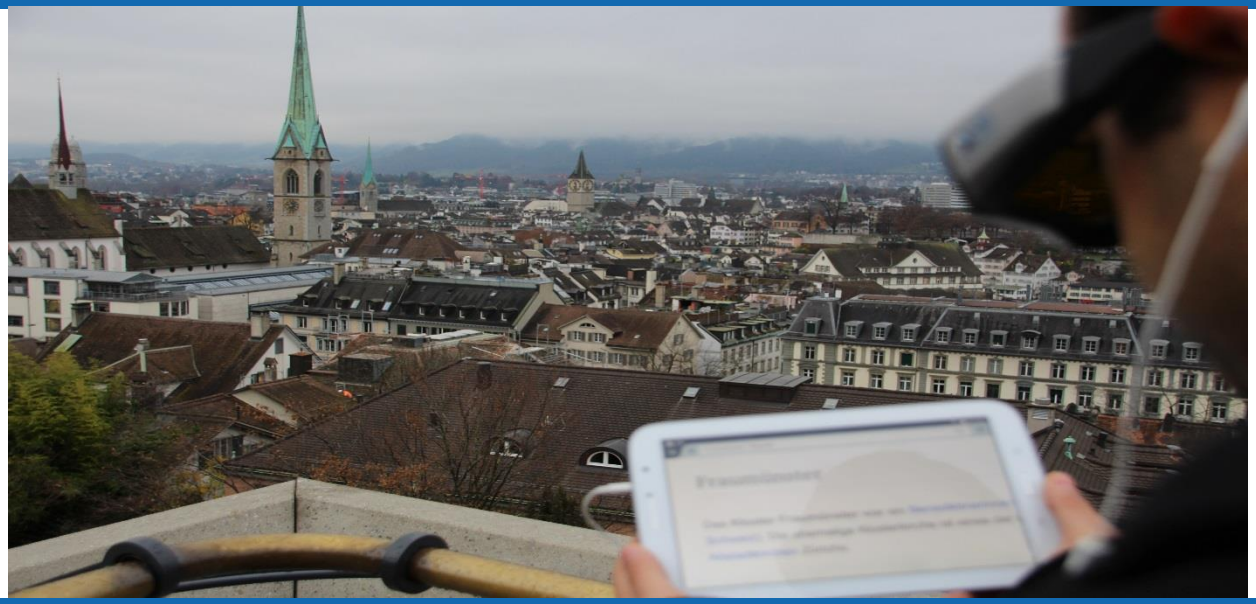
ETH zürich

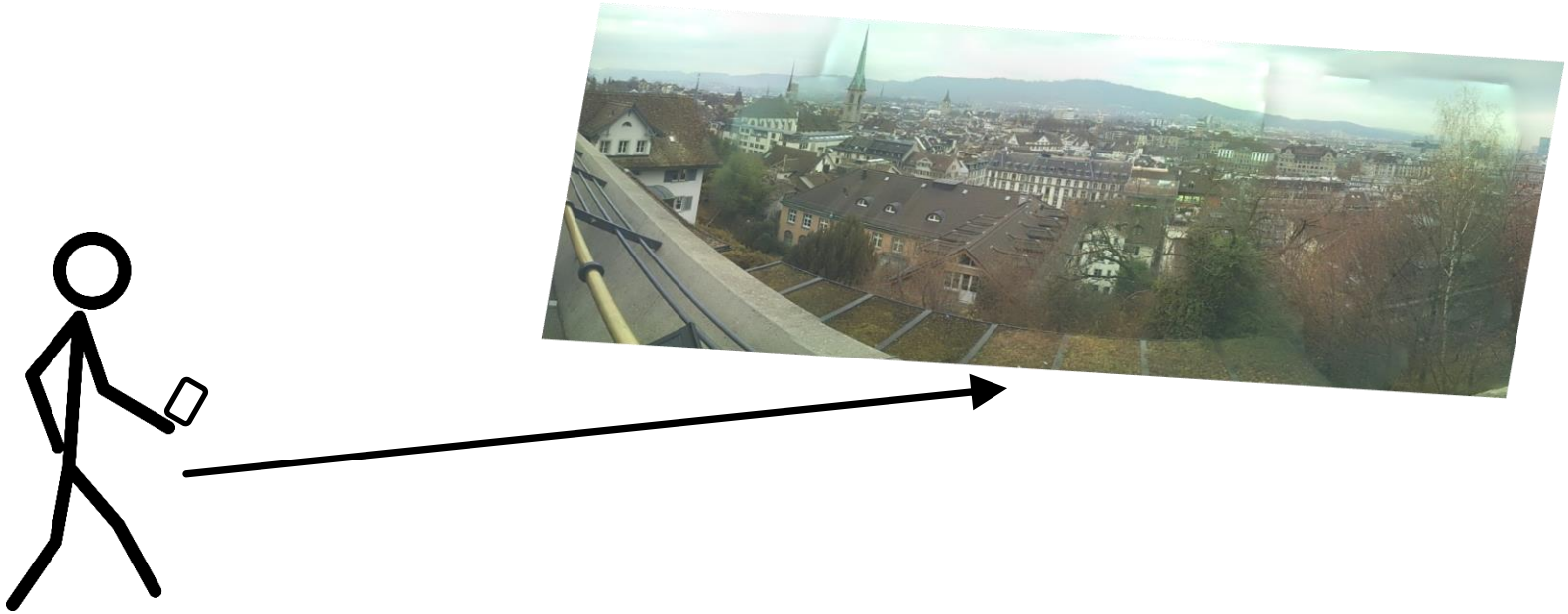


Towards Gaze-Based Interaction with Urban Outdoor Spaces

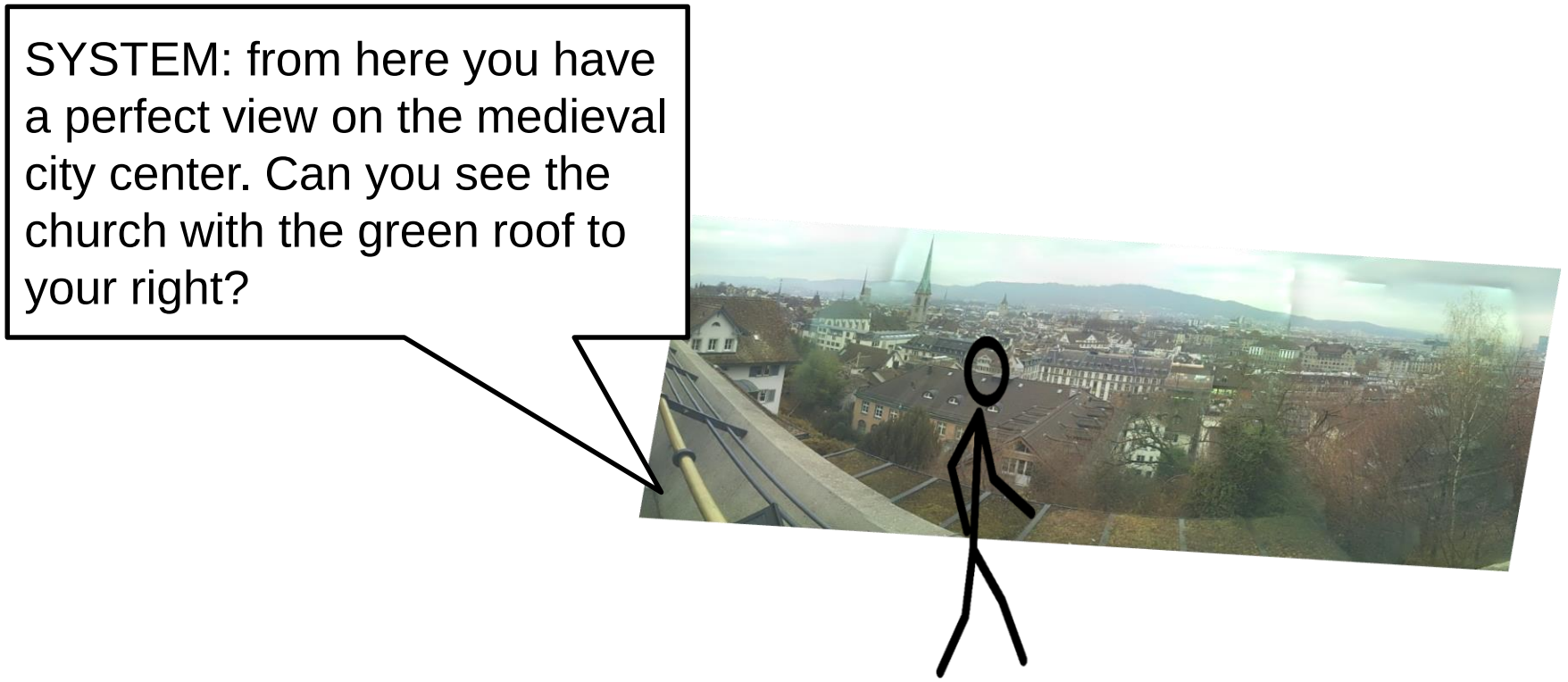
Vasileios-Athanasios Anagnostopoulos and Peter Kiefer
Institute of Cartography and Geoinformation
Chair of Geoinformation Engineering
ETH Zurich

geoinformation engineering ikg eth zurich

Location Aware Mobile Gaze-Based Interaction

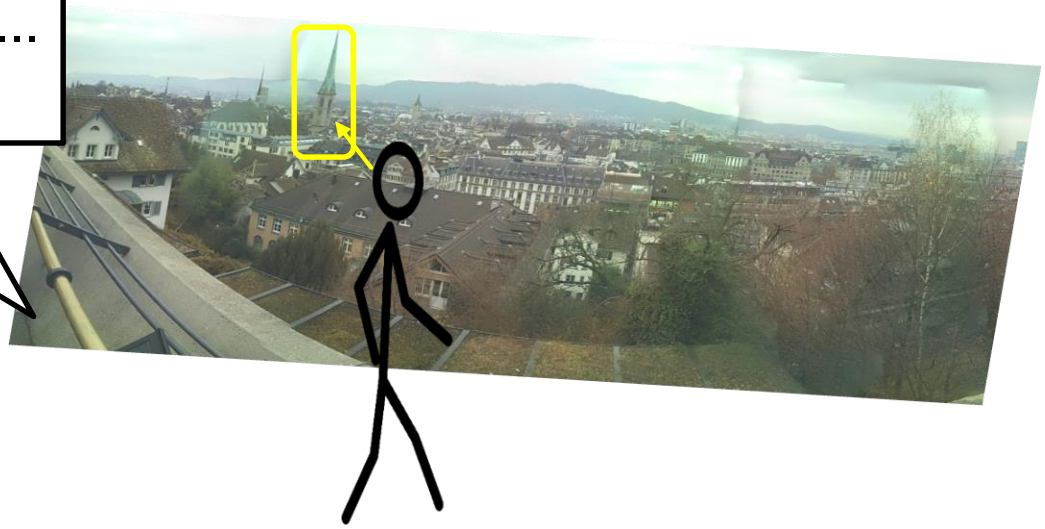


Location Aware Mobile Gaze-Based Interaction



Location Aware Mobile Gaze-Based Interaction

SYSTEM: great, you found it. This is St. Peter's church. It was built in the 14th century ...



A classification of gaze-based interaction

A classification of gaze-based interaction

Movement of the object(s) interacted with.				
	(A) Stationary object(s)			
	(B) Object(s) moving independent of the user			
	(C) Object(s) moving with the user			

A classification of gaze-based interaction

Movement of the object(s) interacted with.	Movement of the user.			
		(I) standing. Interaction available only at certain locations	(II) standing. Interaction available at any location	(III) moving
	(A) Stationary object(s)			
	(B) Object(s) moving independent of the user			
	(C) Object(s) moving with the user			

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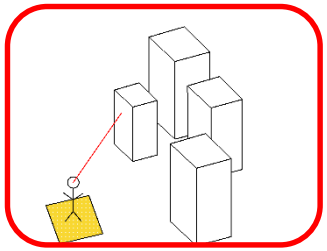
	(A) Stationary object(s)			
	(B) Object(s) moving independent of the user			
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Movement of the object(s) interacted with.	Movement of the user.			
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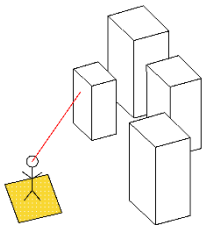
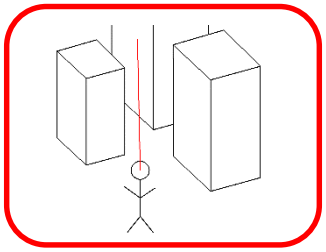
	(A) Stationary object(s)			
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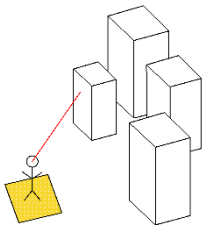
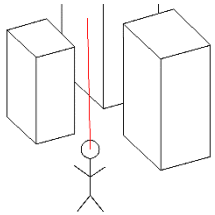
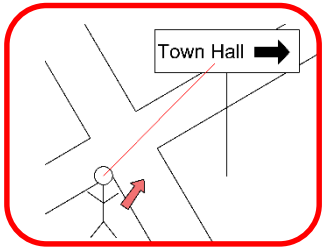
	(A) Stationary object(s)			
	(B) Object(s) moving independent of the user			
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A classification of gaze-based interaction

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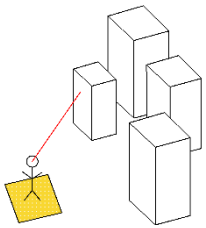
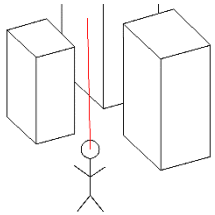
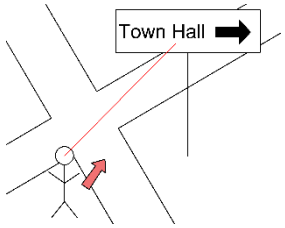
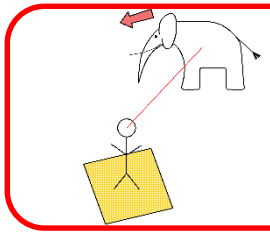
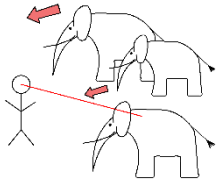
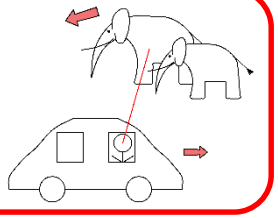
	(A) Stationary object(s)			
	(B) Object(s) moving independent of the user			
	(C) Object(s) moving with the user			

A classification of gaze-based interaction

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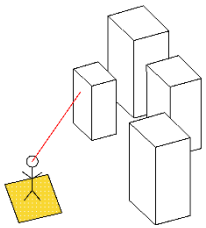
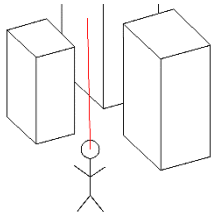
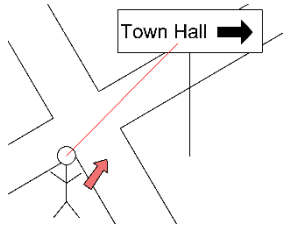
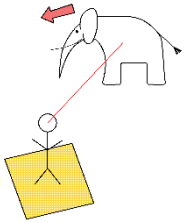
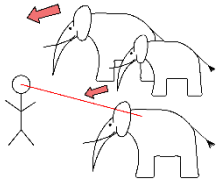
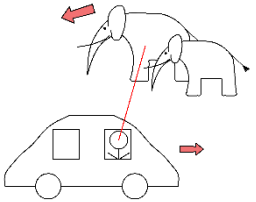
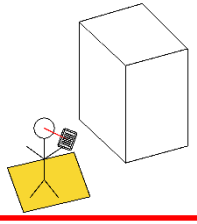
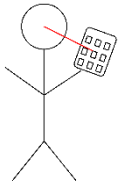
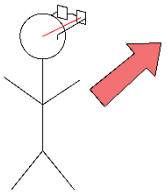
(A) Stationary object(s)			
(B) Object(s) moving independent of the user			
(C) Object(s) moving with the user			

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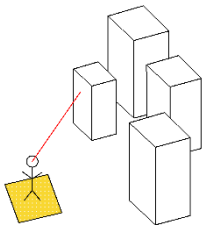
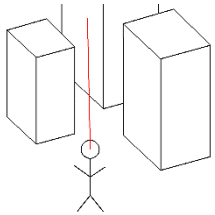
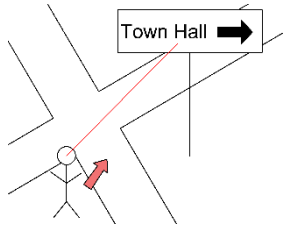
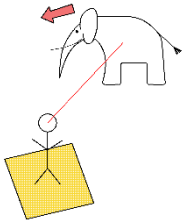
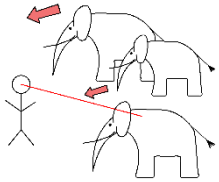
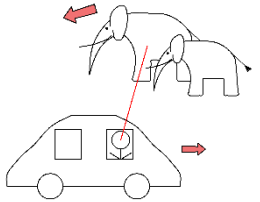
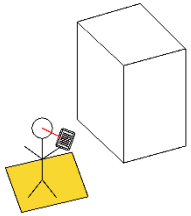
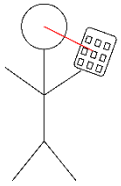
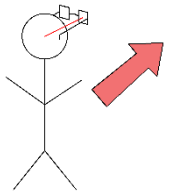
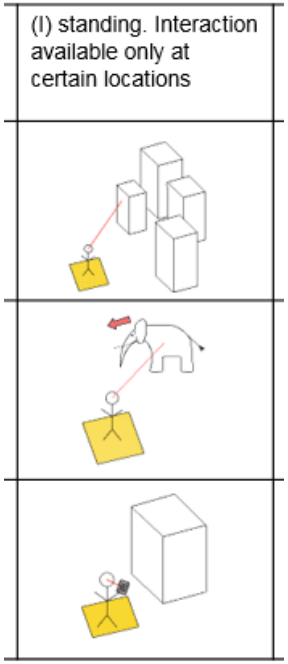
(A) Stationary object(s)			
(B) Object(s) moving independent of the user			
(C) Object(s) moving with the user			

Challenges for mobile gaze-based interaction

- Object of regard detection

Challenges for mobile gaze-based interaction

- Object of regard detection
  - Extra sensor [1,2]



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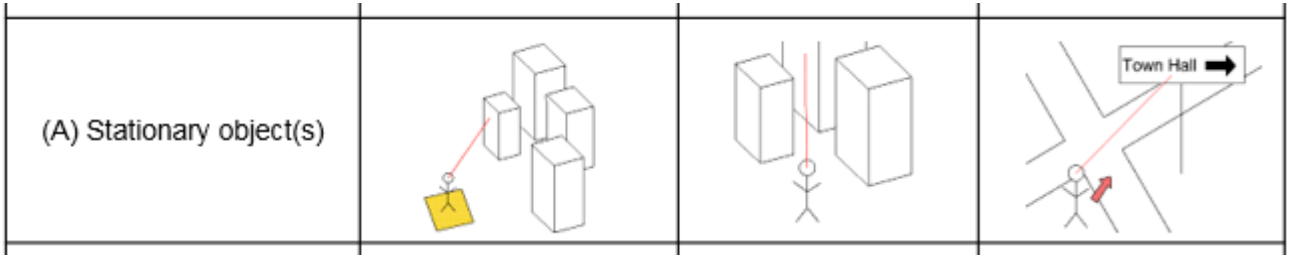
Challenges for mobile gaze-based interaction

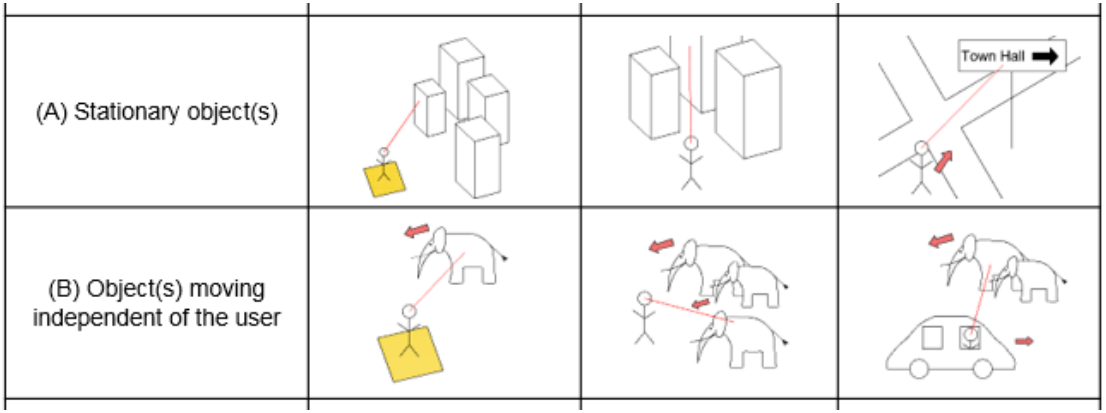
- Object of regard detection
  - Extra sensor
  - Computer vision methods
    - Simultaneous Localization and Mapping (SLAM) [1,2]



1. Lucas Paletta, Katrin Santner, Gerald Fritz, Albert Hofmann, Gerald Lodron, Georg Thallinger, and Heinz Mayer. 2013. FACTS - A Computer Vision System for 3D Recovery and Semantic Mapping of Human. (2013), 62–72.
2. James Pieszala, Gabriel Diaz, Jeff Pelz, Jacqueline Speir, and Reynold Bailey. 2016. 3D Gaze Point Localization and Visualization Using LiDAR-based 3D Reconstructions. In *Proc*. of the *Ninth Biennial ACM Symposium on Eye Tracking Research & Applications (ETRA '16)*. ACM, 201–204.

Challenges for mobile gaze-based interaction

- Object of regard detection
  - Extra sensor
  - Computer vision methods
    - Simultaneous Localization and Mapping (SLAM)
    - Object recognition [1]



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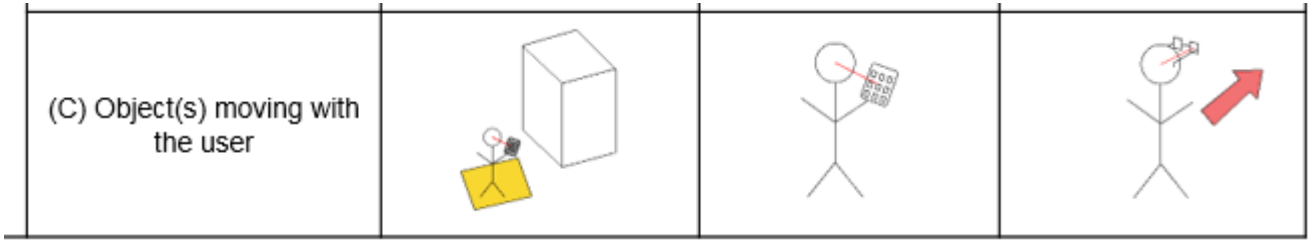
Challenges for mobile gaze-based interaction

- Object of regard detection
  - Extra sensor
  - Computer vision methods
    - Simultaneous Localization and Mapping (SLAM)
    - Object recognition
  - Remote eye tracking from smartphones [1]



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Challenges for mobile gaze-based interaction

- Object of regard detection
- Interaction design

Challenges for mobile gaze-based interaction

- Object of regard detection
- Interaction design
  - Suitable interaction

Challenges for mobile gaze-based interaction

- Object of regard detection
- Interaction design
  - Suitable interaction
  - A screen is not always available

Challenges for mobile gaze-based interaction

- Object of regard detection
- Interaction design
  - Suitable interaction
  - A screen is not always available
  - Midas touch

Challenges for mobile gaze-based interaction

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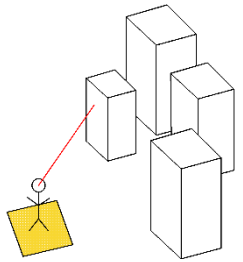
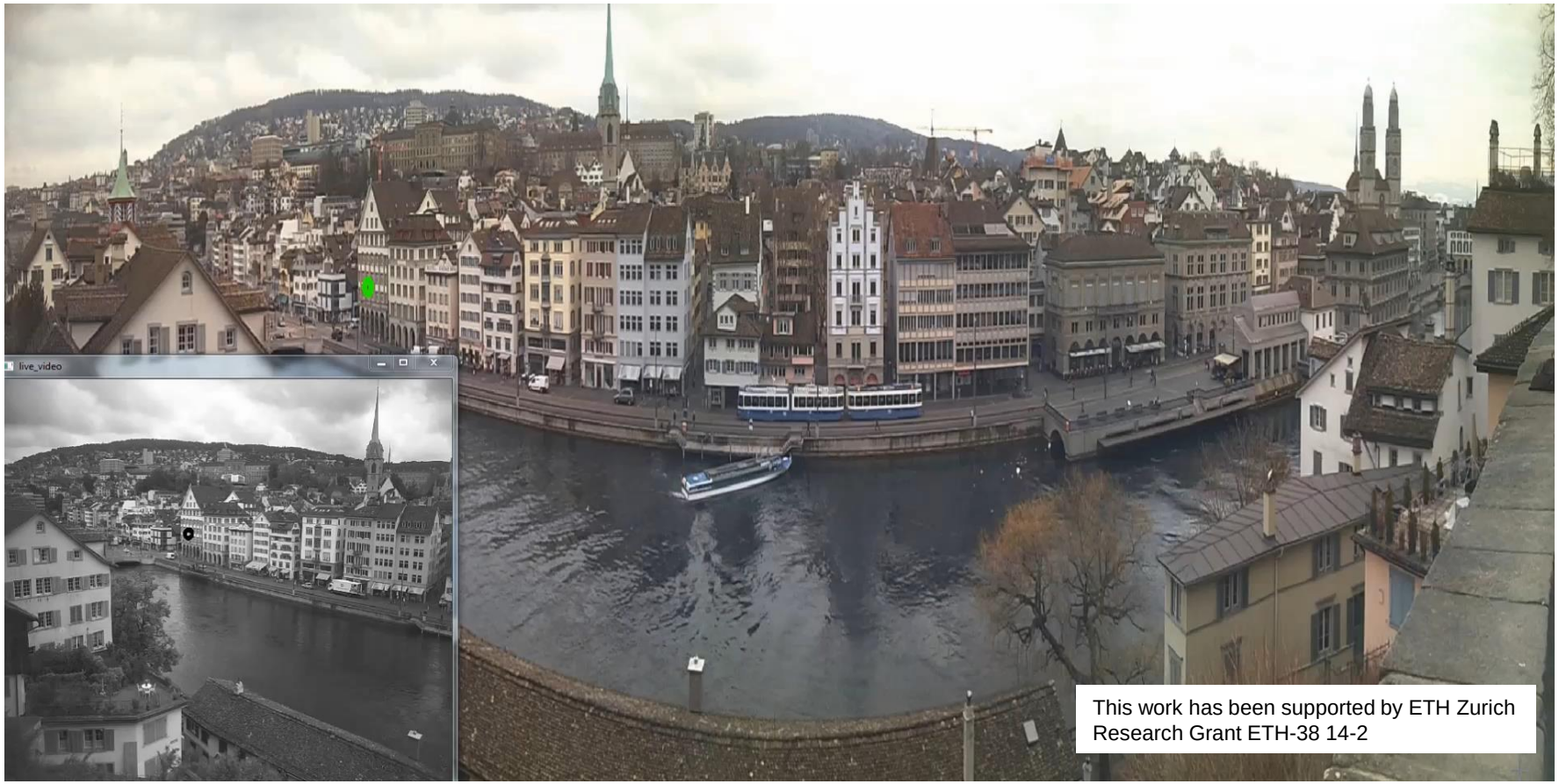
- Interaction design
  - Suitable interaction
  - A screen is not always available
  - Midas touch
  - Gaze guidance

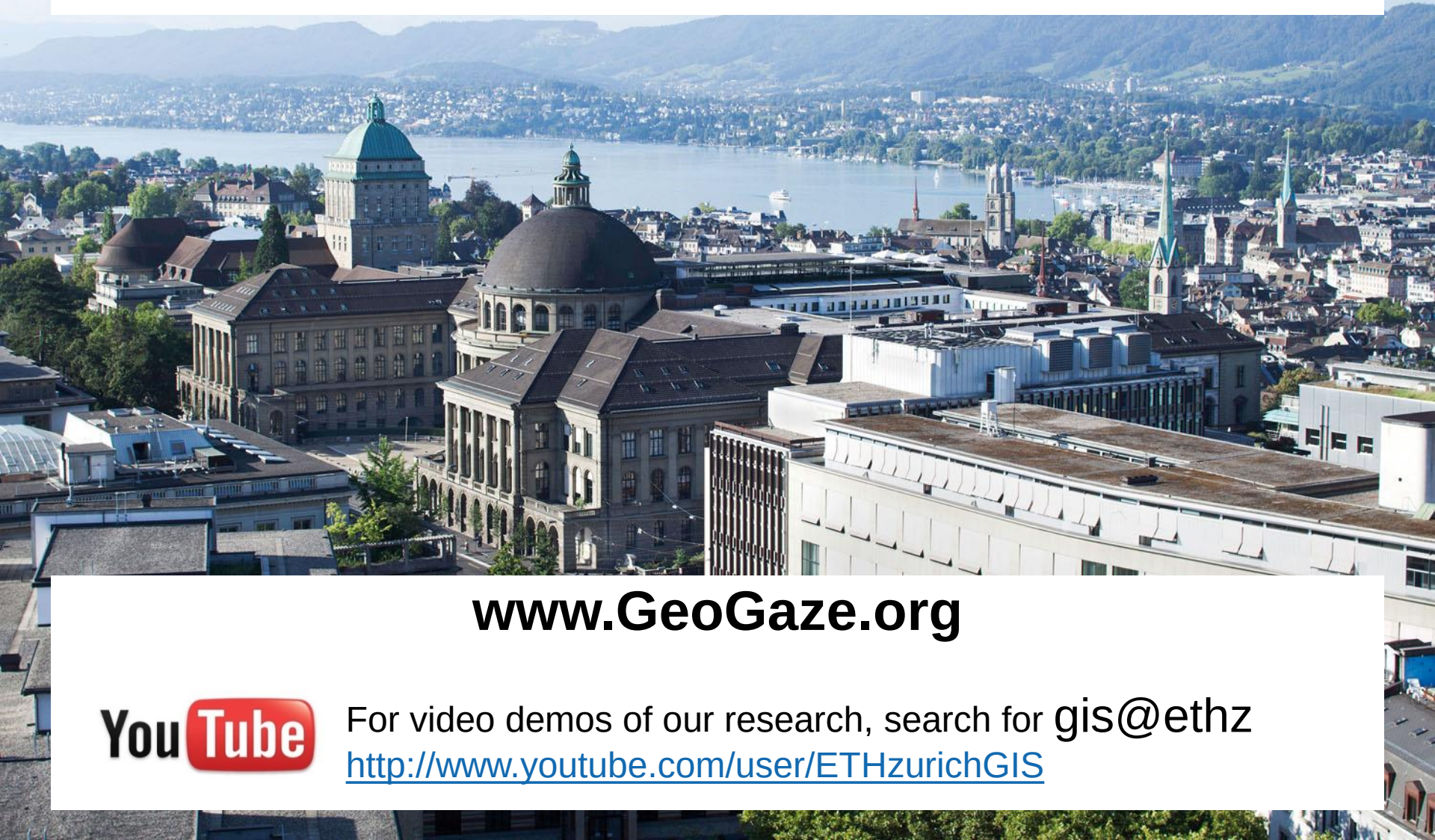
Platform for location-constrained gaze-based interaction with objects





This work has been supported by ETH Zurich Research Grant ETH-38 14-2

Thank you!



www.GeoGaze.org

YouTube

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