

Project Title: **Electronic Hardware & Solar Arrays**

Supervisor: **TBC**

Project details:

The desired outcome for this project is twofold:

Electronic Hardware

This project will involve working on a number of the electronic systems in the car, a large part of which will be focused on the Battery Management System (BMS) which was developed extensively in the 2017 race cycle. This is a safety-critical monitoring system that ensures that the electrochemical cells in the car are within a safe operating window at all times and does not exceed limits outlined by the manufacturer. This role involves completing and testing modifications made to the existing BMS hardware and software, including the development and implementation of a new active cell balancing system to ensure that the maximum capacity of the pack is utilised. This will involve the design and manufacture of printed circuit boards (PCBs), along with extensive testing and debugging.

Other aspects of the project will include testing the new mains charger hardware, optimising power consumption throughout all the electrical systems in the car, and other smaller aspects of the car electronics.

Solar Arrays

Solar cars need solar arrays, and solar cars competing against time pressure with small batteries need very efficient solar arrays. This aspect of the project is to design the most efficient solar array with a given budget. You will use test data and research to design the optimal array positioning and wiring configuration along with the number of maximum power point trackers (MPPTs) for maximum solar power delivery under various lighting conditions.

During the project you will need to fully document all design decisions, software and schematics, to ensure a traceable route for other team members to follow.

Closely linked projects: "Chassis Structure" and "Driver Interface & Telemetry"

Desired Skills and Experience:

*Note: These are not essential (unless listed in **bold**) and those who receive roles will be offered training to compensate for any gaps.*

- **Embedded programming experience, particularly in C++**
- **Experience with practical electronics and with designing PCBs (including schematic design and PCB layout)**
- **Experience with soldering** (preferably experience with reflow as well)
- Ability to use an oscilloscope to debug a circuit
- Experience with using low-level electronic communications protocols like I2C, SPI etc
- Basic understanding of or interest in solar cell theory
- Good communicator of ideas
- Willing team player
- Prior interest/experience with solar cars/CUER
- Flexible and able to work to tight deadlines