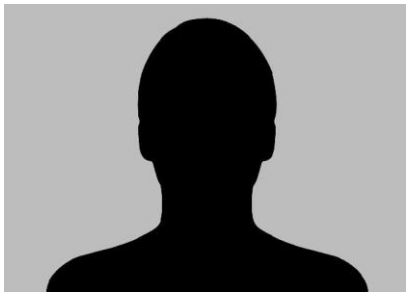
Zurich University
of Applied Sciences

School of
Engineering

InES Institute of
Embedded Systems

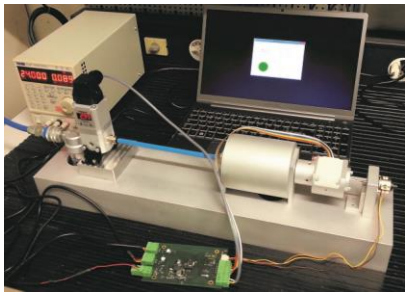
Concept for energy optimization of the control of linear motors



Diplomandin
Irene Saxer

Dozent
Andreas Gieriet

The company Aquis Sanitär AG uses linear motors in their lavatory faucets. These linear motors are used to open and close the valves in the water supply lines electronically. The motors require constantly a lot of energy, so they are currently still energized by a power supply. In the future, the linear motors will be operated with battery. However, batteries have limited energy. This is the reason to find out if the motor can be driven with battery, when these are optimally controlled. Therefore, the properties of the linear motors must be measured realistically. The goal of this work was to develop a concept how the control of linear motor can be optimized.
After obtaining detailed requirements, different approaches have been studied. One approach has been selected and implemented. Some elements were borrowed from the existing electronics. Also parts of the existing software could be used and extended. In addition a program was created so that the whole system is easy to use.
The resulting measurement system is able to measure the motor with different voltages and pressures. A pressure force transducer was developed, which converts the regulated compressed air into force. This force pushes the spindle of the motor and simulates the water pressure. The system checks with a magnetic incremental encoder, if the linear motor drives all set steps. Also, the required current and the set voltage are measured. The measured results are shown in the operating program and additionally stored in a file. So it can be determined at which minimum voltage the motor must be controlled at different pressures. With a few enhancements of this measuring system, it is possible to use these test results and optimize the companies electronics, so that the linear motor can be optimally controlled and operate on battery power.



Resulting measurement system:

Control electronic (front), pressure-force transducer with step monitoring (center), motor (mounted on the right) and PC with the operating program (back)

User interface of the operating program