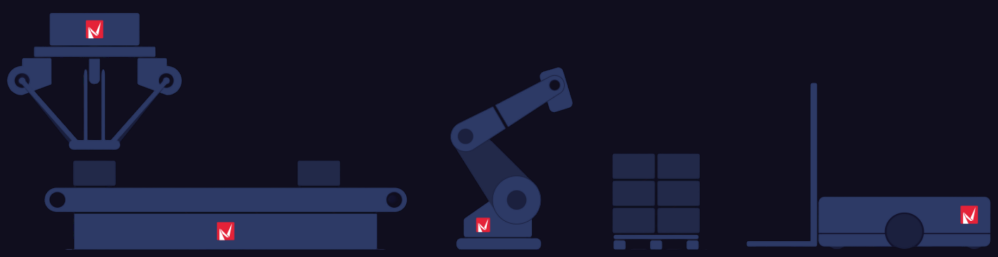
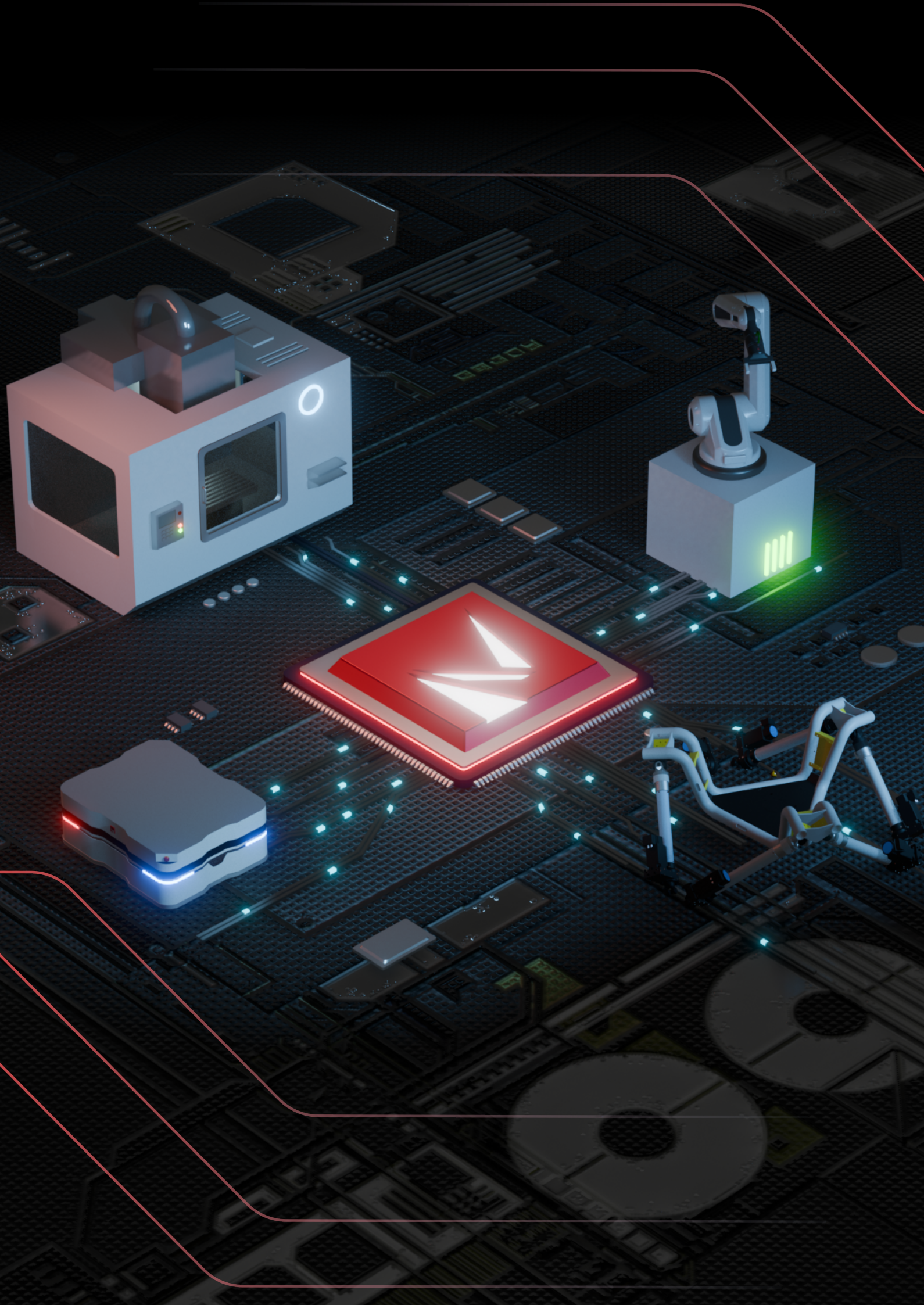
Motorcortex

AUTOMATION SOFTWARE PLATFORM



Design, Simulate, Build, Deploy, Maintain



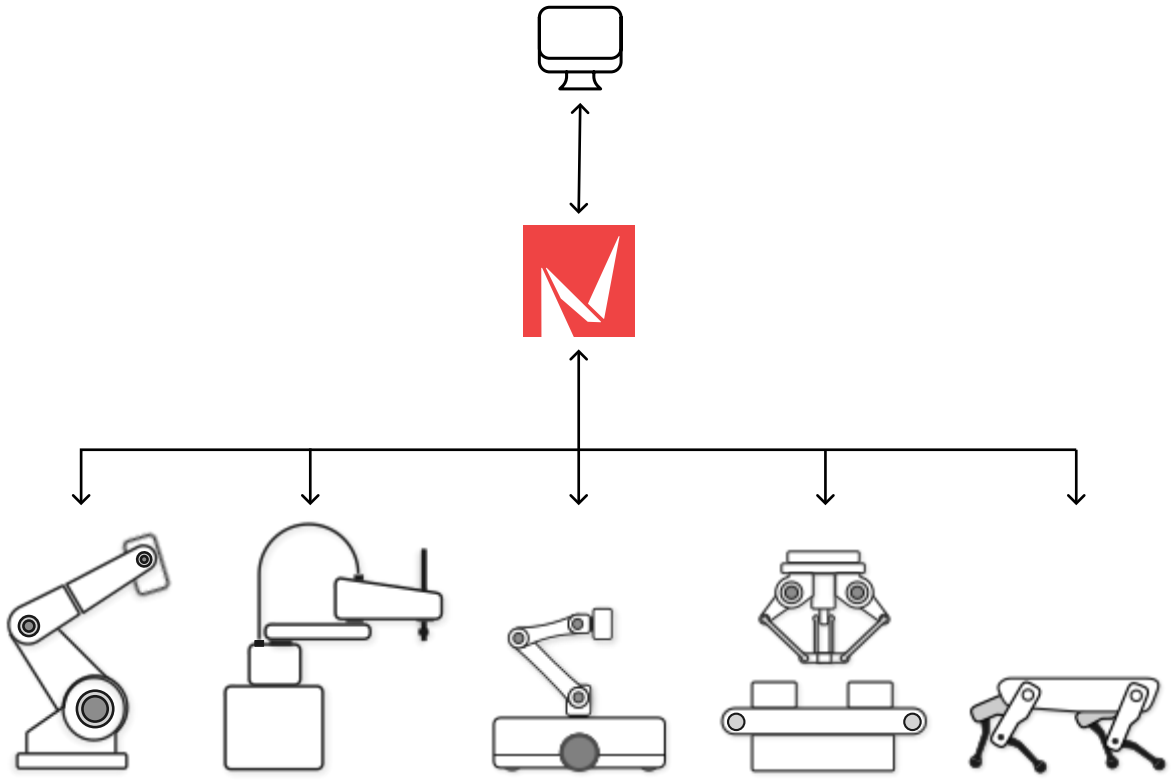
OUR TECHNOLOGY

Motorcortex

Motorcortex is a comprehensive Automation Software Platform for building Embedded Control Systems for Robots, Machines and other automation applications. It offers robust tools and features to streamline the development, deployment, and management of industrial-grade control systems.

Motorcortex-Core provides a powerful Real-Time Operating System (RTOS) and Software Development Kit (SDK), serving as a solid foundation for creating high-performance machine control systems. These components enable precise motion control, real-time communication, and seamless integration with industrial hardware such as EtherCAT devices.

Motorcortex also includes a suite of tools that simplify the entire software lifecycle—designing, simulating, building, debugging, deploying, and maintaining projects. With intuitive interfaces and advanced functionalities like digital twin simulation, Motorcortex significantly reduces development time while enhancing collaboration and efficiency.



THE POWER OF

Embedded Software

Unlike traditional PLCs, which are typically designed to handle straightforward and isolated processes, embedded systems provide greater efficiency, processing power and flexibility. They are capable of seamlessly integrating with diverse software components, enabling more advanced and interconnected solutions.

Embedded systems also offer significant hardware flexibility, allowing developers to choose from a wide range of platforms to meet specific requirements. Additionally, they support scalable solutions such as distributed systems and virtualization. For example, embedded systems can run large-scale simulations in the cloud, making them ideal for modern applications that leverage Artificial Intelligence (AI) and Machine Learning (ML). This scalability and adaptability are essential for addressing the complexities of today's automation challenges and driving innovation in industrial and technological domains.

Benefits of Embedded Systems

Efficiency
Rapid, real-time processing suitable for advanced automation

Customization
Adaptable to specific project needs without the constraints of traditional PLCs

Future-Proof Flexibility
Compatible with a variety of devices, from sensors to full-scale machines

Scalability
Embedded systems allow seamless integration and expansion, growing with project needs

MOTORCORTEX

Foundation for Embedded Software

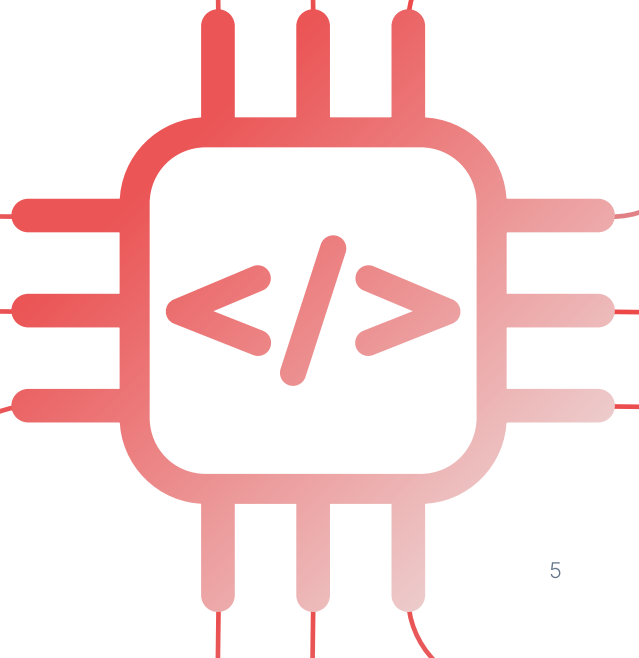
Whether managing intricate automation systems, implementing AI, or connecting with IoT and databases, Motorcortex provides a foundation that's both adaptable and robust. It's accessible to everyone, with user-friendly layers that let operators, developers, and specialists all work at their own level of expertise.

Key Highlights of Motorcortex

Hardware Independence
Freedom to choose any hardware vendor

Layered Accessibility
Intuitive user access points for different technical levels

Future-Ready
Built for today's demands and tomorrow's innovations

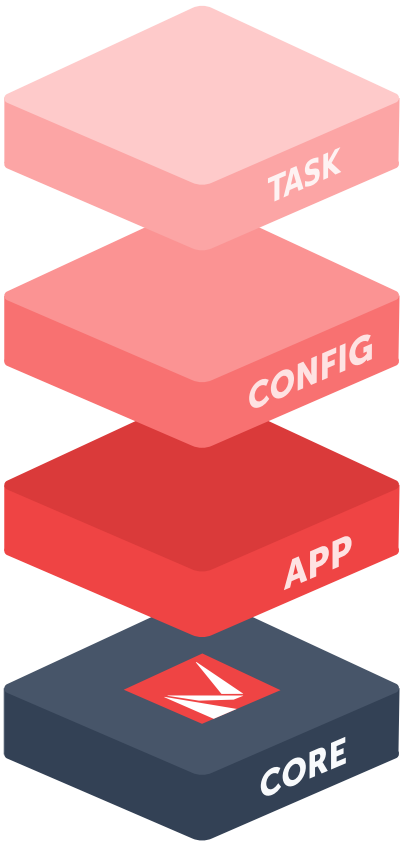


HARDWARE

Freedom of Hardware

Motorcortex is completely hardware agnostic, giving developers the freedom to choose any computer to run their software on.

With no brand or size limitations, Motorcortex offers unmatched flexibility, ready to perform seamlessly across diverse hardware setups. whether it's a compact gadget or advanced industrial machinery.



SOFTWARE

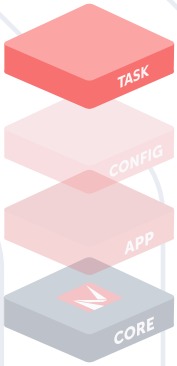
Layers

Motorcortex is designed for users of all backgrounds, with four levels of access—from basic tasks to advanced development—allowing users to focus on what matters for their application without needing to master every technical detail.

The first three layers—Task, Config, and App—offer tools for easy customization, while the secure Middleware manages complex operations.

As you go deeper, Motorcortex adapts to both simple and advanced needs seamlessly.


A New Way of thinking about motion control software.



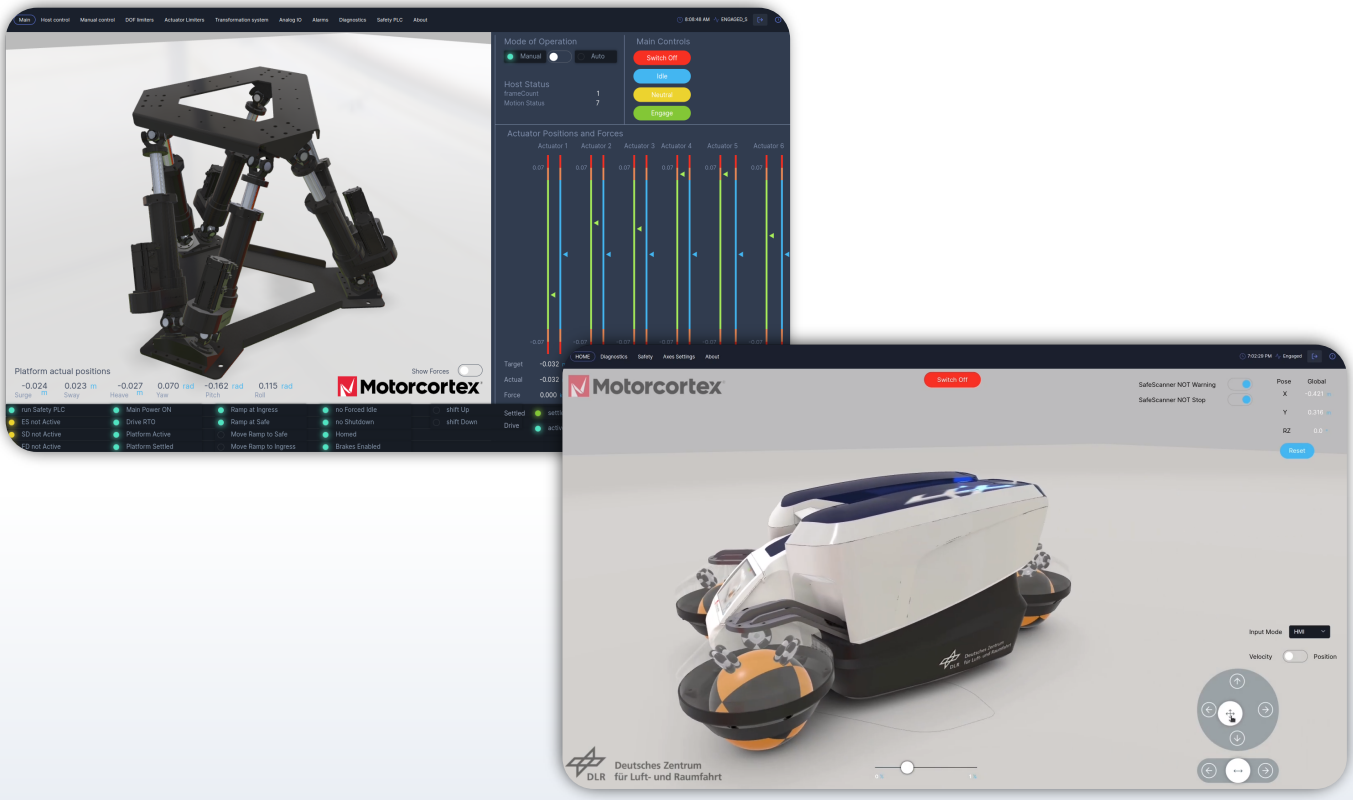
TASK LAYER

Intuitive Machine Control

The Task layer is where interaction begins, offering an intuitive Human-Machine Interface (HMI) designed for effortless control. Easily reprogram robots or machines without writing a single line of code. From teaching robots specific tasks—like moving to a defined position—to adjusting operational parameters, everything is simplified for operators.

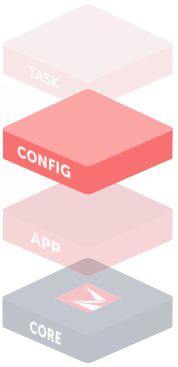
- Easily reprogram without code
- Define roles and permissions
- Teach specific tasks
- Accessible from any device

Define and manage user roles with ease. Whether assigning access levels or specifying user permissions, the Task layer ensures secure and role-specific operation. This layer starts and ends with the HMI, making it the ideal tool for operators, no programming expertise required.



CONFIGURATION LAYER

No-Code Application Development



Using intuitive engineering tools the Apps from the Motorcortex App Store can be configured to work with specific machines. There are turn-key solutions for Robots, Autonomous Vehicles and Production Machines.

Kinematics

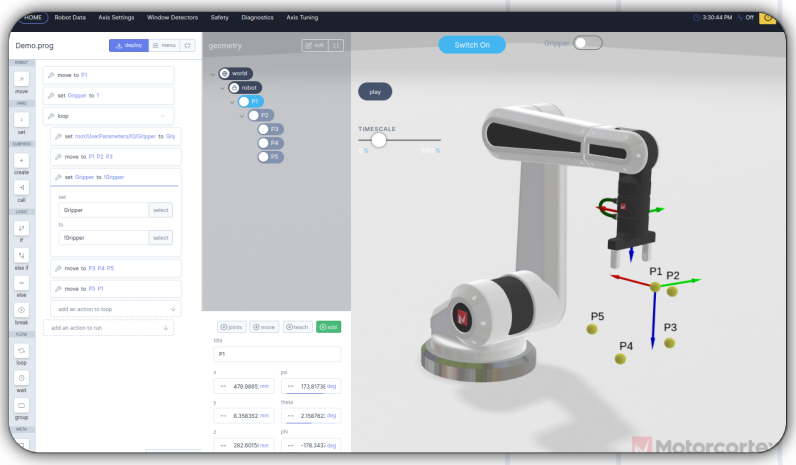
Motorcortex supports many kinematic types out of the box, like serial kinematics for robot arms, parallel kinematics for delta robots and hexapods and vehicle kinematics for differential drive and steered wheel vehicles.

Connectors

Establish seamless communication between devices and motion systems, configuring how each element interacts with the machine.

In this layer, engineers create user interfaces (GUI) using Motorcortex's cloud-based tools and Python APIs. These tools make it easy to design GUIs that will later be used in the Task layer.

Configuration work is done entirely from your web browser, so no need to install anything on your development or maintenance system.

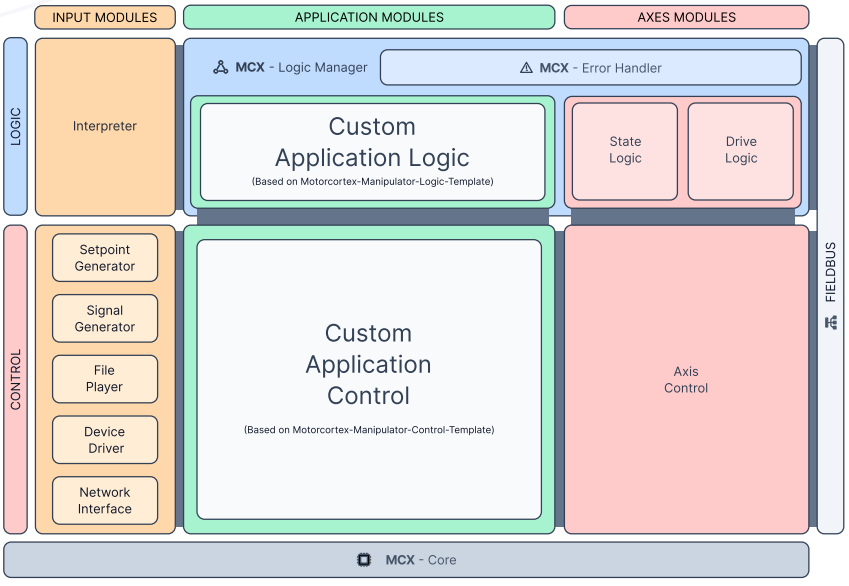


APPLICATION LAYER

App Templates to accelerate your development

Motorcortex Apps are provided as source-code templates, enabling rapid customization to meet specific application requirements. These templates eliminate the need to reinvent fundamental functionalities such as application logic, error handling, real-time performance, and communication middleware.

By leveraging a comprehensive library of pre-developed and tested functional components, users can efficiently assemble complex software solutions without building these features from scratch. All library elements are optimized for performance and efficiency, making them suitable for hard real-time applications.

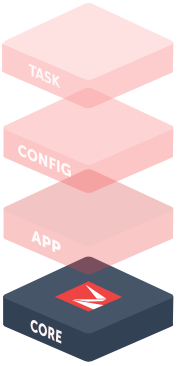


The Motorcortex SDK is built around the standard build system CMake, which is supported by many Integrated Development Environments like Microsoft Visual Studio Code and Jetbrains CLion. The SDK also provides plugins for CLion and VS Code to make developing with these environments easy.

By reducing complexity and development time, Motorcortex lets you hit the ground running while maintaining the flexibility to create highly customized machine solutions.

CORE LAYER

The Backbone of Motorcortex



The Core Layer provides the basis for every Motorcortex Application. It consists of the Motorcortex-Core library running on top of the Motorcortex Realtime Operating System (MCX-RTOS). Motorcortex Core provides convenient abstractions for Realtime Tasks, EtherCAT and a super fast and open Middleware that provides secure internal and external access to all application data.

Motorcortex Core

- CPU-Core Management
- Realtime Scheduling
- Secure Communication
- Debuging Tools
- Configuration Tools
- Connectors and Bridges
- Realtime Data-Tree
- EtherCAT Master
- Open Source API's

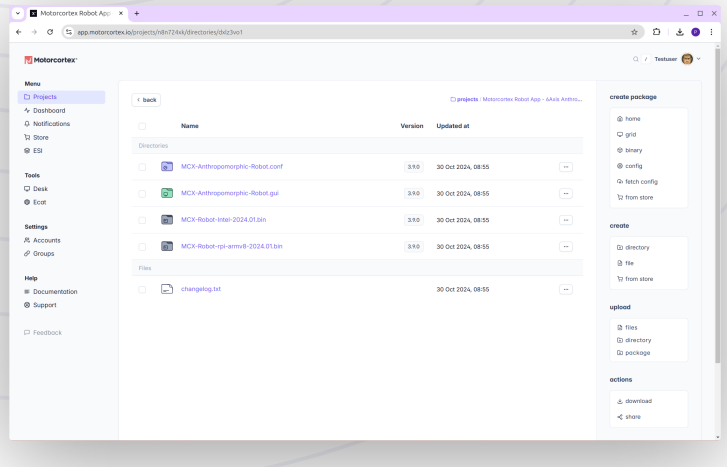
Motorcortex-Core is the foundation upon which a Motorcortex application is built. It provides the essential tools and framework for developing advanced motion control applications.

Motorcortex RTOS

- Web Server
- Package Manager
- Hardened Security
- Real-Time Performance
- Virtualization (Docker)
- Customizable

Motorcortex-RTOS is a high-performance Linux-based Realtime operating system for Intel x86 and ARM based systems. It features everything you need for running realtime applications and their supporting.services like, application deployment, web-based GUIs, logging,
Wifi and Bluetooth support and Docker for limitless expandability.

Motorcortex.io is a online platform where developers can store, create and configure their own motion control applications using the following motorcortex tools in the web browser.



PORTAL

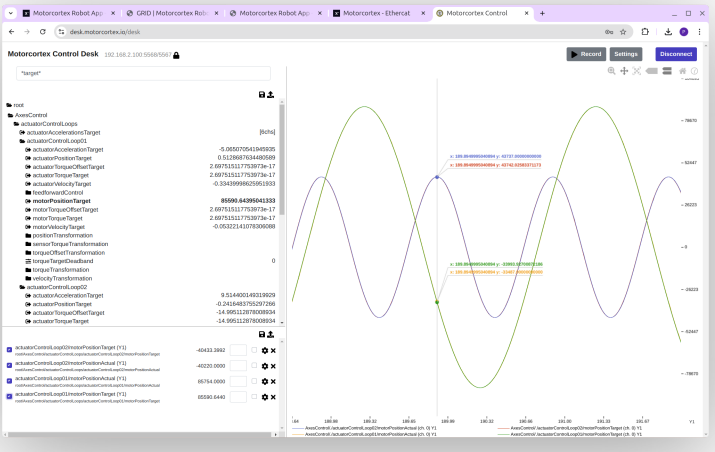
The Motorcortex Portal offers an ideal environment for developing new applications. It facilitates project data management and connects you with software engineers globally.

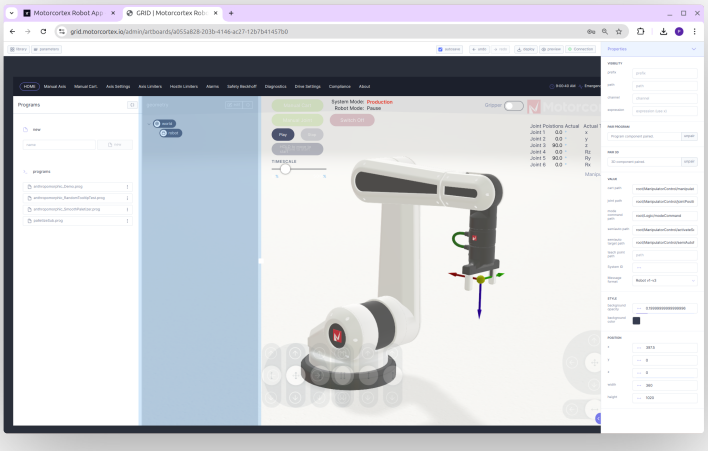
Build and gather software libraries to create customized projects and deploy them seamlessly to any controller.

DESK

Introducing Desk, your essential tool for developing and maintaining applications.

View, update, and plot all signals effortlessly. Display signals side by side, log them for later review, and analyze data with ease.





GRID

Grid enables you to design tailor made Graphical User Interfaces (GUIs) for any machine. Our extensive widget library simplifies the addition of control and visualization elements, including:

- Control Elements: Buttons, switches, sliders, joysticks
- Visualization Elements: Lights, meters, plots, and more
- Special Elements: Camera views, 3D visualizations, robot programming

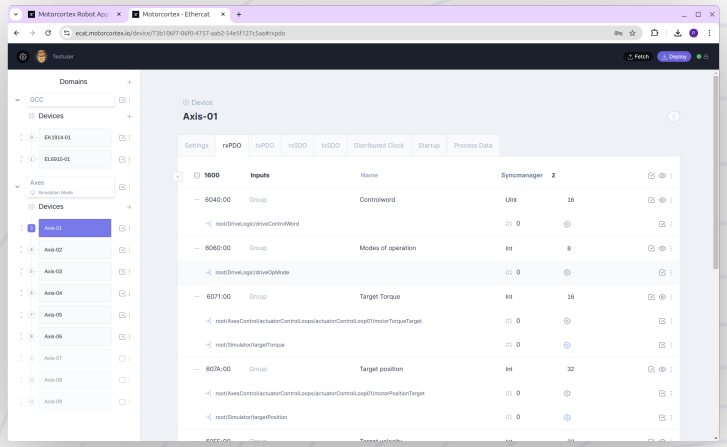
Elevate your interfaces with Grid's powerful features

ECAT

Say goodbye to the complexities of configuring the EtherCAT bus. Motorcortex Ecat tool streamlines this process, supporting devices from any vendor.

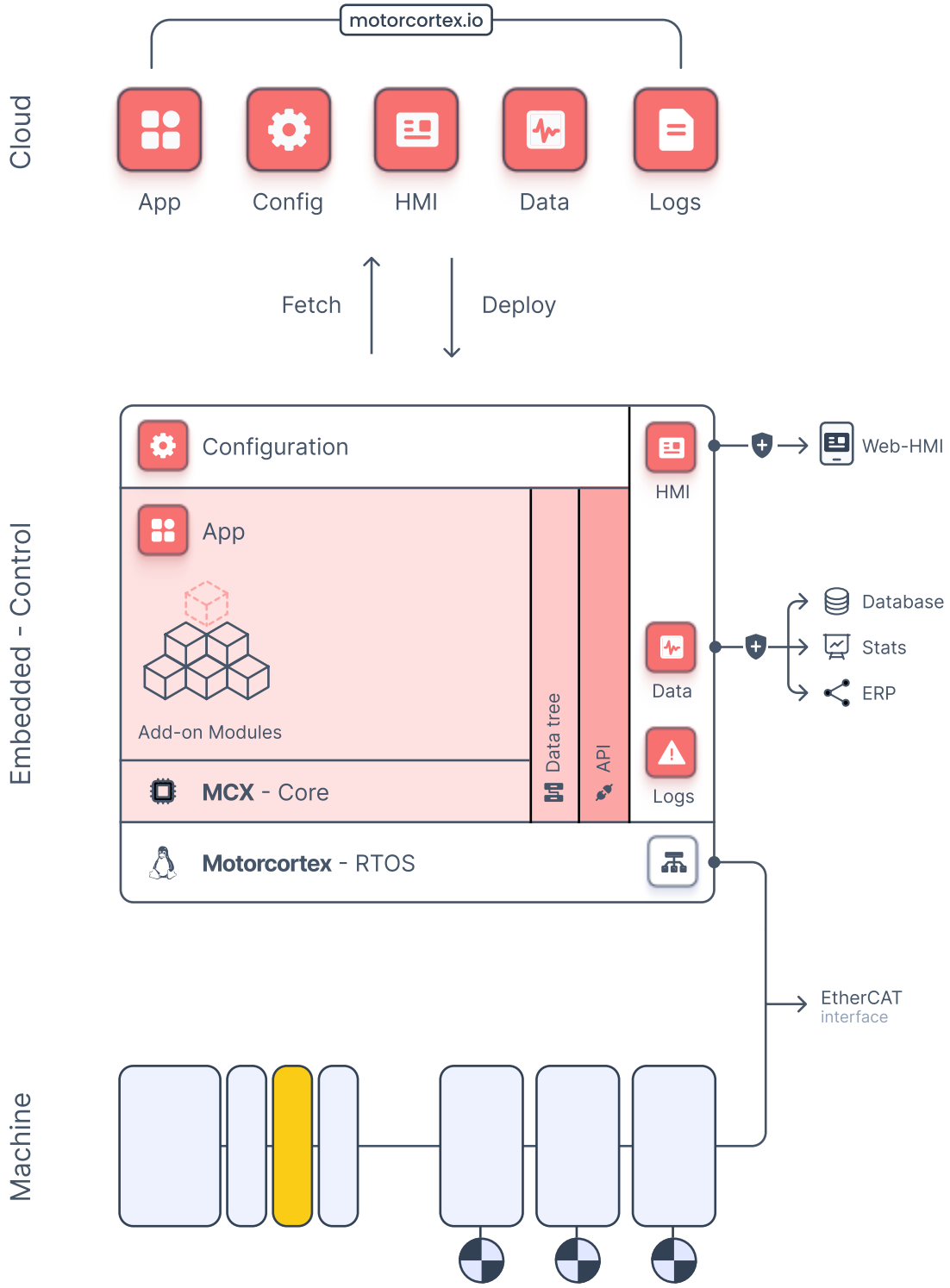
Simply scan your bus to detect devices and upload detailed information (ESI) automatically.

Connecting signals has never been easier!

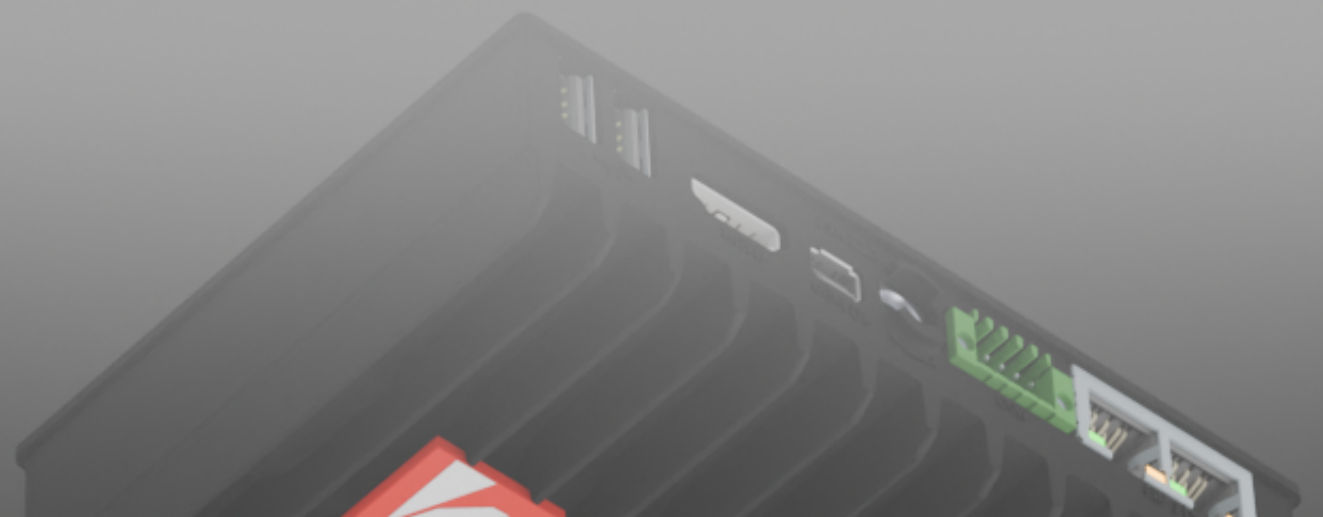


FROM CLOUD TO MACHINE

MOTORCORTEX SYSTEM ARCHITECTURE



Explore and create with MOTORCORTEX.



COMPACT INDUSTRIAL MINI PC

MCX-IPC A4+

- Extreme Durability
- High-Performance Processing
- Customizable Expandability
- Flexible Connectivity

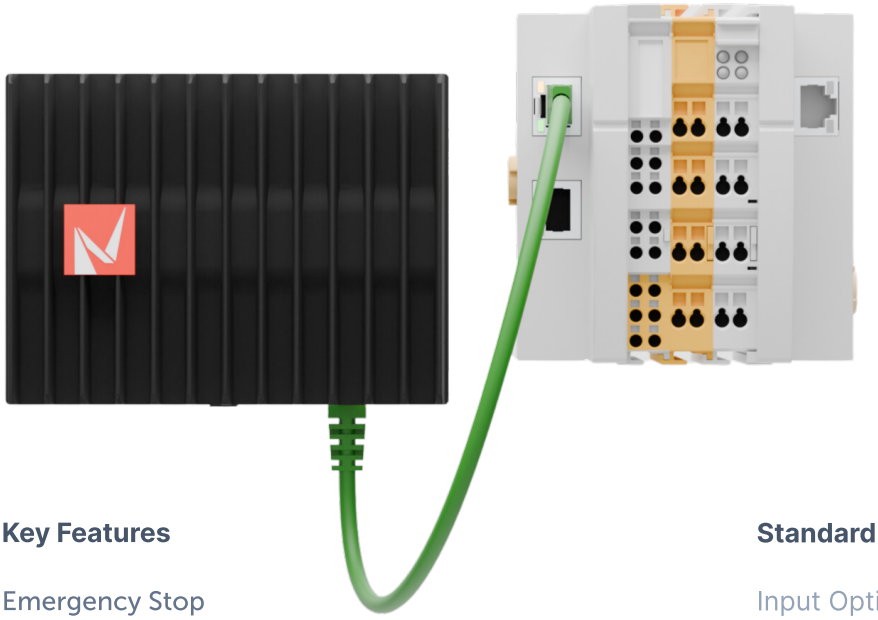
Designed for Demanding Applications

The MCX A4+ is a versatile, industrial-grade mini-PC designed for high-performance computing in compact and rugged environments. With its powerful Atom x6425E processor, dual storage options, and flexible expandability, it is perfect for IoT, networking, edge computing, and other demanding applications. The extended temperature range (-20°C to 70°C) and robust power input make it ideal for challenging industrial use cases.

Processor	Intel® Atom x6425E – Quad-Core, 2.0GHz, 12W TDP
RAM	4GB DDR4
Storage	256GB NVMe SSD
Networking	2x Gigabit Ethernet ports
USB Port	4x USB 2.0 + 2x USB 3.1
Display Outputs	Dual Display support with HDMI and DisplayPort
Power Consumption	9V–42V DC Input
Dimensions	132,8mm x 100mm x 34,8mm
Operating System	Motorcortex RTOS
GPIO	2x Digital Inputs, 2x Digital Outputs (Isolated)
Optional Add-Ons	Wi-Fi + Bluetooth Module
	2x Gigabit Ethernet ports

MOTION CONTROL AND SAFETY PLC

MCX-IPC + Safety



Key Features

Emergency Stop
Instantaneous halting of operations to ensure safety in critical situations.

Software Watchdog
Monitors system integrity and detects anomalies to prevent failures.

Software Estop Signal
Provides a reliable software-based emergency stop signal for enhanced safety protocols.

Safe Torque Off
Ensures motors are safely disabled without causing abrupt stops, protecting equipment and personnel.

Error Acknowledgement
Quick acknowledgment of errors to facilitate efficient troubleshooting and minimize downtime.

Standard Configuration

Input Options:
4 Digital Inputs;
- 2 Safe Inputs
- 2 Non-Safe Inputs

Output Options
Same combination as inputs for flexible safety management.

Safety Over EtherCAT

Seamlessly integrate safety functions with EtherCAT for reliable, high-speed communication across devices.

Safety over EtherCAT

MOTORCORTEX SPECS

Control System

Operating system	Motorcortex MCX-RTOS, Realtime Linux
Update rate	1 kHz (up to 4 kHz)
Development	Cmake, CLion, VS Code, Simulink-Coder
Multicore support	Yes
Control modes	Velocity Control, Position Control
Operation modes	Automatic, Manual Control

Hardware Connectivity

I/O	Expandable via EtherCAT
Drive protocols	SERCOS (SoE), CiA402 (CoE)
Safety integration	FSoE or conventional (with digital i/o)
USB devices	IMUs, Joysticks, Gamepads

Software Connectivity

Middleware	Motorcortex
Messaging	Publish/subscribe, request/reply
API	C++, JavaScript, Python, C#
Security	TLS, end-to-end encryption
Framework support	ROS, Node-RED, Matlab/Simulink
Protocol support	Websockets, UDP, MQTT, OPC-UA
Digital-twin	Hard-Realtime and EtherCAT-simulation

User Interface

User permissions	User authentication via login screen
3D visualization	GLTF models (open standard)
Customization	Fully customizable Web-based user interface

Recommended Hardware

CPU architecture	4 Core intel or ARM CPU
CPU frequency	1 GHz+
Memory	2 GB+
Disk Space	4 GB+
Ethernet	2x Gigabit Ethernet (1x Ethercat)

Get Started Today

Visit our website to learn more about how Motorcortex can benefit your project

Motorcortex™

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