

# Tactile maps of historic gardens

Jakub Wabiński<sup>a,\*</sup>, Albina Mościcka<sup>a</sup>, Emilia Śmiechowska-Petrovskij<sup>b</sup>, Andrzej Araszekiewicz<sup>a</sup>, Damian Kiliszek<sup>a</sup>, Anna Traut-Seliga<sup>c</sup>

<sup>a</sup> Institute of Geospatial Engineering and Geodesy, Faculty of Civil Engineering and Geodesy, Military University of Technology, 00-908 Warsaw, Poland, jakub.wabinski@wat.edu.pl, albina.moscicka@wat.edu.pl, andrzej.araszekiewicz@wat.edu.pl, damian.kiliszek@wat.edu.pl

<sup>b</sup> Department of Special Education, Faculty of Education, Cardinal Stefan Wyszyński University in Warsaw, 01-938 Warsaw, Poland, e.smiechowska@uksw.edu.pl

<sup>c</sup> Institute of Natural Sciences, College of Medicine, Natural Sciences and Technology, Stefan Batory Academy of Applied Sciences, 96-100 Skierniewice, Poland, atraut@ansb.pl

\* Corresponding author

**Keywords:** tactile maps, inclusive cartography, people with visual impairments, cultural heritage, historic gardens

## Abstract:

People with visual impairments (PVI) face perception limitations that necessitate a high degree of map generalization, including a limited number of symbols that can be used on a single map sheet. This makes tactile maps complex to develop. Furthermore, the methods used for tactile map reproduction are not only costly but also limited in their ability to print legible tactile symbols. As a result, insufficient number tactile maps are developed and those that are developed are mainly for navigational purposes.

One particular area of exclusion for PVI is their limited access to cultural heritage objects. Our research aims to address this gap by proposing a technology to design legible and highly informative tactile maps of historic gardens - an important part of cultural heritage in every country.

Our comprehensive technology considers developing tactile maps of historic gardens in five garden design styles: Renaissance, Baroque, Romantic, English, and Japanese. Our pipeline systematically describes the individual stages of creating such maps: selection of content at different levels of detail, the design of tactile and graphic symbols, the principles of map generalization and editing as well as the low-cost production process using UV printing and swell-paper techniques (Figure 1).

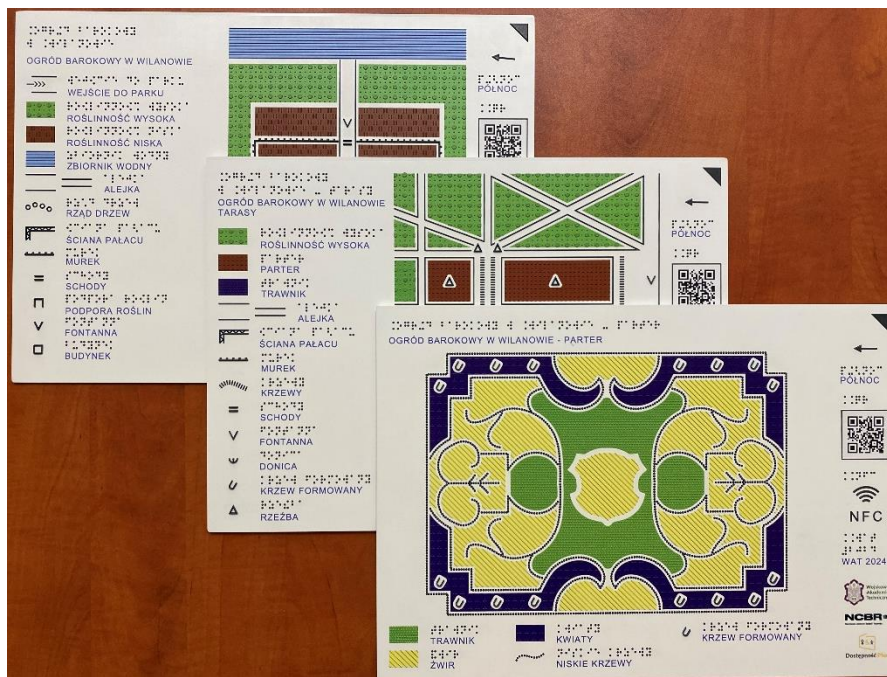


Figure 1. UV printed tactile maps of the Baroque Garden in Wilanów at three levels of detail.

The entire technology was iteratively evaluated at each step of its development during six study sessions with 15-20 PVI with diverse sociodemographic characteristics. These sessions were supplemented by additional, ad-hoc consultations. This inclusive-participatory approach was intended to ensure that the developed technology would meet the actual needs of the target user group.

During the presentation, we will showcase the main characteristics of our technology, experiences from human-subject testing as well as technical and practical solutions useful in tactile mapping. Finally, we will present 13 prototype tactile maps representing 5 different gardens in Poland.

### **Acknowledgements**

This research was funded within the research project No. Rzeczy są dla ludzi/0005/2020-00, titled “Technology for the development of tactile maps of historic parks”, financed by the National Centre for Research and Development for the years 2021–2024 and realized at the Military University of Technology, Faculty of Civil Engineering, and Geodesy. We would like to thank all the study participants, who provided invaluable feedback to our research.