**Requirement Analysis Document**

**Subsystem:** Central Processing Module

**Last date of revision:** 02-01-2023

**Document status:** Draft

***Abbreviations:***

***PDS - Parachute Deployment Systems***

***CPM - Central Processing Module***

***ISU - Inertial Sensing Unit***

***DSM - Data Storage Module***

***MFS - Motor Firing System***

***RTC - Real Time Clock***

**Purpose of the subsystem:**

Processing the ISU data, managing the data in the storage, and controlling the Parachute Deployment System (PDS) and Motor Firing System (MFS).

| **Type** | **Requirement** | **Priority** |
| --- | --- | --- |
| **(Functional, Technical, Operational)** | **(Core, Essential, Desired)** |
| Functional | Acquiring data from Inertial Sensing Unit (ISU) | Core |
| Functional | Store the ISU data in Data Storage Module (DSM) and retrieve back when needed | Core |
| Functional | Command the Parachute Deployment System(PDS) for chute ejection while falling back | Core |
| Functional | Command the Motor Firing System (MFS) to launch the rocket on ignition | Core |
| Functional | Controller is in a compact size to fit inside a sounding rocket | Core |
| Functional | Have hardware compatibility with ISU, DSM, PDS, and MFS | Desired |
| Functional | Support future requirement updations | Desired |
| Functional | Minimum possible power consumption | Desired |
| Operational | Convert the analog signals from ISU to digital signals with required resolution | Essential |
| Operational | Supply necessary power to ISU, DSM, PES, and MFS | Desired |
| Operational | Support required communication protocols for data transfer | Essential |
| Operational | Generate driving signals for PDS | Desired |
| Operational | Contain enough memory for ROM and RAM access | Essential |
| Operational | Enabling and accessing the hardware in the hardware layer | Core |
| Operational | Actuate the PDS actuator/igniter when the projectile reaches the specific deceleration value | Core |
| Operational | Record the PDS feedback signals and send to DSM | Desired |
| Operational | Actuate the PDS actuator/igniter on emergency deploy command as an interrupt | Essential |
| Operational | Detect and process the status/fault of the PDS | Desired |
| Operational | Detect and process the status/fault of the PDS | Desired |
| Operational | Perform Pre-flight checks when pre launch command is given | Essential |
| Operational | Fire the igniter on launch command, after preflight checks | Core |
| Operational | Record the launch sequence data and send it to DSM | Essential |
| Operational | Enabling the hardware and acquire data from all the sensors in software layer | Core |
| Operational | Filter the noise in the sensor data before further processing | Desired |
| Operational | Perform basic data manipulations on the data for further processing, convert the data to specific standard range | Desired |
| Operational | Test for sensor fault in various levels and indicate it with error codes | Desired |
| Operational | Enable the storage hardware for reading and writing the data from ISU, PDS, and MFS | Core |
| Operational | Prepare the data in a structured format mapped along with time data | Desired |
| Operational | Enable and access the Real-time clock module to get time data | Essential |
| Operational | Store the data in a reliable and human-readable format | Desired |
| Operational | The reliable format should be compatible for later processing and sending to ground station | Desired |
| Operational | Check the available space for writing the data | Desired |
| Operational | Allow to set the time data in the RTC when commanded | Desired |
| Operational | Indicate any error in software or hardware level | Desired |
| Technical | Availability of n number of ADC channels with desired resolution for n number of analog sensors | Core |
| Technical | Should provide required clock pulse of desired frequency to each sensor | Core |
| Technical | Should support required communication protocols | Core |
| Technical | Should generate actuator specific modulate signals for the operation | Desired |
| Technical | Should provide required different voltage level output supply | Core |

Subsystem model:

*Revision history:*

*1. First draft completion - 02/02/2023*