Time-Of-Flight (Tof) Sensor Market - Growth, Trends, Covid-19 Impact, and Forecasts (2023 - 2028)

Market Report | 2023-01-23 | 100 pages | Mordor Intelligence

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Report description:

The Time-of-Flight sensor market is expected to grow at a CAGR of 17.3% during the forecast period. In the coming years, the demand for 3D scanning technology will increase due to its ease of usage. Time-of-flight is an active type of 3D imaging and scanning technology, and with biometric authentication, it is expected to form a new trend in demand for the TOF sensor.

Key Highlights
Growing adoption of Machine Vision Systems across various industries drives the market. More general machine vision applications require highly stable and reliable sensory systems. ToF cameras provide a reliable set of depth data, increasing the robustness and flexibility of many surveillance, inspection, and logistics systems.
Applications such as automated materials handling (AMH) systems operate at moderate distances of one to three meters and require more accurate measurements of about one to five millimeters. The preference towards single-pixel ToF imagers is highly being adopted for full-field imagers, which are cascaded through modulating elements and are incorporated into the correlation ToF architecture.
Moreover, newer ToF sensors consume low power, making them a preferred choice for mobile devices. Also, smartphones and gaming devices have been utilizing 3D ToF cameras for highly realistic augmented/mixed-reality (AR/MR) applications.
Though ToF sensors have many benefits, they have limitations too. For instance, when very bright surfaces are located near the ToF sensor, they can scatter too much light into the receiver and create artifacts and unwanted reflections, as the ToF sensor only requires light that has been reflected just once for measurement. Such factors might restrict market growth.
With the supply chain disruptions affecting many end-user industries, such as consumer electronics and automotive, the ToF sensor market was significantly impacted in the initial months of the Covid-19 outbreak. However, the rising trends of digitalization brought about by the pandemic have significantly accelerated the demand for many consumer electronic devices, thereby propelling market growth.

Time-of-Flight (TOF) Sensor Market Trends

Lidar in Automotive to Witness Significant Growth

LIDAR systems and ToF techniques are vital in providing self-driving cars with a detailed picture of the surrounding. The LIDAR system undertakes with a laser diode or LED directed to emit infrared light. Direct ToF uses short pulses of light measuring the time until each pulse returns to the sensor for measuring the distance to an object. Further, indirect ToF sensors emit a continuous wave of modulated light.
Usually, LiDAR uses the dToF measurement technology, which is suitable for short-range and long-range depth sensing applications. On the other hand, iToF is suitable for short-distance depth sensing applications and is mostly used in environments where the sensor is not exposed to direct sunlight.
In September 2021, Sony Semiconductor Solutions Corporation announced the upcoming release of the IMX459 stacked SPAD depth sensor for automotive LiDAR applications using the direct Time-of-Flight (dToF) method. The product combines the tiny, 10 ?m square single-photon avalanche diode (SPAD) pixels and distance measuring processing circuit onto a single chip, making for a compact 1/2.9-type form factor providing high-precision, high-speed distance measurement.
Further, as LiDAR uses high power lasers to achieve the long-range required, so moving to III-V material-based sensor overcomes various issues such as interference and performance, due to its higher QE compared to silicon. Attempts have been made such as using state-of-the-art Si sensors, to extend the light spectrum of ToF sensing to wavelengths beyond 1.1?m Artilux's GeSi sensor technology is the only silicon-based solution that can operate at wavelengths above 1.1 ?m, and thus combines the best features of both silicon-based CMOS sensor and III-V material-based sensor.
Moreover, automotive companies are increasingly coming up with innovative technologies in Advanced Driver Assistance Systems (ADAS), using new and affordable sensors. Currently, ADAS based on LIDAR sensors are among the most efficient technologies for autonomous vehicles, with LIDAR systems providing high accuracy, precision in object detection and recognition in ADAS.

Asia-Pacific Accounts to Hold Significant Growth

Asia-Pacific is anticipated to grow at a significant growth rate due to rapid industrialization. The easy availability of low-cost labor has led to increased manufacturing of different electronic components and devices in this region, which in turn is anticipated to increase demand for ToF sensors for monitoring and inspection applications in the manufacturing sector.
China is the largest producer and exporter of consumer electronics in the world and consequently offers many growth opportunities for the market. Moreover, the electronics manufacturing industry in the region has also continued to maintain steady expansion in recent times. As per a report by the China Academy of Information and Communications Technology, during the two months from January to February 2022, the added value of major electronics manufacturers rose 12.7% year-on-year, compared with the 7.5% growth seen in the overall industrial sector in the country.
Moreover, ToF sensors have become commonplace in higher-end smartphones, fulfilling roles such as depth perception in photography or advanced face detection for biometrics. Also, many major smartphone companies in China are expected to adopt the ToF 3D sensing camera technology for rear imaging modules of new and upcoming smartphone models moving ahead.
In June 2022, the Centre for Civil Society and Governance of the University of Hong Kong and Meta jointly announced a request for proposals (RFP) for Meta AR/VR Policy Research in the Asia Pacific region. This research initiative invites the region's academic community to develop solutions-focused research to support the responsible development of augmented reality (AR) and virtual reality (VR) technologies. With ToF sensors being used in a wide range of AR applications, such initiatives are further expected to expand the market growth in the coming years.

The steps taken to increase the adoption of autonomous vehicles in the region are further driving the growth of the market. For instance, current law in Japan permits self-driving vehicles up to level 3, and commercial vehicles have been equipped with functions up to that level. Additionally, in August 2022, the Japanese government passed a bill to introduce new rules for next-generation mobility, like unmanned self-driving vehicles, automated delivery robots, and electric kick scooters.

Time-of-Flight (TOF) Sensor Market Competitor Analysis

The time of flight sensor market is fragmented as the number of companies operating in the market increases. Leading players are currently focusing on virtual reality experience through drones providing cost-competitive products to customers. Further players are investing heavily in R&D activities, partnerships, and various start-ups are proliferating in the market, especially in the growing economies.

July 2022 - STMicroelectronics introduced its latest FlightSense Time-of-Flight (ToF) multi-zone sensor. Delivered together with a suite of valuable software algorithms, the solution is suitable for user detection, gesture recognition, and intruder alert, specially designed for the PC market.
January 2022 - TDK Corporation, the parent company of Chirp Microsystems, launched the Chirp ICU-10201 and ICU-20201, two new high-performance, ultra-low power integrated ultrasonic ToF sensors for short- and long-range detection. The new offering embedded a powerful on-chip processor with high computational power.

Additional Benefits:

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

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