

Smartphone-Based Portable Pedestrian Indoor Navigation: Experiments on Visualisation and Positioning

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INTRODUCTION

>> *Pedestrian indoor navigation distinguishes from outdoor navigation*

- degree of freedom
- velocity
- spatial resolution
- No GPS signal -> Inertial Navigation Systems (INS)



Development of a portable navigation system for pedestrians, which facilitates robust indoor positioning based on INS, is the objective of STEPPING project.



Accuracy unclear -> Experiments about the presentation of navigational information.

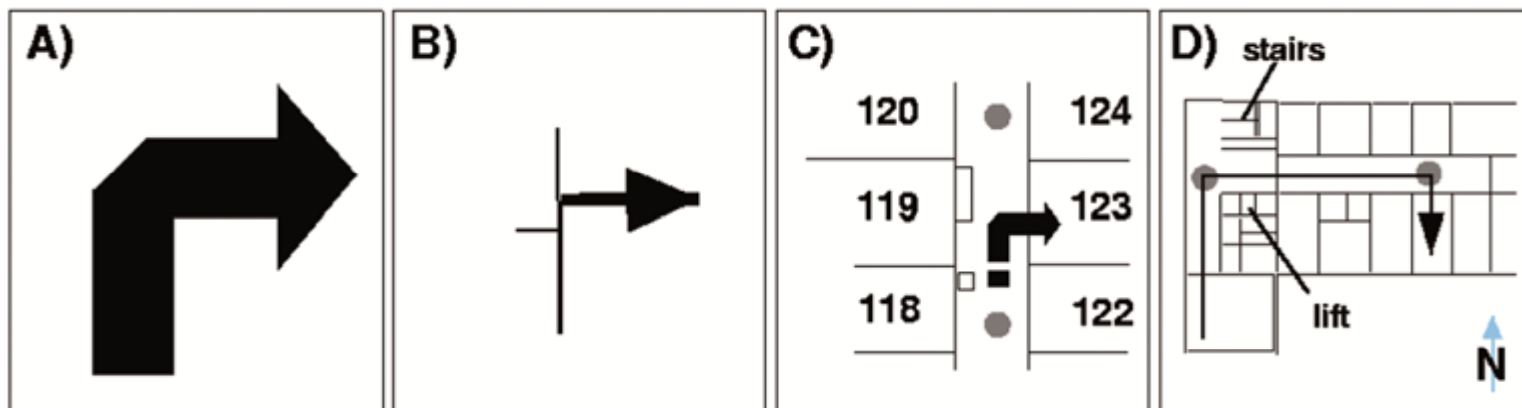
MOTIVATION

>> *General approach*

- Presentation of route directions should be adapted!
- The quality of positioning and thus the quality of the provided route direction is of significant importance to ensure successful navigation.

>> *related work*

- resource adapted route presentation for indoor navigation. (Baus et al. 2001a, 2001b)

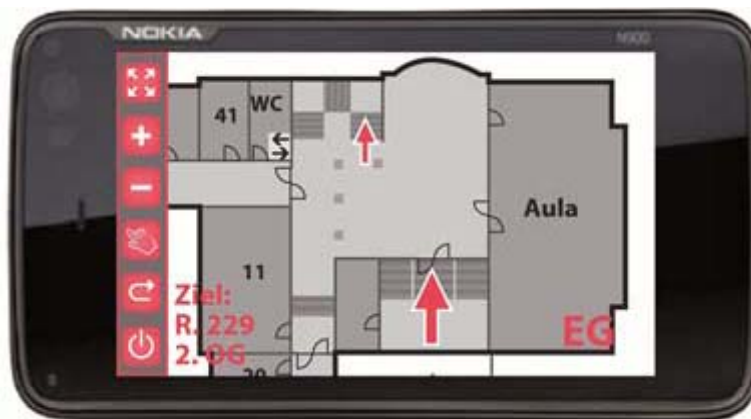


(Baus et al. 2001a).

EXPERIMENTS

>> Hypothesis

- Combining maps with directional arrows to visualize navigational information is more suitable than just using overview maps, because the map gives information about the environment whereas the arrow gives quick information about the direction. An overview map is especially valuable in case of inaccurate positioning.



SCENARIOS AND VISUALIZATION

>> Scenario 1: accurate positioning



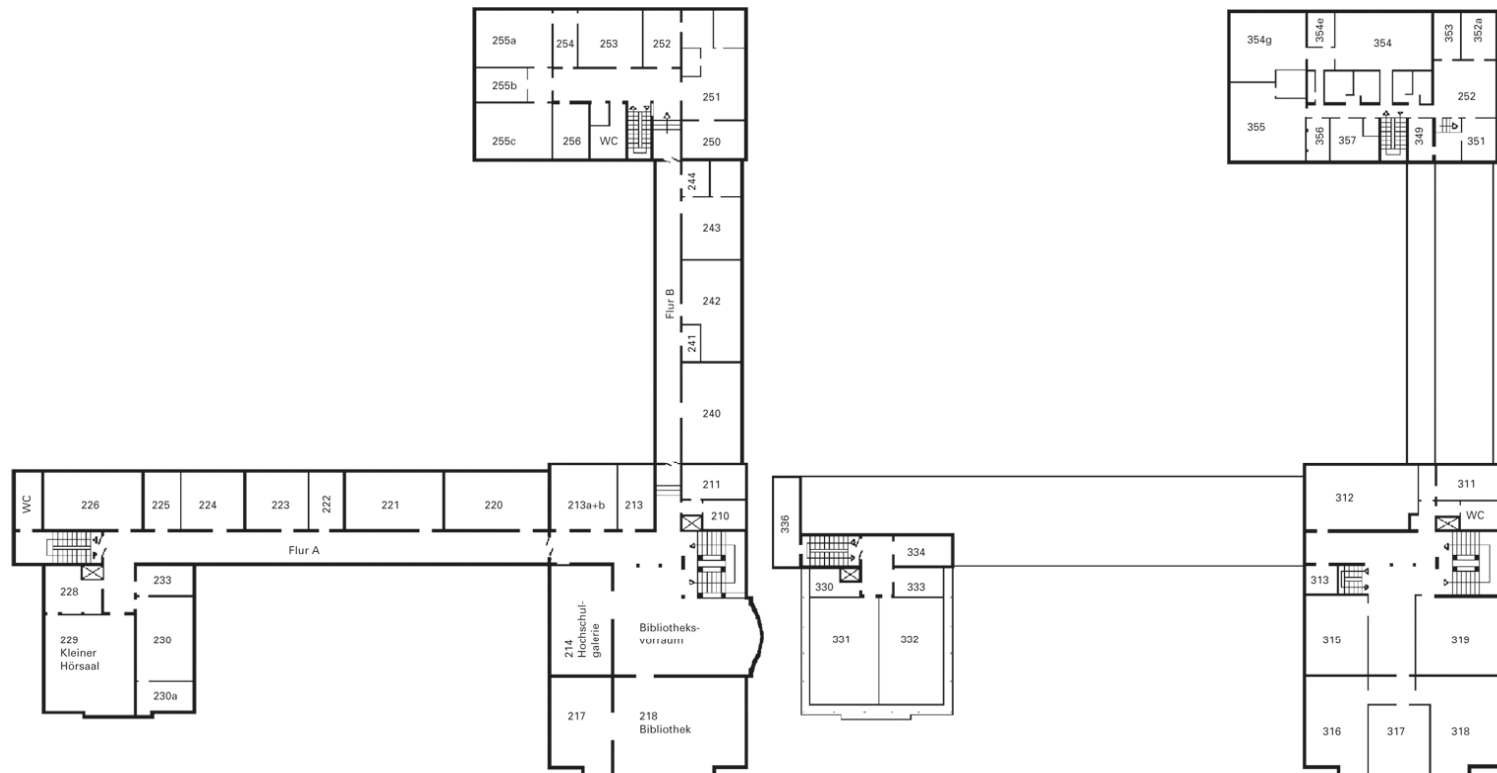
>> Scenario 2: no positioning



EXPERIMENTS

>> *Setting and Participants*

- 21 participants (10 female, 11 male)
- Average age of 22 years
- Location: three-storey L-shaped building



PROCEDURE

- Questionnaire at the beginning and afterwards
- Participants had to navigate to two rooms with the help of their maps -> the second task was complicated
- From the second room they had to go back to the entrance hall without maps
- Protocols: record of time, errors, etc.

RESULTS

- ***Participants were able to complete a complex navigational task faster with provided positioning and directional arrows than with the help of overview maps. (3.5 vs. 5.8 minutes).***
- ***The times for the way back did not differ.***
- ***Participants provided with arrows took the same way back to the entrance hall – participants provided with overview maps have mostly chosen an alternative route.***

DISCUSSION AND OUTLOOK

- What are the personal habits and preferences for indoor navigation?
- Observation method: video, protocoll, eye tracking?
- Phrasing of the tasks
- Further research on uncertainty in pedestrian indoor navigation scenarios is planned.
- Project STEPPING (Sternberg, Lukianto): INS

Questions?

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