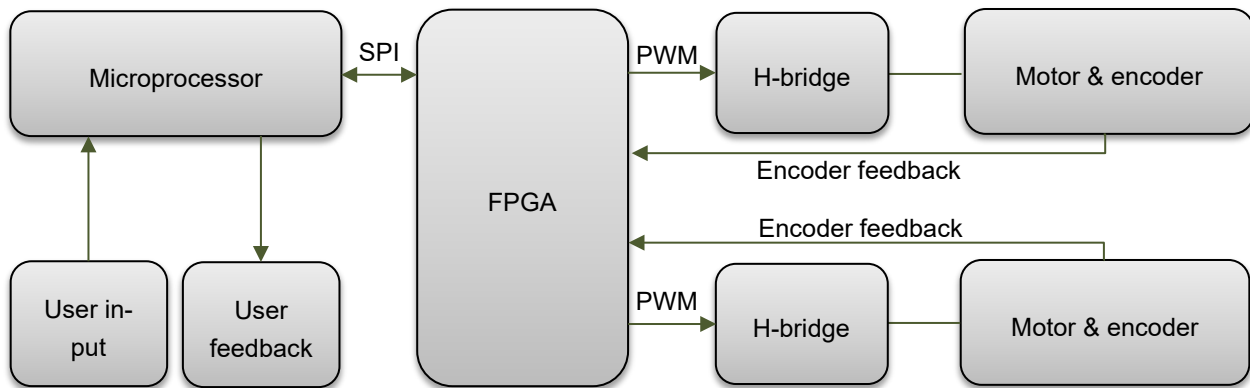


## Project description for the semester project on the 4th semester

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 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.

Throughout the semester there will be activities organized via ItsLearning to assist with the project

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 50 pages and must be submitted no later than 30<sup>st</sup> of May, 2025 at. 12:00.