LiDAR: Key for Autonomous Driving and 3D Mapping Applications

Light Detection and Ranging (LiDAR) has become the technology of choice for the development of 3D sensing for autonomous vehicles. It uses laser light to survey and measure the distance to surrounding objects and features. In terms of object detection, the light pulse in LiDAR has proven to outperform, overall, the other technology options of ultrasound (sonar) or radio wave (radar). LiDAR is the best option for providing high resolution dimensional imagery due to its speed and because its smaller beam diffraction provides better recognition of adjacent objects. This higher resolution is especially important at high speed to provide enough time to respond to a potential hazard when the vehicle is in motion.

Jabil Optics is enabling the effective development and testing of LiDAR solutions for autonomous driving technologies as well as other market applications requiring advanced LiDAR capabilities such as robotics, industrial automation, unmanned aerial vehicles (UAV), and security. Jabil Optics will strive to enable the most high performance and compact LiDAR solutions on the market.

ADVANTAGES OF LiDAR:

- High resolution 3D imagery, from near and far
- Ability to detect objects in the dark
- Fast laser detection speed that stays ahead of driving
- Solid state LiDAR allows for more compact, high performing sensors
- Identification of and discrimination between people and animals, bikes and motorcycles, or balls and rocks
- Ability to identify obstacles regardless of color or lack of contrast

USING ACTIVE ALIGNMENT FOR LiDAR OPTICS

In order to achieve high-definition 3D scanning, the opto-electronics collectively forming the LiDAR system require high accuracy positioning to control beam collimation and pointing, and therefore should be assembled using active alignment. This applies to the collimation optics and potentially the receiver channels of the LiDAR module.

Active alignment systems perform high-precision alignment and assembly of opto-electronic devices for:

- Highly accurate focus or collimation for laser applications
- Precision laser pointing
- Optical receiver alignment

WHY LiDAR REQUIRES HIGH PRECISION ASSEMBLY

While scanning the landscape around a vehicle, a solid state LiDAR system uses a MEMS scanning mirror – this requires that the laser is collimated and precisely positioned relative to the MEMS in order to achieve accurate scanning throughout the field of view. If the laser isn't positioned well enough, the system will scan poorly, compromising safety with inaccurate results. High precision alignment is crucial for ensuring safety in LiDAR scanning.

Our active alignment assembly systems produce the most accurate optical modules and will do so with robust efficiency, raising both yield and quality in high volume production of state-of-the-art LiDAR modules.

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