A PROTOTYPE FOR GAZE-BASED INTERACTION IN URBAN ENVIRONMENTS

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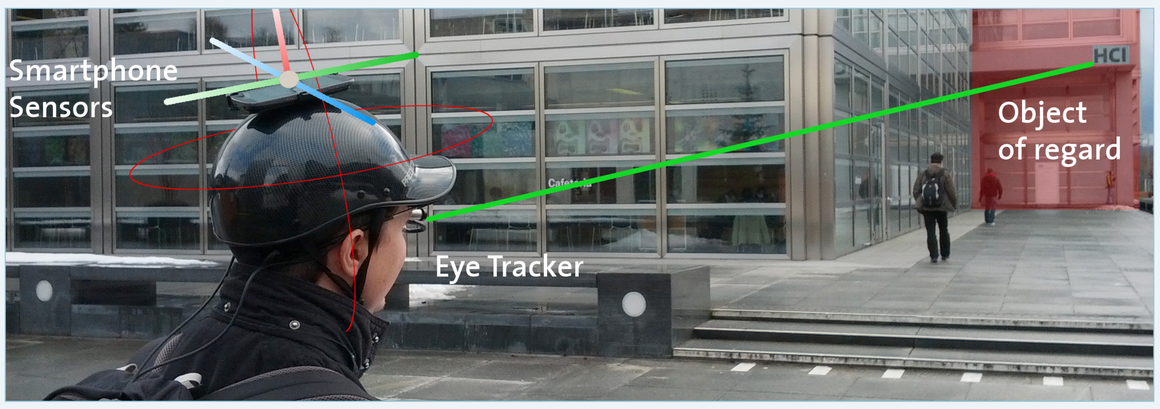
WHAT IS IT ALL ABOUT?

80% of human perception is based on visual observation, but even to-day, only a few gaze-based computer interaction methods exist. Some people may think of Google Glasses, but Google uses location based services and image recognition to identify nearby objects instead of gazes. This thesis presents a service-oriented prototype, which enables the acquisition of information in real-time through gaze interaction.

THE CONCEPT



The following prototype uses a mobile eye tracker for gaze detection and a smartphone for head tracking.

Objectives

- Automate analyses of mobile eye tracking studies, calculating evaluation parameters immediately after gaze detection
- Contribute basics to develop an application able to provide a tourist with information about the historic site he is looking at

Issues

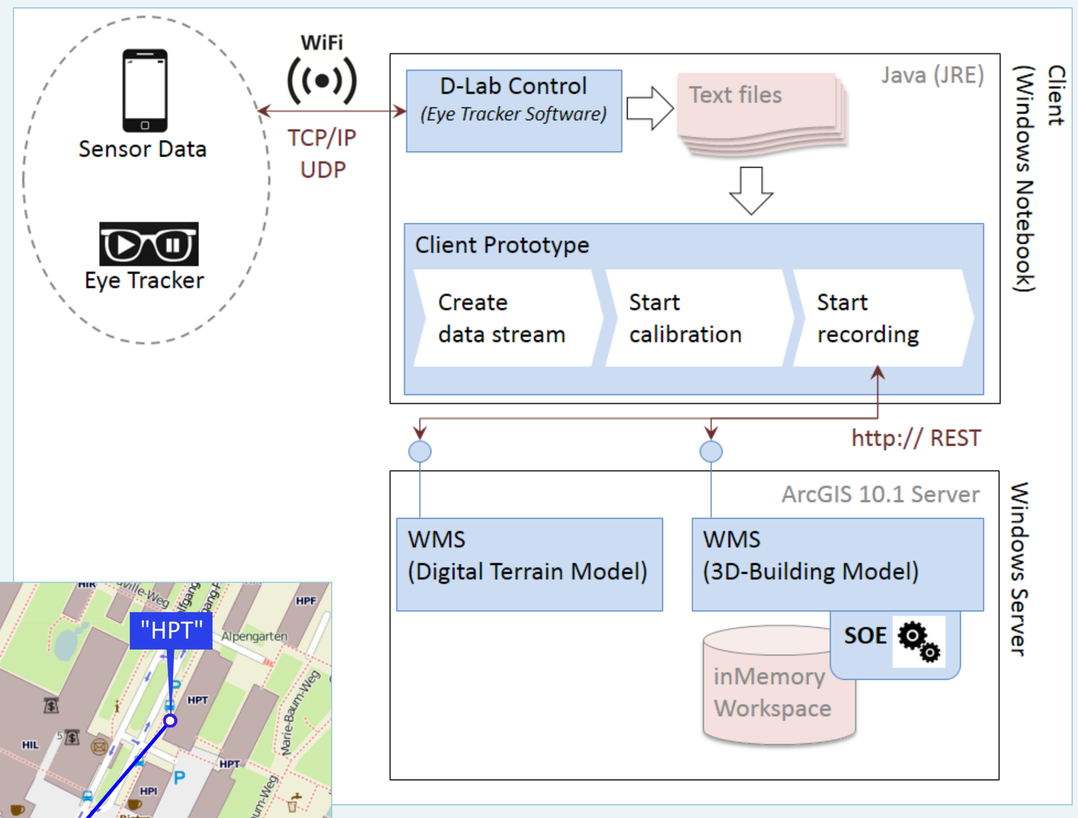
- The vast quantity of gazes
- Overwhelming the user with unnecessary information
- Real-time requirements and the unavoidable computation time

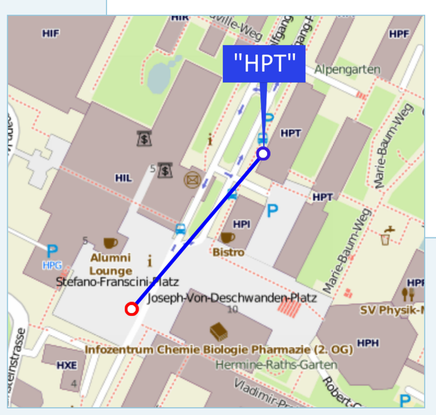
Approach

- Decreasing the number of gazes by using fixation* vectors
- Dwell time approach was used to retrieve relevant information
- The most efficient geoprocessing service technique was used

*fixations are temporal and spatial clusters of gazes

THE IMPLEMENTATION





The ArcGIS Server 10.1 was utilized since it can be programmed. This was essential for extending the server with 3D-Intersection functionality. The duties between client and server were assigned as follows:

Client

- Links sensor data, system calibration, requests corresponding altitudes from the Digital Terrain Model WMS and calculates 3D gazes

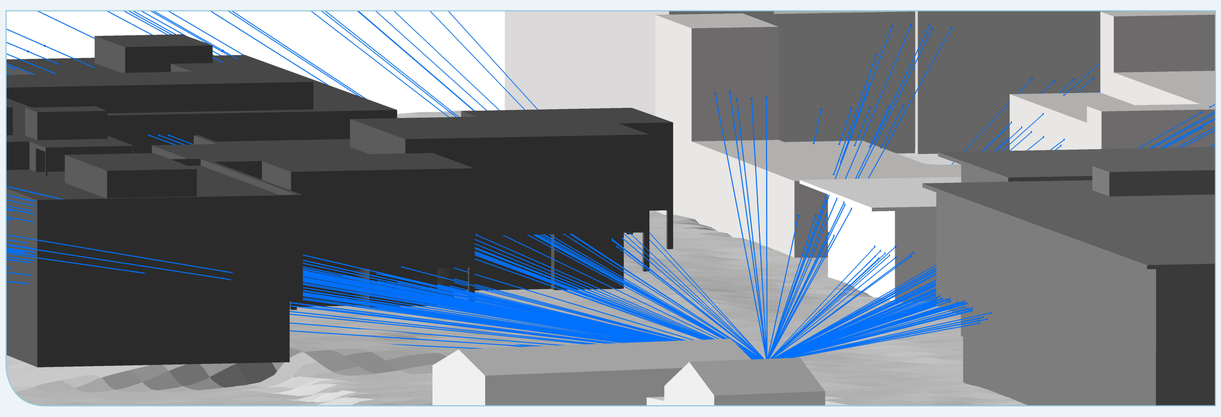
Server

- Computes 3D-Intersections between a gaze and a building
- Performs a query to select the first visible intersection to get its 3D-coordinates and the corresponding building name
- Sends the requested information back to the client

Client

- Publishes server responses on the graphical user interface
- Thus a moving gaze can be observed on the map window
- If a gaze hits a building, then a pop-up with its name appears

FUTURE DIRECTIONS



Increase the ***effectiveness*** of the prototype

- Real-time correction services
- Precise GPS/ GNSS Sensor

Improve the ***visualization*** of the server responses

- Enabling the new ArcGIS City Engine for 3D visualization