+44 20 8123 2220
info@marketpublishers.com

2D & 3D Machine Vision Systems Market – Global Industry Size, Share, Trends, Opportunity, and Forecast Segmented by Component (Hardware, Software), Product (PC-based, Smart Camera-based), End-user Industry (Electronics and Semiconductors, Automotive, Medical Devices, Pharmaceutical, Food and Beverage, Other Industry Verticals), By Region, By Competition 2018-2028.

https://marketpublishers.com/r/21BCA2551293EN.html
Date: November 2023
Pages: 190
Price: US$ 4,900.00 (Single User License)
ID: 21BCA2551293EN

Abstracts

Global 2D & 3D Machine Vision Systems Market has valued at USD 12.84 Billion in 2022 and is anticipated to project robust growth in the forecast period with a CAGR of 14.20% through 2028. Machine vision provides machines with a gift of sight, complementing or replacing manual inspection tasks, using cameras and image processing. Machine vision applications range from basic tasks, like presence detection, to real-time inspection and grading tasks in harsh environments.

Manufacturing firms worldwide realize the benefits of machine vision systems, particularly in areas where redundant tasks, like inspection, should be performed with precision. They are playing an essential role in high-speed production lines and hazardous environments. Some of the significant benefits offered by these systems include increased productivity, reduced machine downtime, and tighter process control.

Key Market Drivers

Automation and Industry 4.0

+44 20 8123 2220
info@marketpublishers.com

Automation and Industry 4.0 are two powerful forces that are driving the rapid growth of the 2D and 3D machine vision systems market. These transformative trends are reshaping industries across the globe, and machine vision systems play a pivotal role in enabling the vision of a highly automated and interconnected future. Industry 4.0, often referred to as the fourth industrial revolution, is characterized by the integration of digital technologies, data analytics, and automation into manufacturing and industrial processes. It represents a shift towards more intelligent, connected, and efficient production systems. As industries embrace Industry 4.0 principles, the demand for advanced machine vision systems is soaring.

One of the primary drivers of the market is the need for enhanced automation. Manufacturers are increasingly adopting robotic systems to carry out tasks that were once performed by humans. Machine vision systems are the eyes of these robots, allowing them to 'see' and understand their environment. This enables robots to work safely alongside humans, handle complex tasks with precision, and adapt to changing conditions. Whether it's in automotive assembly lines, logistics warehouses, or pharmaceutical manufacturing, machine vision is a cornerstone of automation. Moreover, Industry 4.0 emphasizes data-driven decision-making. Machine vision systems are not just about automation but also about gathering critical data from visual inputs. These systems can collect vast amounts of data in real-time, enabling predictive maintenance, process optimization, and quality control. This data-driven approach is vital for achieving efficiency, reducing downtime, and ensuring consistent product quality.

Another aspect of Industry 4.0 is the interconnectedness of machines and systems through the Industrial Internet of Things (IIoT). Machine vision systems are often integrated with IIoT platforms, enabling remote monitoring and control of manufacturing processes. This connectivity enhances the agility and responsiveness of industries to changing market demands. In conclusion, the symbiotic relationship between automation and Industry 4.0 is propelling the 2D and 3D machine vision systems market to new heights. As industries strive for greater efficiency, productivity, and data-driven insights, machine vision technology is emerging as an indispensable tool to achieve these goals. The future of manufacturing and industrial processes is increasingly reliant on the vision systems that enable machines to perceive and act in the world, making them a cornerstone of the fourth industrial revolution.

Increased Demand for Robotics

The increased demand for robotics is a significant driver propelling the growth of the 2D

+44 20 8123 2220
info@marketpublishers.com

and 3D machine vision systems market. Robotics, across various industries, is undergoing a remarkable transformation, with machines increasingly taking on tasks that require vision and perception capabilities. Machine vision systems are at the core of this transformation, playing a pivotal role in enhancing the functionality and efficiency of robots. Robotic systems are becoming increasingly versatile and intelligent, thanks to advancements in machine vision technology. These systems are now capable of 'seeing' and understanding their surroundings, which is crucial for tasks like object recognition, navigation, and interaction with humans and objects. Whether it's in manufacturing, logistics, healthcare, or agriculture, robots equipped with machine vision are becoming indispensable.

In manufacturing, robots are used for tasks such as pick-and-place, assembly, and quality control. Machine vision systems enable robots to precisely identify and manipulate objects on the assembly line, ensuring accuracy and consistency. They can also inspect products for defects, leading to improved quality control and reduced waste. As manufacturers embrace automation, the demand for machine vision systems to enhance robotic capabilities is on the rise. The logistics and e-commerce sectors are witnessing a surge in demand for automation to handle order fulfillment and warehouse operations efficiently. Autonomous mobile robots (AMRs) equipped with machine vision sensors can navigate through complex environments, avoid obstacles, and pick items from shelves accurately. This not only increases productivity but also reduces labor costs.

In healthcare, robots are used in surgery, diagnostics, and patient care. Machine vision systems help these robots perform delicate procedures with precision and safety. They can also assist in tasks like medication dispensing and patient monitoring. Agriculture is another sector experiencing a robotics revolution. Autonomous agricultural robots equipped with machine vision can perform tasks like planting, harvesting, and weed control with greater precision, reducing the need for manual labor and increasing crop yields. Overall, the increased demand for robotics is driving the adoption of 2D and 3D machine vision systems. These systems empower robots with the ability to perceive their environment, make decisions, and perform tasks accurately and efficiently. As industries continue to recognize the value of automation and robotics in improving productivity and reducing costs, the market for machine vision systems is poised for significant growth in the coming years.

Rapid Technological Advancements

Rapid technological advancements are serving as a powerful catalyst for the growth and

+44 20 8123 2220
info@marketpublishers.com

evolution of the 2D and 3D machine vision systems market. These advancements are transforming the landscape of machine vision, making these systems more capable, versatile, and accessible across a wide range of industries and applications. One of the key drivers of technological advancement in machine vision is the continuous improvement in sensors and cameras. The development of high-resolution, low-noise sensors and cameras enables machine vision systems to capture and process clearer and more detailed images. This enhancement is particularly crucial for applications that require precise measurement, defect detection, and quality control.

Image processing algorithms are another area where rapid progress is occurring. Advanced algorithms, often based on artificial intelligence (AI) and deep learning techniques, allow machine vision systems to interpret and analyze images more intelligently. This results in greater accuracy and the ability to recognize and categorize objects and defects with unprecedented speed and precision. 3D machine vision technology, in particular, has benefited significantly from technological advancements. The introduction of 3D sensors, such as time-of-flight and structured light cameras, has enabled machines to perceive depth and shape, making them invaluable for tasks like bin picking, robotic navigation, and volumetric measurements.

Furthermore, the integration of machine vision with other emerging technologies like augmented reality (AR) and virtual reality (VR) is expanding the scope of applications. These combinations create immersive environments where machine vision systems can provide real-time information and enhance human-machine interaction. Miniaturization and cost reduction have also been key drivers. Smaller, more affordable components make it possible to deploy machine vision systems in a wider range of settings, including mobile devices, wearable technology, and consumer electronics. This accessibility is fostering innovation in areas such as autonomous vehicles, augmented reality glasses, and smart appliances.

Additionally, the rapid growth of edge computing capabilities is allowing machine vision systems to process data locally, reducing latency and enabling real-time decision-making in applications like autonomous vehicles and industrial automation. In conclusion, rapid technological advancements are revolutionizing the 2D and 3D machine vision systems market. These innovations are increasing the capabilities, affordability, and adaptability of machine vision technology, which, in turn, is driving its adoption across numerous industries. As industries continue to harness the power of machine vision for automation, quality control, and data-driven decision-making, the market for these systems is poised for continued growth and innovation.

+44 20 8123 2220
info@marketpublishers.com

Key Market Challenges

Cost of Implementation

The cost of implementation is a significant challenge that can potentially hamper the growth of the global 2D and 3D machine vision systems market. While these systems offer a wide range of benefits, the initial investment required to deploy them can be a barrier, particularly for small and medium-sized enterprises (SMEs) and businesses with limited budgets. High Initial Capital Investment: Acquiring the hardware and software components necessary for 2D and 3D machine vision systems can be expensive. This includes the cost of cameras, sensors, lighting equipment, processing units, and specialized software. The total cost can vary widely depending on the complexity and scale of the application.

Integration Costs: In addition to the hardware and software costs, integrating machine vision systems into existing production lines can incur additional expenses. This may involve retrofitting or modifying machinery to accommodate the new technology, as well as hiring or training personnel with expertise in machine vision. Customization Costs: Many applications require customized machine vision solutions to meet specific requirements. Developing and implementing these custom solutions can add to the overall cost, as they often involve tailored software development and system calibration. Maintenance and Support Costs: Machine vision systems require ongoing maintenance to ensure they operate at peak performance. Regular calibration, software updates, and hardware maintenance can contribute to the total cost of ownership over time. Businesses also need to budget for technical support and training to keep their staff proficient in operating the systems.

Economies of Scale: Larger enterprises with higher production volumes can often justify the investment in machine vision technology more easily than smaller businesses. They can spread the cost over a larger number of units or products, making the return on investment (ROI) more attractive. ROI Uncertainty: Demonstrating a clear and timely return on investment can be challenging, especially for businesses that are new to machine vision technology. Calculating ROI depends on factors like increased productivity, reduced defects, and cost savings, which may not be immediately evident.

Competitive Pricing Pressure: In some industries, there may be competitive pressures to keep product prices low. This can limit a company's ability to invest in costly machine vision systems, even if they would improve product quality and efficiency in the long run. Despite these challenges, it's important to note that the cost landscape of machine

+44 20 8123 2220
info@marketpublishers.com

vision technology is evolving. Advances in hardware miniaturization, increased competition among technology providers, and economies of scale are gradually reducing the cost of implementation. Moreover, as the technology matures and becomes more widely adopted, the benefits of improved quality control, automation, and data analytics often outweigh the initial investment, making machine vision systems a strategic choice for many businesses seeking to remain competitive in the modern industrial landscape.

Lack of Skilled Workforce

The lack of a skilled workforce poses a significant challenge that could potentially hamper the growth of the global 2D and 3D machine vision systems market. Machine vision technology is becoming increasingly sophisticated, and its successful implementation and operation require individuals with specific skills and knowledge. The shortage of qualified personnel can impede the adoption and utilization of these systems in various industries and applications. Complexity of Machine Vision Technology: Machine vision systems involve intricate components such as cameras, sensors, image processing software, and often require calibration and programming. Skilled technicians and engineers are needed to design, set up, and maintain these systems effectively.

Shortage of Machine Vision Experts: There is a notable scarcity of professionals with expertise in machine vision technology, as it requires a unique blend of skills in computer vision, image processing, programming, and hardware integration. Finding and hiring such individuals can be challenging for companies looking to implement these systems. High Demand for Skilled Personnel: The increasing demand for skilled machine vision experts is driven by the growing adoption of automation and Industry 4.0 practices across various industries. This heightened competition for qualified talent can result in higher labor costs. Training and Retention: Companies that do invest in training their workforce in machine vision technology may face challenges in retaining these skilled employees. Highly trained personnel are often sought after by other organizations, which can lead to talent turnover.

Diverse Applications: Machine vision is used across a wide range of industries, including manufacturing, healthcare, automotive, agriculture, and more. Each application may require specialized knowledge and experience, further complicating the recruitment process. Rapid Technological Advancements: The rapid pace of technological change in the field of machine vision means that skilled workers need to continually update their knowledge and skills to stay current. This ongoing learning

curve adds to the challenges of finding and retaining qualified personnel.

Global Competition: The global nature of the machine vision market means that companies may need to compete on a global scale to attract skilled talent. This can drive up labor costs and make it even more challenging for smaller companies to access the necessary expertise. Addressing the lack of a skilled workforce in the machine vision industry requires a multi-pronged approach. This includes investing in education and training programs, fostering partnerships between educational institutions and businesses, and promoting the development of machine vision-related courses and certifications. Additionally, companies may need to offer competitive compensation packages and opportunities for career growth to attract and retain skilled professionals. Overcoming this workforce challenge is essential to unlock the full potential of 2D and 3D machine vision systems in various sectors, enabling businesses to enhance automation, quality control, and data-driven decision-making.

Key Market Trends

Integration of AI and Deep Learning

The integration of artificial intelligence (AI) and deep learning is a driving force behind the growth of the global 2D and 3D machine vision systems market. This integration is revolutionizing machine vision technology, making systems smarter, more adaptable, and capable of addressing complex real-world challenges. AI and deep learning algorithms empower machine vision systems to process and interpret visual data with remarkable accuracy and speed. Here's how they are driving the market, Advanced Image Recognition: AI and deep learning algorithms excel at recognizing patterns and objects within images. They enable machine vision systems to identify and classify objects, defects, and anomalies with a level of precision that was previously challenging to achieve.

Enhanced Decision-Making: These technologies enable machine vision systems to make real-time decisions based on the visual data they capture. This is invaluable in applications like autonomous vehicles, where AI-powered machine vision systems can identify obstacles, pedestrians, and road signs, enabling safe navigation. Object Tracking: AI and deep learning models can track objects' movements and predict their trajectories. This capability is vital in surveillance, robotics, and logistics, where tracking moving objects is essential for safety and efficiency. Improved Quality Control: In manufacturing, AI-driven machine vision systems can detect even subtle defects in products, leading to enhanced quality control and reduced production errors.

+44 20 8123 2220
info@marketpublishers.com

Flexible Adaptation: Deep learning models can adapt to changing conditions and environments. This adaptability is particularly valuable in robotics and automation, where machines need to handle diverse and unpredictable situations. Reduced False Alarms: By learning from historical data, machine vision systems equipped with AI can reduce false alarms and identify real issues more accurately, minimizing disruptions and improving overall efficiency.

Customization and Versatility: AI-driven machine vision solutions can be customized for specific applications and industries, making them versatile tools for a wide range of use cases. In conclusion, the integration of AI and deep learning is propelling the 2D and 3D machine vision systems market forward. These technologies are unlocking new possibilities for automation, quality control, and data-driven decision-making across industries, making machine vision systems indispensable in the era of Industry 4.0 and beyond. As AI and deep learning continue to advance, we can expect even more sophisticated and capable machine vision systems to drive innovation and growth in various sectors.

3D Vision Technology Advancements

3D vision technology advancements are poised to be a driving force behind the global 2D and 3D machine vision systems market. These advancements represent a transformative leap in the capabilities and applications of machine vision, offering a depth and precision that was previously unattainable with traditional 2D systems. One of the key advantages of 3D vision technology is its ability to provide accurate depth perception. Recent innovations in 3D sensors, such as time-of-flight and structured light cameras, have enabled machine vision systems to create detailed and reliable 3D reconstructions of objects and environments. This depth perception is invaluable in applications such as robotics, where machines need to interact with their surroundings in a highly precise manner.

Moreover, 3D vision technology enhances object recognition capabilities, allowing machines to not only identify objects but also assess their shape, size, and orientation in three dimensions. This capability has broad implications across industries, from manufacturing and automotive quality control to logistics and healthcare. Additionally, 3D vision advancements are driving improvements in robotics, enabling robots to navigate complex and dynamic environments more effectively. This is particularly relevant in applications like autonomous vehicles, where 3D vision is fundamental for obstacle detection and avoidance. As 3D vision technology continues to evolve and

+44 20 8123 2220
info@marketpublishers.com

become more accessible, it is set to revolutionize industries, enhance automation, and open up new opportunities for innovation, making it a key driver in the global machine vision systems market's growth and development.

Segmental Insights

End-user Industry Insights

Food and Beverages segment dominated in the market. The food and beverage sector is one of the most significant markets for machine vision systems owing to growing safety culture and stringent government regulations forcing companies to adopt advance inspection procedures as a part of automation.

The uniform and systematic application of machine vision in the food industry over the past decade is mainly attributed to continual developments in constituent methodologies, such as image processing and pattern recognition. Moreover, technological advancements have permitted feasible implementation of these machines at lower cost. Inspection of food (concerned predominantly with defects or contaminants), quality control, and in some cases, assembly control of more complex foods (pizzas and layer cakes) during the processing of food are some of the major areas of scope where the machine vision systems find applications.

Regional Insights

North America is expected to dominate the market during the forecast period. North America is a developed region with a well-established infrastructure, North America is a substantial market for vendors offering solutions for machine vision. The regional market is expected to grow significantly over the forecast period, owing to the early adoption of automation in the manufacturing and healthcare industries.

In North America, the sales of machine vision components and systems that provide vision intelligence to robots and other machines increased significantly in 2018, according to AIA, the industry trade group, and part of the Association for Advancing Automation (A3).

In July 2019, Microchip Technology Corporation introduced its Smart Embedded Vision Initiative. The new ecosystem utilizes Microchip’s low-power PolarFireFPGAs with a series of high-speed imaging interfaces, intellectual property for image processing, and an enhanced ecosystem of outside partnerships. This initiative is designed to bolster

+44 20 8123 2220
info@marketpublishers.com

machine vision advances for applications such as industrial, medical devices, automotive, and aerospace.

Key Market Players

Cognex Corporation

Keyence Corporation

Omron Corporation

ISRA Vision AG

IDS Imaging Development Systems GmbH

National Instruments Corporation

MVTec Software GmbH

Sony Corporation

Teledyne DALSA

Toshiba Corporati%li%

Report Scope:

In this report, the Global 2D & 3D Machine Vision Systems Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Global 2D & 3D Machine Vision Systems Market, By Component:

Hardware

Software

Global 2D & 3D Machine Vision Systems Market, By Product:

+44 20 8123 2220
info@marketpublishers.com

PC-based

Smart Camera-based

Global 2D & 3D Machine Vision Systems Market, By End user Industry:

Food and Beverage

Medical Devices

Pharmaceutical

Automotive

Electronics and Semiconductors

Other

Global 2D & 3D Machine Vision Systems Market, By Region:

North America

United States

Canada

Mexico

Asia-Pacific

China

India

Japan

South Korea

Indonesia

+44 20 8123 2220
info@marketpublishers.com

Europe

Germany

United Kingdom

France

Russia

Spain

South America

Brazil

Argentina

Middle East & Africa

Saudi Arabia

South Africa

Egypt

UAE

Israel

Competitive Landscape

Company Profiles: Detailed analysis of the major companies presents in the Global 2D & 3D Machine Vision Systems Market.

Available Customizations:

+44 20 8123 2220
info@marketpublishers.com

Global 2D & 3D Machine Vision Systems Market report with the given market data, Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

+44 20 8123 2220
info@marketpublishers.com

Contents

+44 20 8123 2220
info@marketpublishers.com

6. NORTH AMERICA 2D & 3D MACHINE VISION SYSTEMS MARKET OUTLOOK

7. ASIA-PACIFIC 2D & 3D MACHINE VISION SYSTEMS MARKET OUTLOOK

+44 20 8123 2220
info@marketpublishers.com

+44 20 8123 2220
info@marketpublishers.com

8. EUROPE 2D & 3D MACHINE VISION SYSTEMS MARKET OUTLOOK

+44 20 8123 2220
info@marketpublishers.com

9. SOUTH AMERICA 2D & 3D MACHINE VISION SYSTEMS MARKET OUTLOOK

10. MIDDLE EAST & AFRICA 2D & 3D MACHINE VISION SYSTEMS MARKET OUTLOOK

+44 20 8123 2220
info@marketpublishers.com

+44 20 8123 2220
info@marketpublishers.com

11. MARKET DYNAMICS

12. MARKET TRENDS & DEVELOPMENTS

13. COMPANY PROFILES

+44 20 8123 2220
info@marketpublishers.com

+44 20 8123 2220
info@marketpublishers.com

I would like to order

Product name: 2D & 3D Machine Vision Systems Market – Global Industry Size, Share, Trends, Opportunity, and Forecast Segmented by Component (Hardware, Software), Product (PC-based, Smart Camera-based), End-user Industry (Electronics and Semiconductors, Automotive, Medical Devices, Pharmaceutical, Food and Beverage, Other Industry Verticals), By Region, By Competition 2018-2028.

Product link: https://marketpublishers.com/r/21BCA2551293EN.html

Price: US$ 4,900.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:
info@marketpublishers.com

Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page https://marketpublishers.com/r/21BCA2551293EN.html

To pay by Wire Transfer, please, fill in your contact details in the form below:

First name:
Last name:
Email:
Company:
Address:
City:
Zip code:
Country:
Tel:
Fax:
Your message:

**All fields are required

Custumer signature _____

Please, note that by ordering from marketpublishers.com you are agreeing to our Terms & Conditions at https://marketpublishers.com/docs/terms.html

+44 20 8123 2220
info@marketpublishers.com

To place an order via fax simply print this form, fill in the information below and fax the completed form to +44 20 7900 3970