

## Power supply design

### Context:

The EPFL Xplore Research Pole has the objective of building a legged robot. The robot is designed to autonomously navigate through challenging terrain using its on-board sensors.

### Project description:

The objective of this project is to design and integrate a custom power supply for the quadruped robot. It should provide secure, regulated voltage rails with monitoring.

Furthermore, the student will be an integral part of the Xplore Legged Robot Team, actively participating in its weekly meetings and working sessions. This collaboration will facilitate close interaction with other team members, and the student is expected to share their findings and progress with the team regularly.

### Tasks:

The project involves a series of tasks, outlined below (note that this list is not exhaustive):

- **Literature Review and Familiarization** – conduct a literature review focused on existing power supply topologies.
- **System design** – design PCBs for multiple switching regulator supplies, which should provide 5V, 15V, 24V at 5A each minimum.
- Integrate a precharge circuit for safely charging downstream capacitors
- Implement voltage and current monitoring over CAN-FD
- **Prototyping** – Assemble the PCB
- **Coding** – implement software for monitoring voltage rails and send information over CAN-FD.

### Requirements:

- Experience with PCB design (KiCAD, Altium) with 4+ layers.
- Experience with designing switching power supplies.
- Experience with design guidelines for EMC. Good grasp on grounding strategies.
- Experience with embedded systems development in C++ on STM32.
- Experience with CAN-FD protocol (configuration, setup on STM32, etc.).

### Contact:

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