

30th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Interactive Presentations - 30th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (IPB)

Author: Mr. Michal Piwowarczyk
Lukasiewicz Research Network – Institute of Aviation (ILOT), Poland

Mr. Karol Bresler
Lukasiewicz Research Network – Institute of Aviation (ILOT), Poland

Mr. Konrad Wojciechowski
Lukasiewicz Research Network – Institute of Aviation (ILOT), Poland

Mr. Hubert Graczyk
Lukasiewicz Research Network – Institute of Aviation (ILOT), Poland

Mr. Mateusz Rusak
Lukasiewicz Research Network – Institute of Aviation (ILOT), Poland

DESIGN AND DEVELOPMENT OF ENGINE CONTROL UNIT FOR NANOSATELLITE
APPLICATIONS

Abstract

Lowering launch costs and rapid development of miniaturized electronics allowed nanosatellites to become a very attractive alternative to conventional large spacecraft platforms. One of the challenges today is to provide an effective propulsion system that enables spacecraft maneuvering capabilities on such small platforms. With the advent of nanosatellite constellations, systems like that are becoming increasingly demanded. One of the key elements of such system is an Engine Control Unit (ECU) that, despite the small available volume, will provide the full range of functionality required by the propulsion system and the spacecraft platform. This paper describes the design and development of an ECU intended to operate with a propulsion system utilizing H₂O₂ propellant for Low Earth Orbit nanosatellites. It monitors and operates the fluidic and thermal control subsystems. Serving as an interface between the propulsion system and the spacecraft on-board computer, it allows for performing in-orbit manoeuvres. The paper begins with a brief description of the propulsion system and an overview of the requirements for the ECU. The design process is then discussed, including the system architecture, selection of components and hardware design considerations. An overview of the adopted software solutions is provided. Testing and validation methods for the ECU are covered. Finally, a summary of the key lessons learned so far is presented.