculus Rift [2], and with

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