New projects, like FERMI@Elettra, demand for standardization of systems in order to cut development and maintenance costs. The various motion control applications foreseen in this project required a specific controller able to flexibly adapt to any need while maintaining a common interface to the control system to minimize software development efforts. These reasons led us to design and build “Yet Another Motor Subrack” (YAMS), a 3U chassis containing a commercial stepper motor controller, up to eight motor drivers and all the necessary auxiliary systems. The motors can be controlled locally by means of an operator panel or remotely through an Ethernet interface and a dedicated Tango device server.

Motor Driver Boards
These boards are designed in the DIN41494 Eurocard standard, each carrying the electronics necessary to cope with different motor type and power. From the point of view of the core controller the connecting bus is the same, being its main feature the pulse/direction interface. The power section of the board is realized using the Maxstrix hybrid family produced by IMS (now “Schneider Electric Motion USA”).

Encoder Daughter Boards
The purpose of the encoder boards is to adapt and/or condition the signals coming from the encoder to the inputs accepted by the DMC controller. Up to now we have developed three types of encoder boards:

- Type 1 encoder board: it just connects the external encoder connector to the internal signal bus. No conditioning is performed.
- Type 2 encoder board: it converts RS422 level balanced signals from digital sin/cos encoders to unbalanced signals.
- Type 3 encoder board: it accepts a 4-20mA analog signal and converts it to an internal voltage signal.

SOFTWARE ENVIRONMENT

The DMC family controllers have their own communication and programming protocol and language, besides a good basic instruction set for motor control. So, if necessary, it is possible to add specific routines into the controller memory to improve the controller functionalities. These routines may be referred as “firmware”.

A similar solution for motion control was also adopted by the SOLEIL synchrotron light source, participating with other partners, including Sincrotrone Trieste, to the Tango collaboration. They developed the software architecture and the first releases of the “galilbox” and “galilboxy” Tango device servers. As a result, the YAMS project has inherited a considerable amount of knowledge and ready to re-use code, thus reducing the overall development time.

Differences between SOLEIL and FERMI@Elettra in the modality the stepper controllers are employed, led us to modify both firmware and software from their initial releases. For instance, the FERMI@Elettra version is capable to read a potentiometric encoder, i.e. an analog sensor, and close it if the motion control loop.