

Projektarbeit

Realization of E/O Adapter for I2C Bus and Matlab GUI for Control of Integrated Circuits through a Micro-Processor

In our Project MRexcite, we develop RF circuits for a Magnetic Resonance Imaging system on the basis of commercial ICs. In particular, DAC and I/O integrated circuits require digital control which can be realized by the serial two-wire I2C bus. To allow easy programming and running the bus system from a GUI in Matlab, bus control is required from a PC through its USB interface. A microprocessor has to be inserted in order to convert the USB protocol into the I2C protocol. Since the PC will be in far distance to the RF circuits to be controlled, the I2C bus signals have to be converted into optical signals, transmitted over plastic fiber and reconverted back to electrical signals.

The task of the project is to realize a full functioning control system with the following steps:

- Design and realize an E/O converter for the I2C bus with plastic optical fiber transmission lines (use P82B96 bus buffer, HFBR-1528 /2528 optical transmitter / receiver and VLINK connectors with POF to modify published opto-electric isolation circuits).
- Design and realize a test circuit PCB with a number of integrated circuits with I2C control (use a DAC from Maxim "MAX5115", an I/O expander "PCA9501" and a bus extender "P82B" from NXP).
- Extend an existing Matlab code for the conversion of USB control into I2C control by an Arduino micro-processor so that the test board circuits are properly accessed.
- Realize a Graphical User Interface in Matlab on the PC for the control of the test board circuits through the bus system.
- Test the components and the complete system and provide documentation for transfer of results into the research project.

At the end of the work, a public presentation of results is to be given.