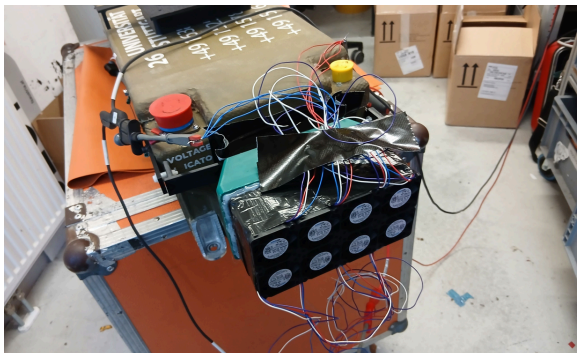



# SUGGESTED TOPIC FOR SCIENTIFIC WORK

## Thermal Simulation and Optimization of the HV Accumulator




Accurate prediction of the thermal behaviour of the high-voltage accumulator is essential for an efficient cooling system. In a Formula Student race car, dynamic power demands cause varying heat generation and potential hotspots between cells. The objective is to develop a numerical thermal model of the accumulator to evaluate and optimise the cooling concept. The model will represent heat generation and heat conduction through the cells, module structure and cooling interfaces. Coupling it with coolant flow allows the effects of cooling geometry, coolant temperature and mass flow to be investigated. Temperature measurements will validate the model, enabling cooling concepts to be evaluated before physical prototypes are manufactured. The topic is merely a suggestion and must be finalised with the institute.

### Tasks:

- Develop a thermal model of the battery cells and accumulator
- Implement heat sources, material properties and thermal interfaces
- Simulate coolant flow and heat transfer
- Evaluate cooling geometries, flow rates and operating conditions
- Validate the model with experimental data and identify optimization potential

### Requirements:

- Knowledge of heat transfer and thermodynamics
- Experience with CFD, FEM or thermal simulation is beneficial
- Basic knowledge of fluid mechanics
- MATLAB/Python or comparable data-analysis skills
- Become a Rennteam member