

## Master Internship Proposal

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### Advanced prototyping for electrical vehicle components

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**Internship location:** Siemens Industry Software NV, Leuven, Belgium

**Supervisors:** Ir. Ing. **Mathieu Sarrazin** ( [mathieu.Sarrazin@siemens.com](mailto:mathieu.Sarrazin@siemens.com) ); tel. : +32 16 384 484  
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**Internship duration:** 4 to 6 months

#### Project summary:

It is clear that improved safety, faster development and better energy flow aspects become more and more critical in the different development stages of electrical vehicles (EV). At the moment, many driveline components were simply connected to each other without taken into account the real driving cycles of the E-vehicle or the interactions between the different components. Troubleshooting or even making big changes are quite difficult in a late development phase. Therefore, a closer analysis, assessment and optimization of the electrical drivetrain components need to happen already in an early development phase with Model-in-the-loop (Mil) and Hardware-in-the-loop (Hil) simulations. Hil simulations combine the real component with the virtual simulation world. In this way, available components can be tested in a realistic environment without an existing EV prototype. Multi-physical vehicle models (including thermal behaviour) are needed to support the Mil and Hil simulations. Test execution in such environment will finally support the improvement of the reliability of EV components, will give a better understanding of the system interactions before their integration on a system level and will speed up the development time.

The student needs to i) become familiar with the topic and perform a literature study, ii) collect experimental data with our software/hardware platform, iii) develop accurate and robust MiL and HiL simulation models for EV components and iv) test and validate the developed models in a wide range of different operating conditions.

#### Project main objectives:

- Gain skills on rapid prototyping and model based testing;
- Gain skills on electrical machines.
- Gain knowledge and practical testing skills

#### Candidate profile:

- Master student in Applied Physics, Electrical and Mechanical Engineering
- Skills in System, control and electrical machines
- Hardware/software: Matlab/ Simulink
- Be fluent in English (both oral and written)
- have a problem-solving mind (take own initiative to solve a problem case)