

VL53L9CX

High-performance 2.3K zones 3D all-in-one LiDAR ToF sensor module

IMAGING Division – July 2026

VL53L9 all-in-one LiDAR module

Time-of-Flight sensing with 2.3K zones reaching up to 9 meters



CES Innovation Awards 2026 Honoree



54x42

Fast and accurate 3D dToF sensor

54x42 zones ranging up to 9 m at up to 100 fps

Fully integrated, compact, eye-safe module

All-in-one reflowable module with on-chip processing & PMIC

Wide 72° diagonal field of view

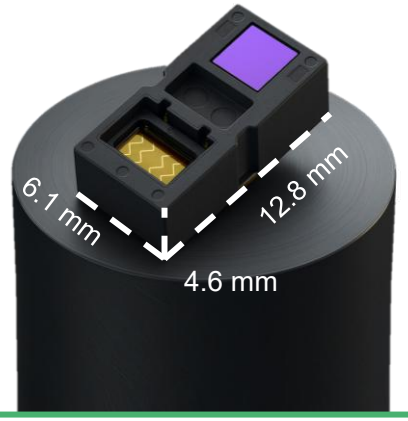
Metasurface optics, 54° x 42° at 1° angular resolution

Easy integration

Calibration-free, I3C/MIPI interface, and low-MIPS MCU compatibility

VL53L9CX all-in-one LiDAR module

2.3k zones Time-of-Flight sensor ranging up to 9m



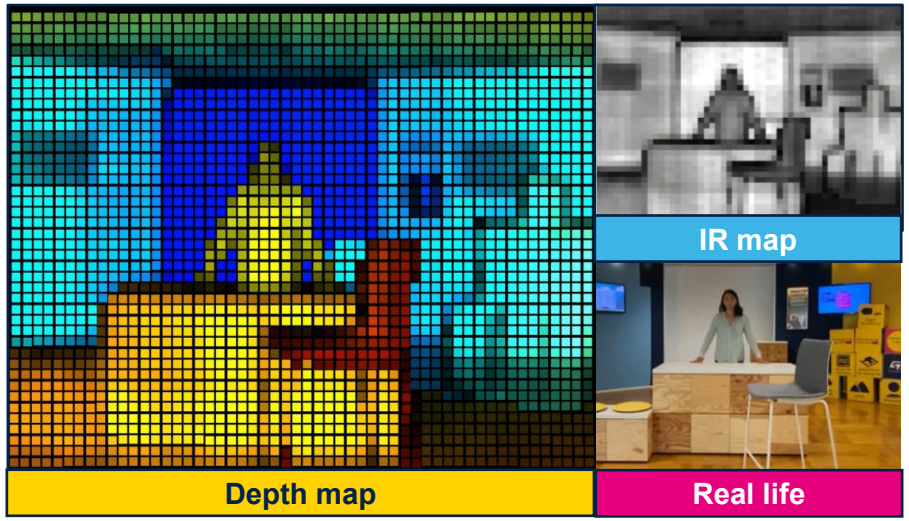
Break through the limit of distance measurement with our new plug-and-play **VL53L9CX dToF sensors.** Featuring **2.3k zones** and **100 fps max frame rate**, measuring distances up to **9 meters,** while maintaining an ultra-low power consumption of just 150 mW, and more!

Features

- **9m at 0 Klux** — @100fps in full res
- **5m at 40 Klux** — @100fps in full res
- **54 x 42 zones** — 2,268 zones
- **54° x 42° FoV** — 1° angular
- **6 Binning modes** — 2.3k / 0.5k / 0.25k...
- **Up to 100 FPS** — MIPI =100; I3C =40
- **150 mW in Low Power** — @100fps in full res
- **<5cm linearity** — Minimum distance

Functions

- **MIPI / I3C** — Bi-protocol
- **Calibration free** — Plug and play
- **On chip processing** — Ready to use data
- **Class 1** — Eye safety



Markets

- Drone
- AR / VR
- Gesture
- Robotic
- Room occupancy
- Industrial
- Content monitoring

Applications & use cases

Opening new 3D applications



Robotics



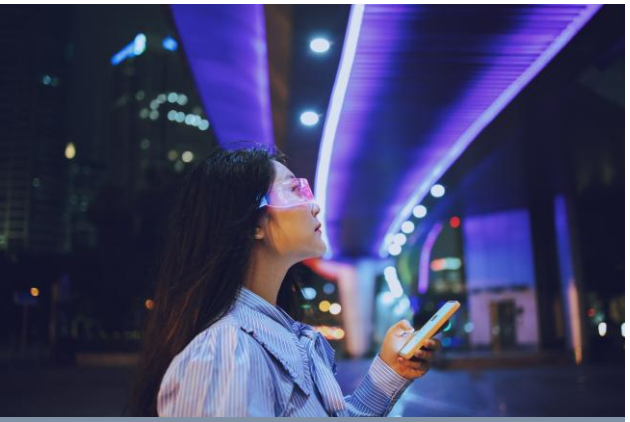
Industrial



Smart building & security



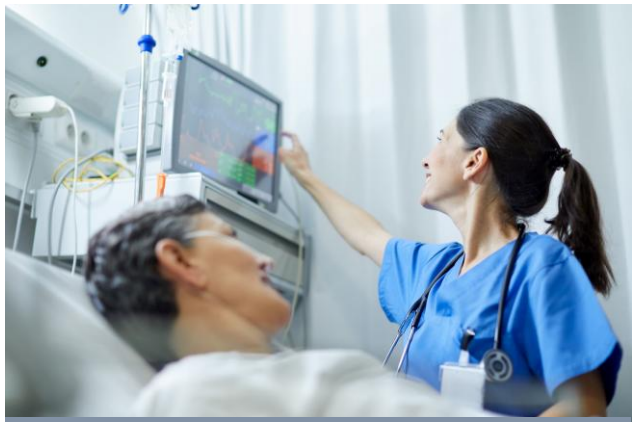
Smart home



AR / VR headsets



Drones



Medical

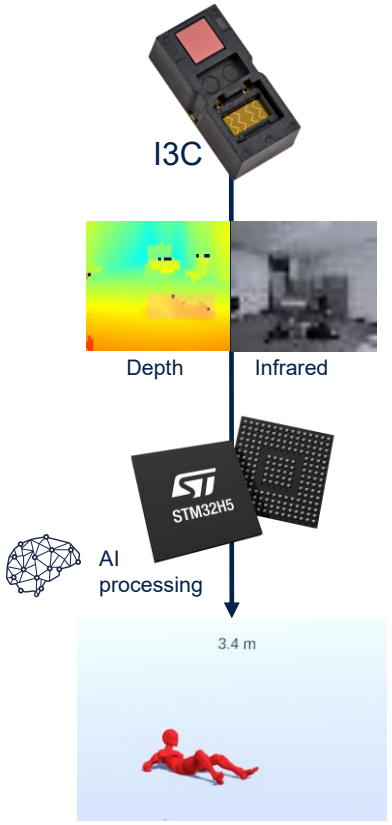


Smart Farming

Advanced people sensing

Fall detection, accurate counting, and posture monitoring with privacy-preserving sensing with low MCU footprint



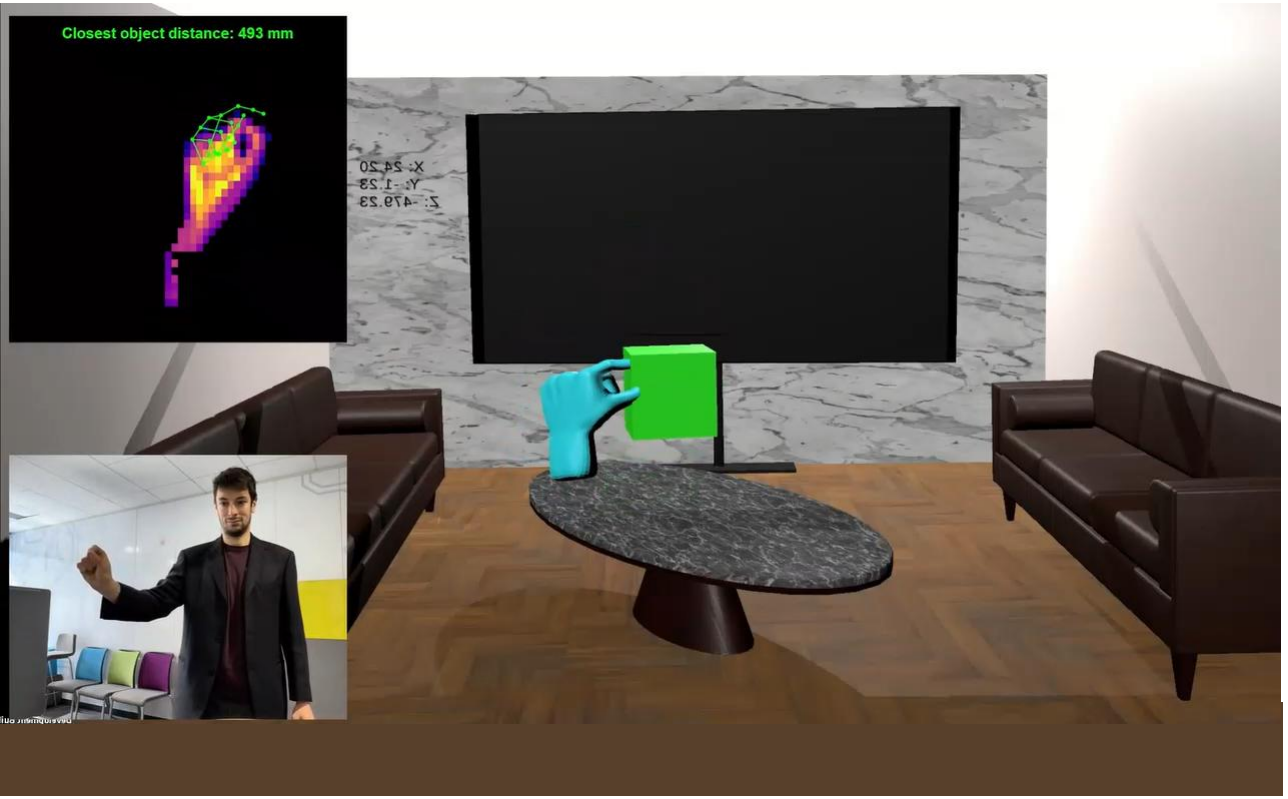


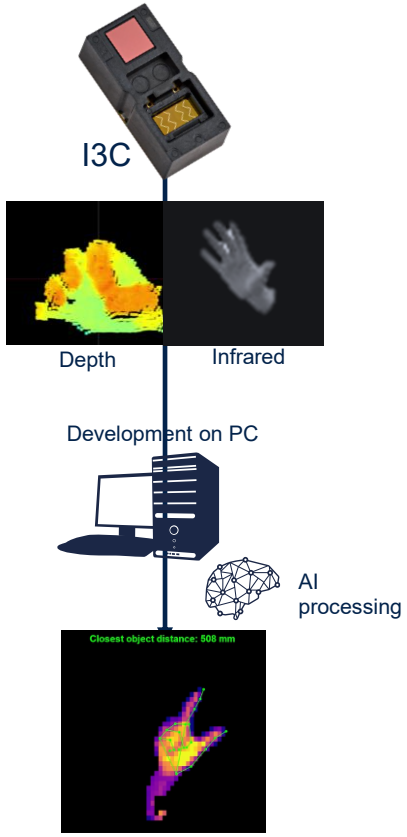
Benefits

- Contactless and non-intrusive
- Ensures user privacy (no image)
- Differentiates between sitting and lying postures to minimize false alarms
- Risk prevention in public areas where people are prone to falls
- Lower burden on caregivers
- Increase work efficiency

Hand gesture and finger skeleton tracking

Development of an intuitive hand gesture control with precise finger skeleton tracking in all lighting conditions





Benefits

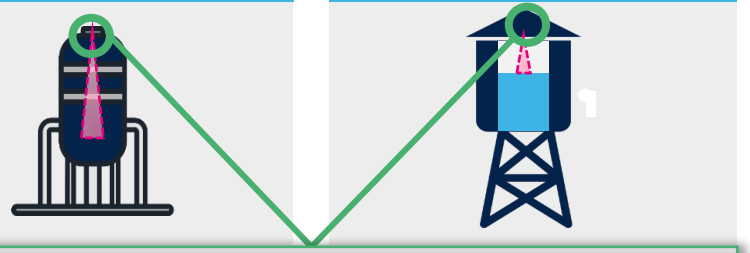
- High accuracy and reliable solution
- Intuitive interaction with natural hand movements
- Fast and responsive (low latency)
- Ensures user privacy (no image)
- Contactless and non-intrusive

VL53L9CX applications

Content management

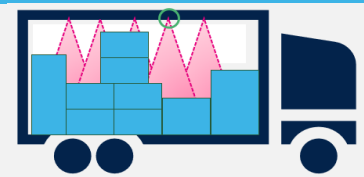
Silos tank

Water tower



Monitoring in real time
Avoiding empty tank

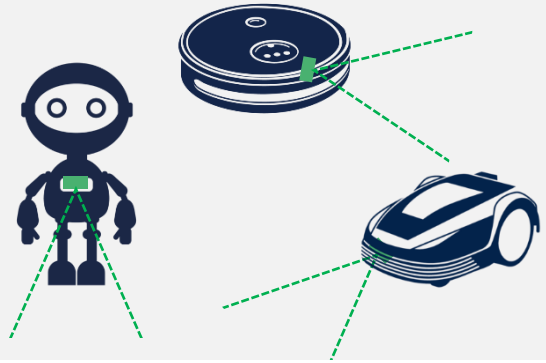
Trucks & Container



Content level Management
Remaining space measurement

Package falling detection
Detect if something is moving in the truck/container

Robotics

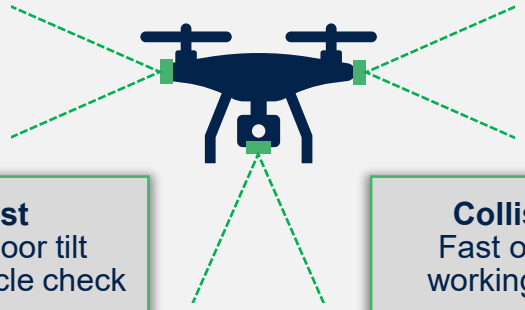


Room mapping
Precise SLAM and 3D mapping working in any light condition

Collision Avoidance
Small large object/obstacle detection

Cliff/Edge/Slope Prediction

Drones



Landing assist
Smooth landing, floor tilt check, ground obstacle check

Collision avoidance
Fast obstacle mapping, working in dark condition

Success stories

VL53L9CX success story – Content Management

Mission

- Monitor the grain silo's content with high accuracy, while ensuring compatibility with all silo types and all grain varieties



Challenges

- Measure grain level with **high accuracy**
- Work reliably in **all silo types**
- Maintain **performance despite dust** and moisture
- Operate in **cold and hot** temperatures
- Run on solar panel **battery power**
- Use a **low power** MCU

Reasons we won

- Cost effective LiDAR vs market
- High 2.3K pixel resolution (54x42)
- All-in-one and compact module
- Power down to 150mW

Differentiating factors

- Long distance ranging up to 9m
- Calibration free device
- Multi sensor working on a single STM32

VL53L9CX success story – Robotics

Mission

- Assist Automated Mobile Robot navigation by proving safe and reliable accurate real-time distance perception



Challenges

- Achieve **accurate distance measurement** while moving
- Handle **rapid scene and distance changes** in real time
- Maintain **reliable perfs** under varying lighting conditions
- Ensure **interference-free operation** with multiple sensors
- Enable obstacle detection with **small angular resolution**
- Deliver **high performance** at **long and short distance**

Reasons we won

- High perfs in all condition
- 1° angular resolution
- Multiple sensor inference free
- Cheaper than existing solutions

Differentiating factors

- Up to 100 Hz frame rate capability
- MIPI CSI-2 interface for fast response
- Short distance linearity from 5cm to long distance up to 9m

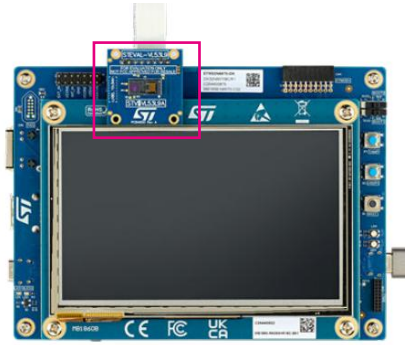
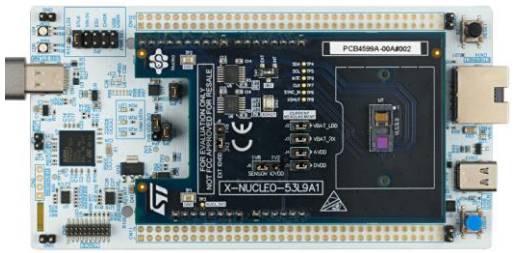
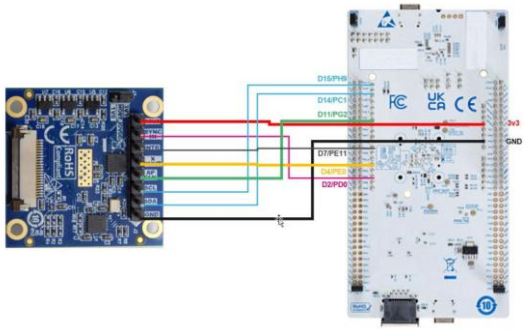
Technical

VL53L9CX Ordering codes

Go to www.st.com/en/product/VL53L9CX or contact your usual distributor

Item	Picture	Commercial Product (= Order Code)	Comments
VL53L9CX sensor		**VL53L9CXV0VE/1**	Delivery in T&R MOQ: 1000units LT = 26 weeks
VL53L9CX X-Nucleo Board		**X-NUCLEO-53L9A1**	Works with STM32 H563ZI & N657X0 Nucleo (I3C only) boards. Comes with cover-glass holder, cover-window sample, 3x spacers
VL53L9CX ST-Eval Board		**STEVAL-VL53L9**	One STEval delivered in the box Works with STM32 Nucleo N657X0 N6570DK boards

VL53L9CX Evaluation and Development kit

	High performances (STM32N6 via MIPI CSI-2)		Low-cost and low power consumption solution (STM32H5 via I3C)	
	Enables development of full resolution full frame rate applications, including the full AI capability of STM32N6 MCU		Evaluation GUI for the sensor & development platform for mid range application using cost effective STM32H5 MCU	
Purpose	**Development (MIPI CSI-2)**	**Development (MIPI CSI-2)**	**Development/Evaluation (I3C)**	**Development (I3C)**
Quick brief	*Serves as development platform MIPI interface with sensor.*	*Enables application with LCD display output MIPI interface with sensor*	*Only way to simply evaluate the sensor trough the GUI.*	*Board is flying wired to the NUCLEO board allowing user to put the board in a custom position*
Ordering codes	MCU: NUCLEO-N657X0-Q ToF: STEVAL-VL53L9	MCU: STM32N6570-DK ToF: STEVAL-VL53L9	MCU: NUCLEO-H563ZI ToF: X-NUCLEO-53L9A1	MCU: NUCLEO-H563ZI ToF: STEVAL-VL53L9
Setup				
Software	Not available: **Target July 2026**	Available soon: **Target week 28**	X-CUBE-53L9A1	X-CUBE-53L9A1
Eval GUI	N/A	N/A	Available soon: **Target week 28**	N/A

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