

## **Geomatics Master Project 2 - Spring Semester 2024**

The following list covers a collection of possible thesis topics for Master students in Geomatics.

Your individual assignment will be adjusted with respect to scope and research/practical focus. You are also welcome to suggest topic adjustments to account for your individual interests.

Please contact the advisor / supervisor of each respective topic for more information.

**Content:** 

A sampling tool and visualization prototype for geo-localized emotions Building a planning tool for the E-Bike City





| Chair:                              | Geoinformation Engineering   |
|-------------------------------------|--|
| Supervisor                          | Prof. Dr. Martin Raubal, <u>mraubal@ethz.ch</u>  |
| Advisors / further supervi-<br>sors | Yiwei Wang, <u>yiwewang@ethz.ch</u><br>Dr. Peter Kiefer <u>pekiefer@ethz.ch</u>  |
| Thesis Title:                       | A sampling tool and visualization prototype for geo-localized emo-<br>tions  |
| Abstract:                           | The experience sampling method (ESM) is used by scientists from various disciplines to gather insights into the intra-psychic elements of human life, typ-<br>ically by self-reporting from the participants of their activities or emotions mul-<br>tiple times a day <sup>[1]</sup> . It can contribute to improving personal reflection and shar-<br>ing of experiences. In the scope of the Eyes4ICU DC 12 project <sup>[2]</sup> , we aim at<br>using gaze and other data sources to detect travelers' emotions for geo-local-<br>ized experience logging. To gather the timely emotion feedback of the users,<br>we need a mobile application for collecting a user's emotions and a map-based<br>visualization prototype for travel experience logs.                                    |
|                                     | The goal of this project is to develop a web app consisting of a frontend web interface and a backend server with a database for collecting emotions from users while travelling, and to visualize the collected data with a web map. The app should support different modes of data collection frequency, enabled through push notifications from the web on mobile devices. Additional data, such as time, location and user feedback should be recorded. The collected location data need to be processed to extract trajectories and major stop points, and together with the attribute data, they will be visualized appropriately. Users should also be able to export the data in a proper format. Furthermore, a user experience study is needed to test the usability of the web app. |
|                                     | Emotion sampling tool  Emotion sampling tool   |
|                                     |  |
|                                     | Please tell us how you feel now Time: 16:11 23.11.2023<br>Location: Bürkliplatz<br>Emotion: xxx<br>Annotation:   |
|                                     | Zurrich OZürich  |
|                                     | Figure 1 Figure 2  |
| Movimum of groups and               | <ul> <li>[1] Niels van Berkel, Denzil Ferreira, and Vassilis Kostakos. 2017. The Experience Sampling Method on Mobile Devices. ACM Comput. Surv. 50, 6, Article 93 (November 2018), 40 pages. <u>https://doi.org/10.1145/3123988</u></li> <li>[2] <u>https://www.geogaze.org/eyes4icu-dc-12/</u></li> </ul>  |
| No of students per group            | 1 group / max students 2   |





| Chair:                               | Geoinformation Engineering  |
|--------------------------------------|---|
| Supervisor:                          | Prof. Dr. Martin Raubal ( <u>mraubal@ethz.ch</u> )  |
| Advisors / further super-<br>visors: | Nina Wiedemann ( <u>nwiedemann@ethz.ch</u> )  |
| Thesis Title:                        | Building a planning tool for the E-Bike City  |
| Abstract:                            | In urban areas, cycling is unmatched by other transport modes in terms of sustainability, health and space efficiency. However, the lack of cycling infra-<br>structure in Zurich is a major obstacle, preventing many people from cycling on a regular basis. In the E-bike City D-BAUG lighthouse project <sup>[1]</sup> , seven research groups are collaborating on a visionary idea: Dedicating ~50% of the road space to (e-)bikes. A key part of the project is the design of the street network. For this purpose, we have developed an optimization approach that allocates bike lanes with the goal of minimizing travel times for cyclists and cars.   |
|                                      | The task for this project is to extend the optimization approach and to develop<br>a web app that serves as a prototype for showcasing the algorithm. As in the<br>figure below, the tool should have sliders to set the input parameters (e.g., the<br>desired weighting between car and bike importance) and should be able to<br>visualize the resulting street network. In the background, the app needs to call<br>a Python backend that executes the optimization algorithm. There are many<br>further possible avenues to extend the functionality of the algorithm or to im-<br>prove the web app, such as evaluating the "goodness" of the bike network with<br>respect to several metrics, such as safety, accessibility and green spaces. The<br>project will be a team effort including frontend and backend development. |
|                                      |   |
|                                      | Car v Bike Bike Safety Car v Bike Bike Safety   |
| Number of students per group         | [1] <u>https://ebikecity.baug.ethz.ch/en/the-project.html</u><br>2-4  |
| Maximum number<br>of groups          | 1   |