

Global Robot Safety Perception & Risk Assessment Model Market 2026 by Company, Regions, Type and Application, Forecast to 2032

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Abstracts

According to our (Global Info Research) latest study, the global Robot Safety Perception & Risk Assessment Model market size was valued at US\$ 154 million in 2025 and is forecast to a readjusted size of US\$ 484 million by 2032 with a CAGR of 17.6% during review period.

The Robot Safety Perception and Risk Assessment Model is a software and algorithmic model for shared human-robot workspaces, dynamic robotic operations, and safety-critical tasks. It uses visual data, point clouds, force and tactile signals, motion states, semantic task information, and environmental context to perceive the risk status of people, robots, tools, objects, and spatial boundaries, and converts distance, speed, contact force, posture, task phase, fault signals, and environmental uncertainty into interpretable risk levels, control constraints, and mitigation strategies. Its scope includes safety situational awareness, hazard identification, collision and crushing risk assessment, speed and separation monitoring, power and force limiting, dynamic protective zones, anomaly warnings, stop triggers, path replanning, and safety report generation. It excludes ordinary object detection models, general-purpose robot controllers, non-safety path planning algorithms, and data collection systems that do not produce risk conclusions. The model is mainly used in collaborative industrial robots, mobile robots, humanoid robots, medical and care robots, domestic service robots, warehouse logistics robots, and special-purpose robots. Key customers include robot OEMs, system integrators, industrial manufacturers, medical and service robot operators, automation safety engineering teams, and third-party certification and testing organizations. ISO/TS 15066 specifies safety requirements for collaborative industrial robot systems and their work environments, while NIST decomposes collaborative robot safety assessment into task, role, state, communication, cognitive awareness, and team

performance metrics.

Robot safety perception and risk assessment models are becoming a foundational safety capability for the large-scale deployment of collaborative robots and embodied intelligent robots. Traditional industrial robots mainly rely on fences, door interlocks, safety relays, and fixed emergency-stop logic to achieve isolated protection, while collaborative robots, mobile robots, and humanoid robots need to operate in open spaces where people, equipment, workpieces, and tools coexist. This makes safety risks dynamic, continuous, and scenario-specific. ISO/TS 15066 sets safety requirements for collaborative industrial robot systems and work environments, while NIST's task-based human-robot collaboration research further incorporates tooling, contact characteristics, contact duration, pressure, and force transfer into the risk assessment framework. This indicates that future safety models cannot remain limited to simple proximity detection, but must integrate task processes, human body parts, robot speed, end-of-arm tools, contact probability, and risk consequences into a comprehensive judgment. As production lines become more flexible and robot deployment density increases, safety perception and risk assessment models will evolve from auxiliary safety functions into core software modules that determine whether robots can enter shared human-robot workspaces.

In terms of commercialization, robot safety perception and risk assessment models will develop along two parallel paths. One path is embedded into robot controllers, safety controllers, and safety I/O systems, directly constraining robot motion through position monitoring, speed monitoring, safe zones, virtual fences, safely limited positions, safely limited speeds, and safety stops. ABB SafeMove, FANUC DCS, and Mitsubishi Electric's FR Series robot safety solutions all reflect this direction. The other path appears as standalone software and engineering services for collision risk analysis, standards compliance judgment, maximum safe speed recommendation, risk assessment report generation, and production-line safety validation. Safetecs SafetyDesigner reflects this software-oriented trend. The common goal of both paths is not simply to reduce risk, but to minimize nuisance stops, reduce safety-zone size, improve cycle time, and enhance human-robot collaboration efficiency while meeting standards such as ISO 10218, ISO/TS 15066, and ISO 13849-1.

From a regional and application perspective, China, Japan, South Korea, Europe, and North America will form the core demand markets. Global industrial robot installations reached 542,000 units in 2024, with Asia accounting for 74 percent of new deployments. China installed 295,045 units, while Japan and South Korea also maintained strong robot application foundations. This means demand for safety models

will first emerge in regions with high robot density, rapid collaborative robot adoption, and deep manufacturing automation upgrades. In China, demand will be driven by collaborative robots, embodied intelligence, humanoid robots, warehouse logistics, and industrial inspection, with safety models increasingly serving large-scale deployment and export compliance. In Japan and South Korea, the market will place greater emphasis on robot controllers, safety certification, electronics manufacturing, and reliable deployment in automotive manufacturing. Europe and North America will focus more on standards compliance, functional safety, cybersecurity, and safety certification services. As ISO 10218-1:2025 strengthens requirements for risk reduction, information for use, and cybersecurity, the value of safety perception and risk assessment models will expand from equipment-level support to full-lifecycle safety management, remote operations, data feedback loops, and compliance auditing.

This report is a detailed and comprehensive analysis for global Robot Safety Perception & Risk Assessment Model market. Both quantitative and qualitative analyses are presented by company, by region & country, by Perception Input and by Application. As the market is constantly changing, this report explores the competition, supply and demand trends, as well as key factors that contribute to its changing demands across many markets. Company profiles and product examples of selected competitors, along with market share estimates of some of the selected leaders for the year 2025, are provided.

Key Features:

Global Robot Safety Perception & Risk Assessment Model market size and forecasts, in consumption value (\$ Million), 2021-2032

Global Robot Safety Perception & Risk Assessment Model market size and forecasts by region and country, in consumption value (\$ Million), 2021-2032

Global Robot Safety Perception & Risk Assessment Model market size and forecasts, by Perception Input and by Application, in consumption value (\$ Million), 2021-2032

Global Robot Safety Perception & Risk Assessment Model market shares of main players, in revenue (\$ Million), 2021-2026

The Primary Objectives in This Report Are:

To determine the size of the total market opportunity of global and key countries

To assess the growth potential for Robot Safety Perception & Risk Assessment Model

To forecast future growth in each product and end-use market

To assess competitive factors affecting the marketplace

This report profiles key players in the global Robot Safety Perception & Risk Assessment Model 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 SICK AG, ABB Ltd, Pilz GmbH & Co. KG, Siemens AG, Symbotic Inc., JAKA Robotics Co., Ltd., Shenzhen Dobot Corp Ltd., AUBO (BEIJING) Robotics Technology Co., Ltd., Doosan Robotics Inc., Safetecs Inc., etc.

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

Market segmentation

Robot Safety Perception & Risk Assessment Model market is split by Perception Input and by Application. For the period 2021-2032, the growth among segments provides accurate calculations and forecasts for Consumption Value by Perception Input and by Application. This analysis can help you expand your business by targeting qualified niche markets.

Market segment by Perception Input

2D Vision Safety Perception Model

3D Point Cloud Safety Perception Model

Multimodal Fusion Safety Perception Model

Force-Tactile Safety Perception Model

Motion State Safety Perception Model

Language Intent Safety Perception Model

Environmental Semantic Safety Perception Model

Market segment by Risk Object

Personnel Proximity Risk Assessment Model

Human-Robot Contact Risk Assessment Model

End-Effector Tool Risk Assessment Model

Motion Trajectory Risk Assessment Model

Object Falling Risk Assessment Model

System Failure Risk Assessment Model

Cybersecurity Risk Assessment Model

Other

Market segment by Collaboration Mode

Safety-Rated Monitored Stop Risk Assessment Model

Hand Guiding Risk Assessment Model

Speed and Separation Monitoring Risk Assessment Model

Power and Force Limiting Risk Assessment Model

Safeguarded Separation Operation Risk Assessment Model

Other

Market segment by Application

Industrial Collaborative Assembly

Warehouse Picking and Sorting

Mobile Robot Navigation

Humanoid Robot Services

Medical Care Assistance

Home Service and Companionship

Special Inspection Operations

Autonomous Mobile Platforms

Research Testing and Validation

Other

Market segment by players, this report covers

SICK AG

ABB Ltd

Pilz GmbH & Co. KG

Siemens AG

Symbotic Inc.

JAKA Robotics Co., Ltd.

Shenzhen Dobot Corp Ltd.

AUBO (BEIJING) Robotics Technology Co., Ltd.

Doosan Robotics Inc.

Safetics Inc.

Rainbow Robotics Co., Ltd.

Neuromeka Co., Ltd.

FANUC Corporation

Yaskawa Electric Corporation

Mitsubishi Electric Corporation

OMRON Corporation

Market segment by regions, regional analysis covers

North America (United States, Canada and Mexico)

Europe (Germany, France, UK, Russia, Italy and Rest of Europe)

Asia-Pacific (China, Japan, South Korea, India, Southeast Asia and Rest of Asia-Pacific)

South America (Brazil, Rest of South America)

Middle East & Africa (Turkey, Saudi Arabia, UAE, Rest of Middle East & Africa)

The content of the study subjects, includes a total of 13 chapters:

Chapter 1, to describe Robot Safety Perception & Risk Assessment Model product scope, market overview, market estimation caveats and base year.

Chapter 2, to profile the top players of Robot Safety Perception & Risk Assessment Model, with revenue, gross margin, and global market share of Robot Safety Perception

& Risk Assessment Model from 2021 to 2026.

Chapter 3, the Robot Safety Perception & Risk Assessment Model competitive situation, revenue, and global market share of top players are analyzed emphatically by landscape contrast.

Chapter 4 and 5, to segment the market size by Perception Input and by Application, with consumption value and growth rate by Perception Input, by Application, from 2021 to 2032.

Chapter 6, 7, 8, 9, and 10, to break the market size data at the country level, with revenue and market share for key countries in the world, from 2021 to 2026. and Robot Safety Perception & Risk Assessment Model market forecast, by regions, by Perception Input and by Application, with consumption value, from 2027 to 2032.

Chapter 11, market dynamics, drivers, restraints, trends, Porters Five Forces analysis.

Chapter 12, the key raw materials and key suppliers, and industry chain of Robot Safety Perception & Risk Assessment Model.

Chapter 13, to describe Robot Safety Perception & Risk Assessment Model research findings and conclusion.

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