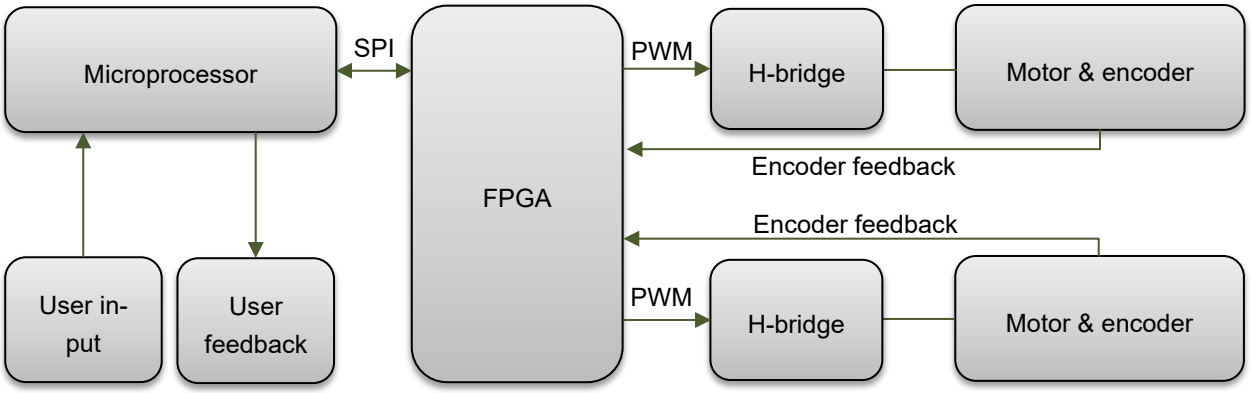
Control of a pan-tilt system

Project description

The purpose of the project work is to design and implement a control of a pan-tilt system that enables control of the system from one or more user inputs, e.g. a joystick, a keyboard, buttons or via commands from a computer. An overview of the system is given in the figure below.



The project must include the following:

- Analysis and modeling of the individual components of the system
- Analysis and design of control loops
- Documentation of the PFGA design and implementation
- Documentation of the design and implementation of the software for the microcontroller, including the partition of tasks and choice of scheduling
- Test and verification of the system

Project groups are free to choose control types as well as requirements regarding properties of the control loop. However, there are a few general requirements to the system:

- Control must be implemented on a microcontroller
- The SPI interface must be used for communication between the microcontroller and the FPGA.
- The FPGA must drive the PWM signals to the motors.
- The FPGA must be utilized to determine the position of the motors based on the encoders.

The following will be made available for all groups:

- Pan-tilt system
- PCB with double H-bridge
- Datasheets for components and drawings on blackboard.

You are expected to be able to argue for decisions made in the project. Therefore, consider

- to be curious and analyze problems/observations that you encounter such that you have a solid basis for a decision as possible;
- what conclusions you expect to draw from an experiment and review the design of the experiment accordingly.

The project, which has a scope of 10 ECTS, concludes with an oral examination, which is based on a submitted project report. The report is intended to document and disseminate project results and supporting theory in a structured, understandable and reproducible form. The report must be a maximum of 45 pages and must be submitted no later than 31st of May, 2024 at. 12:00.