

World's Smallest Time-of-Flight Proximity/Ranging Sensor

ST Imaging

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Product Marketing Manager

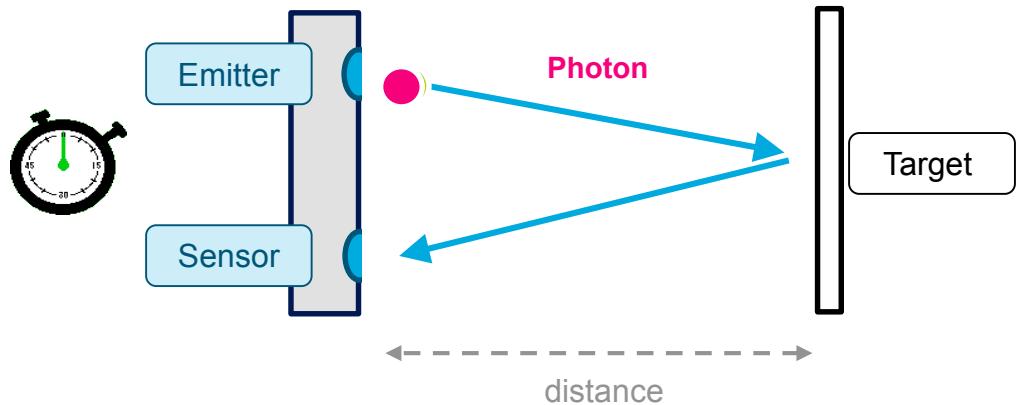


FlightSense™ Breakthrough Technology

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Measurement at the true speed of light !

FlightSense™ Principle



$$\text{Measured distance} = \text{Photon travel time /2} \times \text{Speed of light}$$

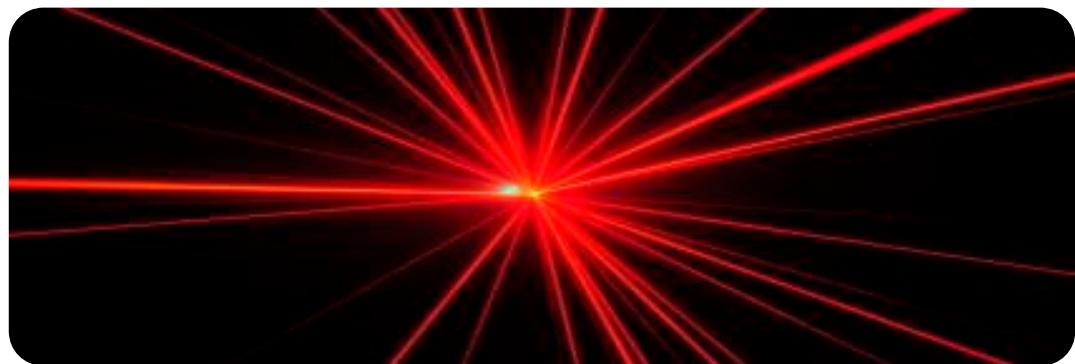
1cm round-trip at 67ps!

Fully Integrated Time of Flight Module
ST #1 World Wide Supplier

Direct distance measurement
Independent of target size, color & reflectance

Very fast (few ms)

Low power



Optical Time-of-Flight Product Family

ST is WWide
#1 ToF supplier



Proven track record in manufacturing

>300Mu products shipped

300% AAGR

Single Photon Avalanche Diode

Ultra fast time resolution enabling Direct ToF processed in ST CMOS SPAD process



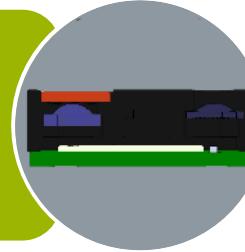
ST Proprietary Time-of-Flight IP

Best compromise of cost, complexity & power vs performance



Compact integrated system

Sensor, filters, optics, VCSEL and driver integrated
Fully calibrated system

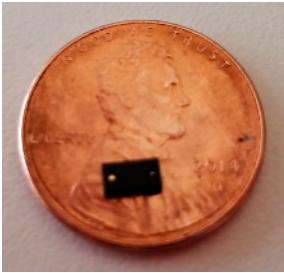


Optimised and reliable supply chain

High volume & low cost



World's smallest ToF ranging sensor



ST Time of Flight: FlightSense™ Technology advantages

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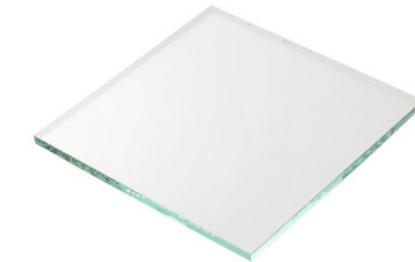
True Distance
High Accuracy



Color
independent



Texture
independent



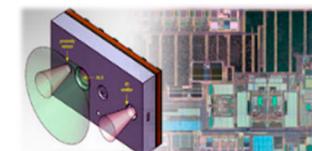
Detect
Glass/Transparent



940nm



Eye Safe



Fully
integrated



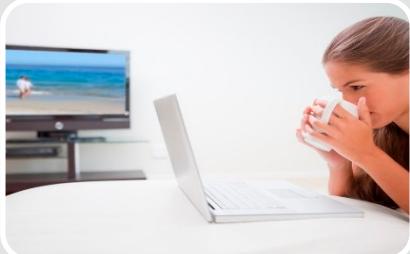
Low Power



FlightSense™

... making light work

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Camera Assist

- Instant focus
- Scene understanding
- AWB & light flicker rejection

Ranging & Proximity

- True distance
- Up-to 4m

Presence, User Detect

- Security
- Power saving
- Eye protection

Gesture

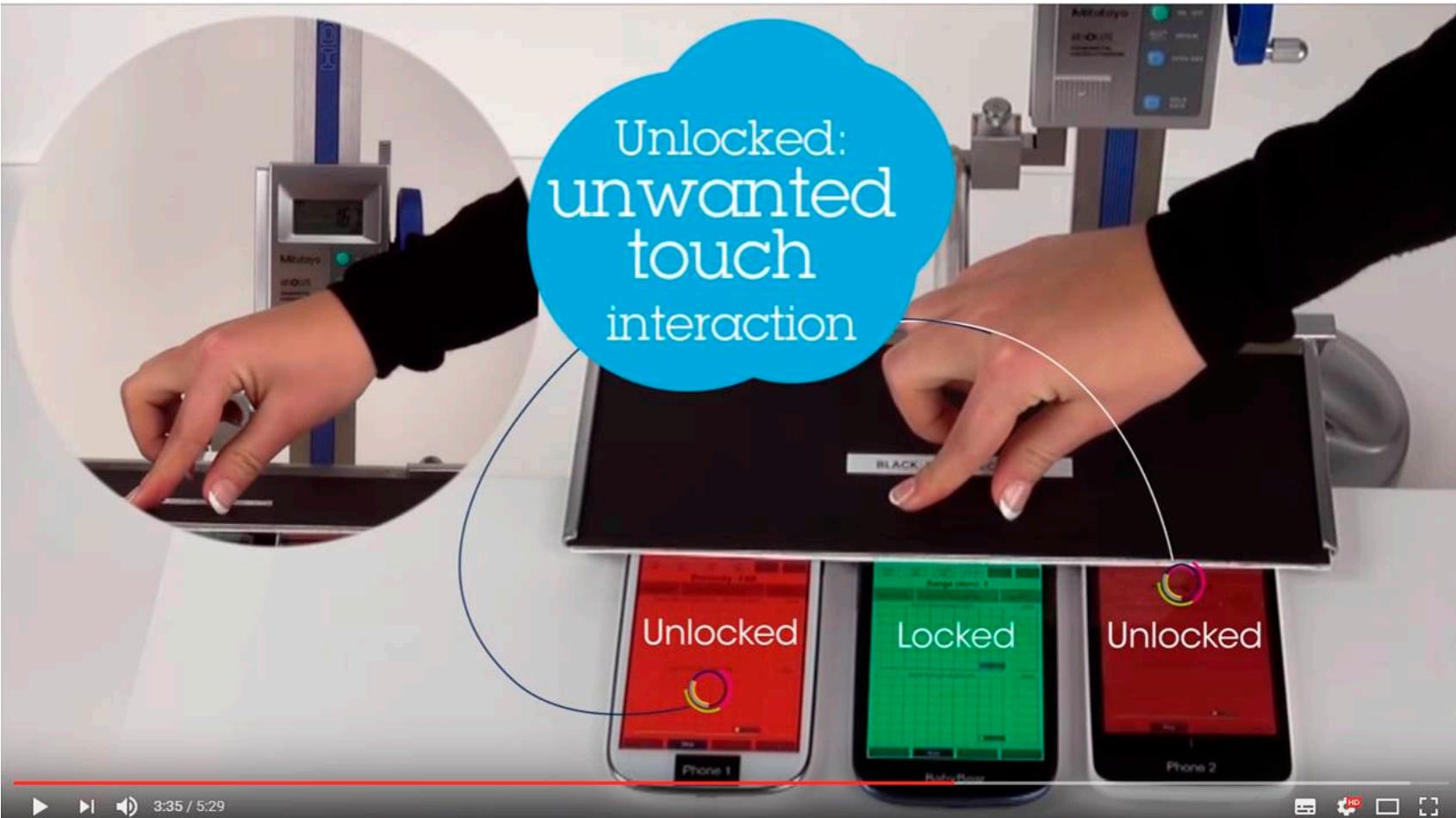
- Power, size & performance
- New ways to interact

Depth Map & AR/VR

- All-in-one Module
- Up-to high resolution receiver

ToF Proximity Sensor: Measure true distance

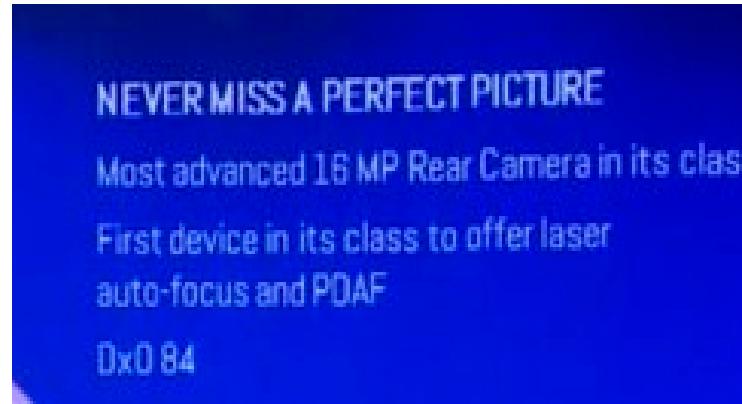
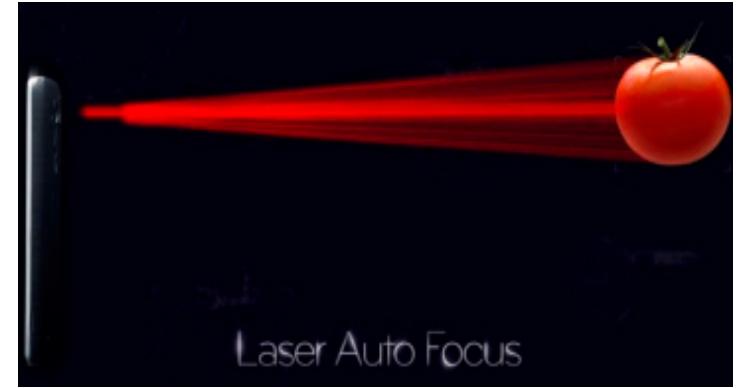
Independent to colour/texture/reflectivity





“Laser AutoFocus”, a Recognized Brand

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Advanced User Detection

IoT, laptops/PCs & displays



Security

- ✓ Early detection of user approaching PC to triggers Hello log-in
 - ✓ Fast screen lock when user leaves desk
 - ✓ Prevent malicious use of laptop in busy office



Power saving

- ✓ Very fast screen power-on/off depending on user presence detection
- ✓ Autonomous interrupt driven operation
- ✓ 400µW typical power consumption when user not present

User Health Care / Eye Protection

- ✓ Warning when user is too close from screen
- ✓ Can log user time spent in front of PC (warning if too long)

Audio / UI Enhanced Control

- ✓ Audio: adjust mic/speaker mode
- ✓ UI: Change font/display size based on distance

Gesture

- ✓ Basic gesture recognition with single device
- ✓ 3D gesture recognition possible with 2 devices



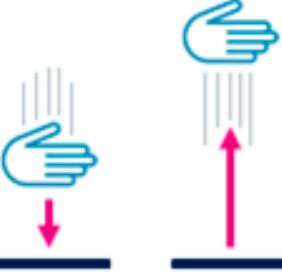
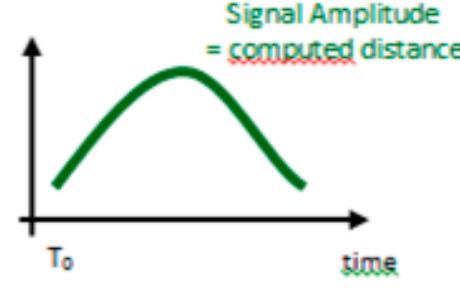
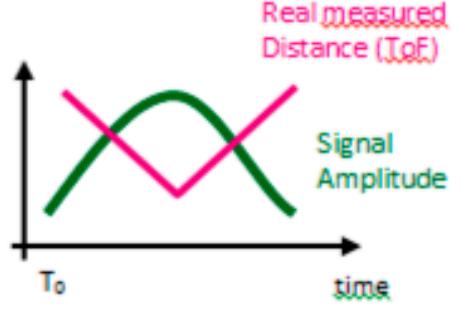
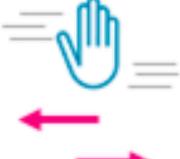
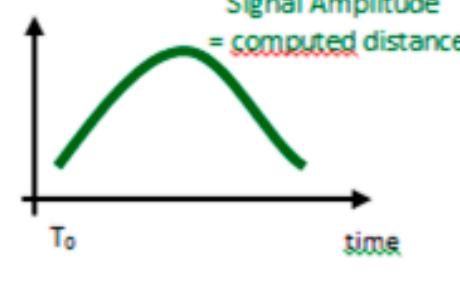
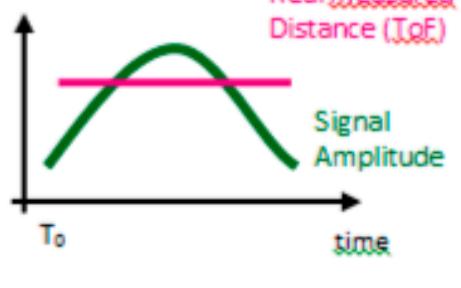


Gesture Recognition

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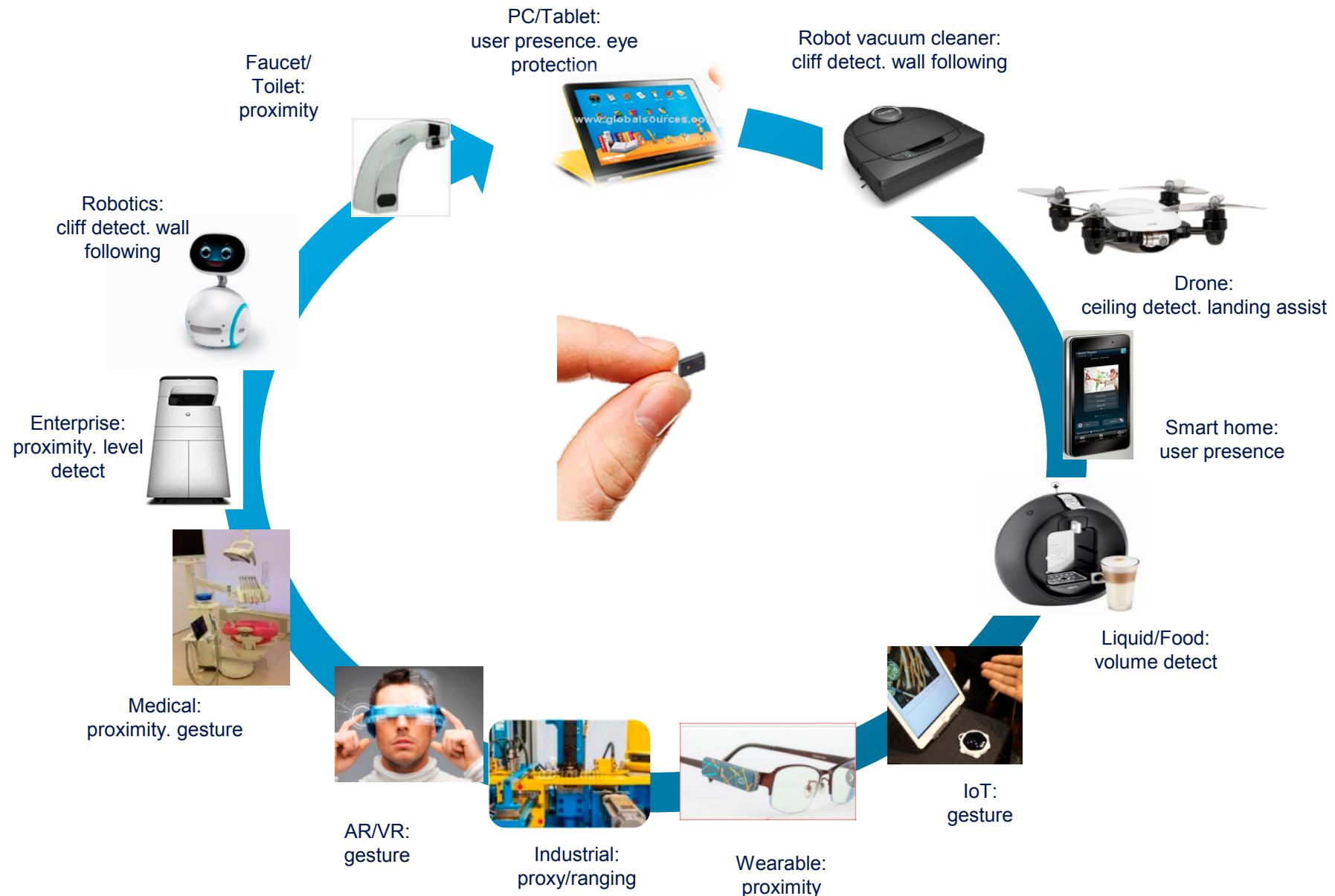
FlightSense™ benefits versus traditional IR

FlightSense™ allows to discriminate vertical gesture from horizontal gesture while traditional IR sensor cannot

Hand Movement	Classical IR sensor	ST FlightSense™
 Up / Down	 Signal Amplitude = computed distance	 Real measured Distance (ToF) Signal Amplitude
 Swipe	 Signal Amplitude = computed distance	 Real measured Distance (ToF) Signal Amplitude
Sensor answer :	1 output	2 outputs

FlightSense™ Unlocks Endless New Applications

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Ambient Light Sensor (ALS) / Proximity Sensor

MASS
PRODUCTION

Highlights



- **Small package**
 - OLGA 4.8 x 2.8 x 1mm
- **Robust and accurate proximity detection**
- **Highly efficient ALS embedded**
- **Fully integrated**
 - Near-IR (850nm) VCSEL emitter
 - Filters
 - Receiver
 - Advanced µC
- **Low power**
- Field-of-View : 25°
- Laser Class1 device (eye safe)
- Independent of reflectance/color/texture
- Complete API package and **Android driver**

Applications



Reliable Proximity detection

- User detection to safely power off touch screen or control white goods
- Obstacle detection for robotics
- ...

Ambient Light Sensing

Adjust the brightness of the display subject to the ambient light level detected



World's Smallest ToF Sensor

MASS PRODUCTION

Highlights



- **World's smallest ToF sensor**
 - OLGA 4.4 x 2.4 x 1mm
- Range up to **2 meters in less than 30ms**
- **High accuracy** (up to +/- 3%)
- **Fast ranging time** (up to 50Hz)
- **Fully integrated**
 - Near-IR (940nm) VCSEL emitter
 - Filters
 - Receiver
 - Advanced µC
- **Low power**
- Field-of-View : 25°
- Laser Class1 device (eye safe)
- Independent of reflectance/color/texture
- Complete API package and **Android driver**

Applications

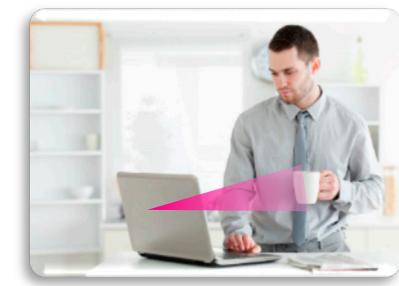
Laser AF

WW #1 supplier, with Focus in 1 frame



Drones/Robotics

Obstacle/ceiling detection; landing assistance.

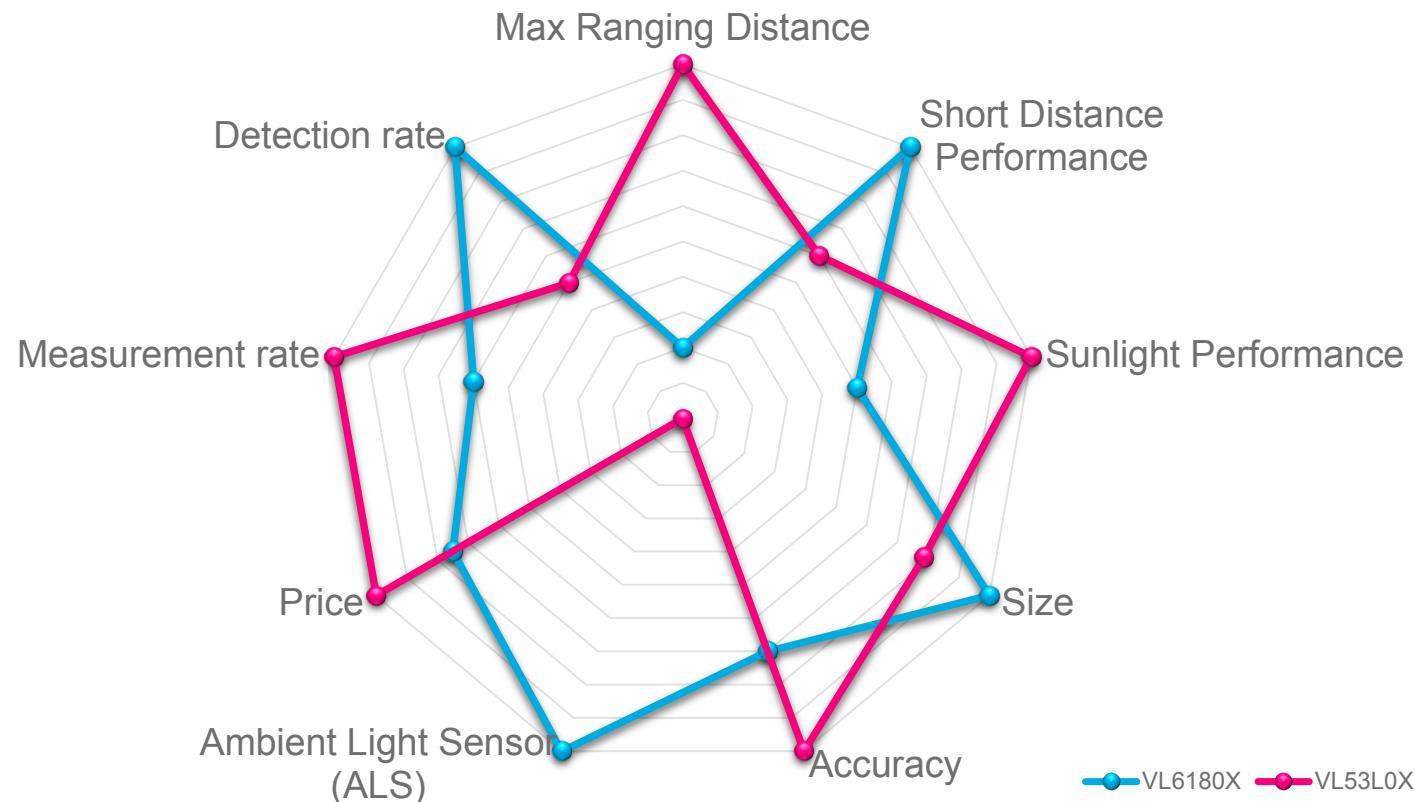


User Detection & Smart Interaction

Power saving, zoom, user detection and counting, ...

Which Time-of-Flight to Use ?

VL6180X or VL53L0X ?



First product with Multi-zone and Multi-object detection

- More info at st.com:
 - Press release:
http://www.st.com/content/st_com/en/about/media-center/press-item.html/p3918.html
 - Data brief:
<http://www.st.com/en/imaging-and-photonics-solutions/vl53l1.html>
 - Datasheet: available under NDA.

STMicroelectronics' Latest Time-of-Flight Ranging Sensor Brings Multi-Object Detection and Multi-Array Scanning to Mobile Applications

- Widely used FlightSense™ low-power sensors are ideal for autofocus, presence-detection, and power-saving functions
- The VL53L1 offers best-ever Time-of-Flight sensor performance, unlocking exciting new applications and user experiences
- Demonstrations at Mobile World Congress (Barcelona, Feb 27 - Mar 2) Hall 7A61 will highlight key features

Geneva / 20 Feb 2017

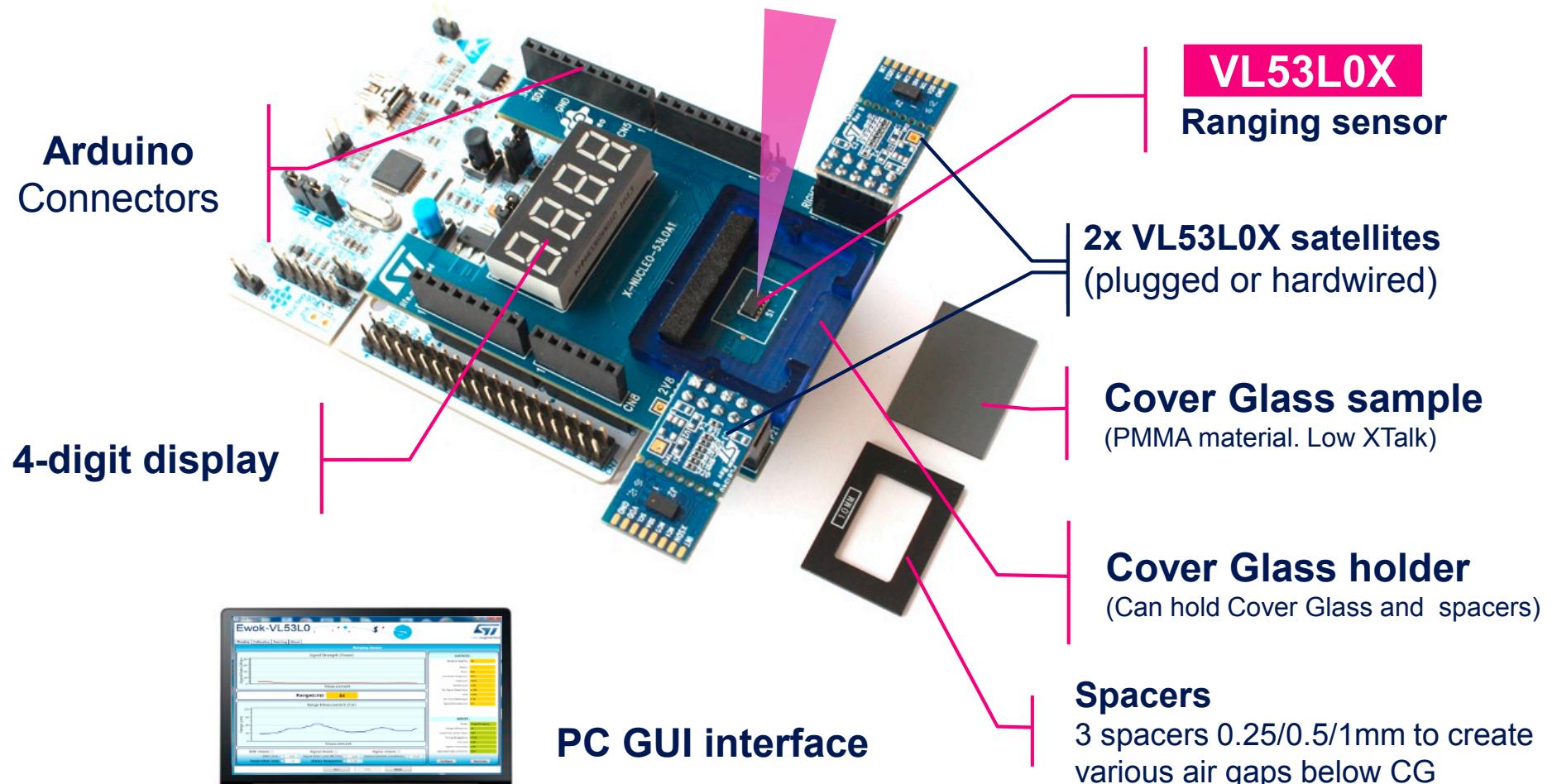
STMicroelectronics (NYSE: STM), a global semiconductor leader serving customers across the spectrum of electronics applications, has released its third-generation laser-ranging sensor based on its industry-leading FlightSense™ technology. The VL53L1 sensor benefits from new patented silicon- and module-level architectures, adding for the first time, optical lenses to the module. This combination boosts core performance while introducing many new features including multi-target detection, cover-glass crosstalk immunity at long distance, and programmable multi-zone scanning. These advances deliver new levels of sensor performance to robotics, user detection, drones, IoT, and wearable applications.

With a form factor of 4.9 x 2.5 x 1.56mm, the sensor module integrates a new lens system, a 940nm VCSEL^[1] invisible-light source, a processing core, and a SPAD^[2] photon detector. The addition of the optical lens system increases the photon detection rate to boost the module's ranging performance. The embedded microcontroller manages the complete ranging function and runs the innovative digital algorithms to minimize host-processing overhead and system power consumption, maximizing battery life for mobile applications.

New FlightSense™ ranging sensor
multi-zone, multi-target detection



VL53L0X NUCLEO expansion board



VL6180X: Module & Development Tools

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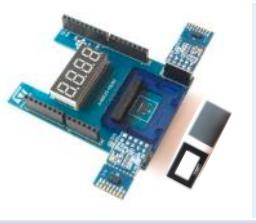
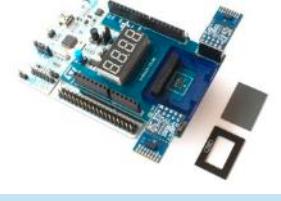
Go to www.st.com/VL6180X or contact your usual distributor

Product	Picture	Order code
VL6180X proximity sensor		VL6180XV0NR/1
Nucleo VL6180X Expansion board (Gen2)		X-NUCLEO6180XA1/1
Nucleo Pack: VL6180X expansion board + STM32F410 "Full features" Nucleo board		P-NUCLEO-6180X1/
VL6180X Satellites (2 units per delivery)		VL6180X-SATEL/1

VL53L0X: Module & Development Tools

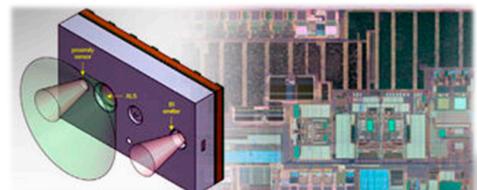
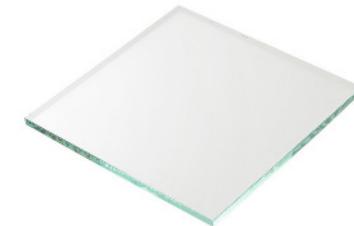
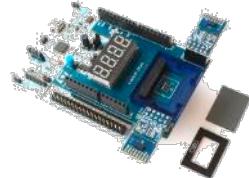
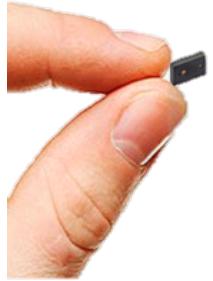
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Go to www.st.com/VL53L0X or contact your usual distributor

Product	Picture	Order code
VL53L0X module	 Delivered with a protective liner	VL53L0CXV0DH/1
VL53L0X Nucleo™ Expansion board		X-NUCLEO-53L0A1/
Pack: VL53L0X Nucleo™ Expansion board + STM32F401 NUCLEO board		P-NUCLEO-53L0A1/
VL53L0X Satellite boards to be hard-wired to customers PCBs		53L0-SATEL-I1/1

FlightSense™ Technology Summary

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Eye Safe





Thank You!