

Fachbereich Elektrotechnik und Technische Informatik
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Project Work, Bachelor
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Development of a Control Unit for Pump Control to Collect Particles on Filters

Abstract

In times of nuclear power plant disasters such as Chernobyl and Fukushima, it becomes more and more important to be aware of radioactivity. Living in the age of nuclear energy is not only our benefit in affairs of great energy source but it entails also dangers we have to deal with. The more is known about this radioactivity the better can thus be handled. Therefore, an accurate measurement of radiation and other particles that is feasible in many places is very important.

The goal of this project is to design an electronic control unit for some electronic parts. First, a suitable microcontroller which is able to implement the desired functions is selected. Then a CAN bus interface for communication with external devices is designed. Afterwards, a differential pressure sensor is chosen to determine the volume flow to calculate the concentration of particles. Furthermore, a circuit for the battery monitoring is developed to avoid deep discharging. This is done by measuring the battery voltage and interpreting the value with the software. The air volume flow is caused by an adjustable vacuum pump. This vacuum pump has to be interfaced for controlling the air volume flow. To realize an automatic filter changing system, two stepper motors are implemented to turn a filter role system. The stepper motors have to be driven and controlled. In addition the battery voltage has to be converted to all needed supply voltages.

All individual functions are first treated separately and tested in individual circuits. The final state is a first concept of the final solution. It consists of four PCBs which fulfill all given specifications.

Examiner: Prof. Dr.-Ing. Uwe Meier