

Hyperspectral Imaging Market - Growth, Trends, Covid-19 Impact, and Forecasts (2023 - 2028)

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Report description:

The global hyperspectral imaging market is poised to register a CAGR of 15.96% during the forecast period. The overall adoption of hyperspectral imaging has started to change slowly. It is gaining traction in the agriculture, chemical analysis, and defense sectors, in addition to the metal and meteorology sector for which it was initially designed. In recent years, ground-based hyperspectral imaging has gained immense interest in researching electronic imaging for food inspection, forensic science, medical surgery and diagnosis, and military applications. It is beneficial for geologic mapping because of its high spectral and spatial resolutions at a millimeter to centimeter scale.

Key Highlights

Hyperspectral imaging systems (HIS) have also grown significantly in medical diagnostics. Existing systems do not allow for seamless integration into the surgical workflow, nor do they provide real-time instantaneous feedback crucial to support effective decision-making during surgery. Various researchers aim to develop a system that provides clinicians with an augmented vision for clear visualization of vital tissue information throughout the surgery. In July 2021, researchers from the School of Biomedical Engineering and Imaging Sciences at King's College London, in collaboration with researchers at the Research in Orthopedic Hospital (ROCS), University Hospital Balgrist, University of Zurich, Switzerland, conducted a feasibility case study of a novel surgical hyperspectral imaging research system. HIS opens up new research possibilities in the field of computer-aided surgery. Today, the top concern of food companies is brand image loss over all other expenses and the consequences of poor quality. Food industry businesses use X-ray machines, metal detectors, and even manual operators for some flaws. There are several artificial vision machines available on the market. However, most of them are only capable of comparing color palettes to identify flaws. Inndeo, a Spanish firm, employs Specim's hyperspectral imaging technology to increase automation in the quality inspection procedures for the food industry to address these difficulties. The strength of INSPECTRA is its combination of many technologies, or "sensor fusion," to enhance detecting capacities. In August 2021, the business placed its trust in Specim, one of the leading

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providers of hyperspectral imaging, which enabled it to identify various invisible flaws and contaminations to the human eye and other technologies.

Data collection and analysis have improved due to technological developments like the creation of micro-hyperspectral imaging technology. The demand for compact, lightweight, and practical hyperspectral imaging devices that may be used in challenging conditions is met by micro-hyperspectral technology. A company like Specim offers Specim FX17, the smallest and fastest InGaAs-based near-infrared hyperspectral camera designed for industrial machine vision. This camera provides more detailed chemical, physical and biological information, saving money and time and reducing unrecyclable waste.

Moreover, a new hyperspectral imaging satellite is expected to support mining operations. In June 2021, San Francisco-based Orbital Sidekick (OSK) announced the launching of its most powerful hyperspectral imaging satellite Aurora. Aurora is expected to capture more than 450 spectral bands visible to the shortwave infrared light spectrum (400 to 2500 nm) with a pixel size of approximately 30 meters, making it the highest resolution commercial hyperspectral imagery available to date. The latest system has been designed to leverage OSK's previous experience collecting and analyzing hyperspectral data to support energy, mining, and defense operations. Furthermore, recent developments in sensor, platform, and computing technologies have transformed hyperspectral remote sensing into ultra-spectral remote sensing (USRS). Though USRS is at the primary stage of its use, the current trends and usage patterns suggest that it is expected to be the next revolution in the mineral and mining industry.

The market for hyperspectral imaging is expected to expand in response to the effects of COVID-19 since this technology may become widely used for assessing COVID-19 rashes. For instance, utilizing its cutting-edge hyperspectral imaging equipment, the provider of hyperspectral imaging technology HinaLea Imaging (Emeryville, CA), started a study program to examine the prognostic significance of skin abnormalities related to COVID-19 infection.

Hyperspectral Imaging Market Trends

Defense Sector Expected to Witness Robust Market Growth

The military industry faces numerous issues daily, requiring the most recent technological solutions. The defense industry has spent considerable money on obtaining the newest technologies to combat the entity's vulnerability caused by a lack of the most recent technology. According to the Stockholm International Peace Research Institute (SIPRI), global military spending increased to USD 2,113 billion in 2021 from USD 1,981 billion in 2020. A budget increase of this magnitude is anticipated to open up many prospects for implementing innovations in the field.

Collecting airborne and space-borne intelligence, surveillance, and reconnaissance (ISR) information is mandatory for addressing the defense challenges posed in the current scenario. A vital tool for increasing the information content of ISR involves using advanced electro-optical devices, including hyperspectral imaging. In addition, the rise in spectral information and spectral degrees of freedom creates a unique opportunity to detect challenging targets at the subpixel level, analyze a scene without prior knowledge of the materials to be encountered, distinguish hidden features and camouflage, tag disturbed earth over buried objects, identify chemical agents in plumes, and perform image classification with greatly improved accuracy.

Military applications exploit the ability to differentiate materials to detect and recognize camouflaged targets. Hence, hyperspectral images captured from earth-observing satellites, aircraft, or UAS offer potential advantages in surveillance and the battlefield. Hyperspectral imaging sensors are used across various defense applications, such as high-altitude reconnaissance and medium-altitude commercial aircraft. The Pentagon's Defense Innovation Unit recently started to seek offers from US operators for remote sensing satellites that can provide data analytics and imagery services interested in remote sensing technologies, such as hyperspectral imaging, synthetic aperture radar, and electro-optical imaging.

Defense environments extensively use uncrewed aerial vehicles (UAV) to improve aerial and ground reconnaissance activities. This is where HSI technologies find applications. Aerial vehicles have been witnessing increased demand over recent years. AI-powered military machines facilitate long-term savings. The United States Department of Defense asserted that the cost incurred by the Pentagon to support a soldier in Afghanistan roughly amounted to USD 850,000 per year. On the contrary, an

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AI-powered TALON robot costs only USD 230,000, thus saving significant public money. Such trends are expected to increase the market's scope during the forecast period.

According to the Federal Aviation Administration, as of April 2022, the total number of drones in the United States for recreational flying has reached around 531.8 thousand units. Commercial drone registrations currently stand at approximately 318 thousand units. Hence, the rise in the total number of registered drones may offer ample growth opportunities in the future.

North America Expected to Hold a Major Market Share

North America's expanding surveillance advancements are anticipated to fuel the market's expansion. Nations like the United States, which has made substantial surveillance investments distinguish the region. In addition to the military, several law enforcement agencies also use sophisticated equipment to monitor and track numerous people or vehicles both during the day and at night, as well as to keep an eye on the activities in a given region. It is anticipated that these new deployments will enhance the use of hyperspectral imaging systems and equipment.

The United States usually spends a significant amount of money on its military. The Biden administration requested USD 753 million for national defense in the budget for the fiscal year 2022, as announced in May 2021, which is an increase of 2% over the previous year. Furthermore, the US Congress was asked to approve USD 715 billion for the Defense Department's budget for fiscal 2022, an increase of USD 10 billion from its 2021 allotment. Weapon development and other crucial national security initiatives are likely to be supported by the Pentagon's 715 billion USD budget. Another addition of USD 38 billion was well outlined for defense-related programs by the Department of Energy and other federal agencies. The US troops have removed many thousand pounds of explosives from the battlefields in Afghanistan by using hyperspectral imagers to spot objects typically hidden from view, like tanks draped in camouflage or emissions from an improvised bomb-making factory.

Apart from the United States, Canada also increased its military spending. Additionally, the United States shifted from the Middle East and Afghanistan to more imminent threats from Asia-Pacific countries, especially China, which pressured Canada's military funding as part of its membership in NORAD, NATO, and the so-called Five Eyes intelligence-sharing alliance. The Canadian Finance Minister's April 2021 budget included a five-year funding commitment of CAD 163.4 million for NORAD modernization. According to NATO, in 2021, Canada spent approximately USD 26.5 billion on defense, an increase of around USD 3 billion compared to 2020. The group also emphasized that North America would be the world's top military spending area in the upcoming years. Moreover, due to these significant expenditures, the military sector is expected to adopt new surveillance technologies, which may create chances to expand the regional market.

Furthermore, the considerable aerospace investments made in the region are also expected to impact the market considerably. The Biden administration planned significant financing for space and commercial space, and this is expected to make room for hyperspectral cameras. The United States hopes to improve its access to space and space capabilities by making these efforts. In May 2021, the White House unveiled its proposed budget for 2022, which included a USD 6 trillion federal spending plan that included USD 24.8 billion for NASA. The NASA space division received USD 7.9 billion, an increase of 9% over 2021. Furthermore, US President Joe Biden proposed an increase in funding for deep-space exploration systems by 5% from 2021.

Hyperspectral Imaging Market Competitor Analysis

The market for global hyperspectral imaging is moderately fragmented. A few major dominant players in this market are Corning Incorporated, Spectral Imaging Ltd, and Headwall Photonics, among others. Partnerships and acquisitions, high investments in R&D, new product launches, etc., are the major growth strategies these companies adopt to sustain themselves in the market.

In January 2022, Pixxel, a company engaged in Earth-imaging technology, announced an early adoption partnership with Rio Tinto. Pixxel's imaging satellites, capable of 5-meter hyperspectral imaging, will help Rio Tinto assess the benefits of the technology in

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mineral exploration, monitoring active and closed mine sites, and tracking ESG indicators. A Pixel satellite will take in 50x more data than multispectral satellites.

Additional Benefits:

The market estimate (ME) sheet in Excel format

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Table of Contents:

1 INTRODUCTION

1.1 Study Assumptions and Market Definition

1.2 Scope of the Study

2 RESEARCH METHODOLOGY

3 EXECUTIVE SUMMARY

4 MARKET INSIGHTS

4.1 Market Overview

4.2 Industry Value Chain Analysis

4.3 Industry Attractiveness - Porter's Five Forces Analysis

4.3.1 Bargaining Power of Suppliers

4.3.2 Bargaining Power of Buyers

4.3.3 Threat of New Entrants

4.3.4 Threat of Substitutes

4.3.5 Intensity of Competitive Rivalry

4.4 Impact of COVID-19 on the Market

5 MARKET DYNAMICS

5.1 Market Drivers

5.1.1 Technological Advancements

5.1.2 Increasing Demand for Data Accuracy and Consistency

5.2 Market Restraints

5.2.1 High Costs Associated with the Use of Hyperspectral Imaging

5.3 Patent Analysis

6 TECHNOLOGY SNAPSHOT - APPLICATIONS

6.1 Surveillance

6.2 Remote Sensing

6.3 Machine Vision/Optical

6.4 Medical Diagnostics/Research

7 MARKET SEGMENTATION

7.1 By End-user Vertical

7.1.1 Food and Agriculture

7.1.2 Healthcare

7.1.3 Defense

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- 7.1.4 Mining and Metrology
- 7.1.5 Other End-user Verticals
- 7.2 By Geography
 - 7.2.1 North America
 - 7.2.2 Europe
 - 7.2.3 Asia-Pacific
 - 7.2.4 Rest of the World

8 COMPETITIVE LANDSCAPE

- 8.1 Company Profiles
 - 8.1.1 Applied Spectral Imaging Inc.
 - 8.1.2 Bayspec Inc.
 - 8.1.3 Specim Spectral Imaging Ltd
 - 8.1.4 Corning Incorporated
 - 8.1.5 Surface Optics Corporation
 - 8.1.6 Headwall Photonics Inc.
 - 8.1.7 Resonon Inc.
 - 8.1.8 HyperMed Imaging Inc.
 - 8.1.9 Norsk Elektro Optikk AS
 - 8.1.10 Cubert GmbH
 - 8.1.11 XIMEA GmbH
 - 8.1.12 HinaLea Imaging (TruTag Technologies Inc.)
 - 8.1.13 ITRES Research Limited

9 VENDOR POSITIONING ANALYSIS - HYPERSPECTRAL IMAGING

10 INVESTMENT ANALYSIS

11 MARKET OPPORTUNITIES AND FUTURE OUTLOOK

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