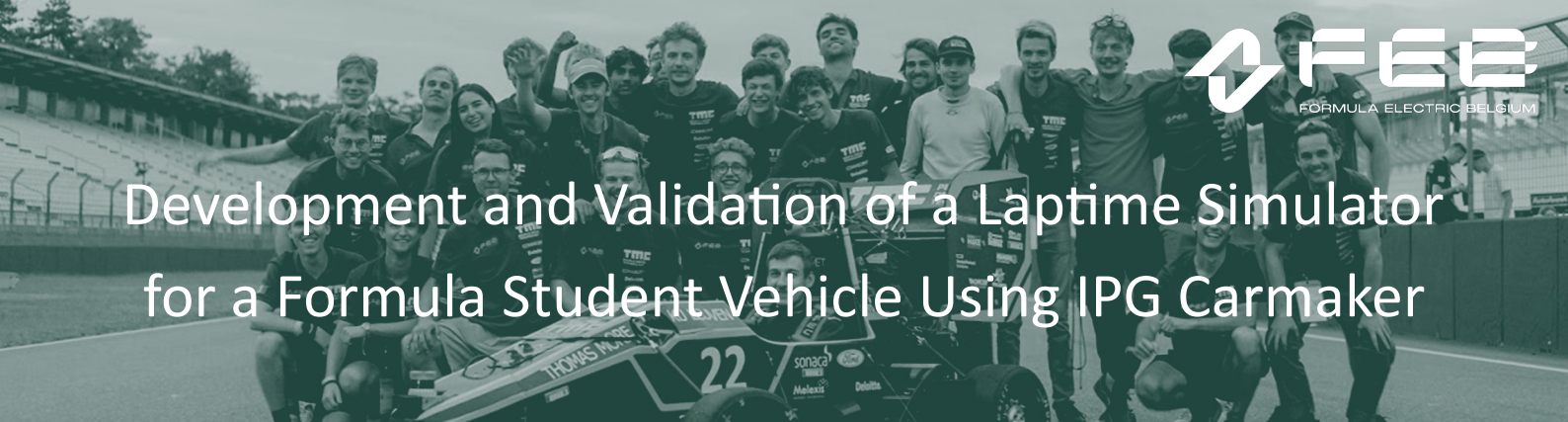


# Development and Validation of a Laptime Simulator for a Formula Student Vehicle Using IPG Carmaker



## 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 develop a laptime simulator using IPG Carmaker that accurately represents the dynamic behavior of the Formula Student vehicle. The goal is to build a virtual model that mirrors the real car as closely as possible, enabling predictive performance analysis under various operating conditions. This model will serve as a digital twin of the physical vehicle, incorporating all relevant mechanical and physical parameters such as suspension kinematics, structural compliances, vehicle mass distribution, power-train characteristics, aerodynamic forces, and battery behavior.

The laptime simulator will be a crucial tool for evaluating and comparing different design choices and development philosophies before physical implementation. For example, the impact of changing the battery location, adjusting the aerodynamic setup, or modifying the spring and damper rates can be quantified in terms of lap time improvements or handling trade-offs. Ultimately, the model will assist in gaining insights into how key parameters like total mass, weight distribution, suspension geometry, and aerodynamic efficiency influence overall vehicle dynamics, drivability, and race performance.

### 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)