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ENABLING TECHNOLOGIES AND PROCESSES FOR SPACE MISSIONS - THE S2TEP PLATFORM

Abstract

Inventing and integrating new technologies into todays spaceborne platforms is inevitable for the technical demands, cost-effectivenes and tight schedules of future missions. The German Aerospace Center (DLR) as the national aeronautics and space research centre of the Federal Republic of Germany plays a central role within this demanding task. DLR focuses on technology research, development and maturation, working closely together with universities at basic research level on the one hand, and with industry at application level on the other hand.
The Small Satellite Technology Experiment Platform S2TEP is DLRs workhorse for doing this kind of research and development: focussing on scientific and technological needs and societal relevance, the S2TEP platform with its modular and scalable design offers the possibility to demonstrate novel technologies and increase their Technology Readiness Level (TRL) from 6 to 9 by in-orbit test and verification. This is absolutely necessary for doing innovative and pioneering research and development, thereby providing flight-proven technologies to future scientific and industrial missions.
The initial research on subsystem level is concentrated on the classical core avionic technologies like the onboard computer, its software, as well as power- and communication systems. But this list is open for further expansions in terms of its research scope, and national as well as European initiatives provide a fertile cooperation environment. By putting a huge emphasis on scalability from component to system level, the developed technologies have the potential to leave the small satetllite scope and be integrated into larger satellites as well. The flexibility of S2TEP-based missions is further extended by using a model-based design process and software development, simulation and automatic verification at different levels as well as a decentralized operational concept with a high degree of autonomy.
Within this paper we will give an overview of the S2TEP platform and its first Mission, which will start in early 2020. We will describe the novel development processes and the technologies forming the platforms baseline architecture. Finally, we will shed light on future missions, the needed platform configurations and – resulting from this – on prospective research and development challenges.