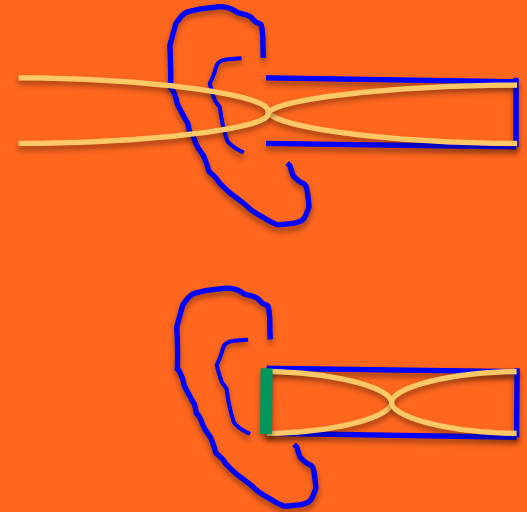




Aalto-yliopisto
Perustieteiden
korkeakoulu

CS-E5530, 2019
Virtual Acoustics



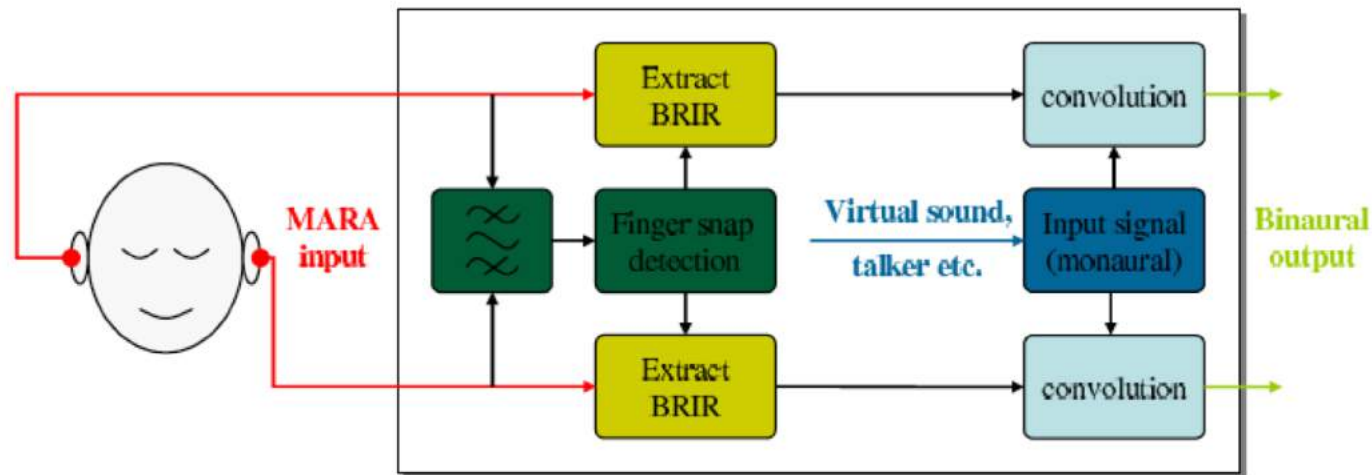
A few audio AR applications

Tapio Lokki, Associate Professor
Department of Computer Science
Aalto University School of Science, Finland

Fingersnap positioning of speakers

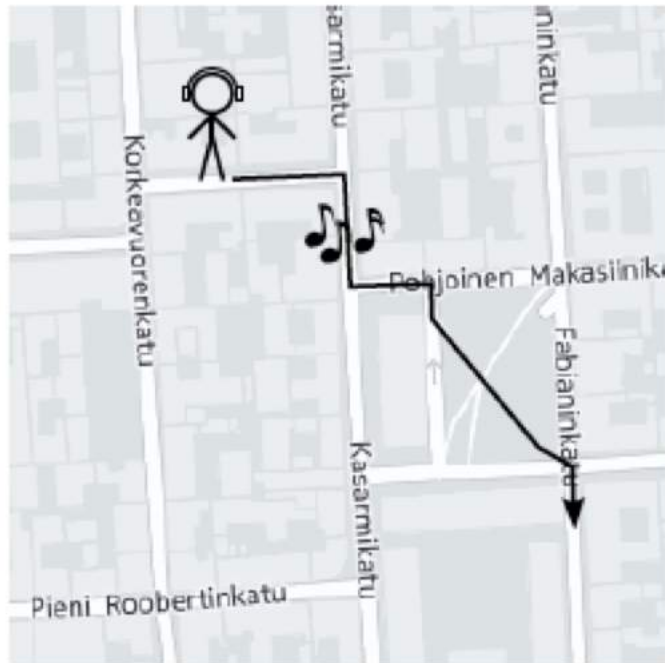
[Gamper and Lokki, 2009]

- The system listens to binaural signals
- If an impulse is detected the following 5-300 ms is buffered
- The buffered binaural response is applied in convolution of virtual sound



Navigation with music in urban environment [Albrecht et al., 2016]

Binaural music on headphones, head-tracker, GPS, navigation

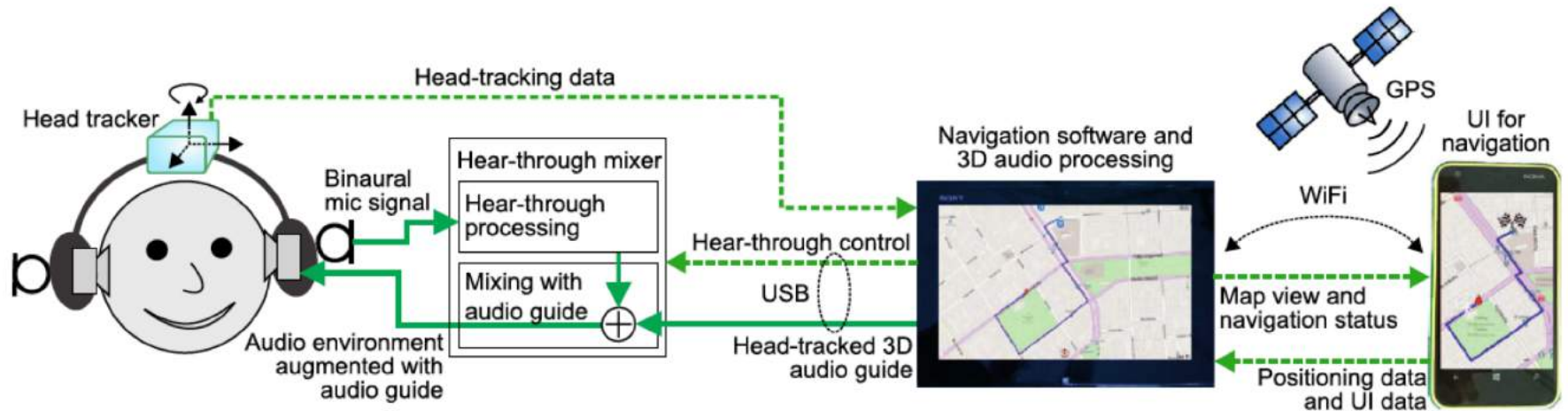


(a) Route guidance.



(b) Beacon guidance.

Hardware setup for the navigation study [Albrecht et al., 2016]



Walking at Helsinki city (navigation routes)

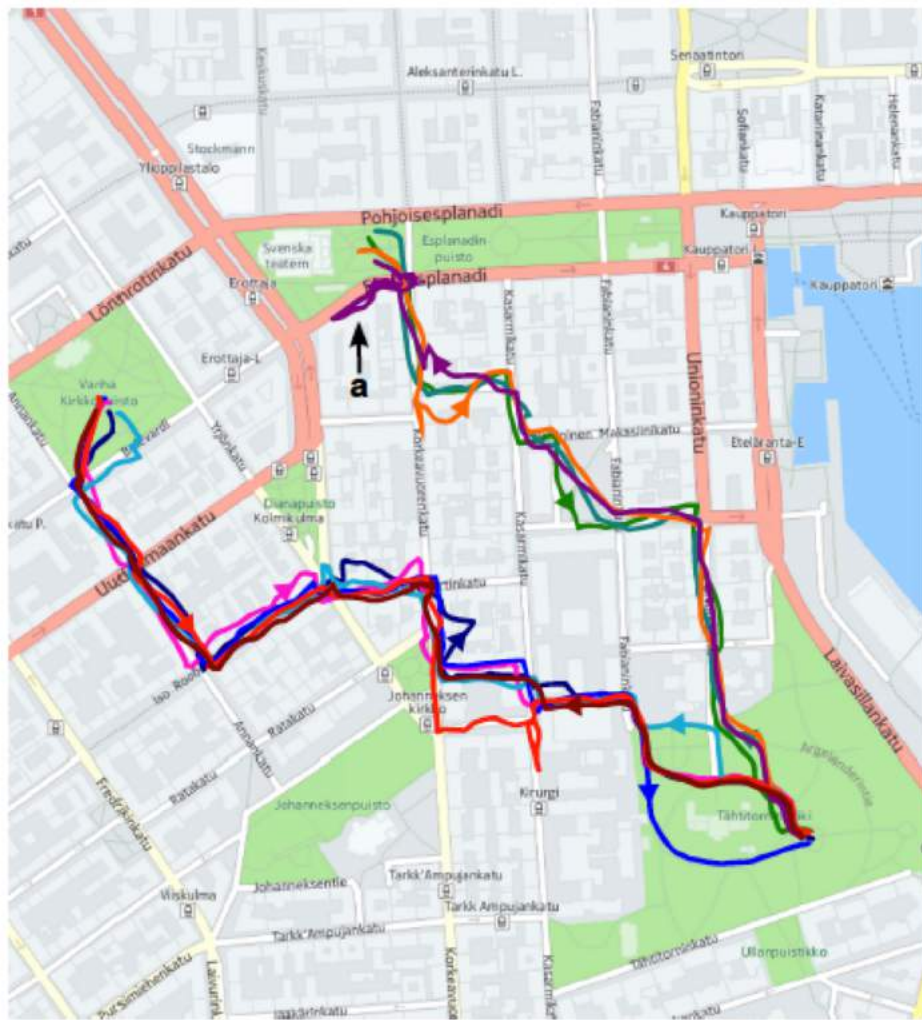


Fig. 27 The routes taken by the participants during route guidance in



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Fig. 28 The routes taken by the participants during beacon guidance in

5.2.2019

Cycling at Tapiola (turn-by-turn)

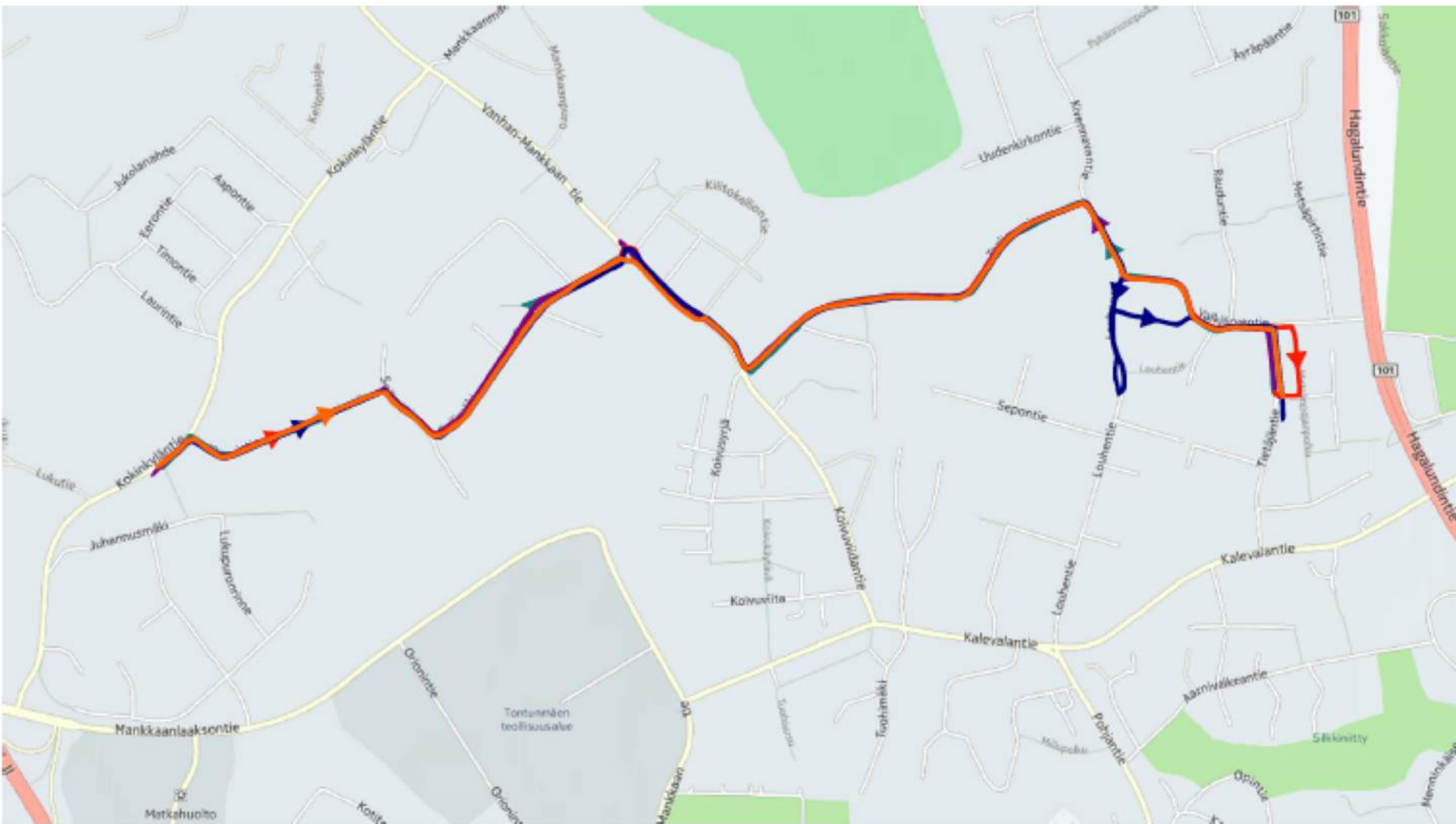


Fig. 29 The northern routes taken by the participants during route guidance in user study C.

Cycling at Tapiola (beacon navigation)

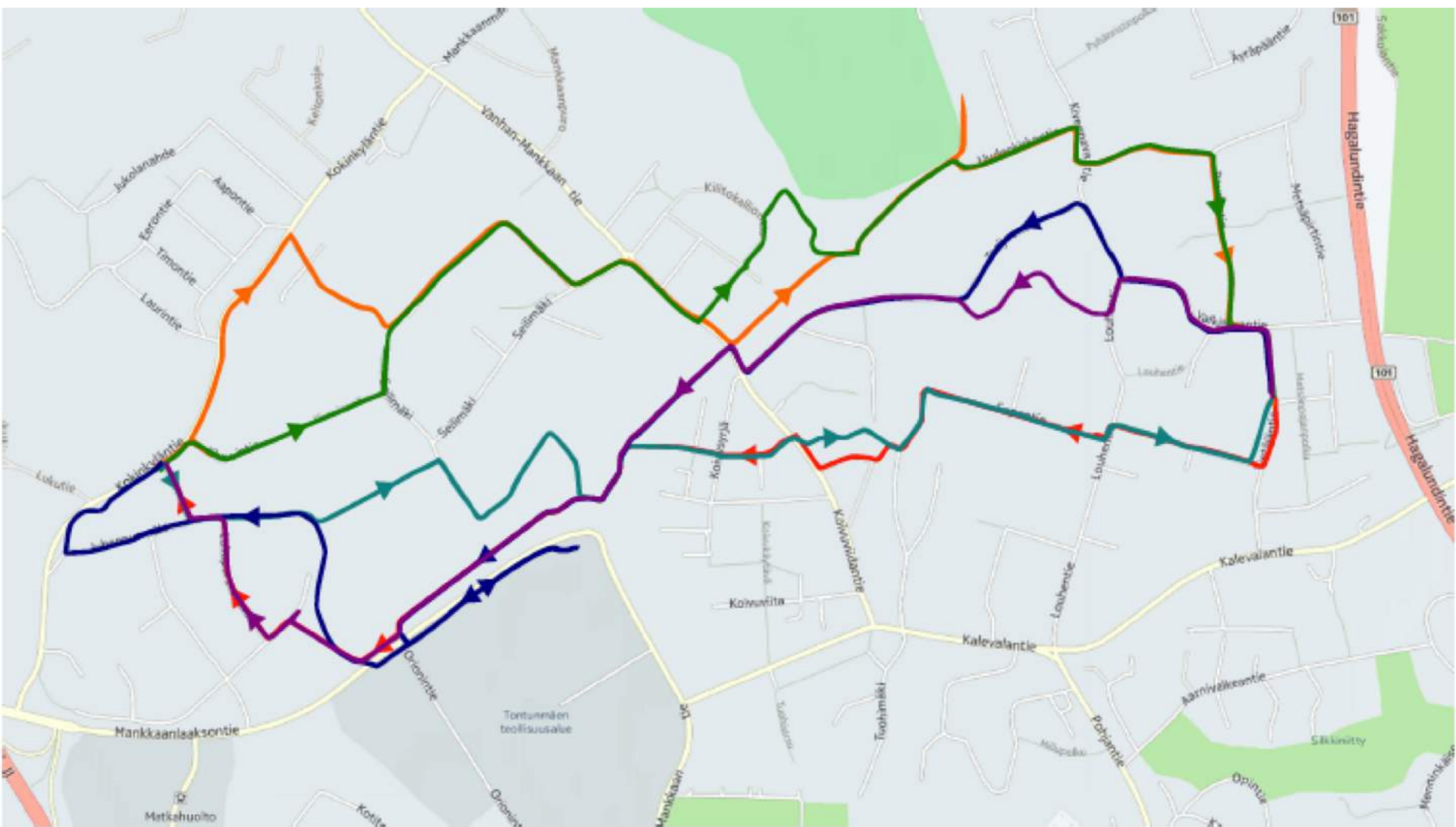


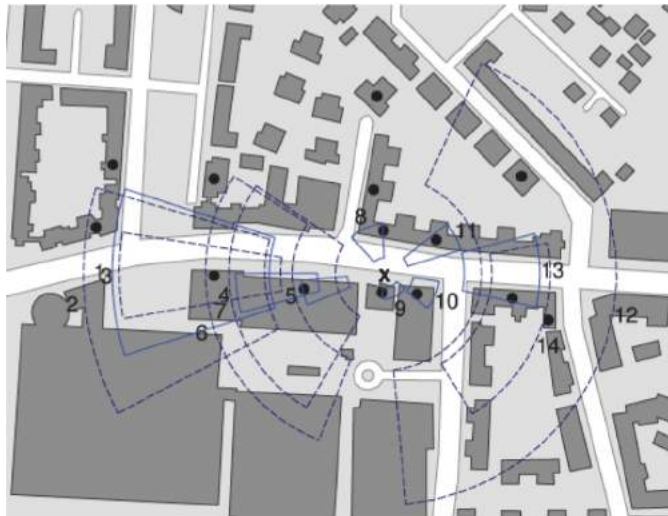
Fig. 31 The northern routes taken by the participants during beacon guidance in user study C.

Auditory distance perception in the context of audio augmented reality

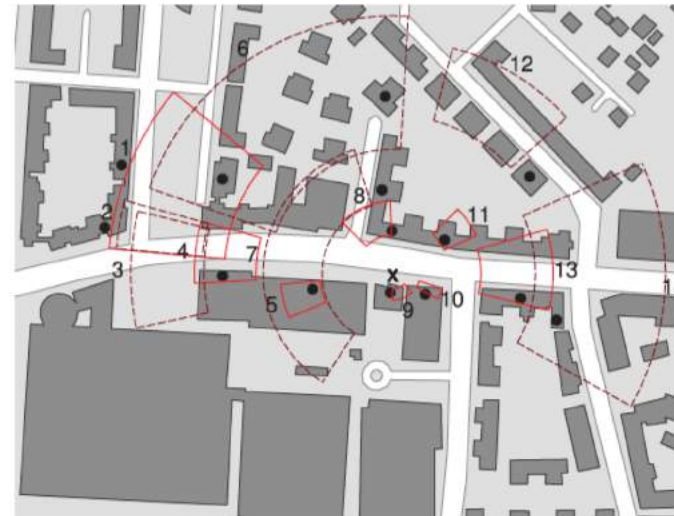
[Albrecht et al. *ACM TAP*, 2015]



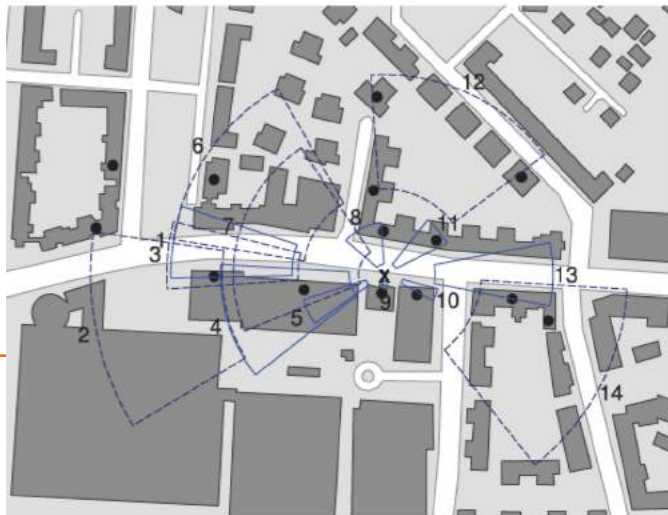
Results, with feedback in training, people can learn the distances



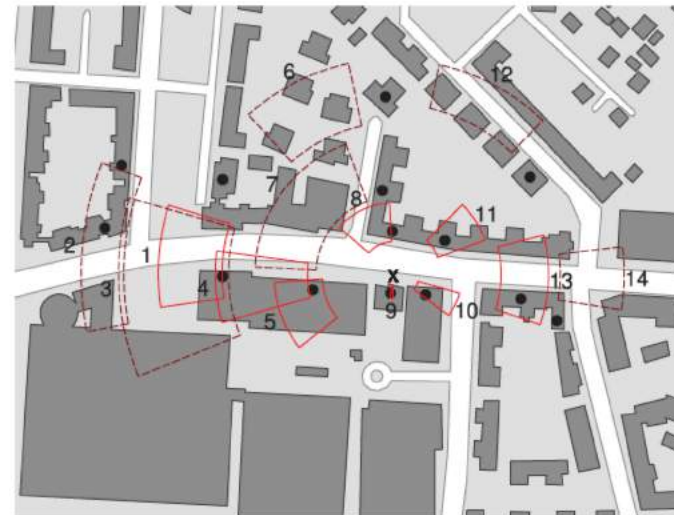
(a) Condition 1a: speech, distance cues, once



(b) Condition 1b: speech, distance cues, once, feedback



(c) Condition 2a: speech, distance cues, repeated



(d) Condition 2b: speech, distance cues, repeated, feedback

Results, best performance when the distances were told in meters



(a) Condition 3a: speech, spoken distance, once



(b) Condition 3b: speech, spoken distance, once, feedback



(c) Condition 4a: noise, distance cues, repeated



(d) Condition 4b: noise, distance cues, repeated, feedback