

# All-In-One Machine Controller Card

## Single-card machine controller lowers cost and simplifies servicing

### Application Challenge

A single card controller solution for automated equipment or instrumentation can lower per unit cost and greatly simplify servicing. But how do you install sophisticated motion controls onto such a card without spending a fortune on algorithm development and amplifier design?

### Application Considerations

Feature/Function	Units/Description
Card Size	6.5" x 8.0"
Motors	3 Brushless DC motors, 24V, 2.0 amps
Power Supply	Single input, 36V



### Motion Control Solution

In this application, we use a **Magellan® Motion Processor** from Performance Motion Devices, Inc. This product provides functions such as profile generation and servo control, and interfaces directly with the motor amplifiers. Figure 1 provides a block diagram of the all-in-one controller card.

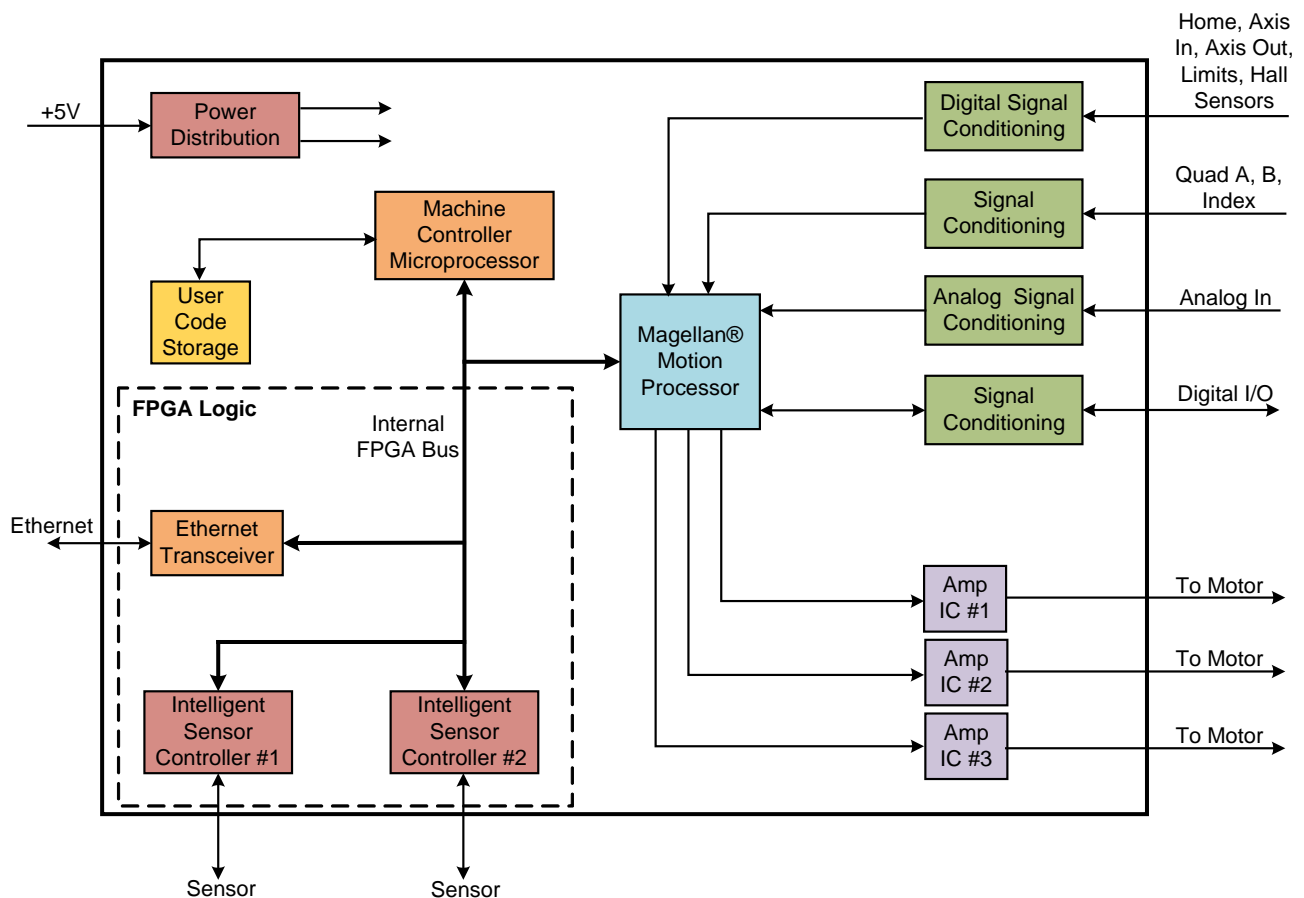


Figure 1: All-In-One Machine Controller Card Block Diagram

Additional components on the card include a Xilinx FPGA (field programmable gate array) and an ARM-based CPU module. The FPGA holds an Ethernet communications module and additional miscellaneous logic for specialized intelligent sensors that the machine must interface to.

The inputs and outputs to the **Magellan® Motion Processor IC** are a parallel data bus and control signals to connect to the FPGA, incremental encoder inputs, analog sensor inputs, Hall inputs from the motors, PWM (pulse width modulated) motor output signals, and limit switch input signals.

The amplifier chips used in this application are three single-axis brushless DC driver ICs from SGS Thomson. These chips only provide voltage control of the motor (no current loop) but this is adequate for the application. The amplifier ICs interface directly to the **Magellan IC**, which generates the appropriate PWM signals to drive the motor along the requested profile.

All of the application code resides in the ARM-based CPU. This user application code provides the overall machine behavior. It utilizes the FPGA Ethernet module to report back to a central host computer, the miscellaneous logic modules to communicate to off-card sensors, and the parallel data bus to communicate to the **Magellan IC**. Motion commands use **PMD's C-language libraries** supplied with the Magellan hardware.

### Summary

Competition is forcing machine manufacturers to develop products that provide more performance, yet reduce cost and require less development time. All-in-one machine controller cards with their attendant benefits in size and serviceability are increasingly feasible due to the availability of off-the-shelf motion processor ICs, continuing reductions in the size of IC-based amplifiers, and continuing improvements in the logic density of FPGAs.

### Going Further

Additional options to consider for an all-in-one controller card are use of solderable amplifier modules rather than IC-based amplifiers. These modules interface directly with the motion IC, but provide high performance current control, and amperage output to 8 amps continuous and beyond.

The **Magellan® Family of Motion Control ICs** provides high performance chip-based motion control for multiple motor types. Magellan motion control ICs are available in 1, 2, 3, and 4-axis versions. They are designed for demanding and precise applications such as this single-card machine controller solution and other automation and instrumentation challenges.



**Contact our customer support team at +1 781 674 9860 for more information including details on Developer's Kits and application support. We would like to assist you in improving your motion system.**