Intern student Offer in AI motor control project

Context:
INP Toulouse and IMRA Europe S.A.S. are joining forces to propose an intern student offer (5-6 months project) in the field of motor control especially by using AI and/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. Therefore, we really need to come up with new technologies that solve above issue by using AI and mathematical model.
As we are working as a company that provides car parts to major car company such as TOYOTA, we always target on the technologies to be released as a product. Through this project, we will try to develop AI/Math control for PMSM (Permanent Magnet Synchronous Motor) installed on our test bench.

Duration: 5 or 6 months
Period: start from January 2025 or later

Desired profile: Engineering school or Master's degree (competence of actuator control and/or AI).

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Subject:
In this project, as explained in the context, we develop a PMSM control method by using AI and/or mathematical model. More concretely, AI and Math will be used for efficient/automatic parameter tuning, tolerance for real machine disturbances or noises, etc. Our goal is that developed technologies will be applied to various size/type of motor, without using traditional ways such as manual parameter tuning.
In terms of methodology, we are now thinking that System Identification, Self-commissioning, Neural network (Deep Learning) and Reinforcement Learning, etc. (of course, we can change to other methodologies after understanding concrete issues).

Profile Sought:
A master student and prefer to be specialized in power electronics or control theory domain.

Location:
IMRA EUROPE SAS, located in Sophia Antipolis, and
LAPLACE (site ENSEEIHT-INP Toulouse)
Contribution to accommodation costs
compétence

Who we are ?

IMRA EUROPE S.A.S

IMRA EUROPE

Laplace

Research in the field of ELECTRICAL ENERGY CONVERSION

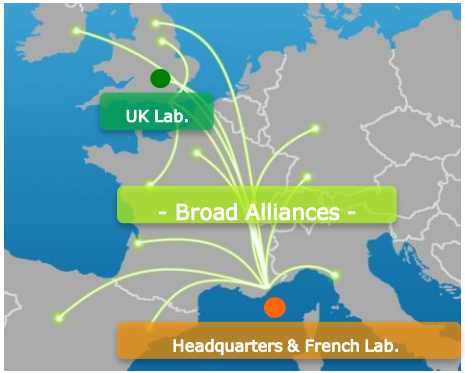
The LAPLACE is a public lab under the authority (Mixed Unit of Research: **UMR**) of the Centre National de la Recherche Scientifique (**CNRS**), the Institut National Polytechnique de Toulouse (**Toulouse INP**) and Université Toulouse III - Paul Sabatier (**UPS**), each of them being members of the Université Fédérale de Toulouse Midi –Pyrénées (**UFTMIP**).

Permanent staff	150	47%
Non Permanent staff	170	53%
Total	**320**	

CODIASE Group: Diagnosis & Control (10 Permanent & 10 PhD)

IMRA EUROPE

- IMRA EUROPE, who is a branch of A: AISIN JAPAN
  - AISIN : world's 6th biggest car parts supplier
  - IMRA : research institute to make PoC (= Proof of Concept)
    - AI + sensor data processing
    - Material
    - Electric motor

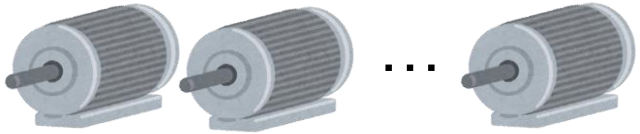


Our current issues and purpose of project

IMRA EUROPE S.A.S

IMRA EUROPE

Big wave of EV



We have to deal with
many types of motor

[issue]
Currently,
to make a type of motor
controllable takes
5-10 weeks and more…

Requirements on controller

More generalized
More efficient
More accurate
Easier installation…

AI and Math model will be a solution !!

Target technologies

- System Identification
- Reinforcement Learning (Deep Learning)

Laplace X IMRA

IMRA asked collaboration to Prof.FADEL as adviser