

## MoMe: a context-sensitive mobile application to research spatial perception and behaviour

Marianne Halblaub Miranda<sup>1</sup>, Sandro Hardy<sup>2</sup> and Martin Knöll<sup>3</sup>

<sup>1</sup> Department of Architecture, TU Darmstadt, Germany

<sup>2</sup> Department of Electrical Engineering & Computer Science, TU Darmstadt, Germany

<sup>3</sup> Research Group Urban Health Games

*Keywords: urban planning and health, environmental stressors, perception, behaviour*

Which environmental and spatial parameters influence the perception of the built environment and its users' behaviour? In this abstract, the authors present the prototype MoMe, a context-sensitive mobile application developed as a research tool to assess spatial perception and behaviour in urban open spaces. The aim of the prototype is to record quantitative and qualitative data by making use of the context-awareness of mobile devices. Thanks to the interactive nature of mobile applications, the proposed framework can be used to guide and engage users in a specific manner with the built environment, which can be choreographed according to research questions in a somewhat flexible or even playful way. A conceptual framework for the development and evaluation of the prototype is presented here and is underlined with the results and experiences of a proof of concept setup.

The case study took place in Darmstadt, Germany. The prototype was tested in one afternoon on-site by a group of visiting students. Each one received a smartphone with the android application MoMe, which guided them through the selected open spaces, while it recorded data about navigation (GPS tracks and waypoints with time-stamp), and perception (photos and ratings) throughout the experience.

The three open spaces were selected because of their importance to the everyday urban life and contrasting spatial characteristics: two main public squares in the city, which are central transportation hubs – transitional spaces – as well, and an enclosed park in the city centre. Participants were asked to search for stressful and relaxing areas within the open spaces, take photographs of distinctively stressful or relaxing elements or setups, and rate the space according to eight core aspects of environmental and behavioural experience. This last part was done by giving the variables a value in a ten-step semantic differential scale. The analysis was focused on navigation behaviour, user perception of open spaces, as well as emotional state and satisfaction with the application, last two assessed through surveys.



Figure 1. Left: Screen from the Android App. Right: Map of the Luisenplatz in Darmstadt showing the location and orientation of snapshots taken by users rating the open space. Red indicates stressful. Green indicates relaxing.

The work presents how an interactive survey, which gathers qualitative data in situ about spatial perception, and data recording on spatial perception and behaviour, are being connected in the prototype. The recorded data, e.g. tracing real-time navigation and the chosen stressful or relaxing areas within the open spaces, among others, was visualized in QGIS. The researchers also outline a set of "portraits" with statements about spatial perception for each area within the open spaces with the gained data, corroborating the relevance of certain environmental and spatial parameters. The recorded qualitative data is linked to the recorded quantitative data and further quantitative spatial analysis, including a space syntax analysis conducted in previous research. The data has been visualized, complementing an analytical urban model of the city, and hasn't been yet thoroughly analysed.

This makes a contribution to the field by suggesting and evaluating a novel method of data recording including context-sensitive mobile applications. It endorses ways to link qualitative data to objective spatial analysis and its visualization, which can be made available to urban planners, citizens and stakeholders and encourage a discussion about the potentials of the data for planning, administration and urban everyday life.

While the focus was on spatial perception and stress perception, other behavioural data has to be the focus of further research.

## References

1. Böhme C., Kliemke, C., Reimann, B. & Süß, W. (2012): *Handbuch Stadtplanung und Gesundheit*, Bern: Hans Huber
2. Knöll, M., Li, Y., Neuheuser, K., Rudolph-Cleff, A. (2015): 'Using space syntax to analyse stress ratings of open public spaces'. In: Karimi, K., Vaughan, L., Sailer, K., Palaiologou, G., Bolton, T. (eds.), *Proceedings of the 10th International Space Syntax Symposium*, 13-17 July 2015, London: University College London, pp.123:1-15
3. Karimi, K. (2012): 'A configurational approach to analytical urban design: 'Space syntax' methodology' In: *URBAN DESIGN International* (2012) 17, p. 297-318
4. Schlieder, C., Kremer, D. (2011): 'Visiting the Same Place but Seeing Different Things: Place Models of Touristic Behaviour'. In: Henrich, A., Schlieder, C. and Schmid, U. (eds.), *Visibility in Information Spaces and in Geographic Environments. Post-Proceedings of the KI'11 Workshop*, Berlin: TU Berlin, pp. 15-21