Simplified Design and Speedy Development Enahances Energy Efficiency for Three-Phase Motor Drives

STMicroelectronics has unveiled new resources for customers that will simplify design and speed up development of energy-saving intelligent motor drives for applications such as white goods, air conditioners, industrial automation, power tools and fitness equipment.

Electric motors operated by traditional on/off drives consume as much as 50% of the world's electricity. Intelligent drives enable improved energy ratings, but present complex design challenges and historically have required expensive processors such as digital signal controllers. ST's advanced STM32 microcontroller family and ready-to-use firmware building blocks for intelligent drives help designers overcome these challenges.

The STM32 FOC PMSM SDK v3.0 motor-control firmware library release adds support for the low-cost STM32 Value Line series (STM32F100x), enabling designers to realize intelligent drives at lower price points for highly cost-sensitive applications. It also targets the STM32 Performance Line High-Density series (STM32F103xx), exploiting the large program Flash memory combined with the advanced peripheral offering, to implement a dual-motor drive in a single controller, saving cost, size and development time. This is the first ST library to support dual motor controls and will benefit designers of equipment such as air conditioning units, industrial automation and robotics systems.

A further innovation offered as part of ST's motor-drive solution is the MC Workbench v1.0.2, which is a graphical PC tool for the configuration of the firmware library. This simplifies the task of assembling the blocks and customizing the drive to perform as required.

STM32 microcontrollers feature an advanced architecture that delivers high processing performance and integrates functions such as the timers needed for motor control at highly competitive cost. ST has more than 180 STM32 variants, from low-cost devices to versions offering high feature integration, performance and memory density. Pin-assignment, peripherals and software compatibility enhances scalability and flexibility for developers.

Further Technical Information
By using the STM32 firmware library, designers can quickly configure controllers for 3-phase Permanent Magnet Synchronous Motors (PMSM), using Field Oriented Control (FOC); a key algorithm for an efficient, silent and responsive motor drive. The library provides a comprehensive set of functionalities, including both torque control and speed control with on-the-fly switching capability, and advanced features such as ST's patented algorithm for single-shunt resistor-based current

reading, MTPA for IPMSM, flux weakening, feed forward and brake strategy. The C-code provided conforms to MISRA-C 2004 rules and ISO/ANSI standards.

The library contains IP blocks supporting speed and position detection using sensors such as Hall-effect or encoder devices, or sensorless algorithms. By supporting several configurations, the library gives designers flexibility to choose the approach that best suits their application. This latest version of the software library also provides designers with extra control to customize aspects such as, for instance, microcontroller pin assignments and an application example based on the FreeRTOS operating system.

Using the new graphical configuration tool MC Workbench v1.0.2, designers can build and optimize their drives without the need to edit code directly, thereby eliminating a difficult, time consuming and error-prone aspect of the design process.

A starter kit is also available, providing designers with a head start when developing motor-control applications. The STM3210B-MCKIT is ready to run, containing a motor-control board, processor board and 3-phase brushless motor, as well as software libraries and development/debugging tools. The kit shortens time to market by allowing developers to apply what they learn in the evaluation phase to real-world applications.

Further information on ST can be found at www.st.com [1].

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