

Hyperspectral Imaging - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts (2024 - 2029)

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Report description:

The Hyperspectral Imaging Market size is estimated at USD 226.08 million in 2024, and is expected to reach USD 463.89 million by 2029, growing at a CAGR of 15.46% during the forecast period (2024-2029).

Hyperspectral imaging captures and processes an image at many wavelengths. A human eye sees the light in three visible spectrum bands (i.e., red, green, and blue). In contrast, hyperspectral imaging divides the spectrum into various bands, covering the visible and near-infrared ranges. In hyperspectral imaging, every image pixel carries spectral information, which is added as a third dimension of values to the two-dimensional spatial image, thereby generating a three-dimensional data cube referred to as hypercube data.

Key Highlights

- One of the key benefits of hyperspectral imaging (HSI) is high spatial and spectral resolution, which enables the detailed characterization of materials. Compared to multispectral imaging, hyperspectral imaging provides more information, allowing for more accurate analysis, identification, and separation of materials and substances. It can differentiate between materials with similar physical or visual characteristics or those that are not visible to the human eye, such as different materials.
- Territorial fights globally have raised security concerns. Globally, this scenario forces government agencies to explore modern technologies that offer enhanced safety to the citizens. Thus, persistent surveillance and collection of airborne intelligence and surveillance information are crucial in warfare against terrorism. High-resolution imagery in visible and infrared bands offers essential detection capabilities based on target shapes, temperatures, and materials.
- The increasing need for data accuracy and consistency in HSI applications, such as food and agriculture, defense, and weather, is driving the demand for hyperspectral imaging in the market. HSI uses robust analytical procedures that are critical for imaging technology in applications such as food and agriculture.

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-Hyperspectral imaging generates a full spectrum for each pixel in an image. Each pixel of a hyperspectral image carries information covering the visible spectrum, offering data that can be used. For instance, it can be used to measure ocean color to map harmful algae blooms. Hyperspectral imaging systems, including cameras and accessories, can be expensive due to the advanced technologies and specialized components involved. The availability of hyperspectral imaging systems is relatively limited, which can contribute to their higher costs. Also, the R&D, refinement, operation, and analysis of hyperspectral imaging data often require specialized expertise, which can add to the overall cost of using this technology.

-The COVID-19 attack had a remarkable impact on the market studied, with several end-user industries that deploy hyperspectral imaging facing several difficulties. The industries were stuck with nationwide lockdowns, which brought them to a standstill, but after Q2 of 2020, they gradually started their operation. Moreover, since the raw materials are bought in China, the sourcing has been affected by the tariffs imposed by the United States.

Hyperspectral Imaging Market Trends

Healthcare to be the Fastest Growing End User Segment

- The application of Hyperspectral Imaging in the healthcare sector constantly expands as researchers explore its potential in various medical fields. For the last twenty years, hyperspectral imaging has witnessed the potential to become a key tool for research and identifying diseases in the healthcare field as it has a non-contact, non-ionizing, and label-free imaging modality.

- The utilization of HSI technology in the healthcare sector is of utmost importance. Moreover, the increasing number of investments in the sector is expected to propel the growth of this domain. The healthcare sector is undergoing a large-scale digital transformation, and these technologies are expected to influence the domain significantly.

- The World Health Organization has estimated that more than 422 million adults have diabetes, and about 1.5 million deaths are caused due to diabetes. Retinal inspection is necessary due to the increasing counts of glaucoma and diabetic patients- skin scans to detect diseased or malignant cells. Specific wavelengths are better suited for penetrating deeper into the skin so a more detailed understanding of a patient's condition can be reached. Given the correct stimulation, cancers and other diseased cells would fluoresce or absorb light, making them easily distinguishable from healthy tissue.

- In some regions, cancer cases have increased yearly, which drives the studied market. For instance, the World Health Organization predicted that in 2040, there will be a total of 3,02,26,151 new cases of lung and bronchus cancer globally.

- Also, skin cancer has increased considerably worldwide, specifically among old and middle-aged individuals. This has increased early disease detection's significance in reducing mortality and morbidity. Hyperspectral microscopic imaging technology can be used for the effective diagnosis of skin cancer. This technology integrates hyperspectral imaging technology with microscopy to provide image and spectral information of the targeted tissue. The combination of machine learning and hyperspectral microscopic imaging can considerably improve the accuracy and efficiency of a skin cancer diagnosis.

North America Holds Significant Market Share

- The presence of countries, such as the United States that have significant investments as far as surveillance is concerned. The surveillance is not limited to the military. It includes several law enforcement agencies that leverage advanced technology to monitor and track multiple individuals or vehicles during the day and at night and surveil the events in an area. Such new deployments are anticipated to increase the adoption of hyperspectral imaging systems and devices.

- The United States has a significantly high military expenditure compared to the rest of the world. In the budget proposed for the fiscal year 2023, released in March 2022, the Biden administration sought USD 813.3 billion for national defense. Furthermore, the Department of Defense sought USD 773 billion from Congress in the 2023 budget, an increase of USD 30.7 billion from its 2021

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allocation. The USD 773 billion budget allocated to the Pentagon will fund weapons programs and critical national security priorities.

- As per Secretary of Defense Lloyd J. Austin III, the U.S. president's fiscal 2024 defense budget request is a strategy-driven document ensuring the U.S. military is the strongest in the world now and into the future. The USD 842 billion budget request ensures the military can perform its missions and be positioned to respond to myriad threats moving forward. China is America's pacing threat, and the budget request is driven by the seriousness of ITS strategic competition with the People's Republic of China. On land, the United States defense sector is investing in air and missile defense and in defenses to counter uncrewed aerial vehicles. It also requested USD 11 billion to deliver the right mix of long-range fires, including significant investments in hypersonics.

- The National Cancer Institute estimates that cancer-related direct medical costs in the United States will increase to USD 246 billion by 2030, an increase of 34% from 2015 based only on population growth and aging. However, the projection is expected to be an understatement to the real-time expenditure, factoring in the growing cost of prescription medicines, with the list price for many now more than USD 1 million annually.

- According to the American Cancer Society, in 2023, it was estimated that there would be nearly 935 thousand new cancer cases among women in the United States. The increased prevalence of cancer in the region is driving the growth of hyperspectral imaging in the healthcare industry to detect cancer at an early stage. Various organizations are collaborating to advance the technology and provide a cost-effective price for larger use for medical diagnosis.

Hyperspectral Imaging Industry Overview

The Hyperspectral Imaging market is fragmented with the presence of major players like Galileo Group, Inc., BaySpec Inc., Specim Spectral Imaging Ltd, Corning Incorporated, and Surface Optics Corporation. Players in the market are adopting strategies such as partnerships and acquisitions to enhance their product offerings and gain sustainable competitive advantage.

- August 2023 - Specim announced the next-generation near-infrared line-scan hyperspectral camera, Specim GX17, for advanced machine vision. The new Specim GX17 complements Specim's highly successful FX camera series, the first hyperspectral camera designed specifically for industrial use.

- February 2023 - Headwall has introduced advanced sensor payloads consisting of hyperspectral sensors and LIDAR for deployment on Unmanned Aerial Vehicle (UAV) platforms. This fusion of spectral imaging data and 3D LIDAR output allows for new industry-leading capabilities in handling essential remote sensing applications varying from civil and military infrastructure inspection to crop science applications needing discrete solutions for crop monitoring.

Additional Benefits:

- The market estimate (ME) sheet in Excel format
- 3 months of analyst support

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