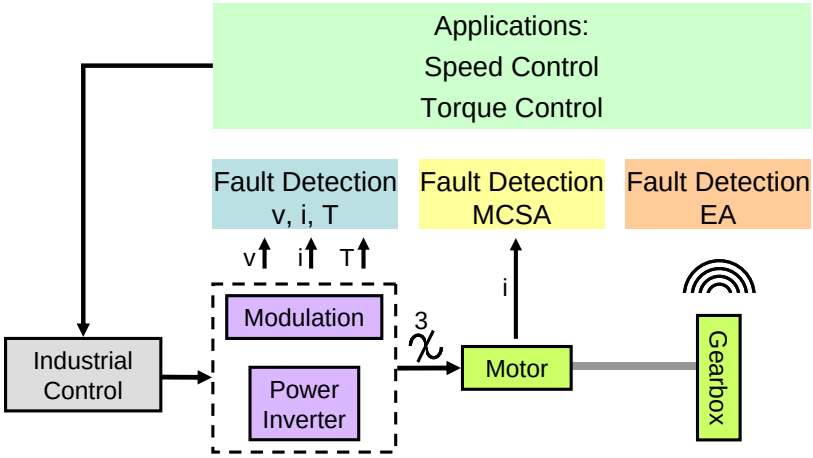
DIAGMAIN – MECHAUTO, Spanish Government Research Project (2007-2010).

The project is focused on the investigation of fault detection of mechatronic systems in order to achieve an optimal diagnosis in high efficiency actuators for robotics, aeronautics, and auxiliary automotive drives applications. The investigation will be specially applied to the new motors used in aeronautical applications and high efficiency actuators, PMSM (Permanent Magnet Synchronous Motor) and new automotive drives, PMSM and SRM (Switched Reluctance Motors).

Specifically, the project aims Investigation, Development and Validation of a Multimodal Expert System for the Diagnosis and Prognosis of the whole mechatronic system, which means the combination of electronic power converters, high efficiency AC motor and associated mechanical coupling to the load.

To achieve this objective, the isolated diagnosis of each component of the mechatronic system, i.e., Power Converter, Motor and Gearboxes will be investigated. Data bases and unimodal expert systems will be also investigated and developed for every component of the mechatronic system. Interrelations under fault state, between these components will be studied.

A multimodal expert system for the total mechatronic system will be obtained by fusion of unimodal experts above explained. This multimodal expert will consider every interrelation between individuals to locate, identify, diagnose and quantify the fault.



The two main objectives and its sub-objectives of the project are as follows:

- Progress in the Fault Detection and Fault Location on a mechatronic system:
  - Development of full models for faulty and healthy PMSM and SRM motors
  - Investigation on the gearboxes and other motor mechanical coupling
  - Investigation on the fault detection methods for power converters

- Investigation and Development of a Multimodal Expert System for the Diagnosis and Prognosis of the whole mechatronic system used in auxiliary automotive and industrial/aeronautical applications
  - Development of a Multimodal Expert System, MES
  - MES validation on an automotive drive application: Power Converter, SRM Motors and Air Conditioning Compressor.
  - MES validation on a high efficiency actuator: Power Converter, PMSM Motor and Gearbox