Centralized or distributed control configuration

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CENTRALIZED CONTROL

The complex electro-mechanical (mechatronic) structures applying different position sensors as LVDT, resolver and actuator technologies as voice-coil, Brushless, DC and AC motors are central subjects of interest to currently developed industrial and scientific applications. Taking into account that low price and short development times become crucial aspects, it is very interesting to analyze different configurations looking for their pertinent aspects. That allows to design only once the common parts for almost all applications as “internal modular standard”. In this way avoid “repeatable” design and optimize implementation time and the global cost.

DISTRIBUTED SOLUTION

The interesting alternative against a centralized configuration is proposed the Intelligent Motion Control System (IMCS) based on the modular design and distributed intelligence concept. It includes:

1. Power Supervisor Unit (PSU) one for each application. Its main goal is to control the Emergency Stop and Enable wired loops but also power supplies
2. Integrated and versatile Intelligent Motion Control Unit (IMCU) one for each actuator. It combines all functions necessary to “local/individual” control of one actuator.
3. Accessories as back planes, standard rack, connectors etc.

IMCU

The IMCU once programmed with suitable and open source firmware, it combines in a single unit all the functions necessary to control one actuator. Designed around reprogrammable (CPLD and DSP) and reconfigurable I2C technologies it allows to be tailored exactly to a particular requirement.

The Most popular control systems are based on the centralized configuration where each part provides a single function (CPU, A/D and D/A conversion, digital I/O etc). This configuration presents several disadvantages:

1. electrical connection structure is quite complex.
2. Knowing that power amplifiers are separated from the control sub-system, the high-resolution analog inter-connections need to be carefully designed and implemented.
3. distance, grounding and resolution become critical.
4. increased EMC sensibility.
5. relatively complex maintenance.
6. many connectors.
7. low reliability.
8. longer manufacturing time.
9. increased price.