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## CONDIAG-MIP, Spanish Government Research Project (2004 – 2006).

The project is focused on the investigation of hardware + software (HW+SW) systems devoted to the sensorless control of electrical drives using Permanent Magnet motors, including both supervised control and maintenance. The investigation is specially applied to the new motors electronically controlled PMSM, Permanent Magnet Synchronous Motor. Specifically, the project aims the development of an Intelligent HW+SW embedded Control for PMSM, able not only of controlling torque and current loops of the motor, but also supervising it for efficiency improvement and predictive maintenance.

The two main objectives of the project are as follows:

- Research and development of innovative control techniques applied to AC permanent magnet synchronous motors, PMSM:
  - o Investigations in the parameters identification and modeling of the new PM motors
  - o Investigations and improvements of the current regulators for standard converters driving PM motors.
  - o Investigations of new power converters and its PWM control, especially matrix converters control, applied to PMSM.
  - o Investigations and development of the new torque control techniques for PM motors, including those related with sensor-less concept.
  
- Development of an Intelligent System for improving the behavior, security and reliability of the electrical drives using PMSM:
  - o Elaboration and development of plant models in low and high frequency, which will be further used to get useful information from the plant.
  - o Investigations and development of PMSM control techniques for improving the efficiency and reducing power loss.
  - o Analysis of the most frequent causes of failure in PMSM, and investigation and development of new methods for fault detection and diagnosis.
  - o Investigations and development of an Expert System able not only of controlling the drive, but also monitoring it to early fault detection.
  - o Development of an Intelligent Drive based on AI (Artificial Intelligence) able to supervise, complement and improve both the efficiency and the inner torque loop of the motor, harmonically linked thru it.

