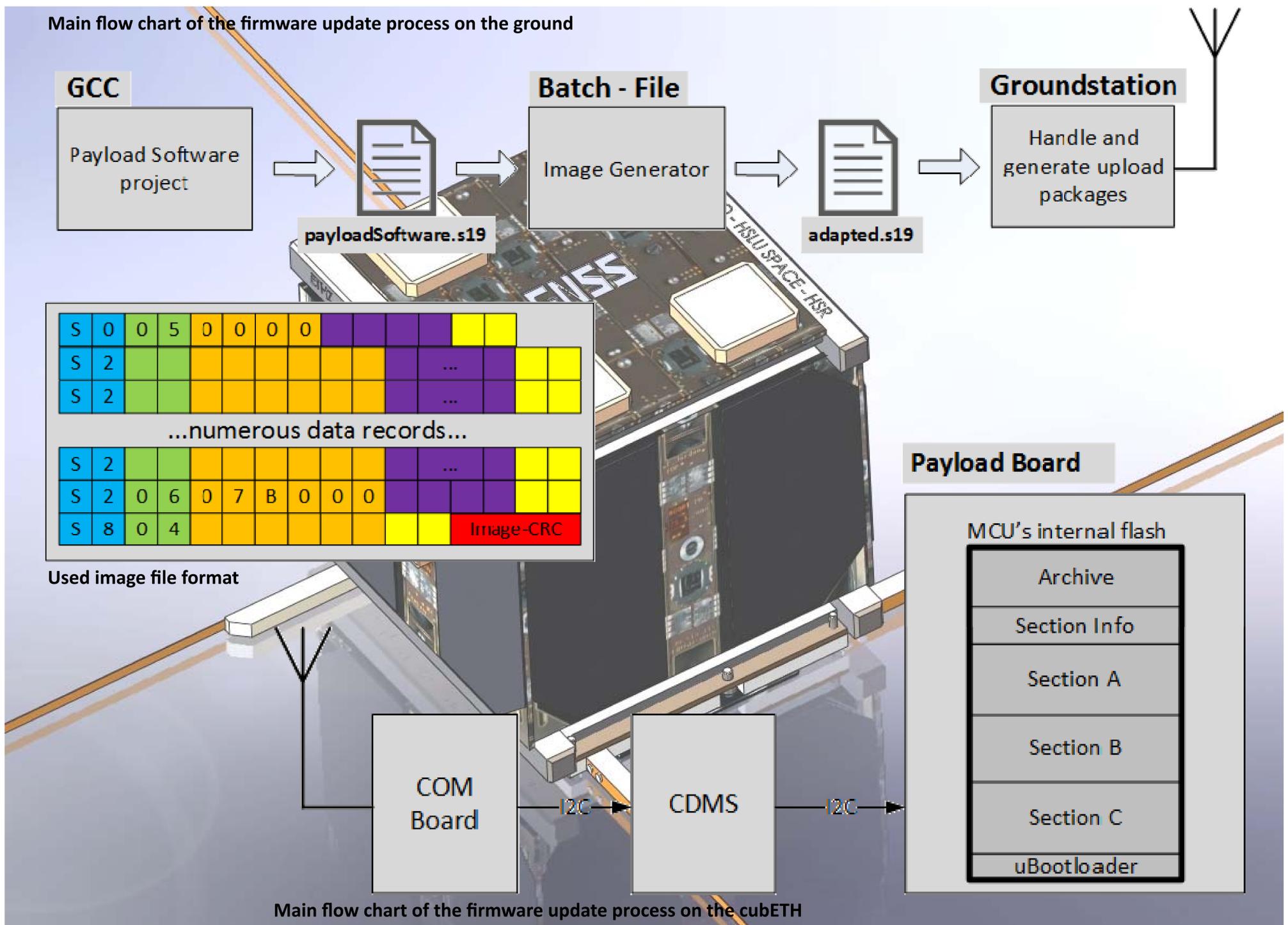


Bachelor-Diplomarbeit Elektrotechnik 2015

CubETH - Payload Firmware: Updates



Problem Statement

The Lucerne University of Applied Science and Arts is developing the Payload for the CubETH. The CubETH is a pico-satellite that has the goal to determine the orbit and the altitude with the use of GNSS receivers, which are a part of the Payload.

Because there is no physically access to the hardware when it's in the orbit, it requires a boot-loader and remote firmware update functionality. Additionally, this firmware needs to be tested

and verified before launch. The goal of this thesis was to change the development environment, so that it's possible to use GNU tools in future projects to test and verify the firmware and to improve the existing firmware update process.

Solution

The payload software and the uBootloader has been moved in a first step from a proprietary development environment (IAR) to a more modern one (Eclipse with GNU). To have again com-

parable code size, the applications were optimized. In a second step, the firmware update process was improved. For this, a batch file is implemented to adapt the image file for upload. To have the ability to upload just a patch, a console application is developed from scratch to generate a image file with the difference between two application versions. Also a new image file format is introduced, which is better handled by the used tools.

The result of this thesis makes a solid foundation to continue the

development on this project, and additional GNU tools can be used in future to verify and test the firmware before launch. The firmware update process has two modes, the full update and the patched update. With the new developed console application just

Kneubühler Siegfried

Advisor:
Prof. Erich Styger

Expert:
Dr. Christian Vetterli