



Reference Design for Autonomous Mobile Robots – Accelerating Time-to-Market for OEMs

eInfochips

20-Feb-2026



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AMR Market Context and customer drivers

Understanding market trends and benefits of AMR technology



AMR Market Momentum, Size, and Growth Outlook

Market Size and Growth

The global AMR market reached \$5.8 billion in 2025 and is projected to exceed \$13 billion by 2030 with 18% CAGR.

Growth Drivers

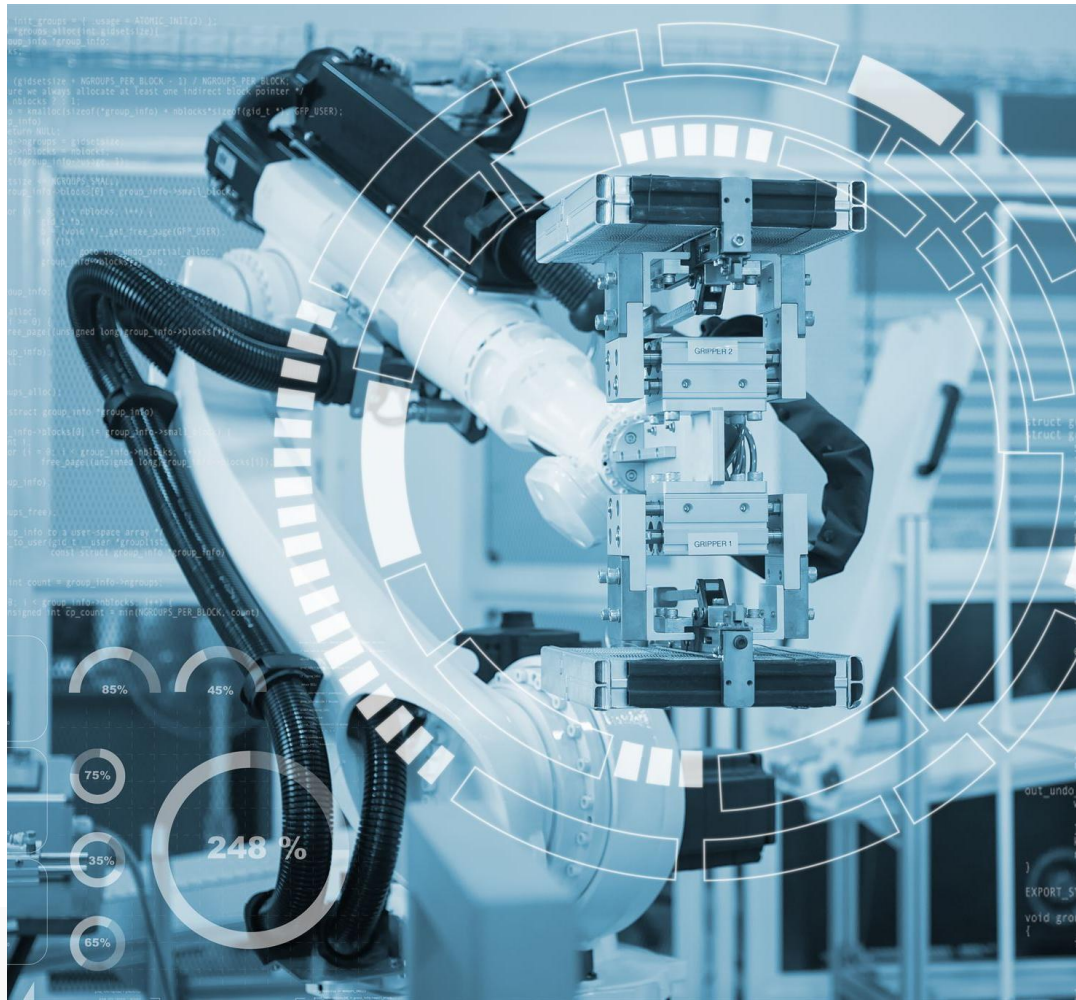
E-commerce expansion and labor challenges drive demand for flexible, reliable AMR automation solutions.

Technological Advances

Advances in AI, LiDAR sensors, motor drives, and power management enhance AMR reliability and reduce costs.

Regional Market Dynamics

North America and Europe lead in installed AMRs; Asia-Pacific grows fastest due to smart factory investments.



Customer Pain Points and the 'Why Now' for AMR Adoption



Labor Shortages Driving Automation

Persistent labor shortages in warehouses increase costs and inefficiencies, making AMRs essential for automating repetitive tasks.

Demand for Throughput and Flexibility

Modern supply chains require fast, flexible order fulfillment; AMRs enable modular automation to handle demand peaks.

Integration Complexity Challenges

Integrating complex subsystems like AI, sensing, and motor control is costly, driving demand for pre-validated AMR platforms.

Safety, Reliability, and Future-Proofing

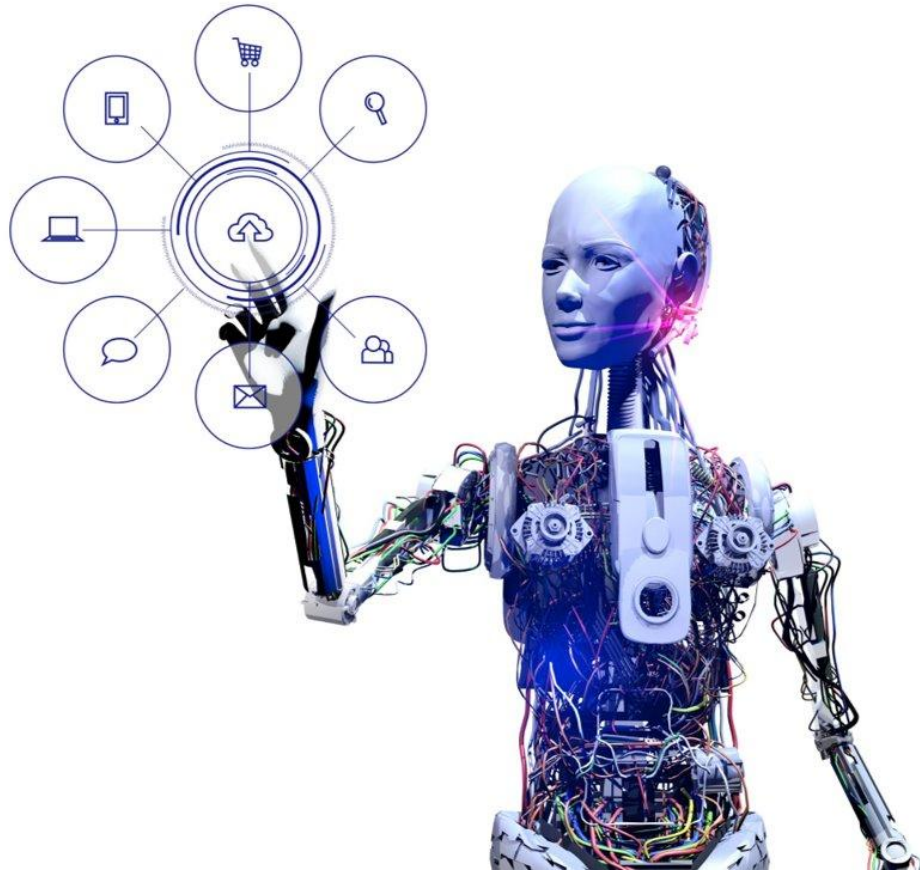
AMRs must operate safely with high uptime, supporting scalability and new AI and sensor technologies over time.



ST AMR Reference Solution Value and Differentiation



Value Proposition: Accelerating AMR Development with a System-Level Reference Design



Validated System-Level Platform

The solution offers a pre-architected, tested platform reducing time to market and risk for AMR development.

Integrated AMR Subsystems

Includes robust power management, STM32 real-time control, dual BLDC motor drives, and MEMS sensor suite.

Scalable architecture supporting 24V and 48V

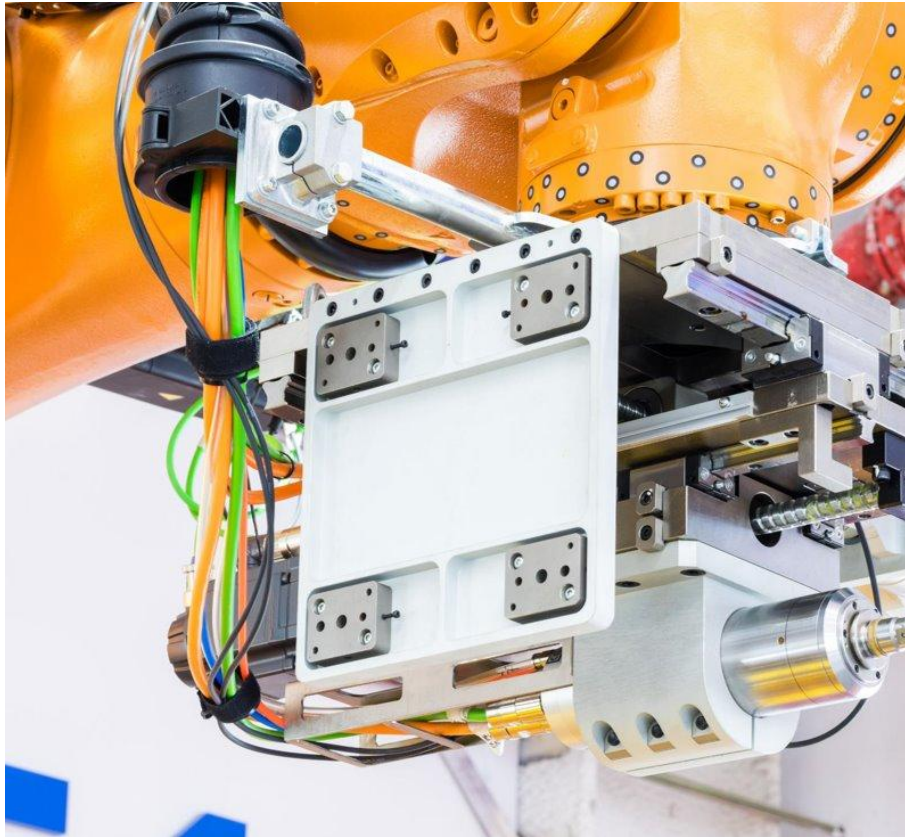
AI and SLAM Compatibility

Supports NVIDIA Jetson Orin Nano for advanced AI, SLAM, and perception workloads on a validated hardware stack.

Scalability and Reliability

Architecture supports prototype to production scale with industrial-grade components and global support.

Competitive Advantages and Technical Differentiation



Holistic System Architecture

The solution offers a complete reference architecture integrating power, control, sensing, motion, and compute domains with clear interfaces.

Robust Power Path

Features hot-swap and power OR-ing capabilities to ensure system reliability and stability in industrial environments.

Advanced Motion Control

Supports dual BLDC motors enabling precise motion control essential for navigation and obstacle avoidance.

Rich Sensor Integration

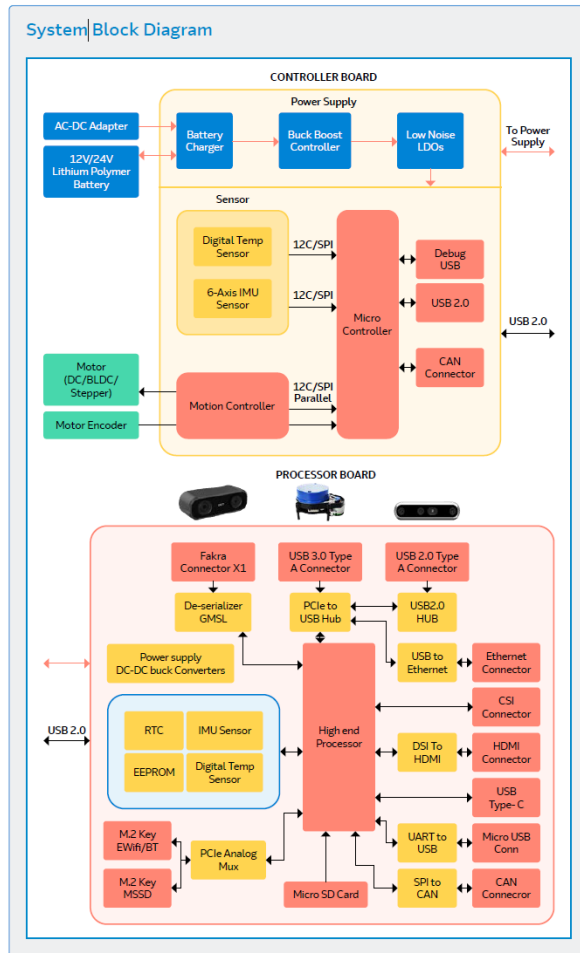
Incorporates MEMS sensor stack including IMUs, magnetometers, and environmental sensors for robust data fusion.



Technical details and BOM



Key Components of an AMR and High-Level System Block Diagram



Controller Board Functions

Handles real-time motor control, encoder feedback, safety monitoring, and communication using a low-power microcontroller.

Processor Board Capabilities

Runs computationally intensive tasks like SLAM, AI, and navigation using multi-core CPUs and GPU acceleration.

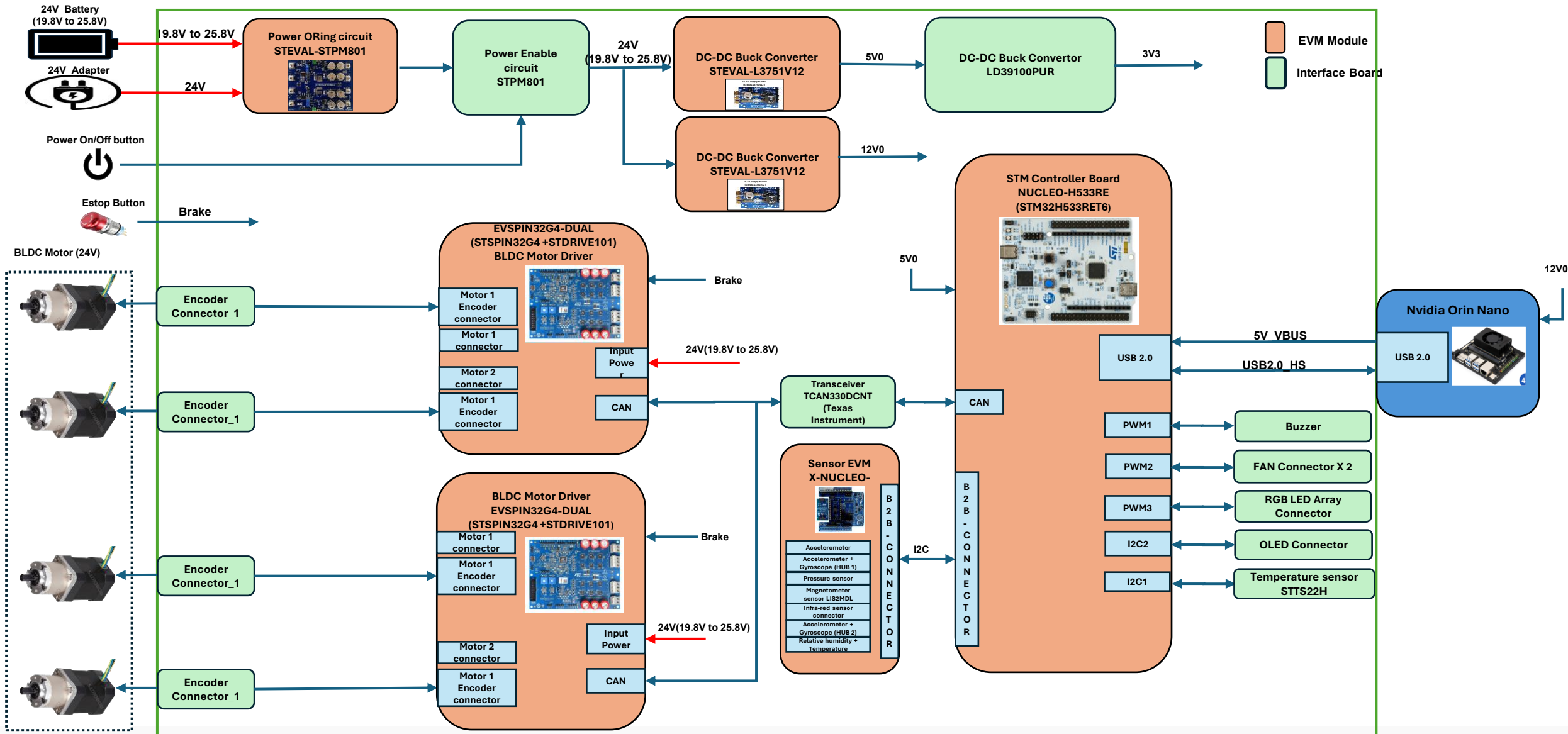
Power Subsystem Components

Provides stable energy via batteries or AC-DC adapters with BMS, converters, and regulators for various voltage levels.

Sensors and Actuators

Includes LiDAR, cameras, IMUs, motors, and encoders to enable perception and precise motion control.

STM AMR System Level Block Diagram



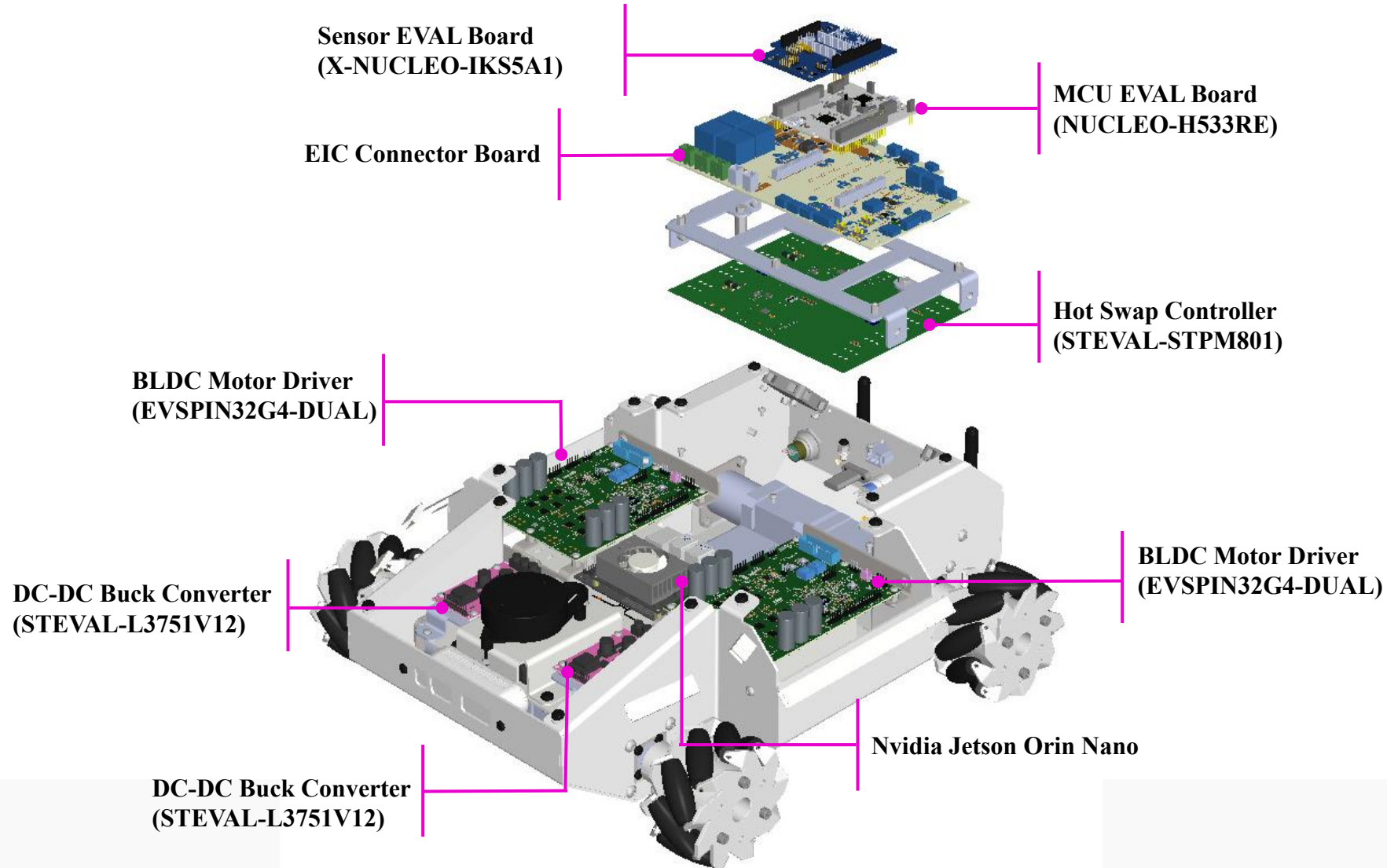
ST AMR Reference Design

Reference AMR solution validated at both 24V and 48V DC

ST Parts Interface board		
Sr. No.	MFG PN	Description
1	STPM801	Hot Swap Controller for soft start and input power
2	STTS22H	Ultralow Power Digital Temperature Sensor
3	LD39100PUR	Linear Voltage Regulator IC Positive Adjustable 1 Output 1A
4	STH315N10F7-2	MOSFET N-CH 100V 180A H2PAK-2
5	STL70N4LLF5	MOSFET N-CH 40V 70A POWERFLAT
EVAL from STM		
Sr. No.	MFG PN	Description
1	NUCLEO-H533RE	NUCLEO-64 EVAL BOARD of STM32H533RE, will act as the controller board interfaced with the Nvidia Orin Nano Dev Kit to perform real-time control and actuation tasks such as motor driving and IMU data acquisition etc
2	STEVAL-STPM801	EVAL BOARD of STPM801 for Automotive high voltage hot swap, soft start and power OR-ing
3	STEVAL-L3751V12	EVAL BOARD of L3751 for DC-DC converter buck regulator.
4	X-NUCLEO-IKS5A1	Nucleo motion and environmental MEMS expansion board for orientation detection of AMR
5	EVSPIN32G4-DUAL	EVAL BRD of STSPIN32G4 and STDRIVE101 for driving two BLDC motors

ST AMR 3D positioning of boards

Complete physical integration showing controller, motor drivers, power modules, and sensor expansion boards



Recommended next steps and engagement path



- **Check your customer base for potential engagement opportunities**
- **Access Reference Design Package**
 - Request the full design package to evaluate system architecture and reuse potential across engineering teams.
- **Conduct Technical Deep-Dive**
 - Engage with experts to review architecture, use cases, and necessary adaptations for specific environments.
- **Define Proof-of-Concept Scope**
 - Set clear success metrics and pilot scope to validate performance and integration capabilities effectively.
- **Align Development and Deployment**
 - Coordinate timelines, scaling strategies, and support plans to transition from PoC to production smoothly.

Thank You



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ST AMR reference Solution

eInfochips
20-Feb-2026



Market Overview and Industry trends

- > The AMR market projected growth: from \$5.79B in 2025 to \$6.83B in 2026 at CAGR ~18%. Driven by e-commerce, automation demand.
- > Industry trends include AI-based Navigation, smart warehouses , industry, domotics
- > AMRs enhance operational efficiency, cut costs, and ensure a safer work environment solving challenges such as like labor shortages, operational inefficiencies, supply chain disruptions, high consumer expectations, cost management, and safety.

Autonomous Mobile Robots and their Impact in Industrial Environments

Advanced Sensing and Navigation

AMRs use sensors like LiDAR and cameras with algorithms for SLAM, obstacle detection, and adaptive motion control.

Automation in Industry

AMRs automate material handling tasks, improving efficiency amid labor shortages and rising operational demands.

Safety and Operational Resilience

AMRs reduce human injury risks and enable continuous 24/7 operations in shared human-robot environments.



Market situation and why AMRs matter

- Market Momentum
 - AMR market growing at ~18% CAGR to 2026 and expected to exceed \$13B by 2030
 - E-commerce, manufacturing, and logistics are adopting AMRs rapidly
 - Deployments rising in manufacturing, retail, logistics, and healthcare.
- Customer Pain Points
 - Shortage of skilled warehouse labor
 - High cost of downtime and inefficiency
 - Need for scalable, flexible intralogistics systems
 - Complexity integrating sensors, power, motion, and compute

Why Arrow+ST+Einfochips AMR?

- Accelerated development: ready-to-use, validated reference AMR design
- The fully validated AMR reference design with seamless interoperability solves system integration of power, MCU , motor drivers, sensors, Jetson compute and accelerates time to market by months
- Reduced risk with pre-validated interoperability and liability
- Scalable architecture supporting 24V and 48V
- AMRs field-proven components from ST (power, motor control, MEMS sensors)