VIAVI
VIAVI Solutions

Brochure

Optics for Photonic and 3D Sensing

Optics for Photonic and 3D Sensing Applications

The Sensing World Around Us

As electronics become more intelligent, they're recognizing our personal identities and subtly adjusting the environment around us as we move throughout our day. The photonics industry is expected to hit $766 billion by 2020,[1] driven by demand for many types of smarter, more efficient electronics that let us seamlessly interact in the physical and virtual worlds.

Recent advances in optical sensor coating technology from VIAVI help sensors recognize ambient light conditions around electronics and optimize their display brightness and color balance. VIAVI coatings are also used for range-finding capabilities in cell phones, enabling them to appropriately turn on and off the touchscreen display and automatically focus the camera. It will soon even be possible for phone cameras to generate a 3D model of the user or the environment, opening up opportunities for new applications.

In the future, hundreds of thousands of sensors embedded in smart homes, cars, wearable devices and offices will automatically adapt according to our environment and preferences, in more customized ways than ever before.

Verifying Your Genetic Digital Signature with 3D Sensing

Use of multimodal biometrics is also on the rise, as passwords are expected to become obsolete by 2020.[2] Fingerprint sensing currently leads the biometrics market, with iris and facial recognition not far behind. By 2021, analysts predict that more than two thirds of smartphones[3] will include one or more biometric capabilities, tying multiple elements together to better protect us from a criminal's ability to steal our personal data.

VIAVI was first to market with 3D sensing filter solutions more than seven years ago, when it deployed its first-generation optical filter capability to support the popular Microsoft Kinect gaming system. It was the first deployment of technology where gestures of players could be recognized in 3D and incorporated into a virtual game on a TV screen.

Next-generation sensing systems with VIAVI filters are now being used for iris and facial recognition to detect a person's unique identity and unlock various levels of access on a device or within an application. A key ingredient of 3D sensing is VIAVI's sophisticated optical-filter technology that separates specific wavelengths of light from a 3D image from ambient light that could interfere and confuse the system.

In the future, multimodal biometric access could eventually replace IDs like driver's licenses or passports, and provide levels of access to public venues and facilities. Even your self-driving car will instantly recognize you, unlock the car, adjust your comfort levels, start the engine, and, if


A multitude of sensors enable conceptual facial recognition technologies

necessary, ensure you stay awake and attentive.

VIAVI Differentiators

VIAVI has invested more than seven years of research and development into its 3D depth-sensing filter technology, and has been awarded several related patents and IP. The specialized coating design on its filters provides less wavelength angle shift compared to traditional coatings, enabling significantly better overall performance of the system. The filters provide a deep suppression of unwanted ambient light, so that they can be used under a wide variety of extreme light conditions. High precision manufacturing at a very large

scale (in the hundreds of millions) with excellent quality and customer relationships has made VIAVI an industry leader in this space.
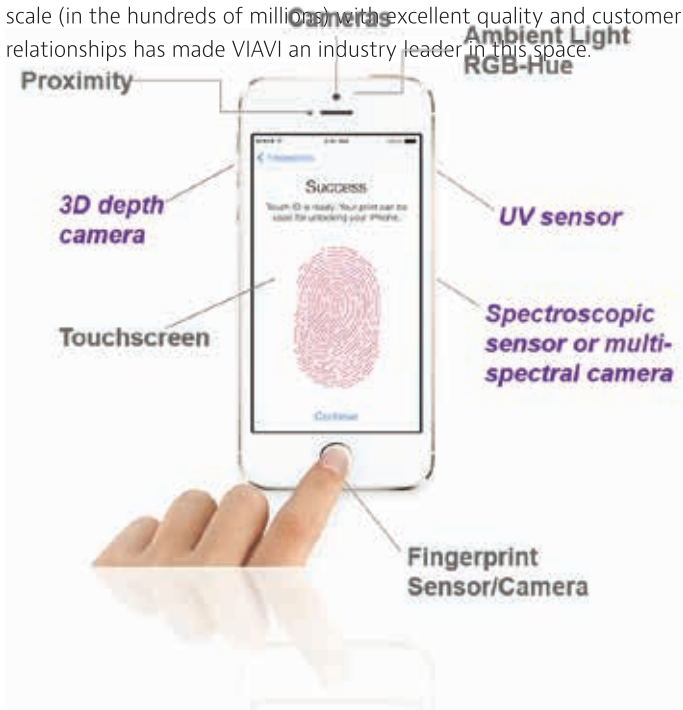
Current and emerging capabilities enabled by optical filters

Automotive

3D Sensing in LiDAR Systems

The Next Supercomputer is Your Car

IOT has made a dramatic impact on the automotive industry. Cars have become supercomputers on wheels with transportation-as-a-service and varying degrees of connected and autonomous vehicles hitting city streets worldwide. Automakers, ride sharing services and other industry players are forming partnerships for connected car services to make driving more comfortable, convenient and safe. It's an industry expected to explode from $13.6 billion today to $42 billion by 2022.[4]

The Path to Autonomous Driving

New improvements are being added to cars every year with more types of sensors and diverse capabilities. Tech companies are fully invested, building whole cars or important features inside a car. While widespread use of fully autonomous cars is still years away, increasing levels of 'driver assist' features have been added such as voice and gesture recognition, automated emergency braking, and parking assistance, moving us closer to fully-autonomous cars.

Ride sharing, combined with full automation, promises big benefits. Eventually, we will cease to own our own car, as improved safety of driverless cars will decrease accident risks below that

of human drivers. Ride-sharing without personal car ownership will also dramatically reduce the need for parking spaces, ease traffic congestion, and alleviate pollution. It conveniently aligns to millennials' preference to own less and share more, with IOT technologies underpinning this behavior.

Sensing for Self-Aware Vehicles

As car automation technology continues to evolve with more multi-sensory capabilities, vehicles will better understand what's happening under a wider variety of situations in order to respond appropriately.

LiDAR sensing is an emerging car technology that has long been used for applications in space, agriculture and geographical mapping -- think radar + light. It's now being used for semi and fully autonomous driving and employs VIAVI filter technology, enabling cars to have full awareness of their environment for the best decision making. A laser light shines out from the car, bounces off an external object, and the returning light is sent through a VIAVI filter before hitting a sensor, which in turn feeds data to the car and the driver.

Driver monitoring inside the car also employs similar 3D depth-sensing technology using VIAVI filters, but at a shorter range to recognize and adapt to conditions of the driver. Soon, cars will automatically recognize the driver with biometrics and set pre-programmed comfort levels. Most importantly for semi-autonomous driving, it will scan the driver to see if they are alert and ready to react, and will immediately take over if a driver is compromised or if there is imminent danger ahead.

By the time millennials have grandchildren of their own, fully autonomous cars could be ubiquitous in cities, speeding across smart superhighways at 100 mph and 2 inches away from each other. Advanced filtering technologies that are successfully guiding semi-autonomous cars today will continue evolving for the safety and p

Illustration of Autonomous Vehicle with LiDAR System

VIAVI Differentiators

Advanced optical filtering technology from VIAVI used in LiDAR systems suppresses stray light very precisely under a wide variety of light conditions. This patented VIAVI low-angle shift filtering technology is also known as "narrow band" functionality. It only allows a very narrow stream of light in to inform the car and driver, while suppressing any ambient light that would otherwise confuse the sensor. It is ideal for extreme light conditions, such as darkness or full sunlight, and can view the changing environment from the widest possible range.

Acknowledgements

To learn more about VIAVI Optical Security and Performance Products, please visit: www.viavisolutions.com/osp.

Sources

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