

Brake Slider with Active Force Feedback

Degree programme: BSc in Micro- and Medical Technology | Specialisation: Mechatronics
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Human-Machine Interfaces are a well-established and popular choice to provide the primary control interface between driver and vehicle. The slider, which is to be newly constructed, is to be provided with active force feedback functionality. The desired brake value, which is proportional to the slider travel, is measured electronically and the measured hydraulic pressure is used as feedback value.

Motivation

In order to enable people with a physical impairment to operate vehicles safely and thus ensure their mobility, special input devices adapted to the impairment are necessary. Thanks to creative minds that build assistive technology devices, physically challenged people can keep their individual mobility. With „joysteer 3.0“, the company Bozzio AG offers an electronic, modular „Drive-by-Wire“ system for steering, braking and accelerating a vehicle. Depending on the driver's impairment, different input devices can be used.

Goals

The aim of this thesis is to develop a brake input device with active force feedback. The force feedback applied is evaluated at the moment of braking by means of analogue pressure sensors placed in the hydraulic hoses of the vehicle. This determines the intensity of the feedback signal. Data transmission between the modules is based on a CAN bus system.

Results

The motor controller (EPOS4), attached below to the braking device (see Fig 1), communicates with the control unit based on a STM32F4 microcontroller via one CAN bus system. A second CAN bus system communicates with the actuator responsible for physically braking the vehicle.

The library functions, to be able to read and write to the objects (that contain the motion information), are programmed in C on STM32CubeIDE.



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Outlook

Different operation modes will be tested to finally conclude on the most agreeable Feedback functionality. Furthermore, the system will be fit to work as a stand-alone module and integrate into the vehicle as shown in the example of Fig 2.

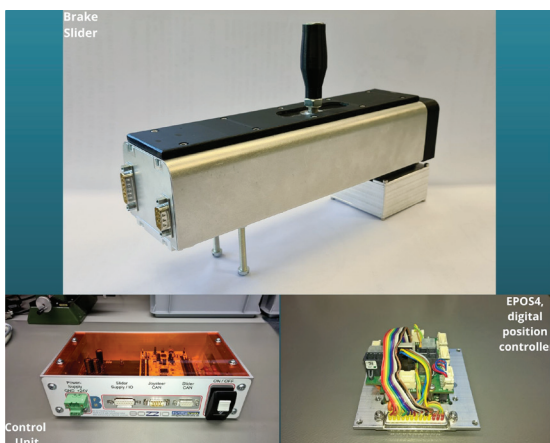


Fig 1: Brake Slider prototype with the main components of the system



Fig 2: Bozzio AG HMI's joysteer example