

Global Robot Motion Planning Engine Supply, Demand and Key Producers, 2026-2032

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Abstracts

The global Robot Motion Planning Engine market size is expected to reach \$ 2944 million by 2032, rising at a market growth of 21.5% CAGR during the forecast period (2026-2032).

A robot motion planning engine is a core software module for robotic arms, mobile robots, humanoid robots, multi-robot systems, and autonomous mobile platforms. Its main role is to automatically generate executable and collision-free paths or trajectories that satisfy velocity and acceleration limits, task accuracy requirements, and safety constraints based on task goals, robot kinematic models, environmental maps, obstacle states, and operational constraints. These products typically combine sampling search, graph search, trajectory optimization, model predictive control, reactive motion generation, and learning-augmented methods, while working together with perception, localization, simulation, controllers, and robotics middleware. Common delivery forms include open-source frameworks, commercial SDKs, robot simulation software modules, offline programming plugins, cloud-based motion planning services, and embedded algorithm components supplied by robot OEMs. Major application scenarios include industrial automation, warehouse logistics, mobile inspection, commercial service robots, humanoid robot development, multi-robot coordination, and research simulation validation.

Robot motion planning engines are evolving from standalone algorithm libraries into a foundational robotics software layer that connects perception, simulation, control, and task execution. MoveIt emphasizes a planning pipeline that combines preprocessing, motion planning, and post-processing, while Nav2 treats planners, controllers, recoveries, and smoothers as the core of navigation tasks. MathWorks Robotics System Toolbox also integrates collision checking, path planning, trajectory generation, forward

and inverse kinematics, and dynamics in one toolchain. This shows that industry value increasingly comes from deployable planning pipelines, interface ecosystems, and adaptability across robot forms.

Industrial applications remain the clearest near-term commercialization path, especially in manipulator offline programming, automatic path planning, welding, assembly, material handling, grinding, and multi-robot workcell optimization. ABB RobotStudio Automatic Path Planning focuses on generating optimized collision-free paths in crowded robot cell environments, Siemens Process Simulate X Automatic Path Planner targets collision-free paths for assembly, disassembly, and robotic welding, and RoboDK serves industrial robot simulation and offline programming. These products serve customers with clear budgets, and their benefits can be measured through cycle time, reduced downtime, and shorter commissioning effort.

Future growth will come from dynamic environments, embodied intelligence, and multi-robot coordination. Isaac Sim motion generation materials describe RMPflow for real-time reactive local policies, RRT-family algorithms for global planning in static environments, and cuRobo integration for GPU-accelerated collision-aware motion generation in dynamic scenes. Realtime Robotics positions itself around robot motion planning and control software and offers cloud-based motion planning expertise, indicating that motion planning engines are expanding from local algorithm modules into software services combining cloud optimization, simulation validation, and industrial AI.

This report studies the global Robot Motion Planning Engine demand, key companies, and key regions.

This report is a detailed and comprehensive analysis of the world market for Robot Motion Planning Engine, and provides market size (US\$ million) and Year-over-Year (YoY) growth, considering 2025 as the base year. This report explores demand trends and competition, as well as details the characteristics of Robot Motion Planning Engine that contribute to its increasing demand across many markets.

Highlights and key features of the study

Global Robot Motion Planning Engine total market, 2021-2032, (USD Million)

Global Robot Motion Planning Engine total market by region & country, CAGR, 2021-2032, (USD Million)

U.S. VS China: Robot Motion Planning Engine total market, key domestic companies, and share, (USD Million)

Global Robot Motion Planning Engine revenue by player, revenue and market share

2021-2026, (USD Million)

Global Robot Motion Planning Engine total market by Algorithm Paradigm, CAGR,
2021-2032, (USD Million)

Global Robot Motion Planning Engine total market by Application, CAGR, 2021-2032,
(USD Million)

This report profiles major players in the global Robot Motion Planning Engine market based on the following parameters - company overview, revenue, gross margin, product portfolio, geographical presence, and key developments. Key companies covered as a part of this study include PickNik Inc., NVIDIA Corporation, The MathWorks, Inc., Realtime Robotics, Inc., ABB Ltd., Siemens AG, RoboDK Inc., Coppelias Robotics AG, Open Navigation LLC, etc.

This report also provides key insights about market drivers, restraints, opportunities, new product launches or approvals.

Stakeholders would have ease in decision-making through various strategy matrices used in analyzing the world Robot Motion Planning Engine market

Detailed Segmentation:

Each section contains quantitative market data including market by value (US\$ Millions), by player, by regions, by Algorithm Paradigm, and by Application. Data is given for the years 2021-2032 by year with 2025 as the base year, 2026 as the estimate year, and 2027-2032 as the forecast year.

Global Robot Motion Planning Engine Market, By Region:

United States

China

Europe

Japan

South Korea

ASEAN

India

Rest of World

Global Robot Motion Planning Engine Market, Segmentation by Algorithm Paradigm:

Sampling Search Robot Motion Planning Engine

Graph Search Robot Motion Planning Engine

Trajectory Optimization Robot Motion Planning Engine

Model Predictive Control Robot Motion Planning Engine

Reactive Motion Generation Robot Motion Planning Engine

Learning-Augmented Robot Motion Planning Engine

Other

Global Robot Motion Planning Engine Market, Segmentation by Planning Space:

Joint-Space Robot Motion Planning Engine

Cartesian-Space Robot Motion Planning Engine

Configuration-Space Robot Motion Planning Engine

Task-Space Robot Motion Planning Engine

Hybrid State-Space Robot Motion Planning Engine

Global Robot Motion Planning Engine Market, Segmentation by Environmental Dynamics:

Static-Environment Robot Motion Planning Engine

Dynamic-Obstacle Environment Robot Motion Planning Engine

Unknown-Environment Robot Motion Planning Engine

Semi-Structured Environment Robot Motion Planning Engine

Highly Congested Environment Robot Motion Planning Engine

Other

Global Robot Motion Planning Engine Market, Segmentation by Constraint Type:

Kinematic Constraint Robot Motion Planning Engine

Dynamic Constraint Robot Motion Planning Engine

Collision Constraint Robot Motion Planning Engine

Velocity and Acceleration Constraint Robot Motion Planning Engine

Joint-Limit Constraint Robot Motion Planning Engine

Contact Constraint Robot Motion Planning Engine

Global Robot Motion Planning Engine Market, Segmentation by Application:

Industrial Manipulator Trajectory Generation

Warehouse Mobile Navigation

Mobile Inspection Path Execution

Commercial Service Robot Passage

Humanoid Robot Whole-Body Motion Generation

Multi-Robot Cooperative Collision Avoidance

Autonomous Driving Low-Speed Mobility

Research Simulation Validation

Other

Companies Profiled:

PickNik Inc.

NVIDIA Corporation

The MathWorks, Inc.

Realtime Robotics, Inc.

ABB Ltd.

Siemens AG

RoboDK Inc.

Coppelia Robotics AG

Open Navigation LLC

Key Questions Answered

1. How big is the global Robot Motion Planning Engine market?
2. What is the demand of the global Robot Motion Planning Engine market?
3. What is the year over year growth of the global Robot Motion Planning Engine market?
4. What is the total value of the global Robot Motion Planning Engine market?
5. Who are the Major Players in the global Robot Motion Planning Engine market?
6. What are the growth factors driving the market demand?

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