

# MASTER'S THESIS REVIEW

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| <b>Author:</b>            | Bc. Dominika Palivcová  |
| <b>Thesis Title:</b>      | <b>Interactive tactile plans for visually impaired older adults</b> |
| <b>Thesis Supervisor:</b> | Ing. Miroslav Macík, Ph.D.  |
| <b>Thesis Opponent:</b>   | doc. Ing. Miroslav Bureš Ph.D.                                      |

## Assignment

The assignment of the thesis was to analyze the current outcomes of research focused on the specific target user audience of older adults with vision impairments, their orientation needs, and abilities. Design and implement a set of prototypes of interactive tactile maps so that it can be used for the implementation of utility model described in [1]. Individual prototypes should be evaluated with representatives of the target user audience.

## Technical Manuscript

The thesis is written in very good English; it is structured into seven main chapters. The main content of the thesis is on 79 pages. There are 89 references (most of them are scientific papers).

The first chapter comprises a comprehensive introduction to the matter. The motivation is structured very well including references to demographical data about the target user audience. Research questions and goals of the thesis are clearly described. Follows a brief description of methodology and terms used in the work.

The analytical part starts with the description of the specifics of visually impaired with a particular focus on older adults, their specific needs and preferences regarding spatial cognition, navigation, and orientation. Particular attention is on the description of non-visual interaction with interactive maps and models, and the method of implementation of such tools. The analytical part is concluded by clear specification of non-functional and functional requirements.

Chapter design comprises a description of two personas, formal description of the UI (scenarios, use-cases, storyboards) and description of two generations of prototypes design. The development was based on User Centered Design methodology [2]. Both prototypes were very sophisticated and required significant effort to create. The high-fidelity prototype implements a very complex and sophisticated interaction method — route learning mode.

Both generations of prototypes were evaluated with representatives of the target user audience. In total, 18 unique clients participated in the evaluation, an average age of a participant was almost 85 years. The execution of evaluation sessions was very demanding, but as a result, it provided extremely valuable feedback. The results of the high-fidelity prototype evaluation indicate that the designed prototype is efficient in creating a mental representation of the environment.

A comprehensive discussion concludes the manuscript, the conclusion clearly summarizes the goals and how they were met by the thesis.

## Implementation

The implementation of the interactive tactile map prototypes required the creation of complex physical objects. Computer-aided 3D design and 3D printing on acrylic glass was used as a base for the design. The high-fidelity prototype required HW prototyping (Raspberry Pi, touch detection, conductive paint) and SW development. The implementation is expensive and functional.

## Questions

1. Do you plan to continue the work on the haptic interaction? Where do you see the biggest challenges?

Master's thesis of Dominika Palivcová is extraordinary from several perspectives. The assignment itself was very demanding. The manuscript surpasses comparable works in extent, structure, scientific quality, and the number of references. Furthermore, the implementation proves extraordinary effort put into creating a functional prototype requiring high skills not only in mechanical engineering (3D design) but more importantly, in the creation of special interaction methods for a specific target user audience. A scientific paper based on the results of the thesis will be submitted to a prestigious international conference. I would like to ask the committee to nominate this thesis to an award.

**I assess the thesis with mark A (excellent).**

In Prague, June 11th, 2019

Ing. Miroslav Macík, Ph.D.

## **References**

- [1] Macík M., Malý I., Balata J., Míkovec Z., Tremel L. Trojrozměrný model budovy určený především pro zrakově postižené uživatele, Nov 2018. Uživatelský vzor. Dostupné z: <http://isdv.upv.cz/doc/FullFiles/UtilityModels/FullDocuments/FDUM0032/uv032260.pdf>
- [2] DIS, ISO. (2009). 9241-210: 2010. Ergonomics of human system interaction-Part 210: Human-centred design for interactive systems.