

# Platform for Farm Robotics

## Conceptualize, Design and Build Drive Modules

### Graduate



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**Problem:** The open-source initiative "OFA: Open Field Automation" of the Bern University of Applied Sciences - School of Agricultural, Forest and Food Science (BFH-HAFL) aims to accelerate the development of robotic, agricultural systems and to make them simpler and more cost-efficient. For this purpose, a development kit is to be created as a basis for future systems.

The University of Applied Sciences of Eastern Switzerland (OST), as one of the involved research institutions, is developing a component of this development kit. A machine (hereafter called "rover"), which transports tools and workpieces autonomously or by remote control, is to be developed.

**Definition of Task:** In this bachelor thesis, drive modules as well as their control system are developed as parts of the rover. These are designed as modular components, so that a vehicle can be equipped with different combinations of them, depending on the requirements.

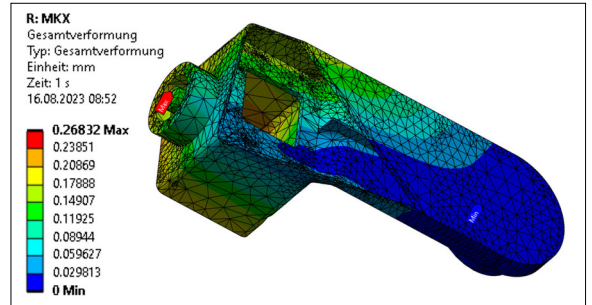
The drive modules are conceptualized, designed and manufactured. Operation of these requires a test setup including a power supply and control system. A computing platform, motor drivers and the sensors will be evaluated, procured and put into operation. For the control of the modules, the software, using a Linux operating system with real-time capability, will be written.

**Result:** One module was completely manufactured and successfully put into operation, except for the assembly of the wheel hub gear and the wheel, a second one partially. The on-board computer was set up, programs and interfaces tested. The motor drivers were successfully controlled via CAN-Bus. The remote control can be read out, the position can be determined via real time kinematics and the motors

can be driven. The software for controlling the modules could not be tested on a complete rover. Reasons for this were problems at a supplier as well as the large amount of work. The project represents an initial stage for the final product, nevertheless a basis for further development at the OST was created.

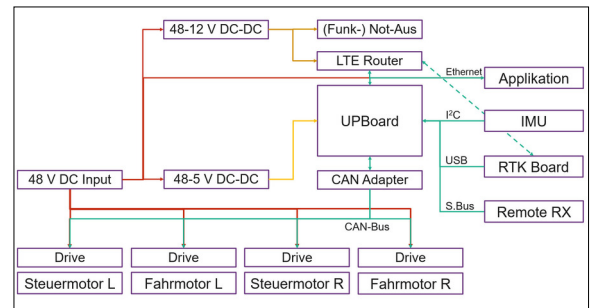
### FEM Analysis of a Component

Own presentation



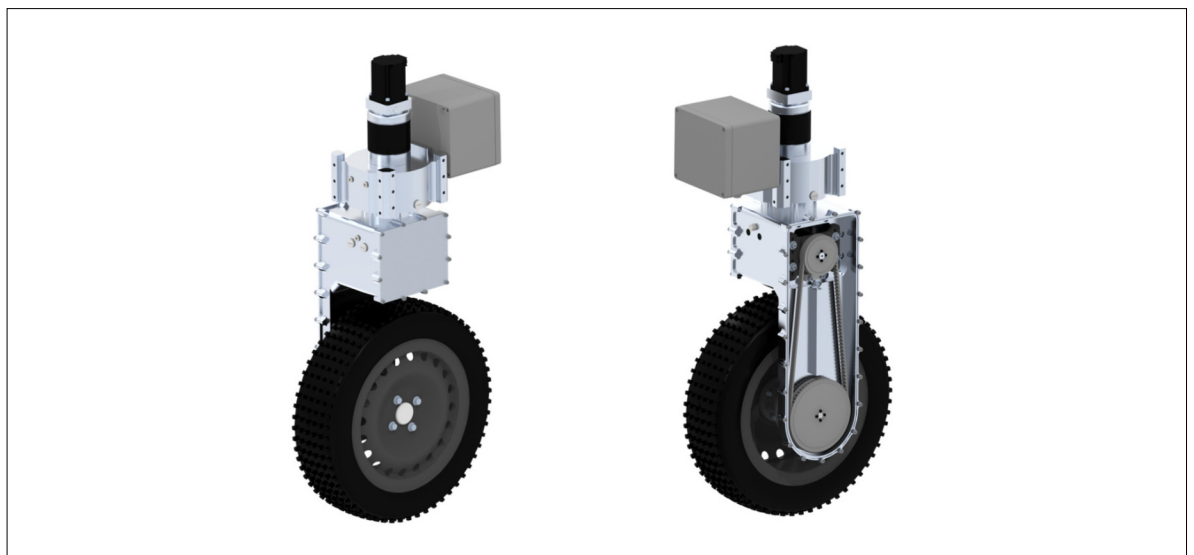
### Hardware Block View

Own presentation



### Design of the Drive Module

Own presentation



### Advisor

Prof. Dr. Urs Graf

### Co-Examiner

Prof. Dr.-Ing. Matthias Scholer

### Subject Area

Computer Science,  
Mechanical  
Engineering,  
Electronics and Control  
Engineering