Project proposal

Title: Power management and thermal design
Supervisor: Prof. Drazen Dujic
Timeframe: Spring 2021

EPFL Xplore is an interdisciplinary project whose aim is to design and develop a Rover to participate in two international competitions: the University Rover Challenge and the European Rover Challenge. The Rover's power and thermal management will play a crucial role in the project.

Project description

EPFL Xplore's power management will have to power many different electrical systems: the avionics, the main computer, a LiDAR, an Ethernet network, 5 cameras, as well as 18 embedded motors. To provide energy for so many components, the power supply will have to provide up to 600W of power from a 24V-12Ah battery and dispatch energy to several busses using DC-DC converters. Output ports must match the following specification.

- 1A@5V
- 3A@15V
- 1A@24V (regulated)
- 15A@24V (bypass)
- 1.5A@48V

Since other DC-DC converters will be chained to these outputs, it is mandatory to minimize the current and voltage ripple. In addition, thermal design must be taken into consideration. In addition to maximizing the converter's efficiency, external passive, or even active cooling, might be necessary. The objective of the student is to realize this power and thermal management system. The design of a BMS (battery management system) is out of the scope of this project.

Reference documents

Power repartition by subsystem (Fig. 1), Power distribution diagram (Fig. 2)

Contact

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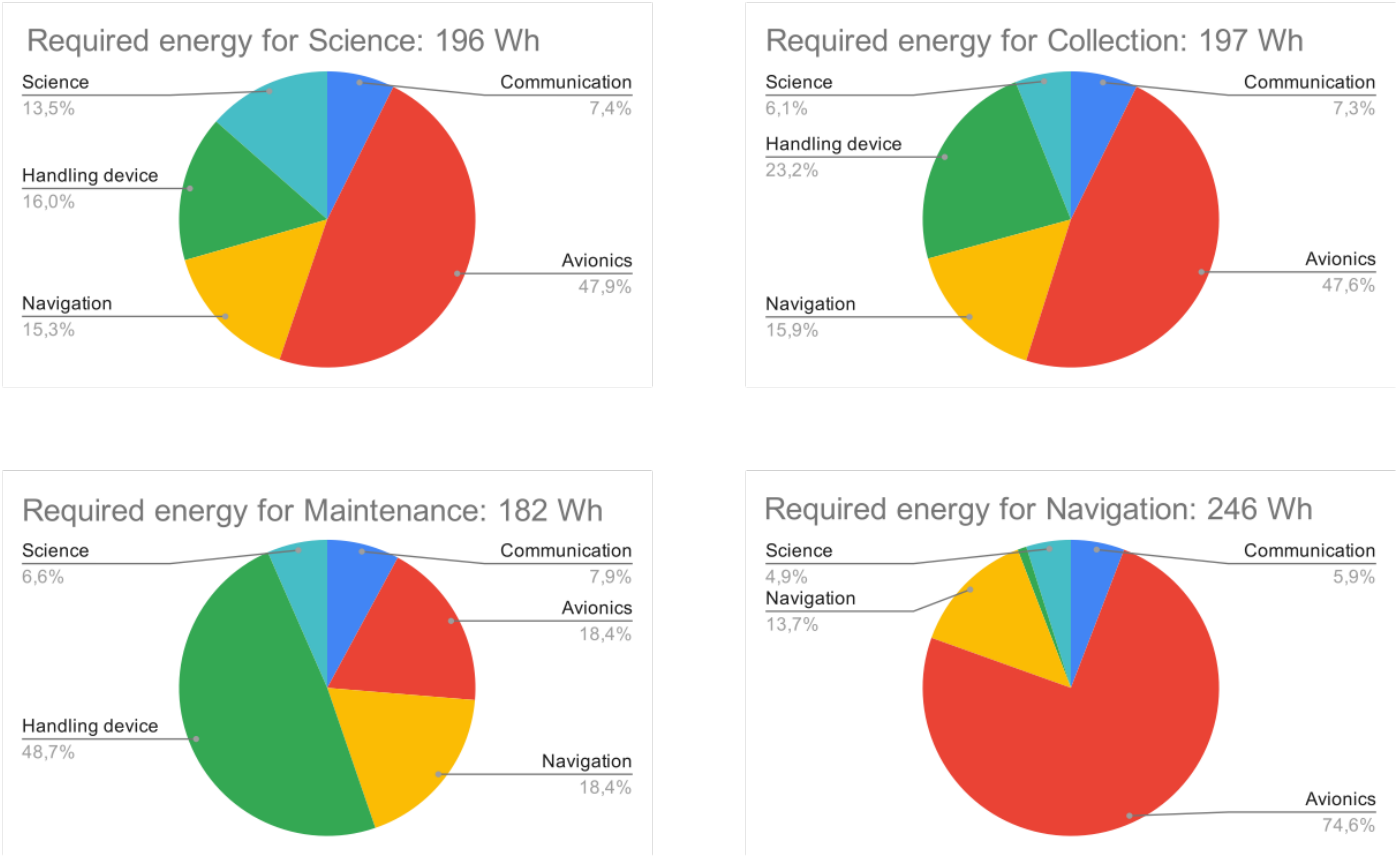

Fig. 1: Power repartition by subsystem

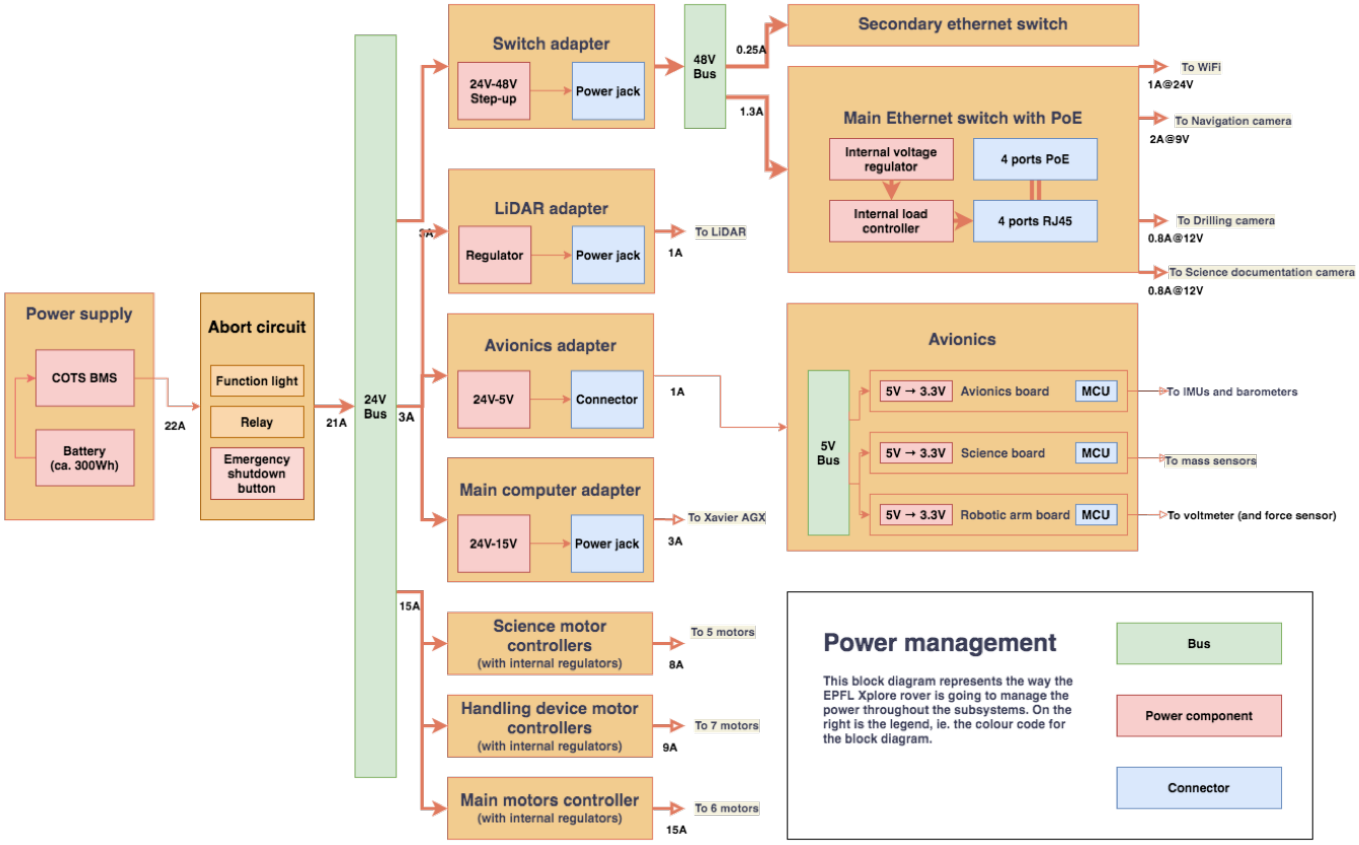

Fig. 2 : Power distribution diagram