**Development of Electrical Power System distribution board for a 6 Unit satellite**

Electrical Power System is a critical element in the success of a space mission. The main responsibility of Electrical Power System (EPS) is the energy generation, control and distribution for a satellite during the mission. Depending on a mission specifics, EPS is responsible for handling different power busses and loads and shall provide robust power channels to all spacecraft subsystems and payload. The Electrical Power System is also responsible for healthcare information collection and analysis.

Current work is dedicated to the development of a new EPS for 6 Unit CubeSat. Preliminary idea is to divide the EPS into two modules: Power Distribution (PDU) and Power Processing Unit (PPU). While PPU will be responsible for battery charging, energy conversion from the solar cells, power processing, PDU will be in charge of control and power monitoring. The present work will cover an architectural design of a whole system, while will be focusing on the design of a power distribution unit, which will be adjustable for different missions and responsible for a power handling.

This thesis aims to provide a full design iteration of a PDU of the 6 Unit CubeSat EPS. It will start with power budget analysis of 6U satellite. After that, the architecture of EPS distribution board will be reviewed. From the design side, electrical circuit and PCB of power distribution unit will be developed, manufactured and tested.

In order to develop the Electrical Power System distribution board for 6 Unit satellite following tasks will be accomplished:

1. Review the main functions of the satellite, payload and subsystems

2. Carry on a research about trends of the subsystems of nanosatellites and their power requirements

3. Define preliminary EPS architecture

4. Implement the power budget analyses

5. Define the EPS architecture, set requirements

6. Design the schematics of the PDU for a 6 Unit satellite using Altium PCB designer

7. Design and build a prototype boards of EPS for an intermediate test

8. Design a PCB layout of the PDU for a 6 Unit satellite using Altium PCB designer

9. Procurement and assembly process of the EPS distribution board for a 6 Unit satellite

10. Testing of the EPS distribution board for a 6Unit satellite based on identified test procedure

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**Time Schedule**

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|  | **Oct 2019** | | | | **Nov 2019** | | | | **Dec 2019** | | | | **Jan 2020** | | | | **Feb 2020** | | | | **Mar 2020** | | | | | **Apr 2020** | | | | |
| **Week** | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | 60 | 61 | 62 | 63 | | 64 | 65 | 66 | 67 |
| **Satellite review** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  |  |  |  |
| **Subsystems research** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  |  |  |  |
| **Architecture design** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  |  |  |  |
| **Power budget** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  |  |  |  |
| **Test procedure development** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  |  |  |  |
| **Schematic design** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  |  |  |  |
| **Prototype boards design** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  |  |  |  |
| **Prototype boards test** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  |  |  |  |
| **PCB boards design** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  |  |  |  |
| **Procurement & assembly** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  |  |  |  |
| **Testing** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  |  |  |  |