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Discussions

Interactive comment on "Mobile Augmented Reality in support of building damage and safety assessment" *by* W. Kim et al.

Anonymous Referee #1

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p. 2602, line 10 Authors state that they retrieve location and navigation information from the mobile device (Smartphone). However, for the LOCs mentioned later in the paper, this information coming from current Smartphones will probably not precise enough.

p. 2602, line 12-14 Authors state that AR superimposes computer-generated information on real world images, which is correct. However, as an example for computer generated images they give a picture taken by the camera. What is computer-generated here?

p. 2604, line 17 In their concept, authors state that they will use marker-based tracking inside a building. I think this is unrealistic. Who put the markers there and when? Were the markers already there before the event happened? It is very unlikely that

every building will be applied with markers just for an emergency situation. And even if so: As soon as a building's structure is damages, the position of the markers is also wrong and thus the tracking doesn't work anymore.

p. 2605, line 15 Authors mention Google Glass in the paper. This product is discontinued.

p. 2605, line 16 Authors state that using some kind of glasses already allows for a hand-free operation. This is not true, since the interaction still has to be done on the Smartphone.

p. 2606, line 10-11 I am wondering, if LOC 1 is really needed. Buildings usually do not completely disappear, but typically a fundament remains. This would already be sufficient to detect the position of a house. The only thing I can think about would be the height of a building, but this already belongs to LOC 2.

p. 2606, line 15 For LOC 2, authors stated that the system could also provide information on the material of a building. Why is this important?

p. 2607, line 15 Authors state, that a lot of information for the LOCs has to be collected by interacting with the Smartphone using touch. This contradicts the prior statement of a hands-free operation. Moreover, touchscreen interaction might not be suitable at all if users wear protective gloves.

p. 2607, line 19 Authors say that "text information is a form of point data". What do they mean by this?

p. 2608, line 7 For many LOCs, authors presume that there is a stable internet connection. However, in case of catastrophes there is typically no internet at all. Thus, all LOCs proposed cannot be used at all. It would be good if authors could take this situation into account and also offer a solution for this, e.g. by a remote station (command station as it is usual in ERM), which still has internet connection and could transfer the information e.g. via satellite radio.

p. 2608, line 15 Many LOCs need intense user interaction for selecting data. For this, the interactive surface of a Smartphone is simply too small to do all this in a reasonable time and under possible stress situations.

p. 2609, line 9 When talking about accuracy, authors mainly think about the accuracy of the 3D data and the geospatial position. However, besides this the actually much more important problem is the information mapping. Due to the movements of a user when holding the device in his hand, the stabilized and precise alignment of the additional virtual information is much more important and cannot be solved by GPS information, but needs some image processing in the mobile device. Thus, it is not really the accuracy of the 3D data, but more a stabile spatial synchronization of the virtual data in the visible image on the Smartphone.

p. 2610, line 9-10 I think it is not the 3D data that challenges the mobile device, but is more the required accuracy of all the sensors needed for the proposed system.

p. 2610, line23-26 Using markers (fiducials) makes the system useless. One cannot expect that a building has markers inside. Thus, someone has to attach them forehead and precisely measure them, before the first responders come :-). This is unrealistic and would also require a lot of time and makes the question e.g. regarding whether a building could collapse obsolete. And even more: who could guarantee that inside a building WiFi is still available?

p. 2611, line 2 Authors strongly rely on touch interaction on the mobile device. However, I think this is the wrong way of interacting, since it would require that user have both hands free. This is typically not the case.

p. 2611, line 7 What do authors mean with a "radar display"?

p. 2611, line 17 For the concept and system evaluation, authors stated that they use an online survey. Did the persons only fill out a questionnaire? Or did they have the chance to really test the prototype the authors talk about? I think, an online survey does

not give a true answer to the usability of the system, but leaves a lot to the phantasy and imagination of the asked persons.

p. 2612, line 6 Authors say that they "showed to the users simple illustrations of each concept". I think that showing just simple illustrations of the concept is not suitable to evaluate such a system. This is more an opinion poll than a thorough user study. With illustrations, users can not judge the usability. Moreover, the user study lacks a precise data analysis in this paper.

p. 2612, line 19 Authors state that they are conceptualizing and testing the system. However, I do not see a real test of the system in the paper. There is only a questionnaire based on simple illustrations.

p. 2612, line 23 Authors state that prototypes were developed and evaluated through online survey taken by experienced users. This is impossible!! Without having the real users' hands on the system, this can't be stated as an evaluation. Also a development without the involvement of the final users is already very critical.

p. 2613, line 5-8 I think the main reason for the negative feedback regarding indoor AR was due to the fact that people realized that they cannot presume markers inside a building, and - even if so - they might be damaged or imprecise due to the house's structural changes.

p. 2613, line 12 Authors state that mAR gains in value when combined with a map system (GIS). This is true, but is then the difference to Google street view or Google maps? And why not using this instead?

p. 2613, line 17-19 Authors state that "users rated highly the usability of mAR based on touch gestures (e.g. zoom-in/out or rotation of 3-D building with two fingers) that let users manipulate contents on the screen interactively". How could they do this? In an online survey, they could have never experienced the system. Otherwise they would have noticed that the screen might be too small to retrieve all the required information

interactively.

p. 2614, line 2 Why is it necessary to have a street level imagery taken at different time periods? Wouldn't the pre-disaster view be sufficient?

p. 2614, line 7-9 Both scenarios LOC 5 and LOC 6 require a precise and repeatable positioning of the mobile device. This is impossible with current technology integrated in current Smartphones.

p. 2614, line 17-18 Authors state, that "Using SfM in combination with dense image matching (DIM) 3-D models of post-disaster buildings can be reconstructed". The only question is whether the Smartphone's sensor accuracy (including the camera) is suitable for doing so. As mentioned earlier, this also requires a stabile positioning of the Smartphone in all 6 DOF.

p. 2614, line 24-25 Mounting an active scanner on the device will significantly reduce the usability of the system mainly due to handling problems in such harsh environments.

p. 2614, line 27-28 In "TANGO", they use a tablet, but not a Smartphone.

p. 2615, line 1-2 I think the authors overestimate the outcomes of TANGO. They cannot detect such small changes. Moreover, in the beginning of the paper, the authors stated that the remote investigation of a building is not sufficient, and now they offer this as an option? This is not clear.

p. 2615, line 10-15 A large portion of the overall concept is based on assumptions and on future technical capabilities of mobile devices that might or might not be integrated in future mobile devices.

p. 2616, line 19 I think, some important references are missing, e.g. Leebmann, J.: "AN AUGMENTED REALITY SYSTEM FOR EARTHQUAKE DISASTER RESPONSE"; in: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Vol. 34, Part XXX or: Aameer R. Wani, Sofi Shabir, Roohie Naaz: :

Augmented Reality for Fire & Emergency Services; in: Proc. of Int. Conf. on Recent Trends in Communication and Computer Networks; 2013

p. 2625 I doubt that a smartphone is a suitable interface to display information to first responders. This is because of the following reasons: Working in hazardous and partly destroyed environments requires both hands for performing actions. Thus, a hands-free operation of information devices would be necessary. There is simply no hand free to hold the smartphone. Moreover, first responders often wear gloves out of several reasons: to protect their hand from injuries, because of epidemic reasons, to avoid electrical shock, and so on. In any case, they won't be able to handle the smartphone to retrieve new information. Authors might also have a look at Billinghurst's "Earthquake VR" http://www.hitlabnz.org/index.php/research/augmented-reality?view=project&task=show&id=24 or: Ming-Kuan Tsai , Yung-Ching Lee, Chung-Hsin Lu, Mei-Hsin Chen, Tien-Yin Chou,Nie-Jia Yau: Integrating geographical information and augmented reality techniques for mobile escape guidelines on nuclear accident sites; Journal of Environmental Radioactivity 109 (2012) 36-44

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