

CIFRE student Offer in AI motor control

Context:

Univ _____ and IMRA Europe S.A.S. are joining forces to propose a CIFRE student offer (3 years project) in the field of motor control especially by using AI or mathematical model. In the automotive domain, although a new wave of EV (electric vehicle) started to break existing technologies, we are still using traditional methods for motor control such as manual parameter tuning. To be more specific, one of the current issues is, it takes huge time for the parameter tuning which is required every time in replacing to a new motor. Another issue is that such traditional methods is dedicated to a special type of motor, it means it is not adaptive even in a small change. Therefore, we really need to come up with new technologies that solve above issues by using AI and mathematical model.

Addition to that, we also aim to develop technologies which can be executed on real machine. Although there are many papers which proposed a new control algorithm developed on simulator, some of them cannot work on real system because of noises, disturbances, etc. As we are working as a company that provides car parts to major car company such as TOYOTA, we always target on the technologies for real system. Through this project, at first, we will try to develop AI/Math control for PMSM (Permanent Magnet Synchronous Motor) installed on our test bench, then apply this concept to other power electronic issues.

Duration: 3 years

Period: start from September 2024 or later

Subject:

In this project, as explained above, we develop a PMSM control method by using AI or mathematical model. More concretely, AI and Math will be used for dynamic parameter tuning, tolerance for real machine disturbance/noises, etc. Finally, developed technologies will be applied to various size/type of motor, without using traditional ways such as manual parameter tuning. What we are expecting now is to develop a mechanism that can train AI on real machine (test bench) and measurement data (not data derived by simulator) for practical uses. In terms of methodology, we are now thinking that System Identification, Self-commissioning, Neural network and Reinforcement Learning (of course, we can change to other methodologies after understanding concrete issues).

Profile Sought:

A student eligible to apply to CIFRE (= Ph.D student from September), and prefer to be specialized in power electronics or control theory domain.

Location:

IMRA EUROPE SAS, located in Sophia Antipolis

Implication LAPLACE:

Groupe CODIASE & GREM3

Contact: Maurice FADEL , fadel@n7.fr, +33 (0) 6 76 96 37 06