![PCS]

![CHI22 New Orleans, LA]

| Submissions | Reviews | Account | sign out |

Reviews of 7679 - *"TARICA: Tangible Augmented Reality Interfaces for Cultural Artifacts"*

Reviewer 4 (1AC)

Expertise

Knowledgeable

Originality

Medium originality

Significance

Medium significance

Rigor

Low rigor

1AC: Recommendation

We recommend Reject.

1AC: The Meta-Review

Editorial Score: Reject

The paper presents a study of two tangible AR prototypes – Postcard AR and CubeMuseum AR – that were designed to improve engagement with cultural artefacts. The paper largely uses a mixed method approach involving quantitative methods as well as qualitative data from interviews to explore and then briefly discuss the potential viability of tangible AR and its possible potential as "hybrid gifts."

All reviewers agree that the paper is relatively well written, although (also as hinted at by reviewers, there may there may be an omission of some related work). However, substantial criticisms of the paper also emerged. This paper also generated a decent amount of discussion on PCS among reviewers and consensus was reached that there

amount of discussion on PCS among reviewers and consensus was reached that there are too numerous issues with the paper in its current form to be accepted to CHI 2022. I encourage the authors to closely attend to the constructive feedback articulated across all reviews (R2 even takes particular care to enumerate areas that need improvement).

In summary, reviewers find that:

A) The two prototypes are interesting, but not novel (at least in the way they are current framed and discussed). The context of the museum could add some novelty, but this is not deeply engaged with in the paper (although it could be in a future iteration).

B) Following from the point immediately above, there is a need for a stronger overall motivation for the design of the two prototypes, and a deeper accounting for decisions in the design process.

C) More details are needed on who the participants were (e.g., demographic details) and what the criteria was for including (and exclude) potential participants in the study. Why exactly were most participants already familiar with AR? This stuck out as a potentially strange aspect of the participant pool, among other possible omissions or anomalies (please see reviews for more details to this end).

D) All reviewers found that the concept of 'hybrid gifting' needs to be better described, situated to prior work, and unpacked in the context of the design of the prototypes and the ensuing discussion/design implications.

E) More details are needed on how the qualitative analysis was handled. (See R2 point 5).

F) Overall the strength of the discussion needs to be improved.

In summary, whilst the paper has much to like and the research truly has potential. The paper in its current form is not yet ready to be accepted to the CHI 2022 conference. We are all enthusiastic about seeing the next iteration at a future venue.

1AC: The Summary of Revisions Required

Please refer to the meta review.

Reviewer 2 (2AC)

Expertise

Knowledgeable

Originality

Low originality

Significance

Medium significance

Rigor

Medium rigor

Recommendation

I recommend Reject.

Review

The paper presents within subjects study (N=24) of two tangible AR interfaces designed to improve motivation and engagement of cultural artefacts. The paper uses quantitive methods as well as interview to discuss the suitability of tangible AR and its possible potential as hybrid gifts.

The paper is in general well written, most of the related work in the space are adequately cited and well argued. However, I would loved more discussion on hybrid gifting and better weaving of it with earlier discussed works. The section 2.4 seemed a little out of context.

The presented prototypes Postcard AR and CubeMuseum AR are interesting but not specifically novel as they utilise tried and tested techniques of AR albeit they may not have been tested formally in the context of museums.

The study appears to be done in good rigour with clear hypotheses and use of suitable methods to evaluate them.

Overall, it is interesting well conducted study but needs few refinements, which I list below.

1. Lack of Stronger motivation and design process:
Although paper argue for potential benefits of using tangible AR methods, citing prior work in this space. These motivations does not translate the presented prototypes or do not fully utilise the potential. This is possibly also because authors have not discussed the design process. Both prototypes use mobile AR, what prompted them to use mobile?

the design process. Both prototypes use mobile AR. what prompted them to use mobile?
I wonder why they did not consider other AR tools for example Hololens, Snap googles
etc. I am not saying that they should have used these other tools but some descriptions
the available tech and how they go forward it choosing one would add strength to the
prototypes.

2. Participants' demographic and inclusion criteria:
More details on how participants were recruited, was there any inclusion criteria? Also
describing figure 5 so that readers can understand the study participants and reasoning
behind their interview responses. For example, why asking participants about
purchasing souvenirs was important? The data also suggest that most participants were
already familiar with AR experiences? More details on how? Do they study it in their
course, or have developed things with it? Or have experienced it elsewhere? More
insights on participants' demographic would add rigour to the analysis.

3. Hybrid gifting:
the study also reports on participants preference for tangible AR as museum gifts. Like
in Related work, this sections seems out of box as gifting did not seem to address or
was relevant to the three outlined hypotheses. It appears that the projects has two goals.
The second one being about hybrid gifting. Authors should either describe it full from the
beginning or leave it out in the refined version.

4. Qualitative analysis:
In comparison to quantitive analysis, the description of the qualitative analysis is rather
shallow. How did the authors analysis data? What methods did they use? Why four
themes? Authors mentioned the details are in Appendix C but I would have expected a
small section in the paper itself. Surprisingly there are also no interview quotes
mentioned and the insights are also written in a manner in which one would write
quantitive results. I highly encourage authors to look into prior qualitative studies or
books and refine this section.

5. Weak discussion section:
Like the qualitative section, the discussion section is also weak. It basically reiterates the
results multiple times (which Hypotheses was supported and which was not) without
broader implications. The data insights/takeways are also slightly arguable, for example
on one hand authors argue that AR has improved users' intrinsic motivation (for what?
To learn about cultural artefacts?) but on the other hand, the data also show not
significant difference in learning across three context. The discussion on novelty and
potential Hawthorne effect is needed to judge the significance of the results. What does
this data mean? And what could be infer from it that could guide future design of
Tangible AR experiences. Later authors do discuss some implications but they are

neither novel or well discussed. For example, what does it mean "select the appropriate medium and be compatible" ? Isn't it true for all designs?

Overall it is interesting work and authors have indeed put significant effort in the study,

so I am positive about the work but I also belive the paper needs strongrefinements particularly on Qualitative data and discussion before it can be accepted.
I highly encourage authors to work on the changes and submit a stronger draft next yearl

The List of Revisions Required

1. revise related work to better situate the concept of Hybrid gifting.
2. add details on inclusion criteria, recruitment and participant's demographic and its relevance to the study.
3. Refine the qualitative analysis and results section. (see my review for detailed comments).
4. Refine the discussion to include stronger and direct implications to the underlying context (learning, cultural artifacts and museums). Describe who are the potential beneficiaries and how they could benefit from the presented insights.

Reviewer 1 (reviewer)

Expertise

Passing Knowledge

Originality

Medium originality

Significance

Medium significance

Rigor

Medium rigor

Recommendation

I can go with either Revise and Resubmit or Reject.

Review

This paper makes 3 main contributions to HCI:

- The design of two tangible AR interfaces for cultural artifacts: Postcard AR and CubeMuseum AR
- An empirical study of these interfaces demonstrating their use for cultural heritage and how they affect learning against a baseline leaflet design

- Design guidelines for designing learning and hybrid gifting experiences for cultural artifacts

The contributions of this paper are useful to practitioners interested in increasing the general public's engagement with cultural artifacts and offers important considerations for educators interested in designing learning experiences that motivate learners to explore cultural artifacts.

The authors adequately reviewed prior work on the use of augmented reality in cultural heritage and using tangible interactions for increasing engagement and motivation in learning. The paper was easy to follow. The experimental design was explained well and figures of the experimental results were well presented.

The authors presented four guidelines for designing tangible AR interfaces for cultural artifacts in relation to improving learning experiences and gifting. I found the 3rd (Allow for Customization) and 4th (Design for Expansibility) guidelines for gifting experiences particularly interesting. The idea of CubeMuseum giving museum goers the ability to curate a personal museum collection of cultural artifacts they find interesting by collecting the relevant cards is novel and the results from their user study showed that participants were willing to buy additional cards to continue to build their collection.

The List of Revisions Required

Some of the areas I think the paper could be improved:

I think the authors could provide more information on the methodology used for categorizing themes in 5.6 from the interviews.

I'm failing to see a distinction between the two themes in section 5.6.2 and 5.6.3 they both discuss how participants found leaflets more efficient for learning because the display and interactions were simple. I think the authors should clarify or merge them into one.

Reviewer 3 (reviewer)

Expertise

Knowledgeable

Originality

Medium originality

Significance

Low significance

Rigor

Medium rigor

Recommendation

I can go with either Revise and Resubmit or Reject.

Review

I was excited to read this paper, and thanks to the authors for furthering research in this interesting area. This paper introduces two augmented reality interfaces for motivation, engagement, and learning about cultural heritage artifacts and compares these interfaces to an informational leaflet in a within-subjects study with 24 participants using both quantitative and qualitative methods. I was a bit surprised to see questions about gifting that were outside of the scope of the study's hypotheses, but these questions provided feedback into the AR interface design. The paper ended with a discussion and implications for design. The points around designing to incorporate both AR and print and supporting perception of artifact size drew out and articulated interesting aspects of the findings.

I do have some concerns that could be addressed in a revision, which are as follows:

-Implemented Design - I am curious for more detail here about the design choices as well as the intended context and use for the interfaces. When reading, I assumed they would be used by visitors in a museum context, which led me to question the choice of leaflet as the baseline condition, but was then unsure if it would be more of an item to purchase in a gift shop.

-Results - The process of quantitative analysis was clearly explained, and it would be good to include at least a short paragraph on the process of qualitative analysis as well. What was the coding process, how were the themes developed, etc. It would also be nice to include some direct quotes from the participants to support the developed themes.

-Limitations - There are significant limitations that need to be more fully addressed. The time reminder is mentioned, but there is also the issue that length of time in and of itself can be a measurement of engagement in museum spaces. The age demographic is also limiting, with only college students participating. The novelty factor of AR technology is not discussed though the data in terms of previous experience was collected.

However, I have two more substantial concerns as well:

-Leaflet as Baseline - If these AR interfaces are designed to be used in a museum setting (which again, perhaps they are not but this needs to be more clearly articulated), an artifact displayed in a museum along with a leaflet or didactic label seems to be the more appropriate baseline that would provide more meaningful results. Those working in the cultural heritage domain would likely find more value from research that compares viewing the actual artifact rather than viewing a leaflet. This seems like a considerable difference that should be considered and investigated, and yet it is not even mentioned.

-Text and Interface Feedback - Through the results and discussion sections, it seems that the inclusion of text on the postcard may be impacting the learning outcomes since that condition includes both AR and text information. It also seems that the authors received useful feedback on the digital AR interfaces that could then be implemented, studied in a way that addressed some of the limitations of the study described here, and would then provide stronger results and recommendations for practitioners.

Overall, this is a well-written paper describing an interesting study, but some of the underlying issues with the study may be limiting the impact of the research.

The List of Revisions Required

Please refer to my review

[Return to submission and reviews](#)