CHI 2015 Papers and Notes

Reviews of submission #1951: "ePort3DAr: Combining 3D Interactive Smart Spaces and Mobile Computing for Construction Collaboration"

---------- Submission 1951, Review 4 ----------

Reviewer: primary

Your Assessment of this Paper's Contribution to HCI

Overall Rating

2.0 - Possibly Reject: The submission is weak and probably shouldn't be accepted, but the

Expertise

4 (Expert)

The Review

The Meta-Review

Reviewers liked the concept and the vision of this work, and R3 appreciated the unique configurations, even if the authors are using known technology.

R2 and R3 point out that there is little novelty for the specific system or the proposed interaction techniques.
Authors also do not provide a clear motivation for their design decisions and R3, in particular, points to numerous related projects, directions and alternative configurations that are not discussed nor referenced. The authors would benefit from placing their interaction techniques and configurations in the context of a larger design space and in relation to previous work. Reviewers, for example, ask whether _actual_ AR could be a strong candidate for these scenarios.

Reviewers find that the user study description is unclear and that more information is needed on the baseline "blueprint" interface. Even so, reviewers point out that there are many different approaches that would be more appropriate to compare against, rather than a "book"?.

Reviewers also found the paper difficult to read and suggest careful proof reading by a native English speaker.

All in all, the scenarios explored are interesting, but given the lack of generalizable results (R1), and the unclear motivation for many of the design choices, this paper is unfortunately not mature for publication at CHI.

---------- Submission 1951, Review 1 ----------

Reviewer: external

Your Assessment of this Paper's Contribution to HCI

The authors present a system that allows viewing building plans in multiple views and with multiple ways of interaction. Changes to the schematics are synced between users, e.g., allowing workers on site to propose an update to the shared construction plans which is accepted at an off-site office.

Overall Rating

2.0 - Possibly Reject: The submission is weak and probably shouldn't be accepted, but the

Expertise

3 (Knowledgeable)

The Review

This paper essentially describes one specific system. Accordingly, much

of the writing focuses on components, interactions, and scenario description. While the system is interesting, I was ultimately left wondering what the more general takeaway here is. It's not clear what others can learn from this specific case to inform their own system designs. While there is a study, I was left with many questions regarding it and at this point don't see some more general emergent effect.

I found this paper rather hard to read. The system description meanders and often repeats itself. The design choices sometimes feel arbitrary and the whole thing feels a bit thrown together. I was a bit put off by the terms used to describe this this system. The authors make multiple mentions of this being an AR system. However, there really is no AR part in this. There is a projection of 3D content on the wall. But this does in no way constitute augmented reality. The phone application also does not seem to have this functionality. I also don't get how this system is an "interactive 3D smart space". What's a "smart space" after all exactly? The system uses space for projection and tracks hands in the space. In my understanding, this doesn't yet make the space itself smart. The mobile setup in a way is space agnostic after all. Unfortunately, the paper, at times, reads a bit like a buzzword hodgepodge.

The authors did run a study to find out whether their system offers a more efficient way to complete common construction tasks. It is not clear what they compare themselves against though. The other condition is described as a "conventional 2D drawing based approach". I'm just not sure what this is exactly. It should be made very clear what the comparison is and how participants interacted in this case. It is also not described whether the study was between or within groups and whether there was any counterbalancing. From the "Test Plan" section it seems like participants always used one system first and then the other. It also reads as if participants received extensive instructions on the proposed system but no instructions on the comparison system before the start of the study. While we can assume that the participants as architecture students have some familiarity with blueprints, they probably don't have much hands-on experience of using them in-the-field (they're still students after all). I'm also curious how the tasks were timed. Some of them don't quite have a specific ending time. For example, the exploration task seems rather open ended and the discussion task times similarly depend highly on other factors.

I have some slight problems with the problem description of the paper. The authors state that architects "are using new computing technology to enhance creativity and aid in communication between stakeholders", yet construction engineers and people on site "might not be familiar with new technology". This and the following parts read very condescending to me. I don't subscribe to this view where engineers are inherently more backwards and unfriendly to technological progress than architects. As the study seems to have been run at an architecture school, this might explain the view described here. If there is an inherent difference in those two groups it would be helpful to provide a reference, otherwise this just comes of as prejudice. One could even argue that this system doesn't really strive for collaboration, but instead is designed for people in the field to provide data back to the architect who then can approve of this input. Regarding the input, I'm not sure dragging parts on a phone is a good way to handle changes. For blueprints to be updated with changes, wouldn't precise measurements be needed? If, e.g., something went wrong with placing the door, I'm sure stakeholders would want more accurate information than a worker dragging it a bit to the side.

Overall, I think this is an interesting system and certainly looking at blueprints can be more efficient in a projection than with blueprints (especially on larger sites). However, I don't quite see what general lesson is to be learnt here. But if this is just a description of one specific system, the value to others isn't as obvious.

---------- Submission 1951, Review 2 ----------

Reviewer: external

Your Assessment of this Paper's Contribution to HCI

This paper presents the design, implementation, and evaluation of a prototype of a collaboration system, supporting hand-guestures, mobile phones, and projectors.

I feel that the prototype itself is not so exciting. It merely combines several well-known techniques. The interesting part of this paper could have been the experiment, but there are also problems.

Overall Rating

2.0 - Possibly Reject: The submission is weak and probably shouldn't be accepted, but the

Expertise

3 (Knowledgeable)

The Review

The paper spends 5.5 pages to motivate and describe the prototype and 2.5 pages on the experiment. I think that most features of the prototype have already been published previsouly. So, basically, the focus should have been on the user study instead.

The user study is pretty basic. 5 tasks were done in succession (the order of tasks should have been randomized!). The elementary tasks such as viewing a 3D model (task 1) have been investigated in many experiments in the IEEE VR and IEEE 3DUI community (many citations to these communities are missing). The user study could have been more interesting if:
- Real workers were used (as Figure 1 seems to suggest)
- More complex and application-domain-specific tasks had been executed

In my view, the submission is overly verbose. Due to the small novelty, 5 pages should have been enough.

---------- Submission 1951, Review 3 ----------

Reviewer: external

Your Assessment of this Paper's Contribution to HCI

This paper contributes a system using multiple display and input devices to aid in collaborative construction management. The system uses a projector to create two ad-hoc displays in an ‘L’ configuration, along with a Leap Motion controller for spatial input, an Anoto (micro-dot pattern) pen for stylus input, and a smart phone for additional display and touch/accelerometer input. While each individual component and the core interactions in general are not significantly novel, the paper combines multiple devices into a unique combination of display / input modalities. Furthermore, the paper explores a domain specific application of construction management. Finally, the paper contributes a user study comparing their system to 2D blueprints (This wasn’t entirely clear to me. The paper states they compare to a ‘book of 2D blueprints approach’). Overall, it is an interesting system targeted to a domain that could benefit from on-site digital construction management solutions.

Overall Rating

2.0 - Possibly Reject: The submission is weak and probably shouldn't be accepted, but the

Expertise

3 (Knowledgeable)

The Review

This work was an interesting read. The system combines known display and interaction techniques into a unique configuration and targets an interesting application domain. I see great value in such ad-hoc multimodal interactive systems. In fact a lot of the marketing effort for pico projectors featured architects / construction workers looking at blueprints at construction sites. There is obvious demand for intuitive ad-hoc interactive systems in this domain.

While I see great value in the goal and the multimodal approach, I have some concerns that reduced my review score. Primarily, the multimodal system is interesting, but it not clear that it is the best solution for

this domain. Why not just use a single projected display running a CAD program? Or why not use a mobile phone/tablet app? Or why not use augmented reality to preview the model deviations and changes?

It seems that the user study compares the system to a ‘book of 2D blueprints’. It seems like a better comparison would be to a single laptop running CAD / SketchUp (or mentioned above...a single projected display running CAD/SketchUp). In the user study, I would imagine that the performance improvements of the system are probably largely due to the fact that the user is interacting with a digital interactive system (vs analog paper), and not because of the unique device configuration. Therefore, it is hard to extract any lessons learned or take-aways from the user study.

The individual interaction techniques do not appear to be novel. There is a large body of research in spatial input for rotating / scaling 3d objects and for multi-scale navigation (pan+zoom). The most interesting and novel interactions involve querying the specific floor plan via spatial input and the touch interactions on the horizontal surface which control the vertical display. These interactions are particularly relevant given the new Sprout display by HP (http://sprout.hp.com/) which combines stylus input on a horizontal projected display with a traditional vertical monitor.

As a personal opinion, it would be interesting to see the system implemented with a brighter short throw projector, e.g. InFocus IN126ST. What would these scenarios look like with a much larger (10 ft+) display for group collaboration / review? The current configuration could be easily approximated by two tablets.

The paper should also address other work in AR for construction management (e.g. the work by Mani Golparvar's lab, http://scholar.google.com/scholar?hl=en&q=Mani+Golparvar).

Finally, the paper suffers from some stylistic and language issues, which ultimately make the paper difficult to understand. In my opinion, the paper could be condescend by omitting some of the system implementation and focusing on the interaction techniques. Figure 2 is barely referenced and provides little value for its size, along with figures 3a, & 4. Also, the questions from the user study are included by reference only, which is inconvenient for understanding the user study.

Overall, I think this is interesting work that is not yet ready for publication at CHI. I look forward to seeing this work published in the future as it is pursuing very interesting ideas with a unique device configuration.