Product Brief

Advanced Velocity Estimator IP Core

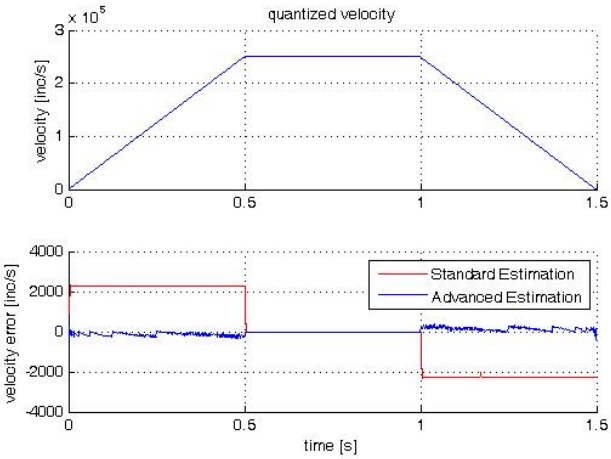
Overview

Today's high-end motion control systems require accurate feedback of actual position, velocity and current values. At the same time, the market is asking for less expensive systems with equal or better performance than their predecessors. This usually leads to motion control systems where there is no expensive velocity sensor (tacho) and thus velocity needs to be estimated from position information.

Common velocity estimation methods (derivation of position information over time and low-pass filtering) suffer from typical problems like an unsatisfactory resolution in the time domain and long dead times which could render the control loop unstable.

Enclustra's Advanced Velocity Estimator IP Core pursuits a different approach; it utilizes the tremendous processing power and temporal resolution capability of today's FPGAs by estimating the actual velocity for each incoming encoder increment.

Highlights



The plot to the left compares the velocity estimation error of a common method (derivation of position information over time and low-pass filtering) and Enclustra's Advanced Velocity Estimation algorithm for a trapezoidal velocity profile.

It is evident that during acceleration and decceleration phases Enclustra's Advanced Velocity Estimation algorithm shows superior accuracy while during constant velocity phases both methods are equally accurate.

Enclustra's Advanced Velocity Estimation IP Core thus enables highly accurate control of velocity during all phases of a motion sequence.

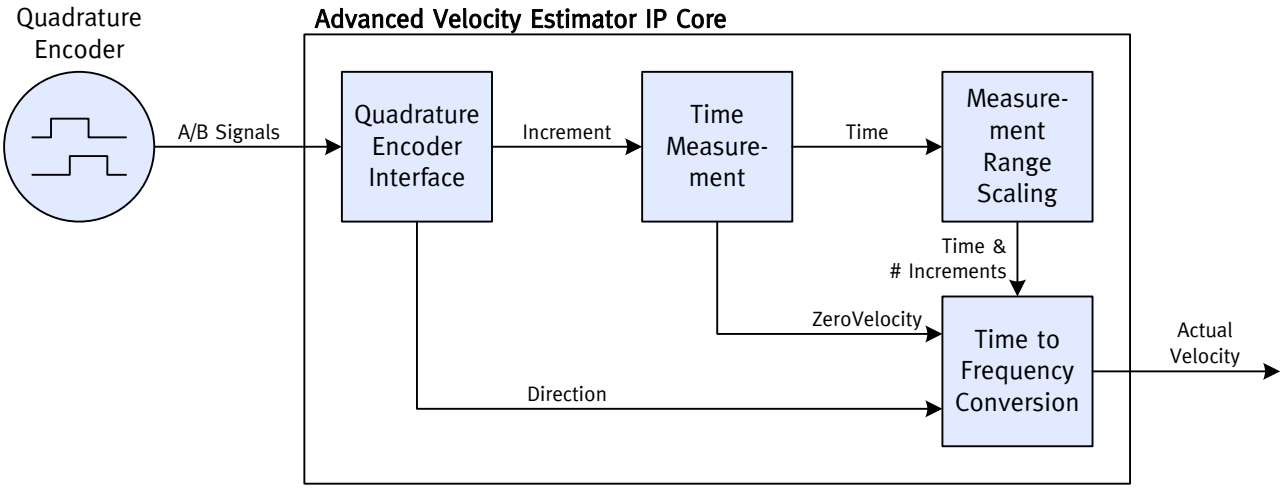
Features

- User-configurable measurement ranges
- User-configurable zero velocity threshold
- Unified bus interface (Avalon, PLB, ClustraBus) for register bank access

Benefits

- Much better accuracy than common velocity estimation methods
- Constant accuracy over a wide velocity range due to automatic adaption of the measuring range (up to one velocity calculation per increment)

Core Architecture



Core Architecture Facts

- Accepts quadrature encoder signals (A/B)
- User-configurable zero velocity time threshold
- User-configurable measurement ranges
- Resource-efficient implementation

Related Products

- Enclustra Universal Drive Controller IP Core
- Enclustra FMC Drive Evaluation Board
- Enclustra Mars MX1, MX2, AX3* FPGA Modules
- Enclustra Mars Starter Base Board

Target Applications

- Industrial Automation
- Medical Testing
- Robotics
- Motion Control
- Servo Control
- Semiconductor

Deliverables

- FPGA-specific netlist & VHDL component declaration
- Precompiled simulation library (ModelSim PE)
- VHDL test bench with bus functional model
- User manual
- Example schematics of external driver and sensor circuitry

* Future product, not yet available.

Information containted in this product brief is subject to change without notice.

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