Author’s response to reviews

Title: Falls Sensei: A serious 3D exploration game for older adults to enable the detection of extrinsic fall hazards within the home

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Response to review comments. Author responses preceded by ‘>>, all edits highlighted in yellow in the manuscript.

Susan Bello (Reviewer 1): Overall the paper is well written and addresses an important issue facing aging populations. The sample size is small but seems in keeping with other studies of this type. I think the conclusions would benefit from some discussion of how to disambiguate engagement due to participating in the study from engagement with the actual game in the impact of using Falls Sensei.

>> Thank you, we have now added clarification in the Conclusion section (pp. 21) that the finding that games such as Falls Sensei can be perceived as engaging, relates to a sample that were given specific instruction to engage with and play the game. We have highlighted that further research is required to establish whether the prospect of playing a falls prevention education game like Falls Sensei is perceived as a potentially more engaging task than engaging with more traditional forms of falls prevention education.

I was also curious as to the potential audience for the game and/or plans the authors had to motivate their target audience to play the game?

>>Thank you for this observation. We have now expanded on how we plan to improve the level of motivation and engagement achieved by the target audience, which is presented as future work (last paragraph on pp. 19 – pp. 20). We have also suggested that future research is required to potential
target audiences for this application, including children, young adults and carers, in-line with the insights gained from the participants in this study.

I would also suggest adding a definition of 'serious game'. Is this meant to be the equivalent of an educational game?

>>Thank you for this suggestion. Serious games have now been defined on (pp. 2, lines 26-29)

Finally, as this appears to represent only one iteration of user testing, expanding the section on future improvements would be useful. Are further iterations of testing planned? What do the authors plan to do to enhance player engagement with the game?

>>Thank you, player engagement is an important factor that should be considered in future work (pp.19, lines 6-19). We have now expanded this section considerably to indicate future research directions and have suggested how player engagement may be improved based on existing serious games design theory.

Please retake screenshots of the game at a higher quality. The images provided are rather fuzzy and the text, especially in Figure 2, is unreadable.

>> Thank you for noticing this, we have now retaken the all of the screenshots and provided them in PDF format which appears to retain their original high-resolution.

Some minor comments:
pg2. line 22: authors mention 3 most common fall hazards but then list only 2 in the parentheses, what is the third?

>>Thank you, this has now been updated. The three items are the absence of a non-slip bath/shower mat, grab rails, a non-slip bathroom rug).

pg3 line 9: The sentence beginning "One study found..." is difficult to follow, I think there is a word missing

>> Thank you, this sentence has now been rephrased.

pg9 line 39: There appears to be a typo in the time stated here "increasing to 065:36 for Level 4." from the table this should be 06:36

>> Thank you, this has been updated as suggested.

p9 line 50: Authors state that "One out of the 15 participants.." failed to complete the SUS form but in the next sentence state that there were a total of 13 SUS questionnaires analysed. Is this a typo? If not what happened to the other SUS not analysed?

>> Thank you for pointing this out, indeed it was a typo, the total number of participants that completed the SUS was in fact 14.

pg18 line 38: The sentence starting "The users did critque..." needs to be reworded. As written I found this very confusing.
Thank you for this observation, we agree that this sentence was confusing and have rewritten it to make the point more clear.

Raymond Bond (Reviewer 2): The study is very interesting. Perhaps more technical details on the development of the serious game e.g. games engine etc. Could also present some logic.

Thank you for your valuable comments. We have now added a system architecture and game logic section at the start of Section 2 (pp. 4) and added a new figure to provide a technical overview of the system and game logic.

The study has a small number of subjects but this is in-depth. Unfortunately, the study has no control e.g. a leaflet hence future work could be an RCT.

Thank you, we have now expanded the future work section considerably (last paragraph on pp. 19 – pp. 20) and suggested that future work should include an RCT to establish the effectiveness of the Falls Sensei game with traditional falls prevention interventions. We have also suggested numerous additional future work directions.

The SUS survey is perhaps not best for evaluating games? Game usability is different from system usability. Please comment.

Thank you for this observation, we have now acknowledged that there are numerous game experience questionnaires that may have been more appropriate, and have justified the use of SUS, on the basis that a comparatively simple but valid usability inventory was desirable so as to avoid tester fatigue and not to put older adult participants under unnecessary cognitive stress as part of the user trials (pp. 8, lines 6-14).

The mean game timings in table 2 could also include the SDs.

All SD’s have now been reported in Table 2. Thank you for suggesting this, it provides important additional information.

Ethan's quote appears twice in 2 different sections.

Thank you for spotting this, the first instance of Ethan’s quote, in the Performance Expectancy section has been deleted as it was included in error in the draft.

Overall, good English, topical work and a decent qualitative study.