



Maps on smartwatches

by MAIRA UTEBALIYEVA

There are several limitations when it comes to design of maps for smartwatches such as limited screen size, limited battery supply and small hardware size [1]. And hardly any research has been done on the design, use, and usability of map displays on smartwatches nor on the communication of spatio-temporal information through smartwatches in general.

OBJECTIVE

The overall objective of this project is to provide recommendations for the design and use of maps on smartwatches. The recommendations for the design could be further used by the smartwatch app developers to efficiently communicate the spatio-temporal information to the users to provide effective, efficient and satisfactory location-based apps.

METHODOLOGY

A combination of mixed methods approach centered around the mobile eye-tracking system (see Fig.1). Other research techniques applied are the observation, thinking-aloud method, interviews and questionnaires. satisfactory location-based apps.

SELECTED APPLICATIONS

In order to help answering research questions the following applications involving maps were selected: Locus Maps (see Fig. 2), Google Maps, ParKing, My Location, City Mapper.



Figure 1. Pilot test participant wearing Tobii Pro Glasses 2 eye tracking device and Mobvoi Ticwatch E2 smartwatch.



Figure 2. Smartwatch with Locus Maps application map.

USER TEST

The usability test was undertaken in Enschede, the Netherlands. Nine test participants were selected. They were given a set of tasks on smartwatch applications. Out of these nine participants, three participants owned a smartwatch and one used to own a smartwatch.

RESULTS

The acquired data from the thinking aloud during the usability test (approximately 90 minutes per test person) and interview (approximately 15 minutes per test person) were transcribed and coded. satisfactory location-based apps.

RECOMMENDATIONS

The analysis of the eye-tracking data (see Fig.3), think-aloud protocols, and post-test interviews led to the conclusion that maps are useful to convey spatio-temporal information on smartwatches. General recommendations for the use of maps on smartwatches are related to the geographic questions the map should answer.

- For gathering spatio-temporal information regarding geographic objects in the user's proximity, a map is not necessary, and information could be provided in textual form.
- For gathering spatio-temporal information regarding the spatial distribution of geographic objects, the spatial relation between different objects, and overview of the region,

maps are needed.

- For wayfinding and navigation, the map is needed for route confirmation.

In order to improve the user experience, more detailed design and interaction guidelines for future mapping applications on smartwatches are proposed.

CONCLUSIONS

This thesis research addressed the issue of usability of maps on smartwatches by proposing and executing exploratory use and user requirement analysis. The recommendations for the communication of spatio-temporal information through smartwatches were derived, focusing on the design and use of maps on smartwatches. General recommendations for the use of maps on smartwatches are related to the geographic questions the map should answer.



Figure 3. Heat map produced after analyzing the eye-tracking gaze data (Google Maps application).

THESIS CONDUCTED AT

Department of Geo-Information Processing
Faculty of Geo-Information Science and Earth Observation University of Twente (Utrente)



UNIVERSITY OF TWENTE.

SUPERVISORS

Dr. C.P.J.M. van Elzakker

YEAR

2019

KEYWORDS

smartwatch, usability, design, map use

REFERENCES

- [1] Rawassizadeh, R., Price, B. A., & Petre, M. (2015). Wearables. *Communications of the ACM*, 58(1), 45–47. <https://doi.org/10.1145/2629633>