Abstract

In today's modern vehicles, more and more functions are implemented by electronic control units. In these controllers, flash memory is most commonly used for data storage. In the case of safety critical features, it is essential to ensure proper data storage. AUTOSAR is an automotive software standard that defines the requirements for the memory handling safety critical software modules.

My task was to develop a fault injector software that can simulate different types of damage to the flash memory, thus examining the fail safe capabilities of the flash memory-based journaling file system.

In the first chapter of my thesis, I present the features of the flash memory, the architecture of the AUTOSAR standard, with special attention to the structure of memory management modules, and the nature of fault injection testing.

In the second chapter of the thesis, I present the considerations that were taken in the development of the test environment, I give an estimation of the run time of the test, and then detail the structure of the implemented test environment.

In the following chapter, I detail what kind of pre-defined flash memory content should be used for the fault injection. I also outline the design process of the algorithm that handle the memory operations after the fault injection. I also detail the design process of the transmission protocol which ensure fault tolerant transmission.

In the last chapter of the thesis, I present the process of creating the flash memory contents, the behavior of the fault injection algorithms, the implemented transfer protocol algorithms and the implementation of the test report generation.

I conclude my thesis by demonstrating the proper functioning of the test software algorithms.