

# Using hyperspectral imaging onboard of unmanned ground vehicles for inspection and navigation purposes

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## Summary

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*This thesis focuses on hyperspectral imaging (HSI) with machine learning for monitoring environment parameters. The PhD candidate will learn HSI technology and its uses for modern industry and deep learning for image classification.*

Research field:	Electrical power engineering and mechatronics
Supervisors:	Prof. Dr. Anton Rassölkin Dr. Dhanushka Chamara Liyanage
Availability:	This position is available.
Offered by:	School of Engineering Department of Electrical Power Engineering and Mechatronics
Application deadline:	Applications are accepted between June 01, 2022 00:00 and June 30, 2022 23:59 (Europe/Zurich)

## Description

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The department will provide required imaging hardware, software for HSI research as well as required unmanned ground vehicles (UGV) platforms. Moreover, the department will arrange necessary facilities for the candidate to collect necessary data.

The PhD candidate will develop necessary evaluation methods for identifying spectral bands for HSI with respect to inspection and navigation tasks and devise a generalized criterion for band selection regarding latest trends in industry.

The main tasks of the thesis are:

- 1. Understanding of the main concepts of computer vision, especially spectral imaging**
  - A literature study in the field of HSI and remote sensing must be performed to understand the field trends and analyze possible research gaps.
- 2. Research into state-of-the-art machine learning methods for HSI analysis**
  - Identify / further development of machine learning models for HSI analysis.
- 3. Development of the UGV collaboration methods and their implementation**
  - Develop and implement energy optimization navigation methods
  - Multi agent system in different capabilities will be researched.
- 4. Evaluate the effectiveness of the proposed methods**
  - Evaluate the developed models in relation to the practical application.

## The applicants should fulfil the following requirements:

- Master's degree in electrical engineering or mechatronics
- Experience with common scientific software and development environments (e.g. Matlab, ROS, Visual Studio, PyCharm)
- Experience with computer vision libraries and programming languages (e.g. Python, C#, C++, Pytorch, OpenCV)
- Experience with common research support software (e.g. Office 365, Mendelay, LaTeX, etc.)
- Practical experience with publishing and presenting research works (e.g. conference papers)



- Very good command of English
- Fluent Estonian language skills in written and oral are eligible



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