**Title:**

Investigating the role of gesture modalities and screen size in an AR 3D game

**Authors and Affiliations:**

Department of Information and Communications Technologies, Asian Institute of Technology, Pathum Thani, 12120, Thailand

Abdul Raheem Fathima Shafana & Chaklam Silpasuwanchai

Department of Information and Communication Technology, South Eastern University of Sri Lanka, Oluvil, 32360, Sri Lanka

Abdul Raheem Fathima Shafana

**Abstract:**

In pursuit of immersive Augmented Reality (AR) Games, gesture interaction is considered a promising mode. On the other hand, despite the considerable effect of screen size on user experience and usability in game contexts, the effect is still under-explored in AR game contexts. This, in turn, sparks a specific research interest in the interaction between gesture modalities and screen sizes in AR games. This work contributes to a controlled study investigating the effect of two different gesture modalities (touch and tilt) on varying screen sizes in a custom-made AR game. Competence, engagement, fatigue, and user preference were evaluated using the combined effect of gesture modalities and screen sizes. The results revealed that gesture modalities affect game competence and fatigue while they had no significant impact on user engagement. Further analysis has revealed that touch outperforms tilt for target-selection tasks like destroying enemies while tilt outperforms touch for path-following tasks like turning a character. However, no significant effect was found on screen size, contradicting past studies that suggested that screen size has an effect on engagement, fatigue, and performance. The findings of the study could be useful for AR game designers to further develop usable and engaging AR games.

**DOI:**

<https://doi.org/10.1007/s11042-023-16052-y>

**Published:**

13 July 2023