

**Submission Information: Id: papers\_0274 Title: Way-Go Torch An Intelligent torch light for Navigation and Search & Rescue**

**Reviewer #19:** 1) Description The authors present a prototype navigation system that projects directions onto the road ahead instead of using, say, an LCD screen, as commonly used today.

The idea of the project sounds good: project directions directly onto the environment, where users find them easier to follow, avoiding split attention between the environment and the navigation device.

Nonetheless, I have difficulties recommending acceptance

First, the authors set their baseline artificially low. "...but be it digital GPS navigation aids or paper maps, map reading skills vary from person to person." Maps should clearly not be the base here. It would be slightly more realistic to refer to car navigation systems with turn-by turn instructions, and the proposed delta gets already much smaller. But what I would really like to be used as reference are other systems that suggest the same user experience, i.e., augmented reality based systems, be it head mounted or heads up, etc. When compared to these. the proposed contribution gets quite small, as the authors essentially just propose a different way of displaying the data. Finally, there are systems that already project into the path.

Second, that delta, i.e., how the data is displayed does not really work. The authors argue that the use of green lasers makes the system work in daylight, but in reality there are known limitations in terms of power. The video is thus shot more or less exclusively at night, and still I find the symbols in the video very hard to decipher.

In summary, this submission is only a small step from existing systems and it is not clear whether this step goes in the right direction.

2) Clarity of Exposition Not great. Starting with the artificially low baseline, the paper is unnecessarily long and explains things that could be shorter. 3) Quality of References Misses a lot of related work in AR. 4) Reproducibility Ok. 6) Rating 1.0 8) Explanation of Rating This submission is not ready for publication for the reasons described above.

Details:

The authors propose a stabilization system, but it does not run at the relevant frequencies, so there is still substantial shake.

The paper needs to be reformatted to fit the Siggraph paper format **Reviewer #57:** 1) Description The paper reports a concept and prototype of a system which is based on a personal projector that projects navigational information in front of the user. The overall concept is partially novel and has the great advantage that navigational information is projected in front of the user. No map based information is needed and no mapping with the environment is required.

The paper discusses furthermore some related work in the area, discusses the prototype and a sketchy video shows that the prototype actually works. 2) Clarity of Exposition The paper in its current form doesn't state explicitly which research questions have been addressed and what the novel contribution of the paper is (when compared with related work). The video doesn't support the paper as it is very difficult to recognize what's actually being shown and it's also questionable whether the projected information can be effectively and efficiently used. 3) Quality of References The paper discusses some references but not in a structured way in order to show an overall state of the art and what novel contributions the paper provides. Please have a look at previous Siggraph papers and the corresponding writing style.

Please consider the following papers / persons / groups when revising the related work section:

- Phd thesis of Xiang Cao (first author of your reference 16)
- <http://www.cs.bris.ac.uk/~cauchard/Publications.html>
- Christian Winkler, Markus Broscheit, Enrico Rukzio. NaviBeam: Indoor Assistance and Navigation for Shopping Malls through Projector Phones. In CHI 2011 Workshop on Mobile and Personal Projection. 2011.
- Enrico Rukzio, Paul Holleis, Hans Gellersen. Personal Projectors for Pervasive Computing. In IEEE Pervasive Computing. 2011.

4) Reproducibility Section 4 discusses the implementation of the prototype and I guess that others could build the system as well (based on this description). The overall writing style (of the whole paper) isn't inline with the Siggraph (e.g. "got burnt during experimentation") style and should be revised as well. 6) Rating 2.0 8) Explanation of Rating The paper in its current form is rather sketchy when it comes to the discussion of the contribution, related work, prototype and video. Furthermore is the overall writing style, formatting, etc. not in line with the Siggraph style. The reason for this might be that at least one of the authors has been sick (there is an image file stating "I have been seriously sick for some time ...").

I encourage the authors to continue their interesting research / ideas / prototypes in this very timely research field. Furthermore I would suggest that the authors read some previous Siggraph papers, analyze more related work in this field, think about their research questions, ....

**Reviewer #66:** 1) Description This paper presents a prototype that combines a handheld projector with GPS and IMU, and uses it to support certain navigation tasks. Although an interesting engineering exercise, I'm having a hard time to identify the research contribution in the paper. 2) Clarity of Exposition The writing quality of the paper is somewhat low by academic standard. It needs a careful proofreading to remove the many formatting errors. More importantly, the style of the writing is mostly casual, often being repetitive and imprecise, and having a generally low information density.

Similar to the paper, the accompanying video is long and slow-paced. It would benefit from some significant cutting and editing.

The paper would benefit from including not only photos of the hardware prototype but also those of the system in use (as those shown in the video).

3) Quality of References The authors seem unaware of the core body of research around handheld projector interactions. Most of the current references are either general magazine-style intros, or lie on the border between handheld projector interaction and other research areas (e.g. ubicomp, field studies...). Just to name a few representative works in this area:

- Paul A. Beardsley, Jeroen van Baar, Ramesh Raskar, Clifton Forlines: Interaction Using a Handheld Projector. *IEEE Computer Graphics and Applications* 25(1): 39-43 (2005)
- Xiang Cao, Ravin Balakrishnan. (2006). Interacting with dynamically defined information spaces using a handheld projector and a pen. *Proceedings of UIST 2006*.
- Xiang Cao, Clifton Forlines, Ravin Balakrishnan. (2007). Multi-user interaction using handheld projectors. *Proceedings of UIST 2007*.
- Karl D. D. Willis, Ivan Poupyrev, Takaaki Shiratori. (2011) Motionbeam: a metaphor for character interaction with handheld projectors. *Proceedings of CHI 2011*.
- Karl D. D. Willis, Ivan Poupyrev, Scott E. Hudson, Moshe Mahler. (2011) SideBySide: ad-hoc multi-user interaction with handheld projectors. *Proceedings of UIST 2011*.

All of which explored the unique interaction affordances of using the handheld projector not only as a display device, but at the same time as an input device by taking the motion of the projector into account. They also explored many applications to leverage these unique affordances, e.g. augmented reality, gaming, social interaction...

That said, even with the existing references, the Related Work section is presented in a very disorganized way, lacking a clear structure or flow. Each paragraph seems disjointed from each other. The way the citations are referred to is also quite haphazard, often simply as “this paper” or “it” without proper attribution, and sometimes even lacking the reference number, leaving the reader to guesswork.

4) Reproducibility The system is generally simple and straightforward. The paper describes a lot of low-level implementation details (perhaps too much for a research paper) so it should be relatively easy to reproduce. 6) Rating 1.5 8) Explanation of Rating Handheld projector interactions has become an active research field from as early as 2004, and during the last decade there have been a large amount of research on the technology, the interaction techniques, and the applications. Unfortunately, compared to existing work, this paper does not pose a new research contribution in any of the three aspects. On the technology side, despite the detailed engineering information, the system is a straightforward integration of existing devices and services. On the interaction side, the projector is used almost purely as a display device without much interactive functionality. And on the applications side, navigation assistance is among the earliest applications explored on handheld projectors (e. g. Rapp, S., Michelitsch, G., Osen, M., Williams, J., Barbisch, M., Bohan, R., Valsan, Z., and Emele, M. Spotlight navigation: Interaction with a handheld projection device. In *Proceedings of Pervasive*, (2004)), and the “User scenarios” section is also a quite obvious generalization of it.

Perhaps the only novelty that I find in this paper is the head-lock mechanism, something

that reminds me of related work on handheld projectors with steerable projection angle using a rotatable mirror (Jessica R. Cauchard, Mike Fraser, Jason Alexander and Sriram Subramanian. Offsetting Displays on Mobile Projector Phones. In Ubiprojection 2010, First International Workshop on Personal Projection at Pervasive 2010). It might be interesting to compare these two setups and explore how they support different interactions/scenarios, which could make a true research contribution. Regrettably, the head-lock mechanism is only very briefly mentioned in the paper without any in-depth exploration on its implications for interaction.

Given the above, I'm afraid I cannot recommend for acceptance of this paper.

**Reviewer #84:** 1) Description This work presents a system-design paper for an augmented reality flashlight that uses a GPS to provide turn-by-turn directions projected into the real world. The idea is interesting (although in itself is not especially novel, as hand-held projector systems have been used for augmented reality applications before), and the construction of a prototype flashlight is definitely impressive. However, as submitted, the work is incomplete (there are even notes in the paper for text that needs to be added), and I do not feel that that this paper is suitable for review in its current state. As such, I would recommend rejection, and encourage that the work be completed before re-submission.

2) Clarity of Exposition The writing in this paper contains countless typos and grammatical errors, and should be proof-read by a native English speaker. In addition, please refer to published ACM SIGGRAPH documents for appropriate citation and text formatting. 3) Quality of References References are unfinished in submitted version. Furthermore, the related work section is long and unorganized. It should more concisely address the individual contributions that this work presents as related to existing publications. 4) Reproducibility This work is essentially a systems paper, as it does not provide any major novel technical solutions, but rather presents a piece of prototype hardware. As a result, more in-depth detail about the hardware selection process, system configuration, and problems encountered would be required to make the research useful for others to replicate the device. 6) Rating 1.3 8) Explanation of Rating As mentioned above, I believe this work to be incomplete.

Furthermore, the presentation of results are very hard to see. In order to get a sense of the practical utility/operational functionality of the prototype device, a high quality, stable, video is absolutely necessary. This video should demonstrate why an augmented reality system is beneficial in the navigation task presented.

The main concern with the practicality of this work, is that most cell phones nowadays have walking directions in addition to maps. What are the situations where augmented reality would be more useful than carrying a small screen? Maybe for something like orienteering or military usage, where one must focus on the terrain while navigating, and as such could not sacrifice the time/attention to read a secondary screen? For the case of groups, "path light" [9,10] already proposes this application for group navigation in museums. In addition, it seems to me that in some of the discussed examples, for example the car or bicycle case, projecting personally-relevant navigation information into the real

world is a bad idea, as it would confuse other bikers/drivers for whom the information is not relevant.

Some additional questions: What are the power requirements of laser projectors as opposed to screens that exist on today's mobile phones? is the 15 minute limit a prototype-only restriction or a fundamental drawback of the laser projector system?

How are waypoints selected for navigation? Is there some kind of intuitive way that this could be done with the flashlight system as the input device as well as the navigational display? This could justify the augmented reality form-factor.

Finally, there are some anonymity breaches in the acknowledgement and supplementary material. Please remove these for re-submission. Reviewer #11: 1) Description The paper presents a spatial and orientation aware projector as tool for guided navigation. A pico projector is augmented with an IMU tracker as well as GPS and a camera to support different scenarios, walking, heading, biking, etc. The projector head is even actuated to allow for stabilized display.

The mentioned scenarios are interesting but not novel. The text is in pretty bad shape. Besides the technical description of the device the text mostly features vague descriptions of scenarios rather than concise algorithms. 2) Clarity of Exposition The text is readable but needs to be improved significantly.

It contains many typos and should be proof read by a native speaker.

It is not set in the SIGGRAPH template. Especially the bibliography needs to be cleaned up.

The structure of the text is missing a detailed algorithmic description and does not provide any evaluation of the setup. The related work section is quite lengthy and not to the point. I can hardly see the connection to reference 18 for example.

The conclusion section needs to reflect the content of the paper rather than just pointing out potential future changes of the hardware. 3) Quality of References The references are pretty poor as well. Here I just give three additional papers that need to be addressed and reasonably well compared with.

iLamps: Geometrically Aware and Self-Configuring Projectors, appeared in SIGGRAPH 2003

Ramesh Raskar, Jeroen van Baar, Paul Beardsley, Thomas Willwacher, Srinivas Rao, Cliff Forlines

Christian Winkler, Markus Broscheit, Enrico Rukzio. NaviBeam: Indoor Assistance and Navigation for Shopping Malls through Projector Phones. In CHI 2011 Workshop on Mobile and Personal Projection.2011

A Context-Aware Light Source.

Oliver Wang, Martin Fuchs, Christian Fuchs, James Davis, Hans-Peter Seidel, Hendrik P.A. Lensch

ICCP 2010. 4) Reproducibility The results are hard to reproduce as the text only contains a vague description of how the flash light operates in the individual scenarios.

6) Rating 1.5 8) Explanation of Rating The actual hardware setup of this paper is not without merits. The idea of stabilizing the projector mechanically is interesting. However, the remainder of the paper more reads like a loose collection of ideas rather than a scientific paper. Especially, an evaluation of the system or a thorough comparison to existing approaches is missing.