

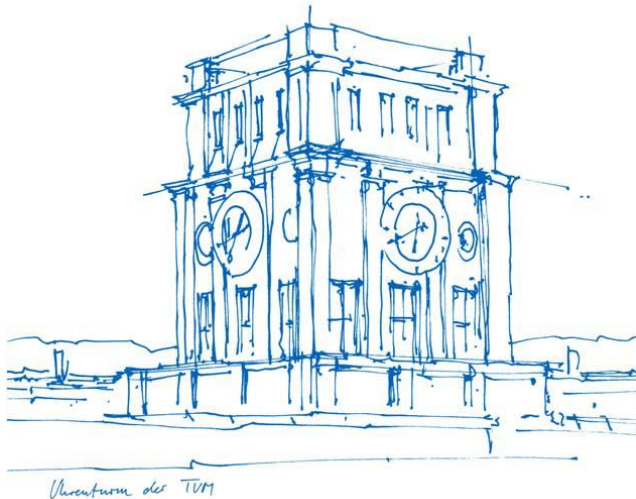
# Doing research online in 2020 - what if you cannot?

Bing Liu, [bing.l@tum.de](mailto:bing.l@tum.de)

Supervisor: Prof. Dr. Liqiu Meng

Mentor: Dr. Linfang Ding

Chair of Cartography, Technical University of Munich



# Ph.D. topic

## Spatial Learning in Indoor Navigation using Mixed Reality

- 90% time indoor (2001, USA)
- GNSS/GPS unavailable, limited indoor navigation systems

Quickly  
• Reach the destination

Safely  
• Not injured during moving  
• Spatial awareness

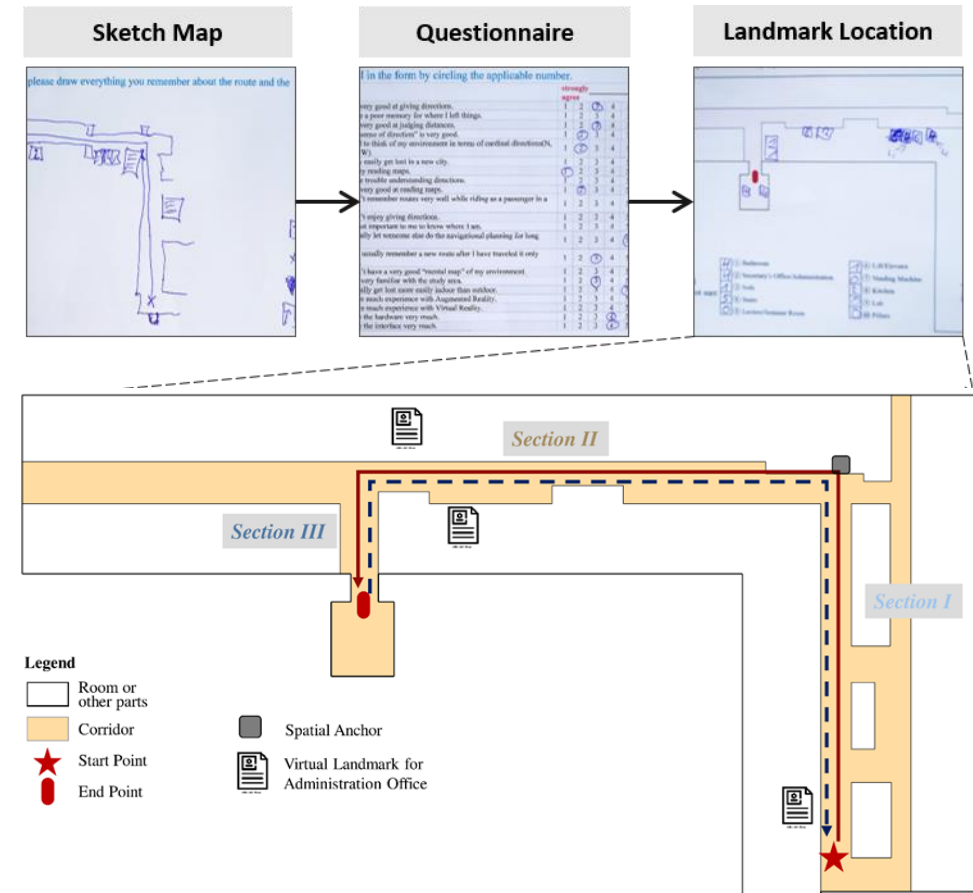
### Informatively

- Get information for future use
- Spatial knowledge acquisition



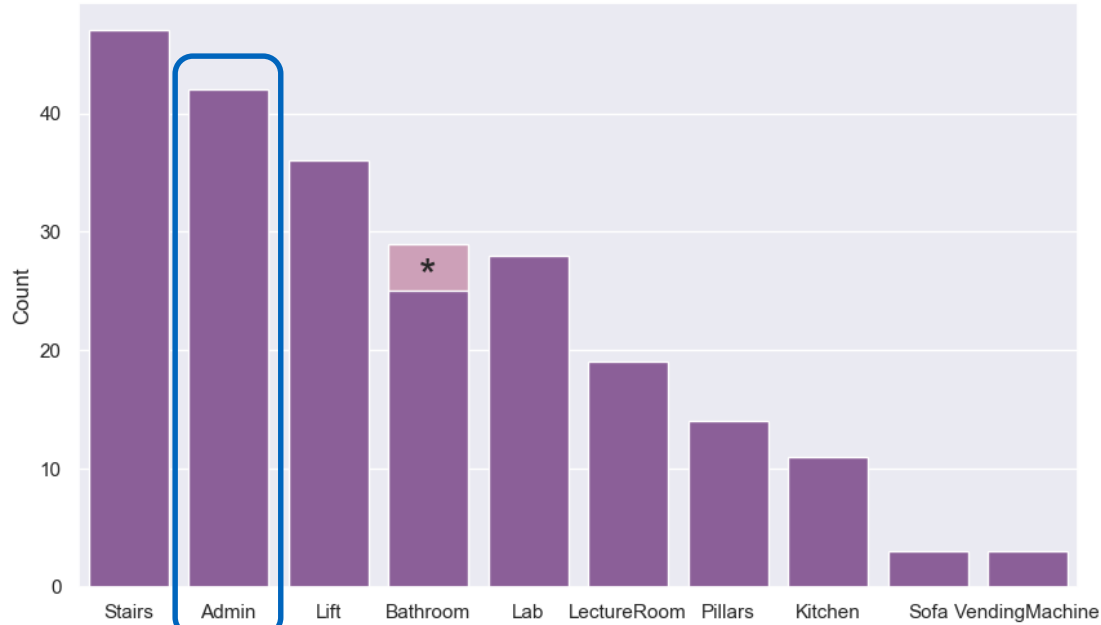
# User Study

## *Spatial knowledge acquisition with virtual semantic landmarks in MR-based indoor navigation*



Bing Liu, Linfang Ding & Liqiu Meng (2021) Spatial knowledge acquisition with virtual semantic landmarks in mixed reality-based indoor navigation, *Cartography and Geographic Information Science*, DOI: 10.1080/15230406.2021.1908171

# Results



*Counts of landmarks labelled on the given map by all participants*

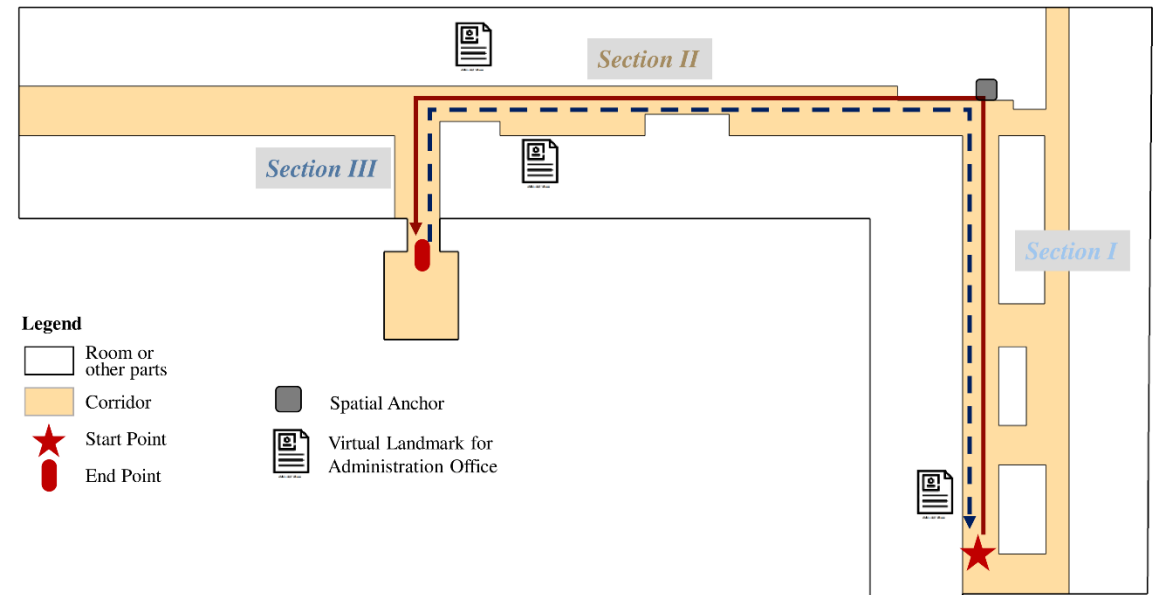
- Virtual semantic landmarks can assist spatial learning, even incidentally.
- Arrows are intuitive and practical to indicate direction

# Conducting User Study Online

Online: not MR



Findings: head mounted MR influence the perception of height change, time and color



Conducting online AR/MR/VR study is not ideal.



# Work Online



Online Conference

- 20200205\_for Lecture\_BLiu\_Towards a Better ...
- 20200206\_Poster\_Doctoral\_Candidates\_Day\_
- 20200621\_Liu\_slide\_Towards a Better User int...
- 20200919\_De\_FR
- 20201216\_IGWG2020
- 20210430\_BingLiu\_BNU group meeting\_科学...

Online presentation



VR Campus

# Possible solutions

- Many people are getting their **personal AR/VR devices**, is it possible to reach those people for user study?
- (VR conference)
- As the **environment** of each user is completely different, how can we design a project that can be used?  
(MapStudy)
- How can we deal with the **bias** as such users are more likely to be quite positive about AR/VR?

# Discussion

