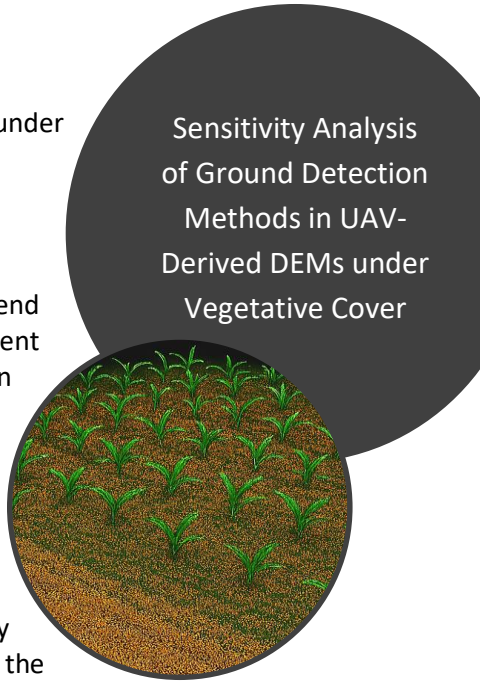
Universität Stuttgart

IWS Department of Hydraulic Engineering and Water Resources Management
Prof. Dr.-Ing. Silke Wieprecht

B.Sc. Topic

"Sensitivity Analysis of Ground Detection Methods in UAV-Derived DEMs under Vegetative Cover"



Background

The development and calibration of numerical hydro-morphodynamic models depend on high-quality input data, particularly digital elevation models (DEMs). In recent years, unmanned aerial vehicles (UAV), commonly known as drones, have seen widespread scientific use for capturing aerial imagery and generating DEMs through structure-from-motion (SfM) photogrammetry. However, the presence of vegetative cover poses substantial challenges to accurate ground surface detection, often resulting in errors or imprecision in the derived DEMs.

This thesis aims to develop an efficient workflow for generating reliable DEMs from UAV imagery in areas with vegetative cover. For this purpose, aerial imagery will be collected using a DJI Phantom 4 RTK drone over a designated test site on the Campus Vaihingen. Ground reference points will be surveyed using a Leica GNSS system to serve as control data. Then, multiple processing workflows will be developed and applied to generate DEMs. Ultimately, their accuracy will be evaluated against the control data to rank the methods based on precision. The resulting workflow will support a broader research initiative assessing the impact of climate change on soil erosion dynamics in agricultural landscapes.

Thesis Overview

1. Record aerial images and reference points.
2. Review literature on ground classification from UAV imagery with vegetative cover.
3. Develop and apply workflows to create ground data DEMs.
4. Analyze DEM quality and give workflow recommendations.

Desirable Skills

- Interests in fieldwork and data processing.

The thesis can be written in German or English.

Apply now!

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