# Multi-functional Steering Wheel for DTU ROAST

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Introduction

This project involves the design and implementation of a multi-functional steering wheel for a solar car developed by the DTU Roadrunners Solar Car Team (DTU ROAST).

The objective was to create a functional and compact steering wheel that incorporates all necessary functions in the absence of a traditional dashboard and that complies with international solar car competition rules and road law in the competition countries and Denmark.

PCB design
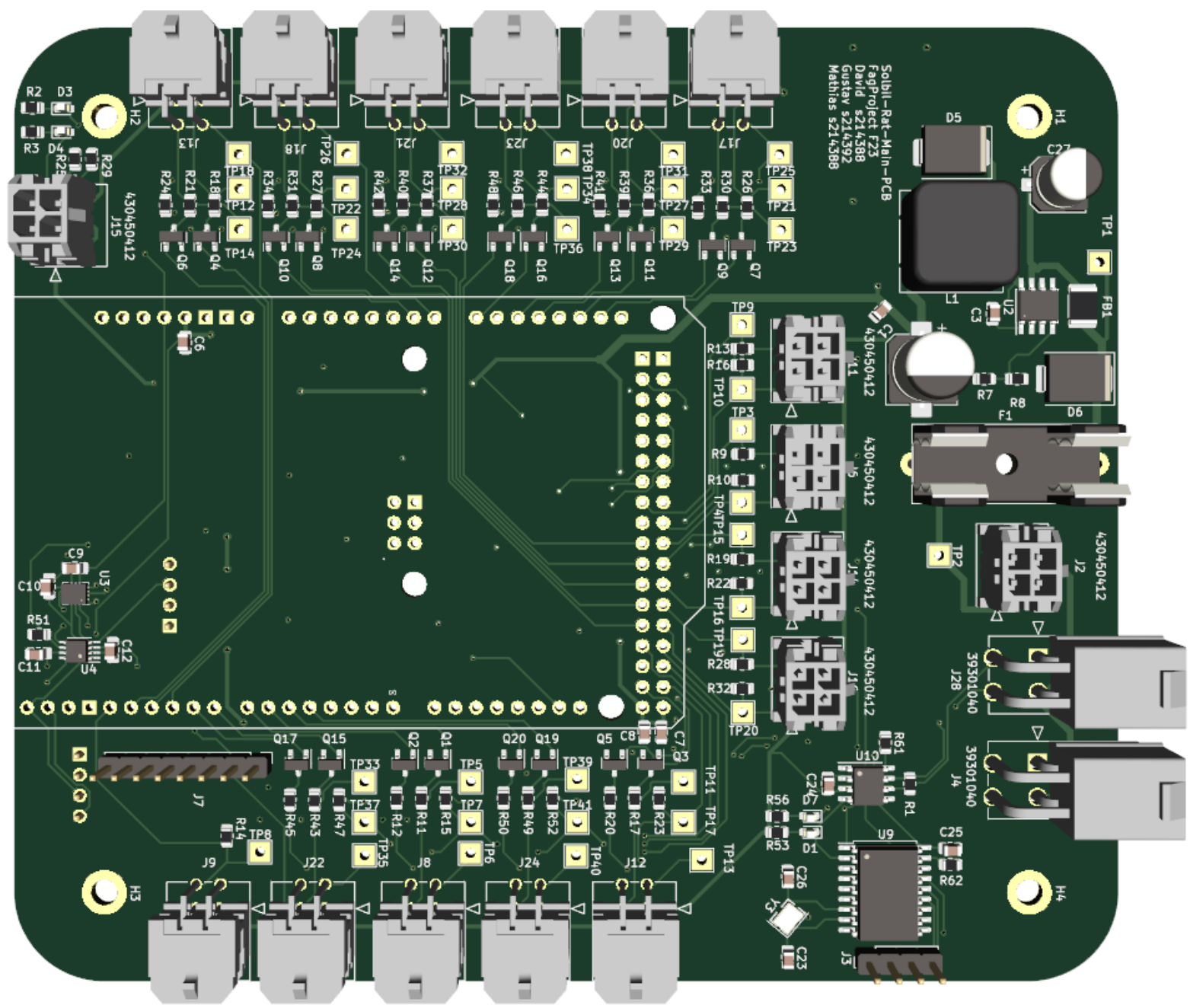
A PCB was designed to control all the necessary peripherals of the steering wheel. It features the Arduino Mega as the main MCU, offering a wide range of GPIO pins. The PCB incorporates various external components to effectively manage power supply, buttons, CAN-bus communication, and an LCD display. Under expected driving conditions, the steering wheel uses 1.476 W of power.
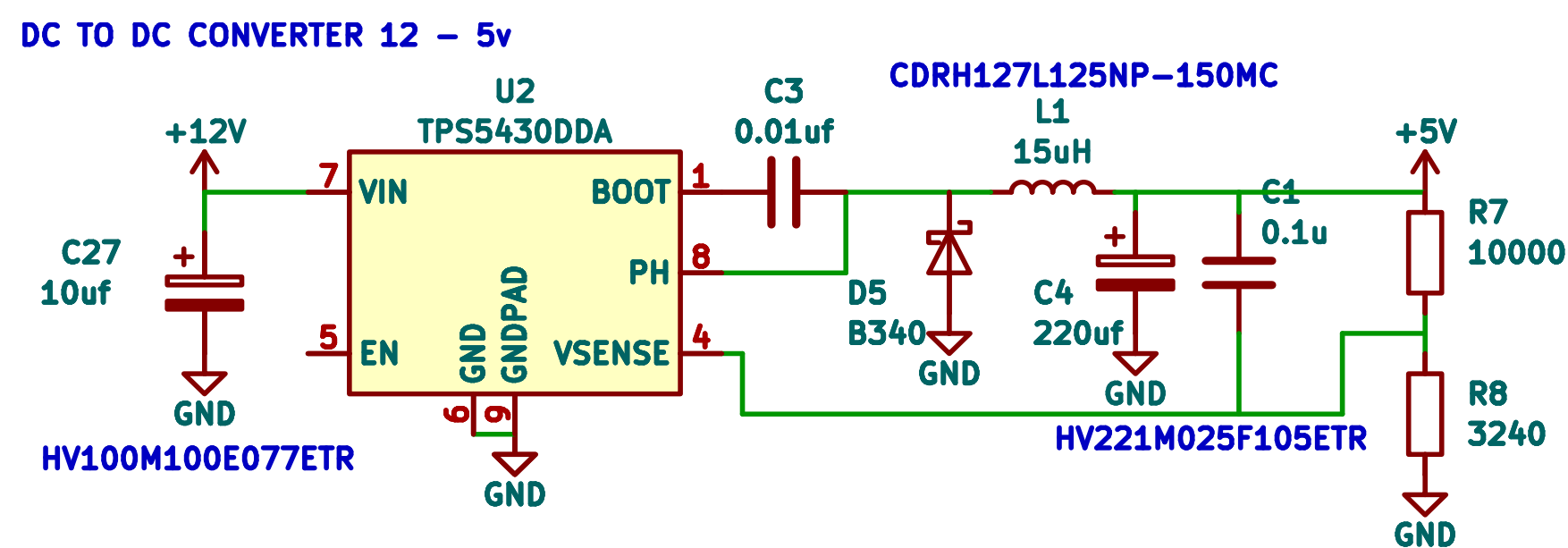
Power supply

An effective switch mode buck converter that can supply up to 3A.
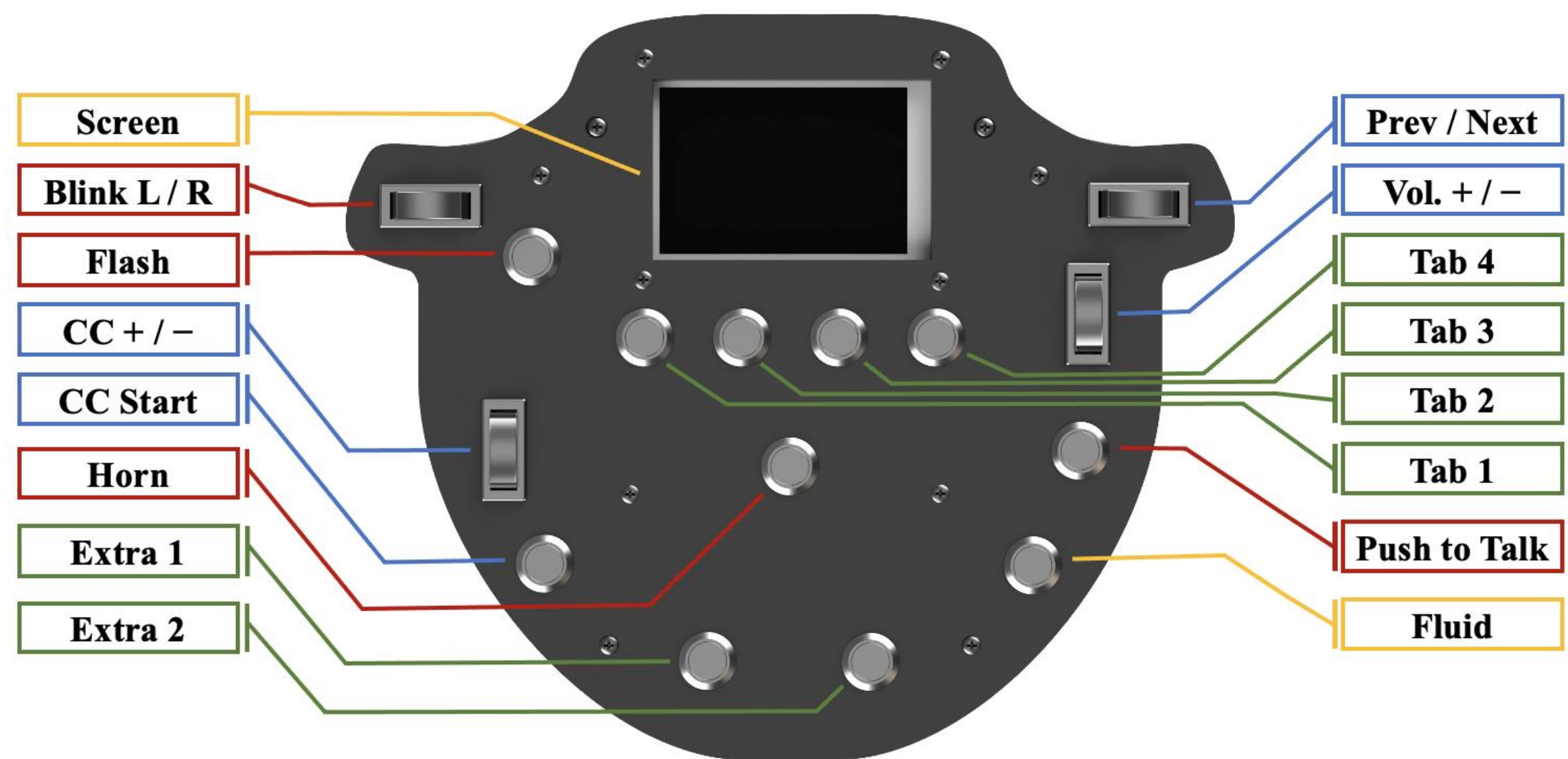
Buttons and LED

PCB supports 1 switch and 2 color channels per button for dimming and color control.
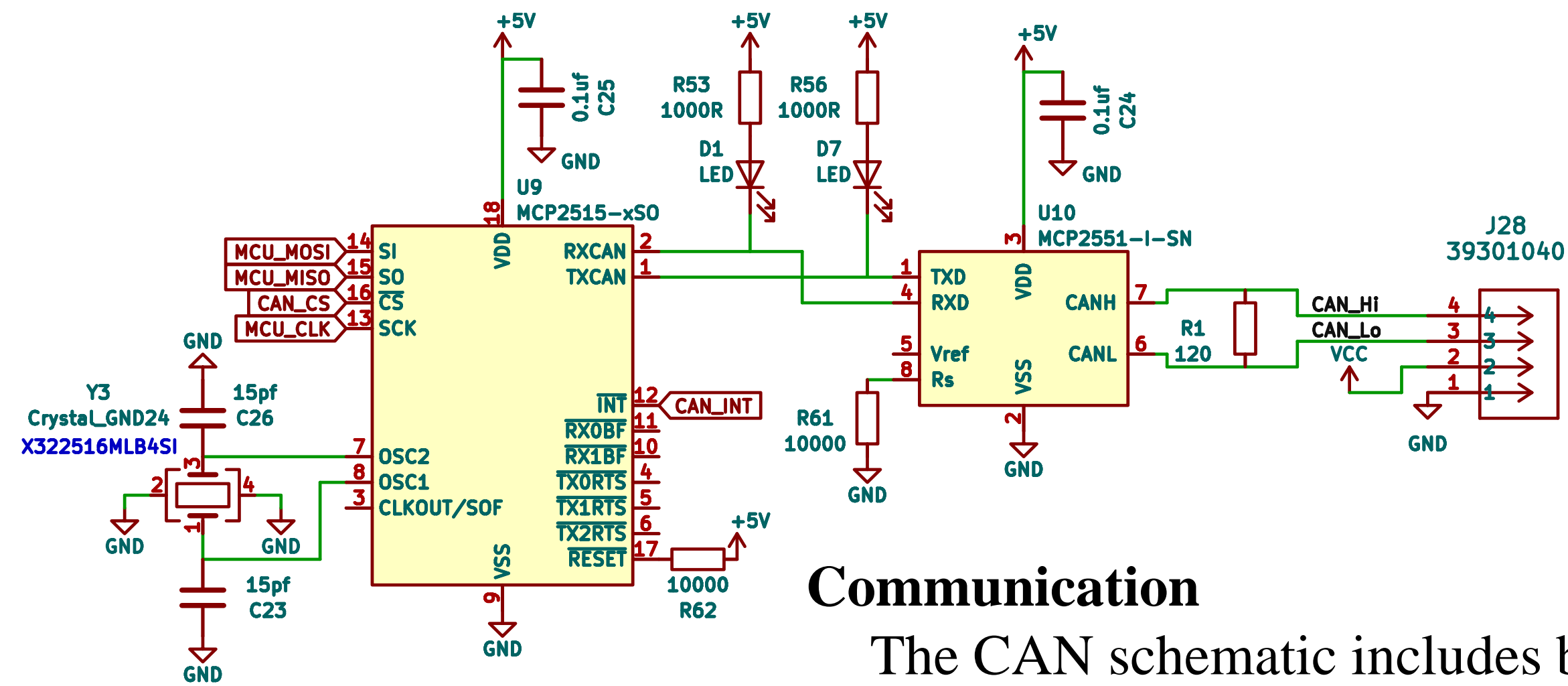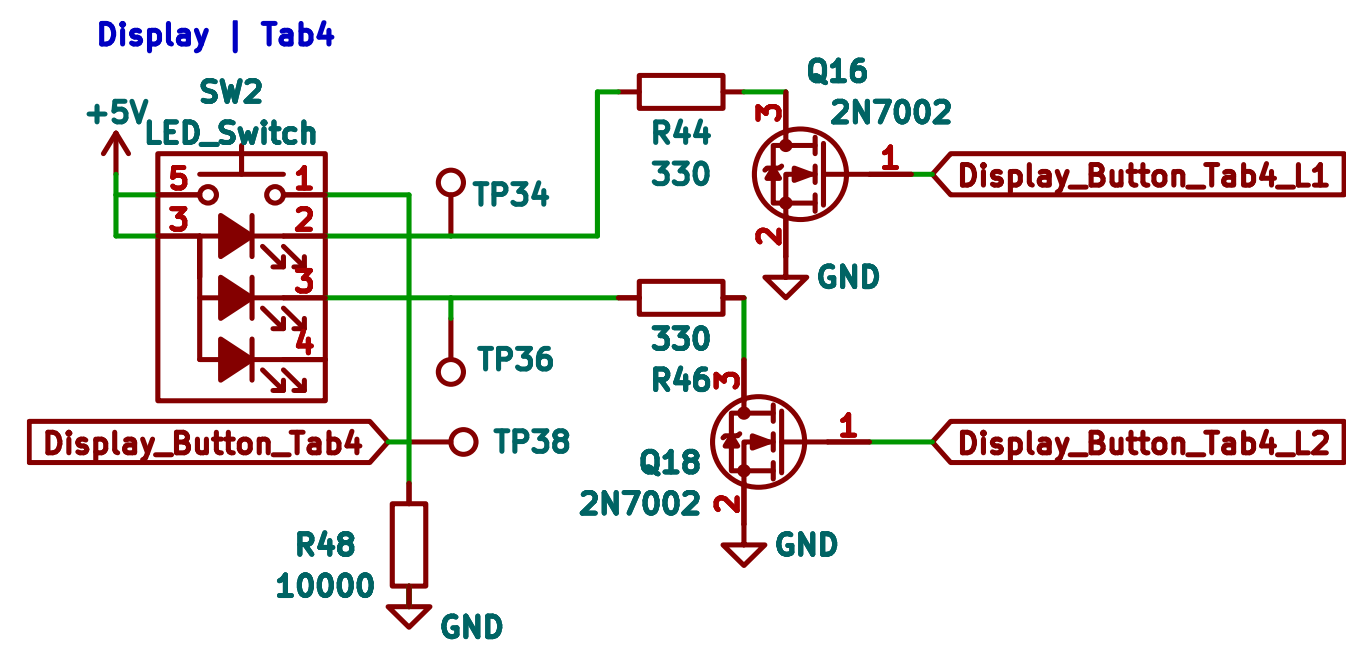
Communication

The CAN schematic includes both a transceiver and a controller, simplifying the integration of a CAN-bus functionality into the project.

User Interface

Buttons
- Two types of buttons: rocker switches and momentary RGB push buttons.
- Rocker switches for volume, cruise control, and turn signals.
- RGB buttons serve specific purposes with intuitive illumination for e.g., indicating a latching function.

LCD
- Central display for vital car information.
- Current speed displayed in the center.
- Icons indicate active functions.
- Flexibility for different elements to be added/removed in the future.

3D-model
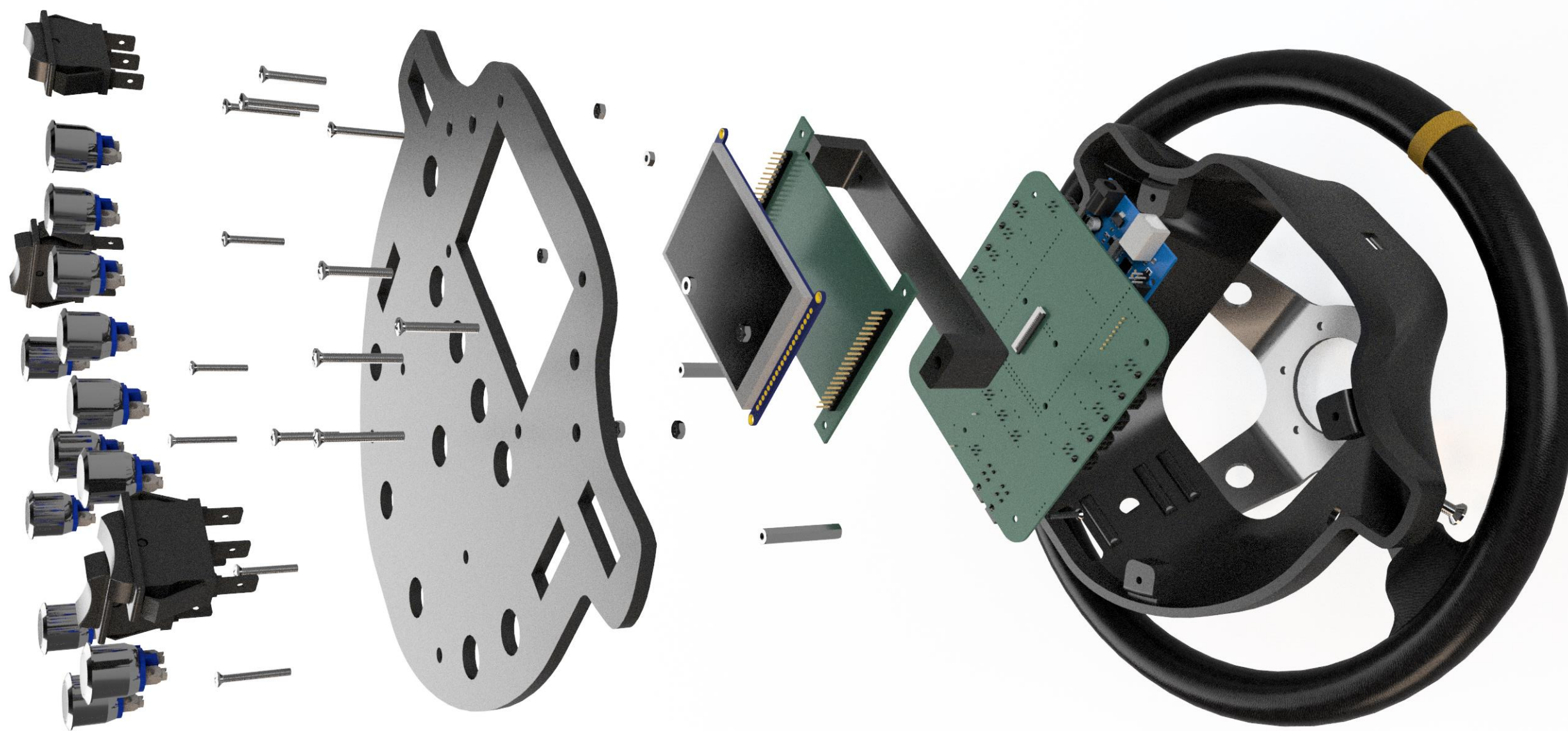
- Custom insert designed to fit into base steering wheel.
- The base steering wheel was chosen since there is no power steering, therefore a bigger radius → easier steering of the car.
- The base steering wheel has a deep-dish design for housing electronics.
- Peripherals, LCD and PCBs securely mounted to the front panel, allowing for easy access.
- Robust design as the front and body are bolted together.

Conclusion

A functional steering wheel was created for DTU Roadrunners Solar Car Team. The project included careful button selection, a PCB for connecting peripherals, an LCD for display flexibility, and a CAD-insert for housing the electronics and buttons safely. The result is a well-designed and functional steering wheel that complies with competition and legal requirements.