

# Development of an Intelligent Torque Management System for Electric Race Car Performance and Efficiency Optimization

## OUR PROJECT

Formula Electric Belgium is a student-run electric race team which competes in Formula Student, the world's largest competition for engineering students. We aim to push the limits of performance, innovation and sustainability within electric racing every year, which is only possible with the help of our Thesis students. These pioneers are responsible for performance-defining innovations within the team, and we would love for you to join our team of highly ambitious and motivated engineers. As a Thesis student, you will research, design, prototype and test your innovations alongside the full-time members which make sure the team pushes itself and the car to new heights.

### AIM AND OBJECTIVE

The objective of this thesis is to design, implement, and validate an intelligent torque management system for an electric Formula Student vehicle. This includes torque vectoring for handling and stability and also the strategic distribution of torque over a complete race stint to optimize energy efficiency, lap time, and overall vehicle performance.

The system will manage how torque is applied between the left and right wheels (torque vectoring), and when and how much torque is delivered over time—based on track layout, driver input, vehicle state, and energy constraints. The control logic may incorporate predictive elements, such as track segmentation, optimal acceleration points, and battery energy usage planning, motor temperatures,...

Using vehicle models in IPG Carmaker and Simulink, different strategies will be simulated and compared. These may range from basic rule-based logic to more advanced map-based or model predictive algorithms. The ultimate goal is having a torque management system for cornering performance, straight-line acceleration, energy consumption, and lap time consistency over an entire race simulation.

### PROFILE

- Strong interest in vehicle dynamics and performance optimization
- Basic understanding of modeling and simulation (e.g., Simulink, IPG Carmaker)
- Analytical and problem-solving mindset
- Motivation to work independently and not afraid to work with complex or unfamiliar software

### RETURNS

- In-depth understanding of vehicle dynamics, simulation, and model-based design
- Hands-on experience with industry-standard tools like IPG Carmaker and MATLAB/Simulink
- Skills in system modeling, validation, and performance analysis
- Ability to evaluate complex trade-offs in vehicle design

### INTERESTED?



Send us your contact details and field of interest to [recruitment@formulaelectric.be](mailto:recruitment@formulaelectric.be)