

Module Description

Mobile Geoinformation, Routing & Wayfinding

General Information

Module Code

GEO MobilGI

Module Category

Specialization

Lessons

3 lecture and exercise periods per week

Number of ECTS Credits

3

Module Language

Taught in English

Materials in English

Projects (report, writing text section, presentation) can be completed in German or English

Module Description

With the rapid advances in mobile communications, the increasing performance of the smallest portable computers and positioning technologies, the vision of "geo-information for everyone, everywhere and anytime" has become a reality. For the development of modern mobile geoinformation solutions, but also concerning their professional use, a solid understanding of the underlying concepts and technologies is an important prerequisite. The necessary basics as well as knowledge about current and future application possibilities will be taught in this module.

Firstly, the term 'mobile' in the context of this module includes *navigation or propagation in networks*, which is based on the following aspects:

- Graphs as mathematical models for network-like structures.
- Optimal route calculations (routing)
- Analysis of networks (reachability, centrality, reliability, etc.)

Secondly, the term 'mobile' is intentionally kept broad in the context of this module. It describes the *mobile, location-independent use of geoinformation technologies*, which builds on the following concepts and technologies:

- Positioning and localisation technologies for different application scenarios.
- Lightweight mobile devices with mostly small displays
- Suitable interfaces and services for optimal interoperability.

A whole range of prospective (mobile) geoinformation applications builds on these foundations, such as:

- Optimisation of networks in transport, energy supply, etc.
- Logistics / optimisation of routes
- Mobile navigation / optimal route calculation
- Localisation and orientation inside buildings (indoor)

Learning Objectives, Contents, Methods

Learning Objectives and Acquired Competences

- Students can explain the most important concepts and basic technologies for location-based services (LBS).
- They assess the various possible applications of learned concepts as well as strengths and weaknesses of different methods and technologies in the realisation of mobile geoinformation solutions.
- They explain the concepts and methods for modelling and analysing network-like structures and explain basic procedures for route calculation and optimisation.
- They analyse the possible applications of the concepts and methods covered and show suitable approaches for solving and answering specific problems and questions.

Contents of the Module

- Introduction
- Geographic routing & wayfinding with R

- Introduction to R
- Graph Theory - Introduction and Basics
- Routing & Wayfinding
- Location Based Services (LBS) & Technologies (guest lecture)
- 3D Mobile Apps & Augmented Reality
 - Creation of 3D Mobile Apps with Unity3D
 - Creation of Augmented Reality Apps with Unity3D with OpenCV and Vuforia
- Selected topics / outlook

Module outline

- Geographical Routing & Wayfinding (approx. 5 weeks)
- Mobile 3D Apps & Augmented Reality (approx. 4 weeks)
- LBS guest lecture
- Applied examples from LBS, GeoRouting & Mobile Apps (approx. 5 weeks)

Teaching and Learning Methods

- Lectures (approx. 2 lessons per week)
- Exercises (approx. 1 lesson per week)
- Self-study, exercise work and written report of selected supplementary content

Assessment

Assessment and Testat Requirements

Final module exam

Exam duration	90 minutes
Permitted aids	Written summaries (max. 4 pages A4, single-sided, handwriting)

Remarks

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