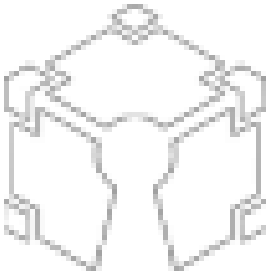

Contribution ID: **23** Type: **Talk**

Lessons learned by development of UPSat Attitude Determination and Control Subsystem

Tuesday, 15 October 2019 16:20 (20 minutes)

\documentclass[a4paper]{article}

\usepackage{amsmath}
\usepackage{amsfonts}
\usepackage{amssymb}
\usepackage{graphicx}
\usepackage{gensymb}

\begin{document}
\pagenumbering{gobble}

\Large
\begin{center}
Lessons learned by development of UPSat Attitude Determination and Control Subsystem\\
\hspace{10pt}

% Author names and affiliations
\large
Agis Zisimatos[1]\\

\hspace{10pt}

\small
[1] Libre Space Foundation\\
agis@libre.space\\

\end{center}

\hspace{10pt}

\normalsize
The purpose of this talk is to present the lessons
that learned form development of open-source CubeSat subsystem,
the Attitude Determination and Control System (ADCS) of UPSat.
The presentation is divided into three parts, the architecture
of the ADCS, the known problems and the results of life in orbit.

The ADCS is responsible to compute the pose of CubeSat and to
control, usually, the rotation of it. In order to do the above
functions, it uses sensors and actuators. The specifications that
achieved by the UPSat is 15\degree pointing accuracy, knowledge
accuracy of 5\degree and the CubeSat recovered from tip-off
rates of up to 10\degree/sec within 2 days.

Before the UPSat get in orbit, known issues in firmware and
hardware existed. The biggest of all was about the Global
Positioning System (GPS). The GPS wasn't fixed the position
in test campaign. This issue has led to the determination

algorithm hasn't worked properly. Other firmware issues are presented, such as the counter that measured the number of resets of ADCS. Also the test campaign didn't contain test for control algorithm due to limiting time of development. For the same reason a non open-source software used for simulation of the system.

When the UPSat was in orbit, limited extended Whole Orbit Data (WOD) was received. Using these data we conclude that the sensors have worked properly, the ADCS has time synchronization with On-Board Computer (OBC) and part of control algorithm worked. Due to GPS issue the determination algorithm and pointing controller didn't give the right results.

Last but not least, this presentation is an open-call for open-source software and hardware development of testing tools for ADCS.

To conclude, this talk summarize the success and the failure of the ADCS, a process that is valuable for the open-source development.
\end{document}

Primary author: Mr ZISIMATOS, Agis (Libre Space Foundation)

Presenter: Mr ZISIMATOS, Agis (Libre Space Foundation)

Session Classification: Talks

Track Classification: Development, Testing, and Lessons Learned