IIO T Electric Drives & Motor Control

INTRODUCTION

Electric drives and motors need electronics to create appropriate currents and voltages to run a motor at a given speed and torque. With Industrial IoT, electric drives are expected to be a responsive member of a network doing sensor interfacing, data collection, edge intelligence, HMI and connectivity to the cloud.

AMD Electric Drives solutions simplify and accelerate development to create motor control implementations that meet the needs of Industrial IoT. Multiple offerings for beginner to advance users are available.

AMD Adaptive SoCs are being used in a variety of applications in Industrial, Vision, Healthcare, Automotive, Aerospace and Defense markets.

AMD Adaptive SoC Inherent Benefits:
> Single or Multi-axis
> High Efficiency
> Fast Control Loops
> Diverse and futureproof Networking Support
> Deterministic Motor Control Performance, regardless of what else is in the same chip
> Cybersecurity and Functional Safety
> On-chip Predictive Maintenance or other Analytics
> Compact Size
> Scalable Embedded Platform that spans multiple products
> Unified SW approach for lower Total Cost of Ownership
> For harsh environments over Industrial lifecycles
> Flexible interfacing to changing companion chips

SOFTWARE UPGRADABILITY AT NO CHARGE

ELECTRIC DRIVES DEMONSTRATION PLATFORM

PLATFORM OFFER
> Industrial Motor Control Reference Design
> Open Source Code
> SPYN: Python Powered Control & Edge Analytics using PYNQ
> SPYN AI: Predictive Maintenance
> SPYN X: Model Predictive Control

For Advanced Users
> High Performance Motor Control IP

Electric Drives Design Flow

Motor Control Algorithm written in C/C++

Vitis™ and Vitis AI™

Automatic Implementation Generation by Vitis

Zynq™ & Zynq UltraScale+™ Based Boards

Same Hardware, Software Upgradeable
AMD DRIVES & MOTOR CONTROL SOLUTION FOR ALL

AMD comprehensive motor control solution includes:

> Source code for Field Oriented Control offer as Open Source in GitHub
> Complete documentation on FOC algorithm, IPs, and Electric Drives Demonstration Platform
> Whitepapers, Workshop tutorials and YouTube demo videos

AMD INDUSTRIAL & HEALTHCARE IOT SOLUTIONS STACK

IoT trends in Industrial and Healthcare applications have increased the complexity of embedded systems where the only scalable method in accelerating cost-effective products to market is a platform approach. AMD provides three key ingredients for architecting these systems:

Industrial IoT Solutions Stack - [www.xilinx.com/applications/industrial/motor-control.html#solutionStack](http://www.xilinx.com/applications/industrial/motor-control.html#solutionStack)

> AMD Adaptive SoC portfolio enable a common processing subsystem combined with programmable logic to customize the functionality to fit a wide range of Industrial and Healthcare applications
> AMD Industrial and Healthcare IoT Solutions Stack provides solutions for Functional Safety, Cybersecurity, Control, Communication, Vision Processing, Mixed Criticality Software, Machine Learning and Analytics at the Edge, supporting sub-10ns real-time decisions
> AMD offers high performance, low latency neural network-based or traditional machine learning solutions without compromising on power or physical footprint. AMD uniquely offers state of the art AI solutions on platforms meeting stringent long lifecycle requirements and extended temperatures for harsh conditions

SOFTWARE UPGRADEABILITY AT NO CHARGE

> PYNQ is an open-source python framework from AMD that makes it easy to design embedded systems with Zynq™ SoCs
> Vitis AI development environment is AMD’s development platform for AI inference on AMD Adaptive Compute Platforms, including both edge devices and Alveo cards. It consists of optimized IP, tools, libraries, models, and example designs. It is designed with high efficiency and ease of use in mind, unleashing the full potential of AI acceleration on AMD Adaptive Compute Platforms.

AMD DRIVES & MOTOR CONTROL SOLUTION FOR ADVANCED USERS

AMD motor control solution for AMD Adaptive FPGA and SoC advanced user includes:

> Solution Powered by QDESYS
  > 15 Control Functions, All Modular
  > Dynamic Operation with Minimum Footprint
> Zynq™-7000 based Three Level Inverter (TLIMOT)
  > Silicon-Carbide Technology
  > Fast Control Loop
  > Optimal Design for Size, Cost, EMI & more
  > Complete with exhaustive IP, Design Services

“The tremendous integration enabled by Zynq boosts control performance and encompasses safety, multiple communication buses, a display for easy setup and diagnosis and all relevant encoder types.”

- Kollmorgen
4 axes, 16 or 97? A single SI6 drive controller can control up to two axes. Thanks to the modular system, the number of motors or axes to be controlled can be freely scaled. The SI6 drive controller is the most compact solution on the market.

- STÖBER Antriebstechnik GmbH
ADDITIONAL RESOURCES

> Avnet Ultra96 - [http://zedboard.org/product/ultra96-v2-development-board](http://zedboard.org/product/ultra96-v2-development-board)
> PYNQ Hardware-Software Framework - [www.pynq.io/](http://www.pynq.io/)
> SPYNX (Open Source Community Contributed) - [https://github.com/stefan-ba/IioT-SPYN](https://github.com/stefan-ba/IioT-CONCLUSION

Zynq and Zynq UltraScale+ Adaptive Compute Platform portfolio are the lowest total cost of ownership solution for integrated Industrial IoT/Industry 4.0 drive platforms. There has never been an easier path for getting started with AMD Motor Control solutions than the C/C++ language based Electric Drives kit, which is software upgradable to include Edge Analytics, Predictive Maintenance through integration of open-source Python libraries. Implement your own algorithms or modify the default field-oriented control source code available on Github along with full documentation and how-to tutorials.

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