

Student research project Communication setup between test bench components

An electric drive contains the inverter, the electric machine and the control algorithm. After a new control method has been developed in simulation successfully, it must be also verified within a real-world experiment at the test bench. View values from single measurements can be read out and reported manually, however, a fully automated test bench comes with many advantages. Thus, in this work the communication between the measurement components and the dSPACE MLB II, which acts as the main controller, should be established. For this, the measurement components must be connected via bus or direct connection (trigger signal) to the MLB II, to start a measurement process. In addition, also some results, i.e., the efficiency, should be transferred back to the MLB II to use it in an closed-loop optimization manner. Further components, such as the DC source, must be controlled via the MLB II too, i.e., the voltage and current limits as well as the actual voltage must be set via ControlDesk. In addition, these values should be visualized in ControlDesk for the test bench operator. An exemplary setup is shown in Fig. 1.

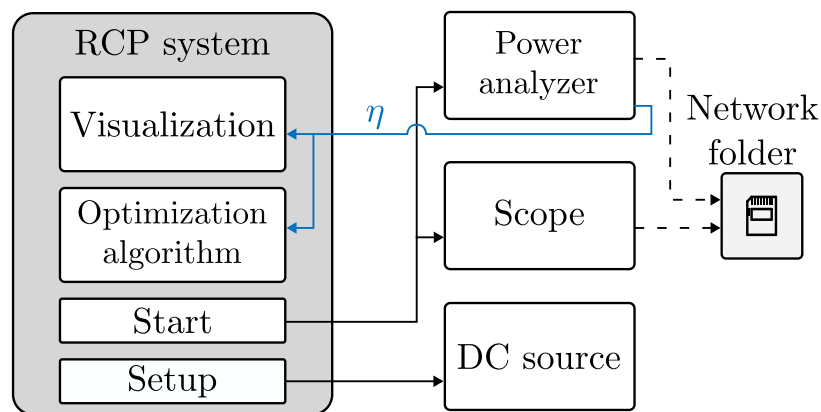


Figure 1: Structure of the components, which are all controlled by the dSPACE MLB II.

Necessary requirements:

- Finished course work on power electronic fundamentals
- First experiences in MATLAB/ Simulink or Python
- Interest in transmission protocols

WP 1: dSPACE environment**[1 weeks]**

The first part of this work involves familiarizing yourself with ControlDesk, ConfigurationDesk, and MLB II. This includes setting up all software components and running a simple demo project to get an overview of the system.

WP 2: Power analyzer**[2 weeks]**

The power analyzer is the first component that needs to be integrated into the toolchain. Therefore, a simple example of a measurement setup (with the current transducers) must be created in real world and then configured in the OXYGEN control software of the power analyzer. After that, the measurement process can be started, and the calculated efficiency value should be fed back to the MLB II and visualized in ControlDesk.

WP 3: Oscilloscope**[2 weeks]**

The second component that must be integrated into the toolchain is the oscilloscope. The start/trigger signal for starting the measurement process must be sent from ControlDesk. Furthermore, the signal/trigger to stop the recording must also be generated in ControlDesk. Due to the expected high amount of data, the recorded data must be stored (with a proper name) on a network folder for a later usage.

WP 4: DC source**[1 weeks]**

The DC power source also has a communication module that can be used to set the voltage, current and power limits. In addition, the applied voltage must be set and visualized in ControlDesk for the test bench operator.

WP 5: Documentation**[1 weeks]**

All work should be reported according to the GitHub repository.

Gantt chart

The planned timetable is shown in the Gantt diagram below.

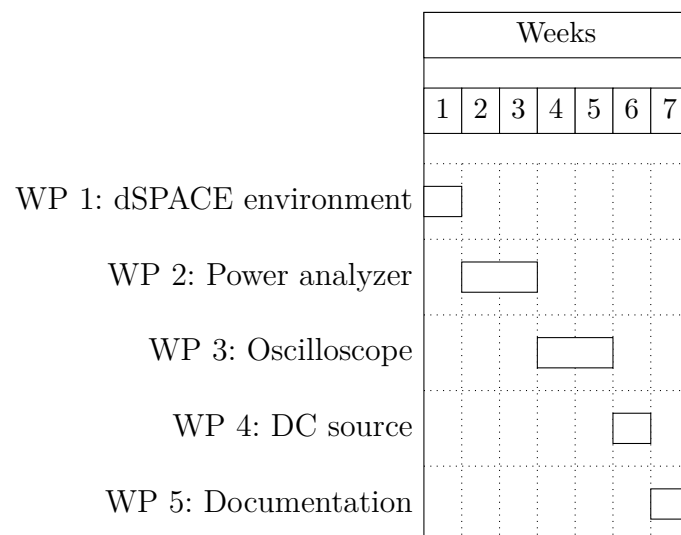


Figure 2: Gantt chart for the thesis (assuming student full time work on project).