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CTU Diploma Project review- 2nd reviewer's evaluation of master thesis with title " Simulation and control toolkit for small satellite projects" by Space Master student Adam Smialek.

I find that the goal of the thesis project fulfills the requirements of a master thesis in space technology. The work concerns implementation of an open source AOCS toolbox, mainly for inexperienced users for small and low budget satellite projects.

Chapter one includes a review of some available tools within the field. This is a very important part of a project like this, since this part motivates the whole project. The review is not extensive and some already existing open source software is left out. Since the chosen solution is partly based on existing libraries (Matlab, Simulink, STK) the review could have been broader, seareching for other libraries with existing components in for example python etc.
The requirements for the projects are not stated explicitly in this chapter, but are implicit (partly) in the comparison table and are then listed somewhat different as objectives. Starting with requirements before review and comparison would have been better.
In the comparison open source is listed, but this is not a requirement, and the solution chosen is based on Matlab/Simulink tools.

Chapter 2 presents the software architecture and the different components of the software. I find the architecture to be neat and clean, and the idea to have a common signal bus is good for modularity and extension of the component database.
The main drawbacks of this chapter are the lack of references to the mathematical models of the components, and the lack of verification of the individual models.
References shall always be given, but as the author consider the thesis as documentation for the software, it is even more important to give the user references to the mathematical background for each component. It is a very good idea to provide information attached to the model itself as described in chapter 4, but this is not enough.
It is also of importance for the user to trust the software, and it need to be tested and verified component for component (and as an integrated model). Moreover it is important to know possible limitations, accuracy etc.,both for each component and for the complete system. This is not discussed in the thesis.
The base models should capture the most important characteristics of the components. This is not always the case, for example is noise an important issue for accelerometers, and drift for gyros. This is not included in the models.

Chapter 4 includes three example simulation models. The examples are not verifications of the models, but shows how models can be set up and used in the design process.
The overall trend of the graphs shows a correspondence to what would be expected, and can be seen as a 2sanity check" but there are some issues that should have been commented: what is the reason for the similarities of the shape for the different graphs in fig. 4-9 and 4.22?

Summary:
The student has put in a sufficient effort into the task: he has implemented complete model including a

baseline database with relevant components. The result of the thesis project may contribute to a future solution to the problem addressed, but the model needs to be verified as a whole and for each component.

Based on the review above I recommend to grade the thesis by C(good). The oral presentation is still to be graded.

This review serves solely for the purposes of the diploma project defense at CTU. LTU official evaluation for the SpaceMaster double degree will follow the thesis defense and may differ from this review report and suggested grade.

Kiruna, September 25 2020

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