MECHATRONICS: Tethered Drone System

Graduate

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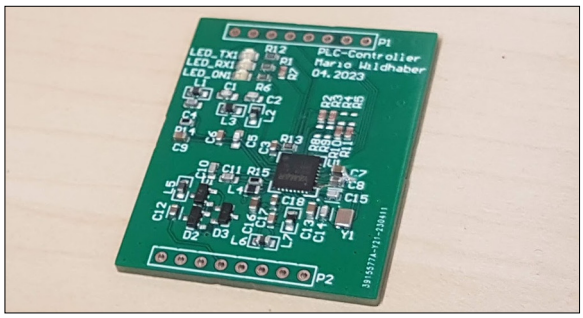
Problem: In today's world, drone technology has become an efficient tool in many fields. Despite their diverse applications, battery-powered drones are limited in their flight time. The main objective of this work was to develop a system that extends the flight time of drones by supplying power directly through a cable to overcome the existing challenges and limitations of battery-powered drones.

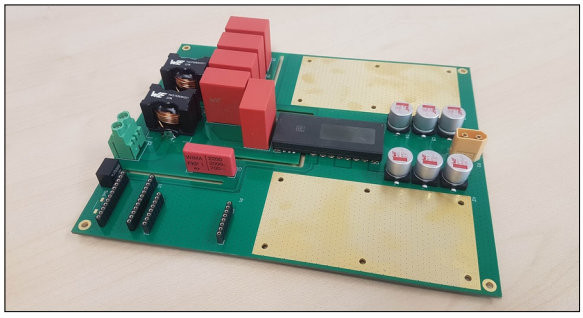
Approach / Technology: To solve this problem, a subsystem was developed consisting of a ground station and an interface for the drone. Communication between these two elements was made possible by implementing Power Line Communication (PLC) technology. The ground station will implement a cable winch with a max cable lenght of 100 m. A power supply converts the line voltage to a 400V DC voltage. This voltage has been chosen high enough to reduce the power dissipation in the cable. A circuit board with a high-efficiency DCDC converter was developed on the drone side. to ensure that the drone is always supplied with the optimal operating voltage.

Result: The result of this bachelor thesis is a system that has the ability to keep a drone in the air for a significantly extended time. The direct power supply via a cable overcomes the limitation on flight time of battery-powered drones. Despite these advantages, it should be noted that the cable connection limits the drone's mobility.

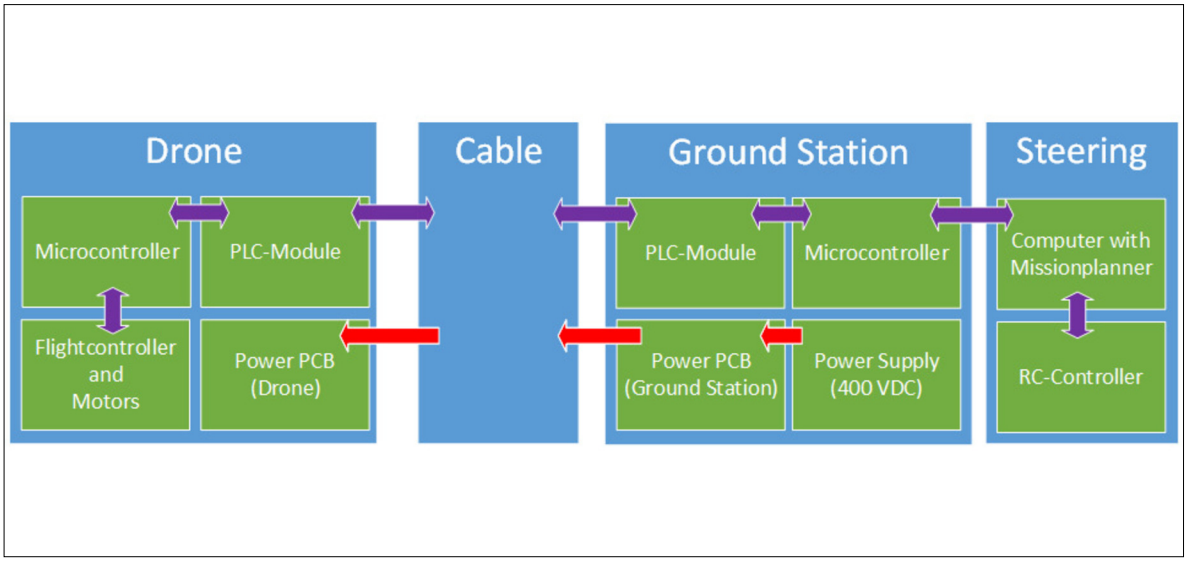
PLC-PCB
Own presentment



Power-PCB
Own presentment



Block diagram
Own presentment



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Subject Area
Electronics and Control Engineering