Vantaggi dell’architettura riconfigurabile basata su FPGA e distribuita, tramite rete EtherCAT, per applicazioni di controllo assi ad alte prestazioni

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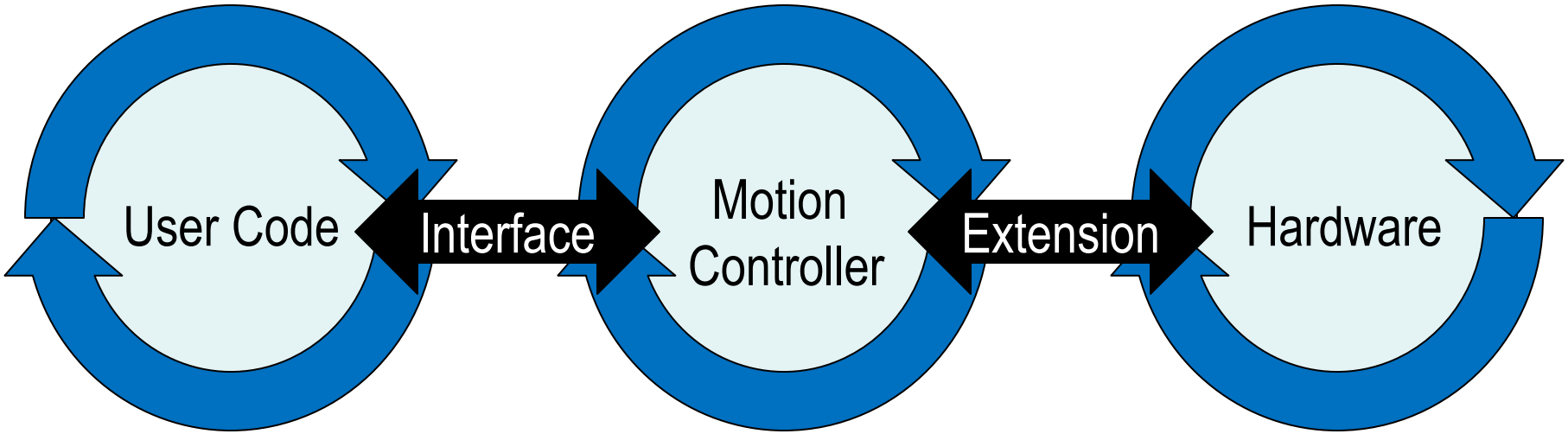
National Instruments

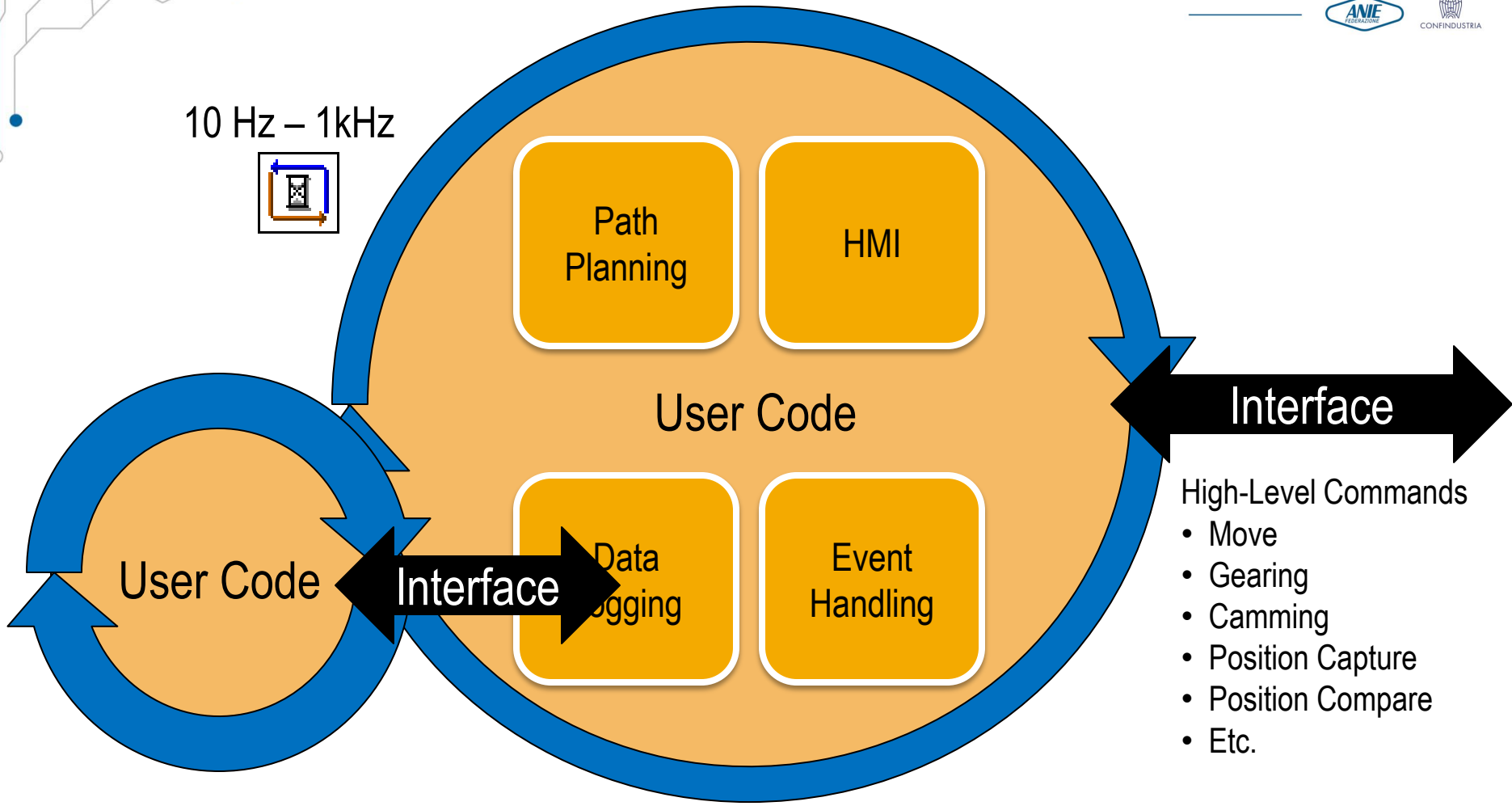
Agenda

- **Motion System Components**
    - User Code
    - Motion Controller
    - Hardware

- **Hardware Extension**
    - Distributed
    - Embedded

Motion System Components

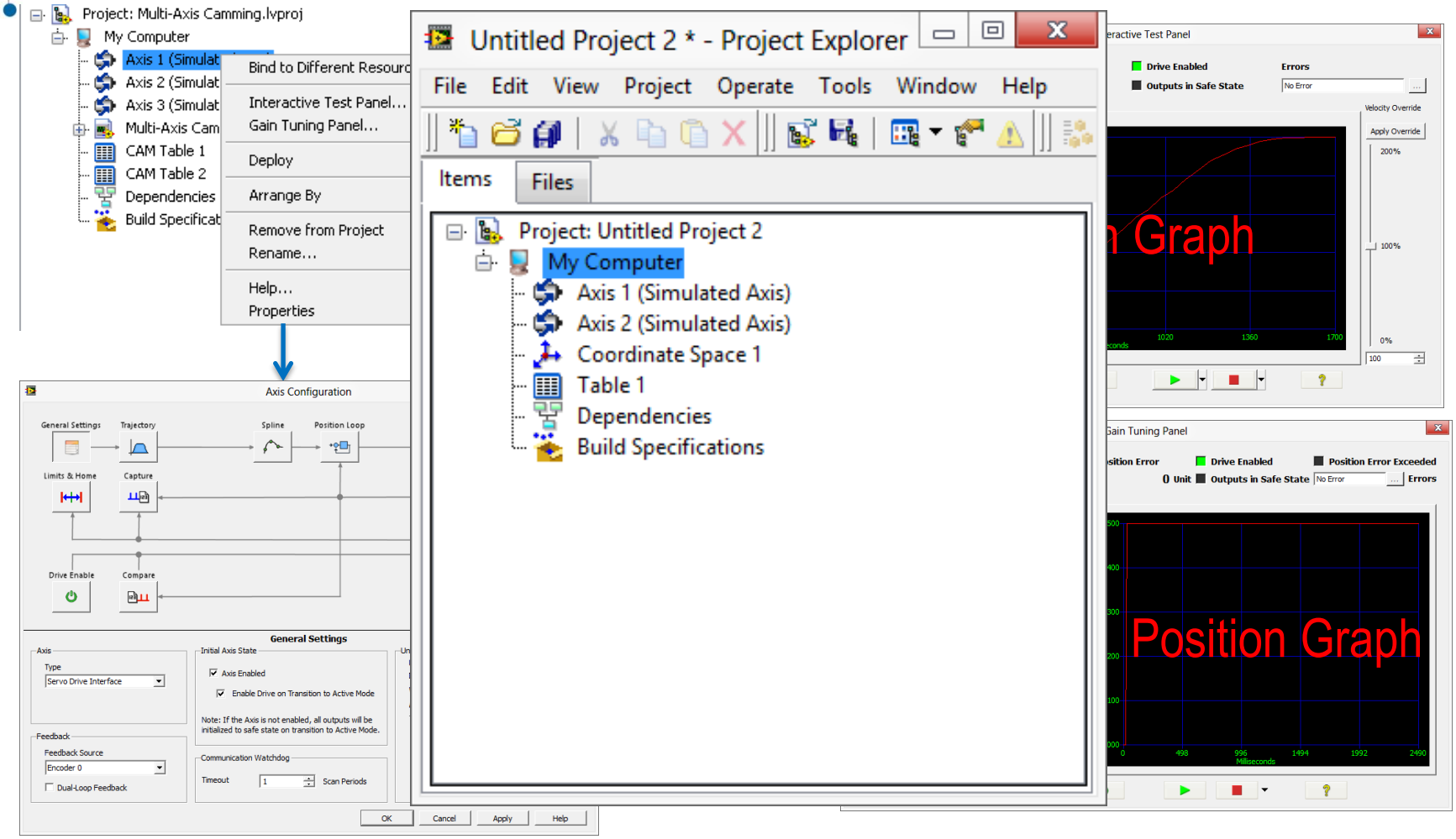




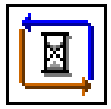
High-Level Commands

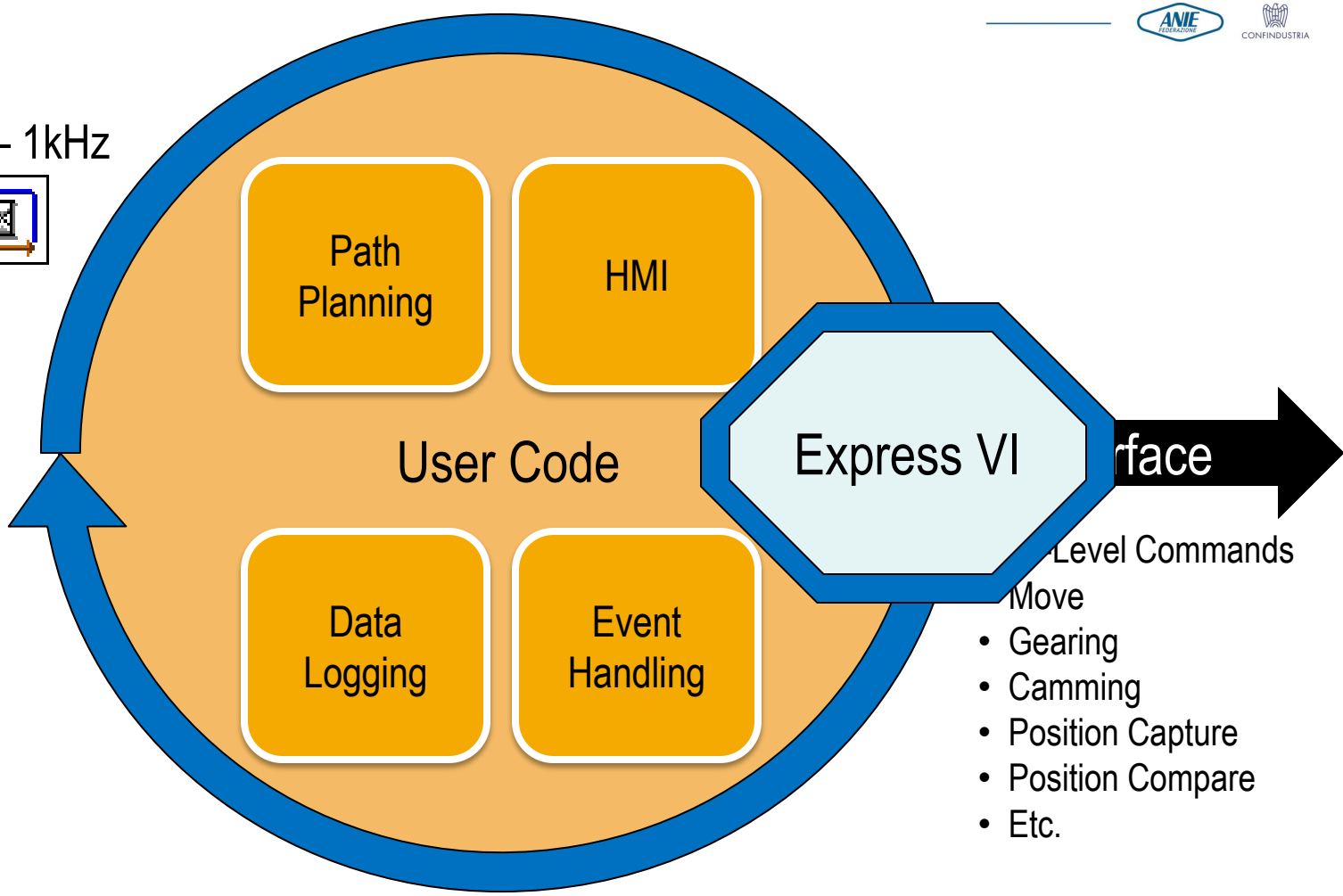
- Move
- Gearing
- Camming
- Position Capture
- Position Compare
- Etc.

Motion System Configuration



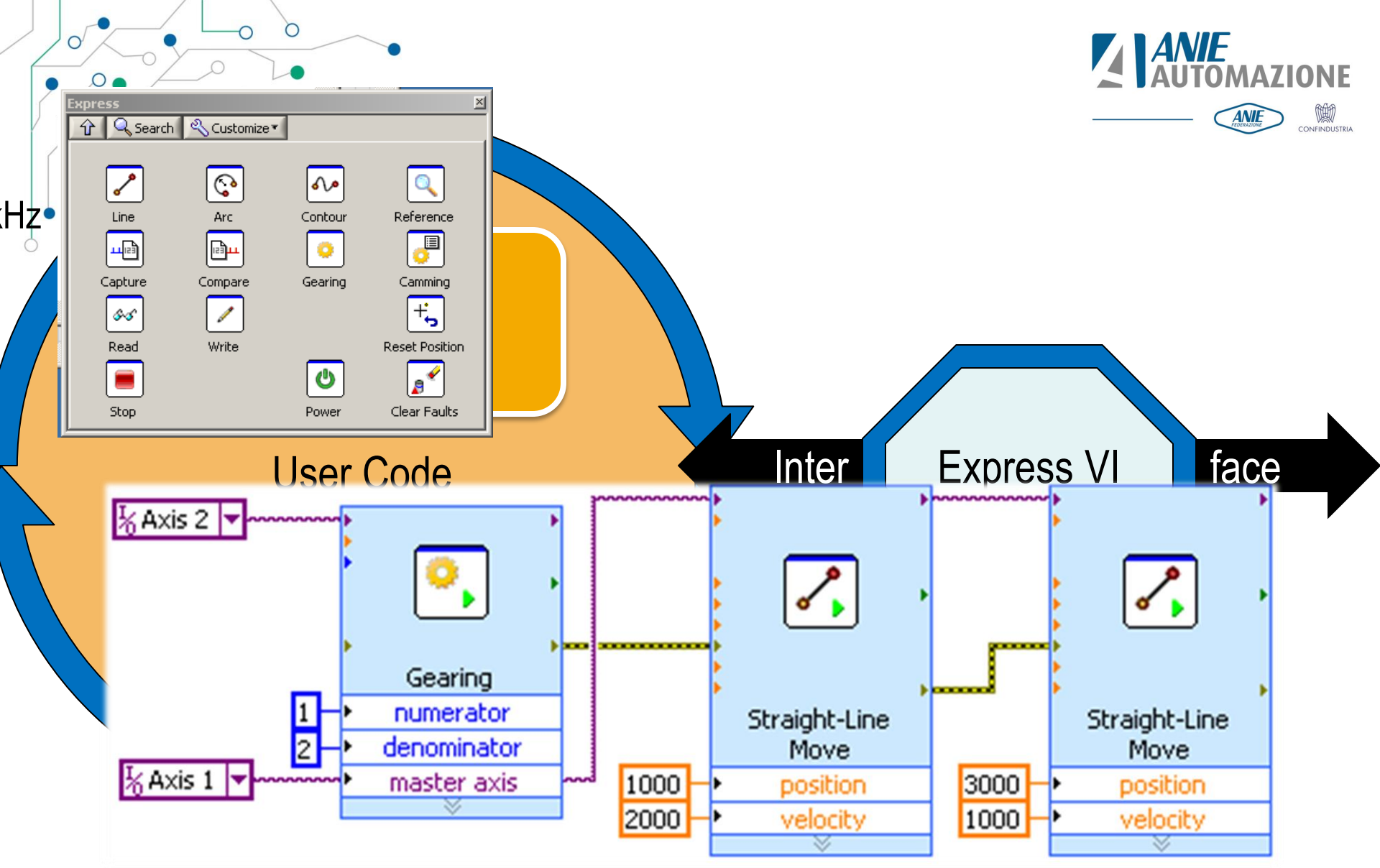
10 Hz – 1kHz

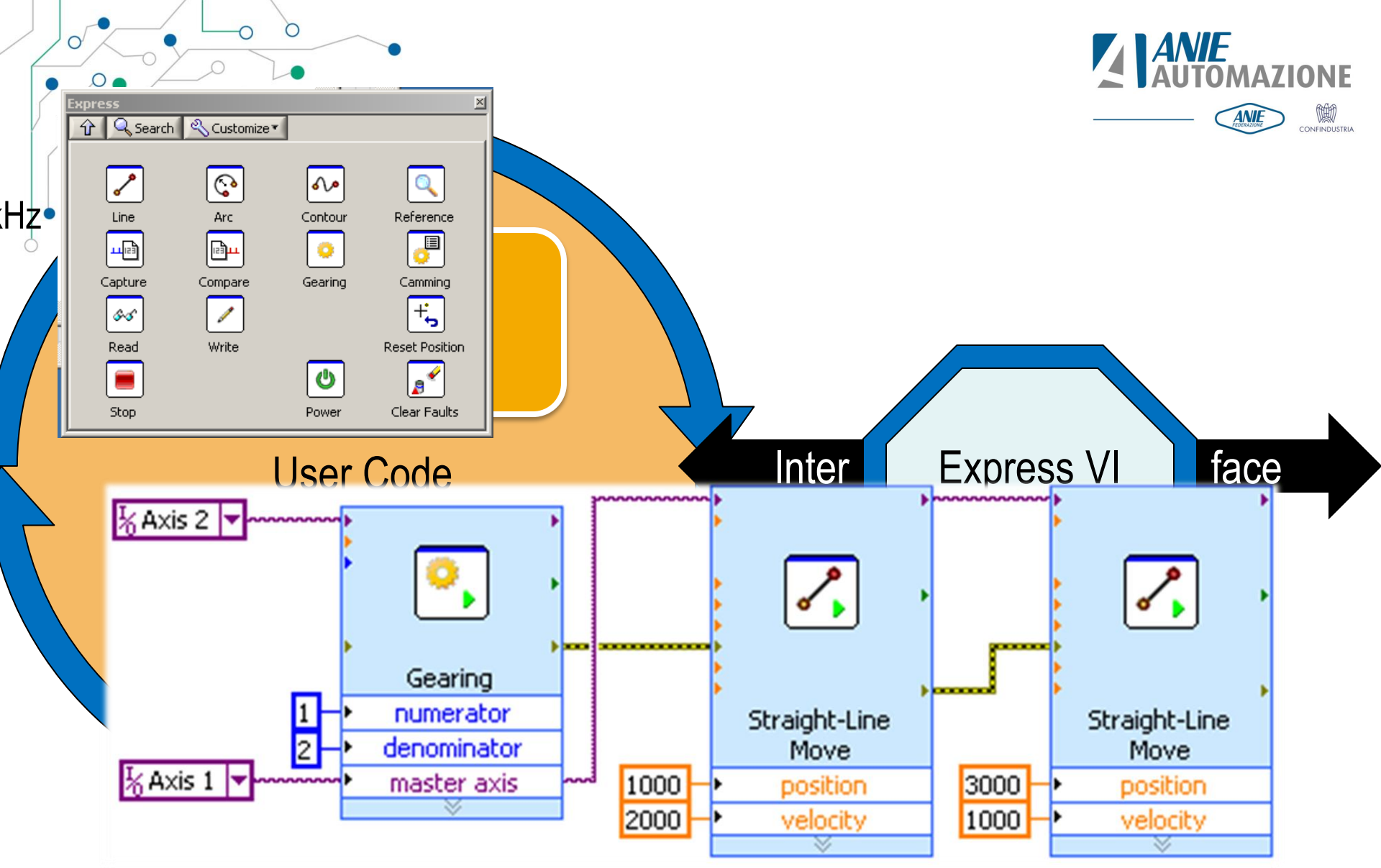




-Level Commands
Move

- Gearing
- Camming
- Position Capture
- Position Compare
- Etc.


Express
Search
Customize
Line
Arc
Contour
Reference
Capture
Compare
Gearing
Camming
Read
Write
Reset Position
Stop
Power
Clear Faults
User Code
Inter
Express VI
face
Axis 2
Axis 1
Gearing
numerator
denominator
master axis
1
2
Straight-Line Move
position
velocity
1000
2000
Straight-Line Move
position
velocity
3000
1000


Express
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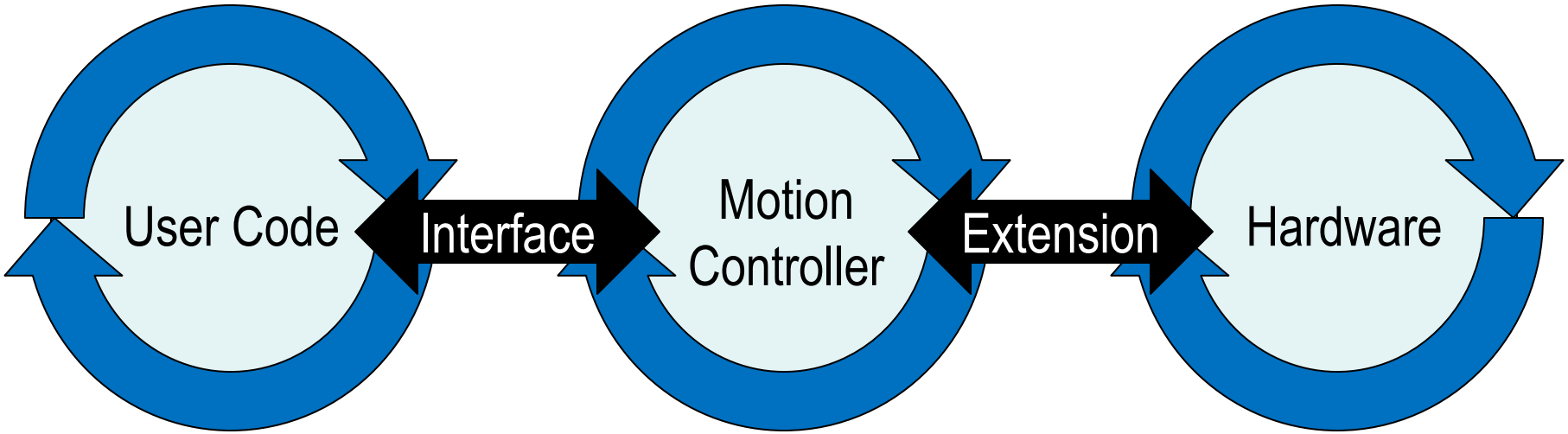
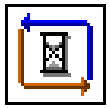
Motion System Components



100Hz - 1 kHz



Supervisory Control

Trajectory Generator

Motion Engine

Analog I/O

Digital I/O

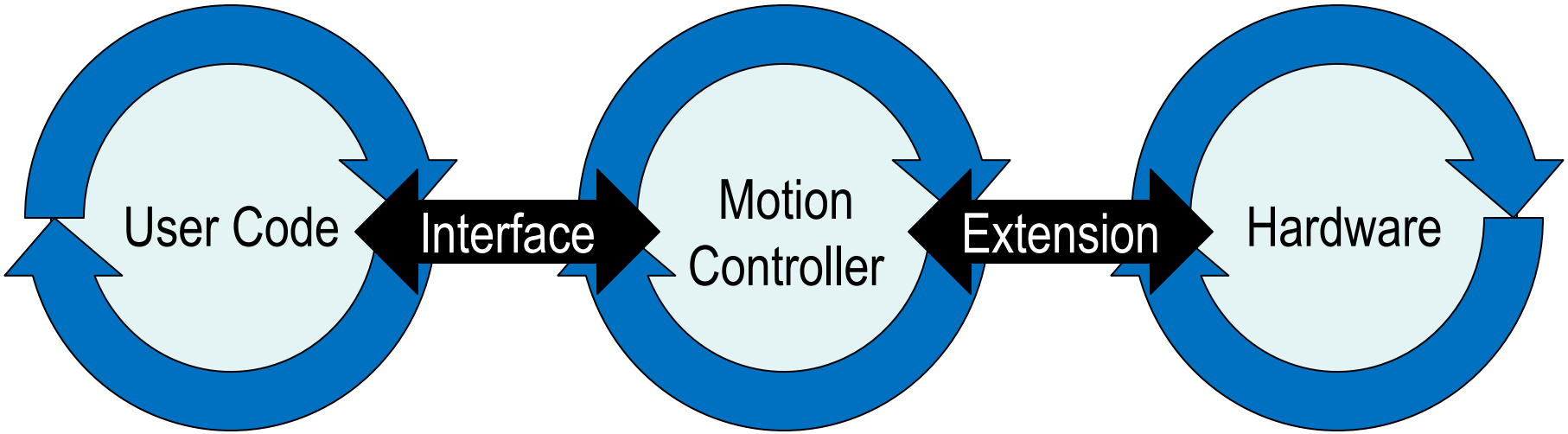
Interface

High-Level Commands
- Move
- Gearing
- Camming
- Position Capture
- Position Compare
- Etc.

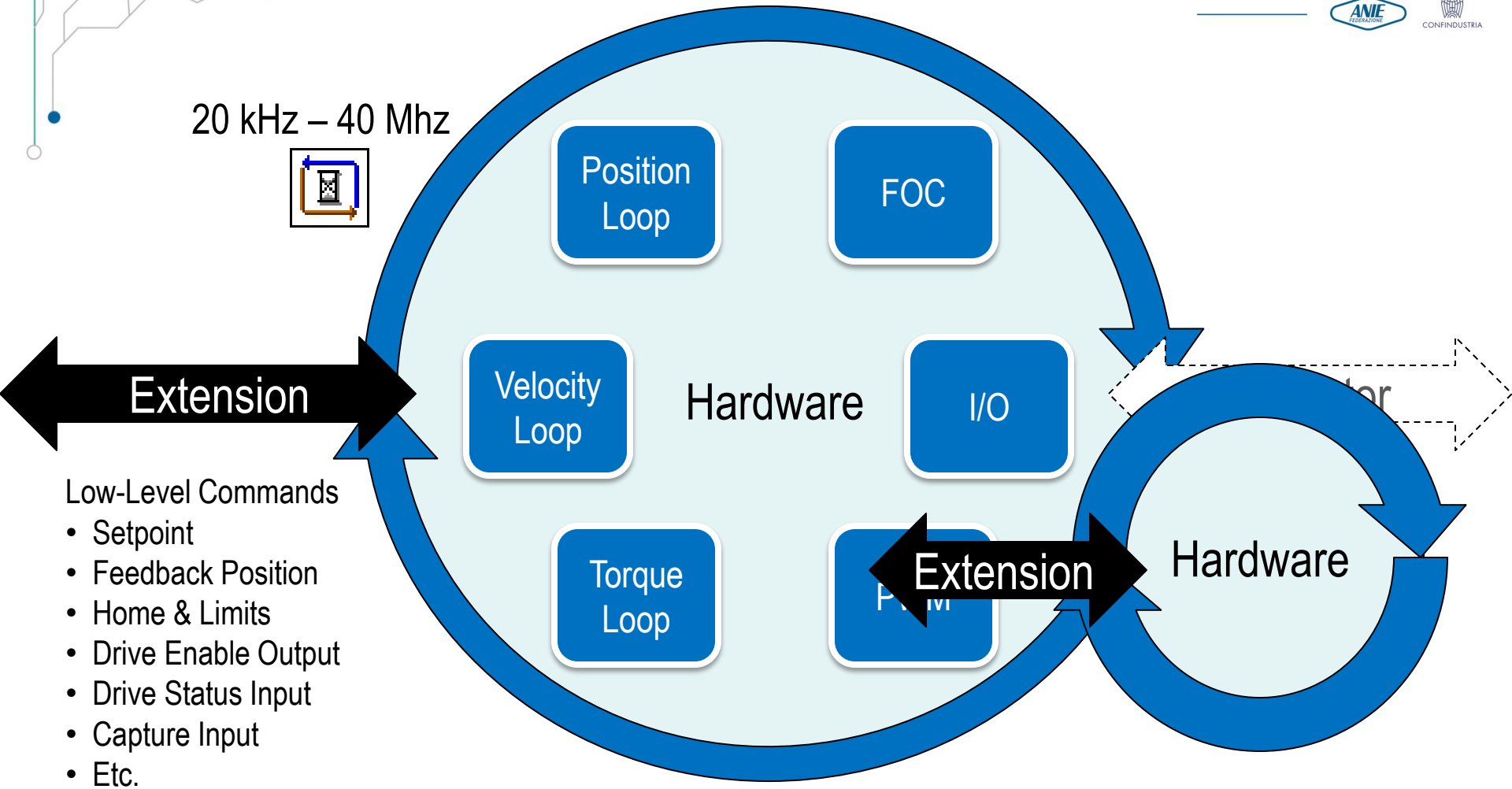
Extension

Low-Level Commands
- Setpoint
- Feedback Position
- Home & Limits
- Drive Enable Output
- Drive Status Input
- Capture Input
- Compare Output
- Etc.

Motion System Components



20 kHz – 40 Mhz



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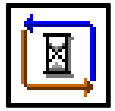


Exter

Data Translation

Position Loop

FOC

Hardware

I/O

Torque Loop

PWM

To Motor

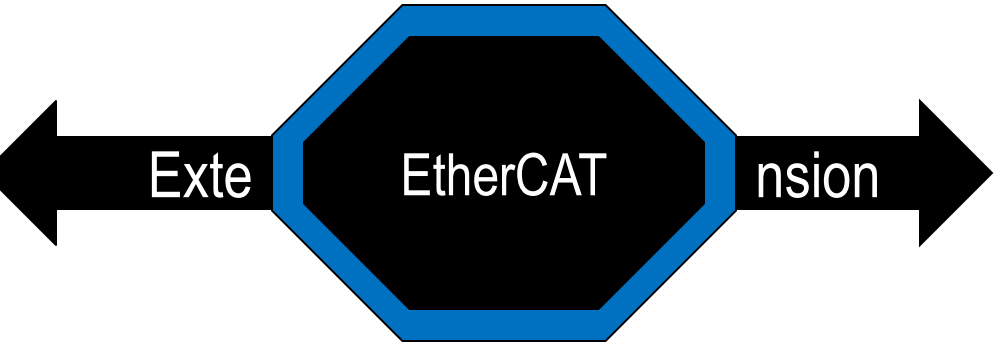
Low-Level Comma

- Setpoint
- Feedback Position
- Home & Limits
- Drive Enable Output
- Drive Status Input
- Capture Input
- Etc.

I/O Signals

- Phase A, B, C
- Encoder A, B, Z
- Etc.

Distributed Solution

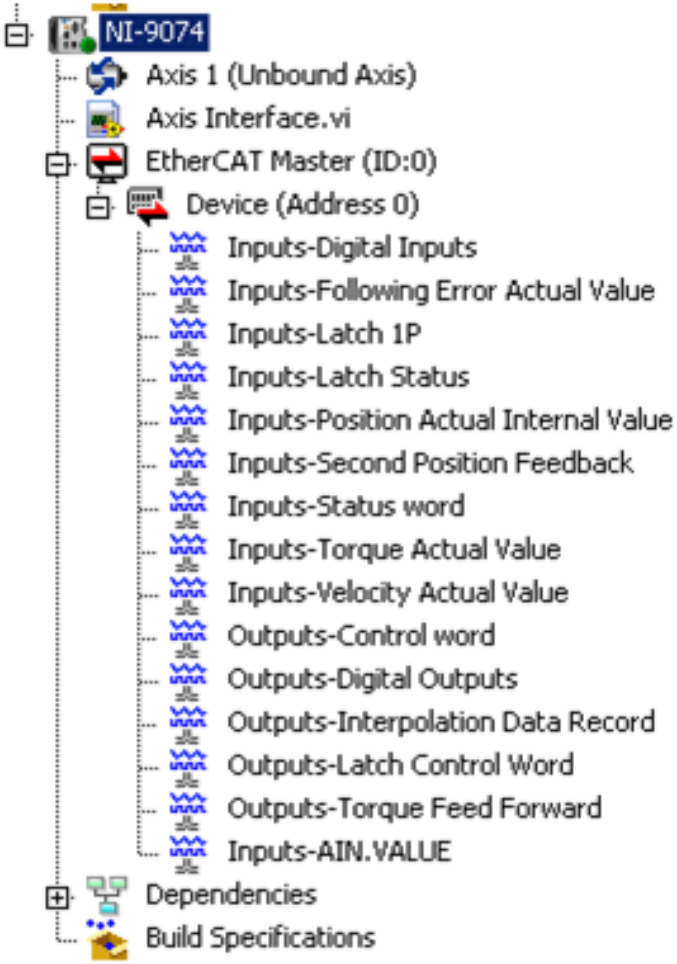


EtherCAT Drive

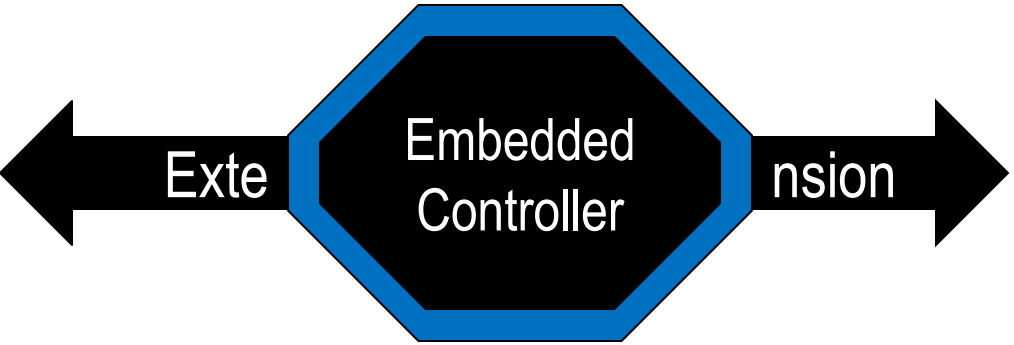
Low-Level Commands

- Setpoint
- Feedback Position
- Home & Limits
- Drive Enable Output
- Drive Status Input
- Capture Input
- Etc.

3rd Party EtherCAT Servo Drive



Embedded Solution

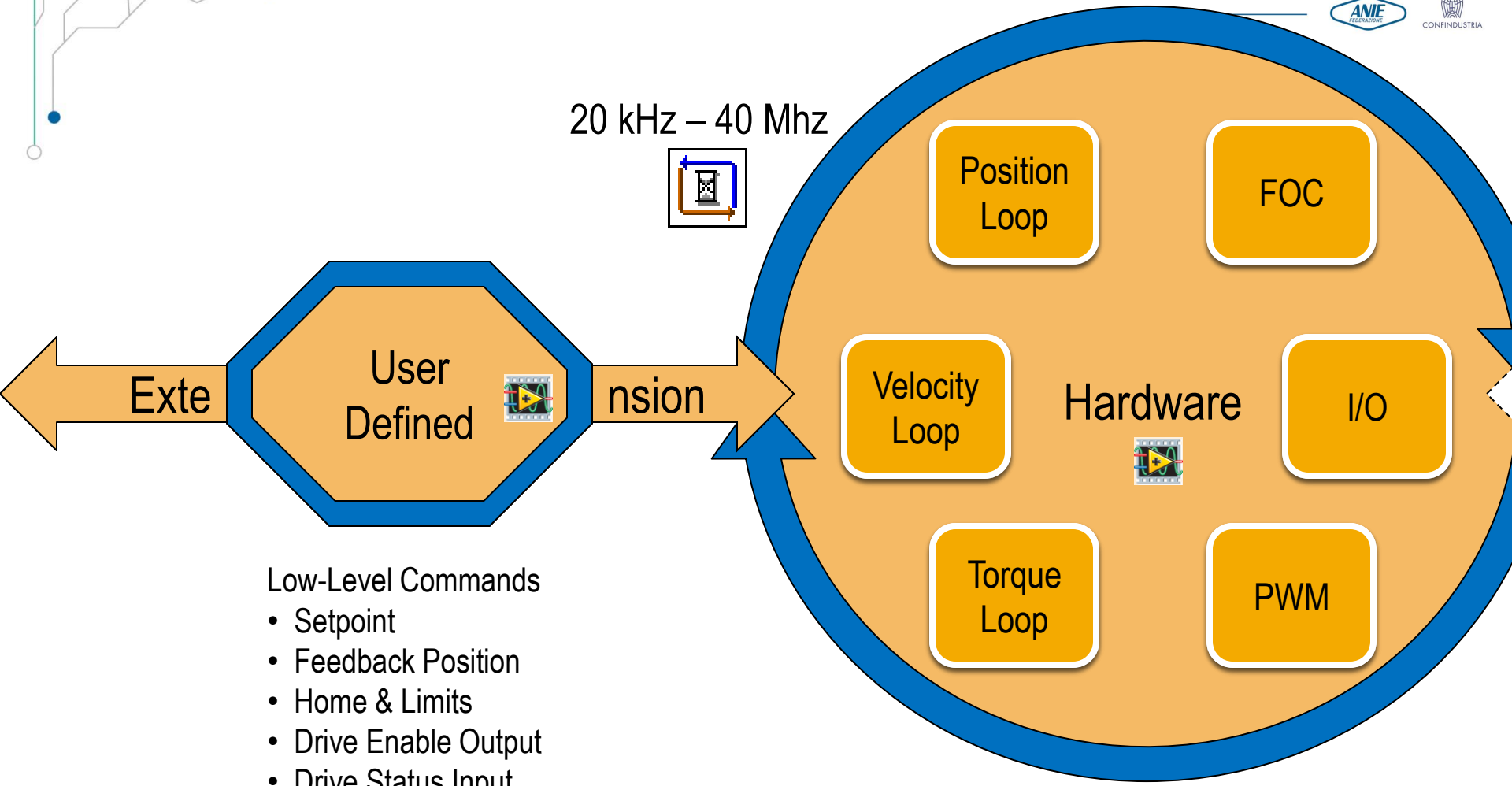


Drive Interface Module

Stepper Drive

Low-Level Commands

- Setpoint
- Feedback Position
- Home & Limits
- Drive Enable Output
- Drive Status Input
- Capture Input
- Etc.



Low-Level Commands

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- Drive Enable Output
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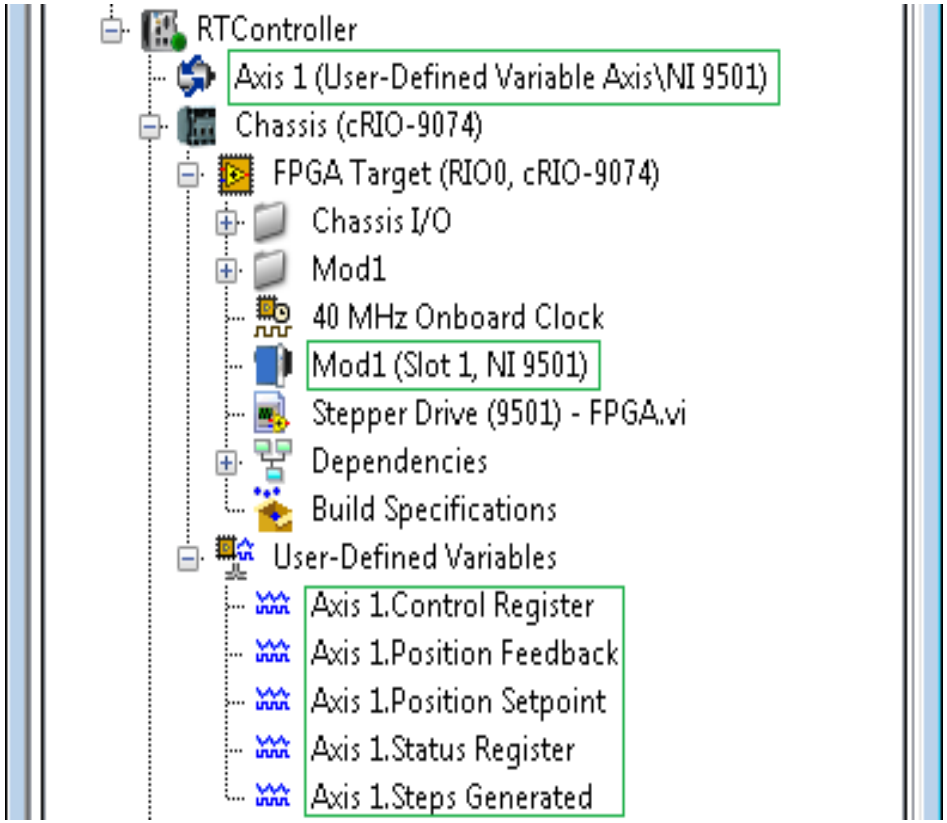
- Etc.

FPGA Programming



Summary

- Motion and System components through hardware and software architecture: it allows adding **Multifunction I/O** into the Motion Controller

- Hardware Extensions Benefits
  - **Distributed** solution: Custom Hardware Control
  - **Embedded** solution: FPGA and flexibility to write code