



life.augmented

STMicroelectronics – FlightSense™ Focus on VL53L5CX

Imaging Division

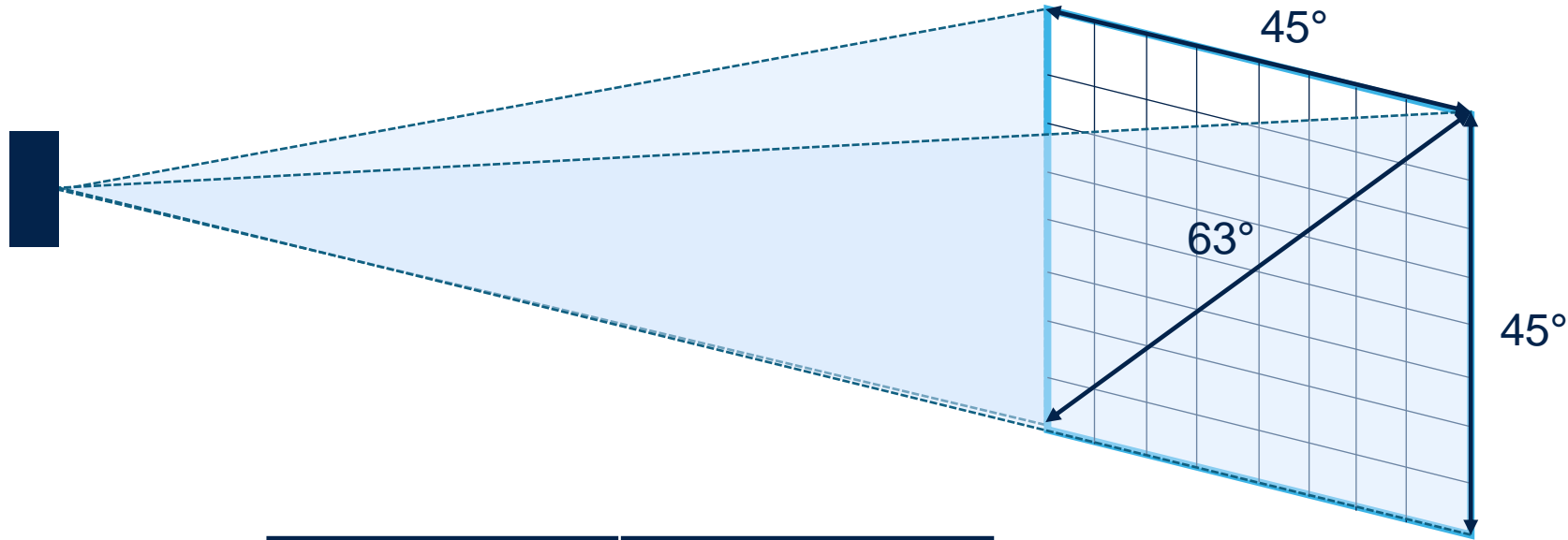
August 2021



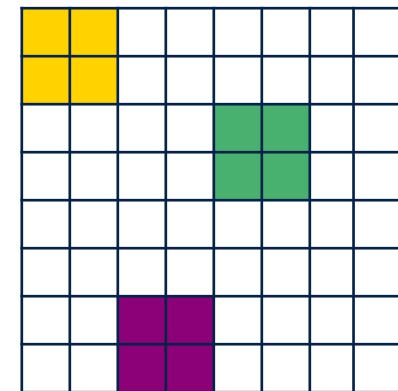
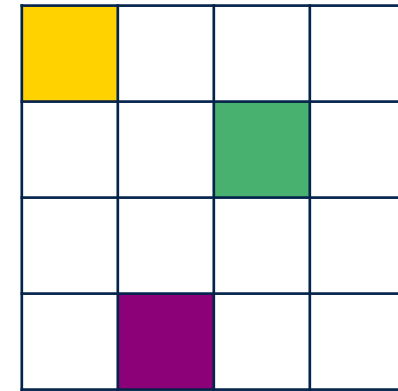
VL53L5CX Technical Specification

Feature	Description
Package	Miniature Optical LGA16
Size	6.4 x 3.0 x 1.5 mm
Ranging	2 to 400 cm per zone (dependent on target reflectance and ambient conditions)
Field of View	Square FoV: 45° x 45° Diagonal FoV: 63°
Operating Voltage (AVDD)	2.5V to 3.3V (typ. 2.8V)
Typical Power Consumption	95mA (low power mode available <1.4mA @1Hz)
Function Temperature range	- 30 to 85°C
IR Emitter	940nm
I ² C (Clock / Data)	Up to 1MHz serial bus
INT	Interrupt pin: Thresholds or sample ready interrupts

Choose between high frequency or high resolution

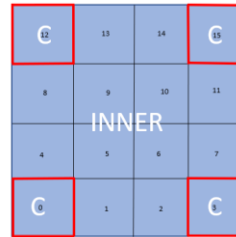


Zones	Max frequency
4x4 = 16 zones	60Hz
8x8 = 64 zones	15Hz



Ranging capabilities in Continuous ranging mode

4x4 zones performances:



White Target 88%
Grey Target 17%

 Indoor (no IR)
400 cm
240 cm

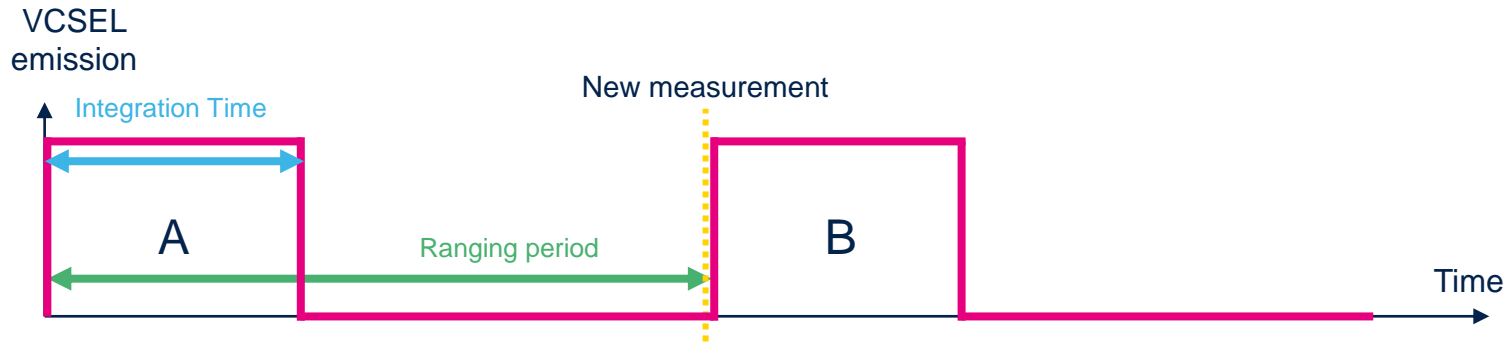
8x8 zones performances:



White Target 88%
Grey Target 17%



 Indoor (no IR)
350 cm
130 cm

Low power consumption thanks to the autonomous mode

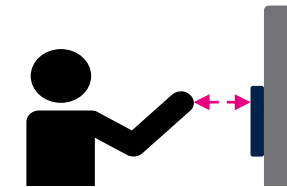


- The sensor is active only during the **Integration Time**
- During the remaining time of the **Ranging period**, the sensor is sleeping and consumes low power, the SW is in stand-by
- The user can define the **Integration Time** and the **Ranging period** depending on his application
- Thresholds can be programmed, in order to send an interrupt to the host and wake-up the system only when a target is approaching the sensor

Benefits

- Low power consumption 1.3mA @1Hz 
- The system can sleep until an interrupt is sent by the sensor to the host
- Can be integrated to battery powered devices 

Market and use-cases



System Activation

www.st.com/en/imaging-and-photonics-solutions/VL53L5CX

Specs

- Datasheet
 - [DS13754](#)
- “Thermal pad “ Application Note
 - [AN5657](#)



Software

- API (ULD “Ultra Light Driver”)
 - [STSW-IMG023](#)
- GUI for X-NUCLEO expansion board
 - [STSW-IMG024](#)
- X-CUBE example
 - [X-CUBE-TOF1](#) compatible with CubeMX

Videos



[Liquid Level Control](#)

More and more will come soon...

User Manuals

- ULD driver User Manual
 - [UM2884](#)
- Software integration Guide
 - [UM2887](#)
- X-NUCLEO Start Guide
 - [Detailed Quick Start Guide for X-NUCLEO-53L5A1](#)

Linux driver

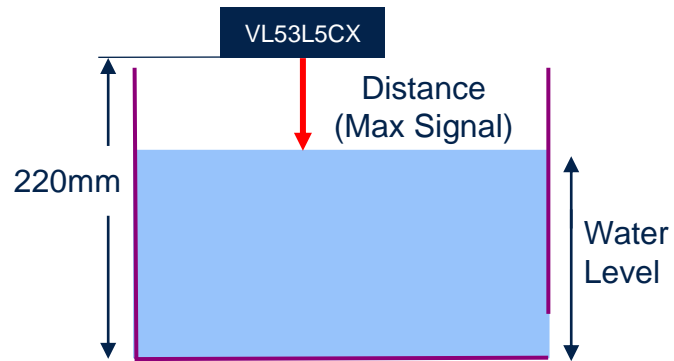
- [STSW-IMG025](#)



Applications & Markets enhanced by VL53L5CX



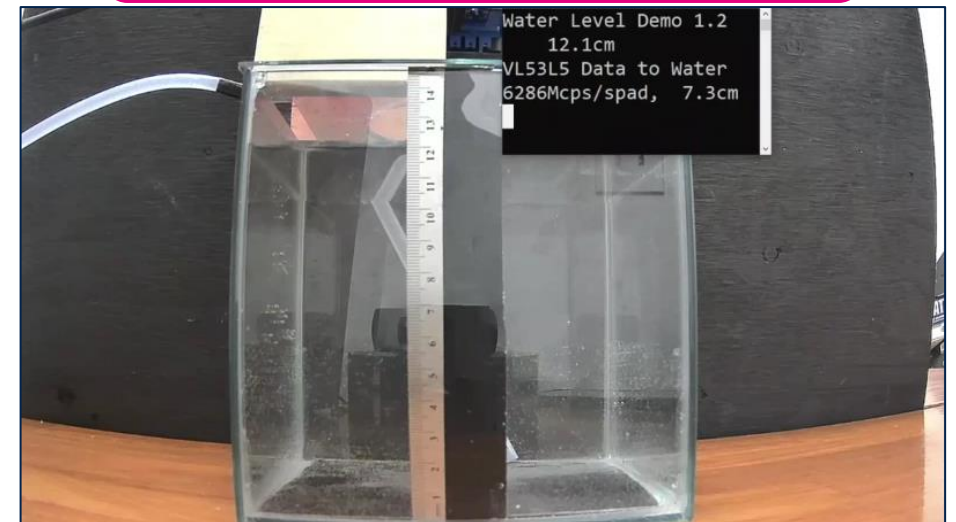
Liquid Level Control enhanced by the multi-zone capability of the VL53L5CX



- The VL53L5 can process up to 64 zones over a FOV of 45° x 45° **simultaneously**
- In each zone we can measure the **signal strength** as well as the **distance**
- The zone that has the **highest signal level** is **perpendicular to the laser emitter**
- The VL53L5's **multizone** feature ensures that there is enough **resolution** to find a zone reporting the **right liquid height**

- Highest signal will be the zone of the laser perpendicular to the liquid
- The distance in this zone will be an accurate distance to the liquid surface




Water Level =
Water Tank Height – Distance(max Signal)





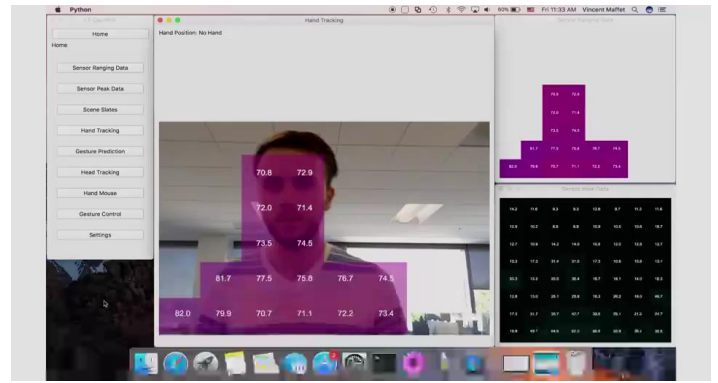
Gesture recognition

Gesture movements

- **Directional Swipe detection**

- **Tap / double tap detection**

- **Level control**



- Basic **gesture recognition** allowing no touch control
- High **robustness**
- Many applications and markets released by such gesture

Hand Tracking



The screenshot shows a Python application window titled 'Hand Tracking'. It features a video feed of a person's hand with a red bounding box and numerical coordinates. To the right, there are two data visualizations: a bar chart and a heatmap, both showing tracking data over time.

Markets

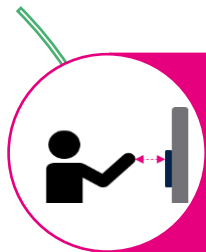


The 'Markets' section displays eight icons representing different application areas: Smart home (house with Wi-Fi), Home Appliances (coffee machine and hair dryer), Audio (speaker), ATM (ATM machine), Home Automation (weather station with 20°), White Goods (washing machine), Vending machines (vending machine), and Sanitary (hand sanitizer).




Thermostat application enhanced by only one VL53L5CX

- **Two use-cases** enhanced by only **one ToF** multi-zone sensor
- **Low power consumption** thanks to the autonomous mode switching the sensor in sleep mode
- Basic **gesture recognition** allowing no touch control of the thermostat



Wake on Approach – System activation


- Turn on the device when someone is in front of it
- Turn off the device when nobody is detected after few seconds



Gesture recognition

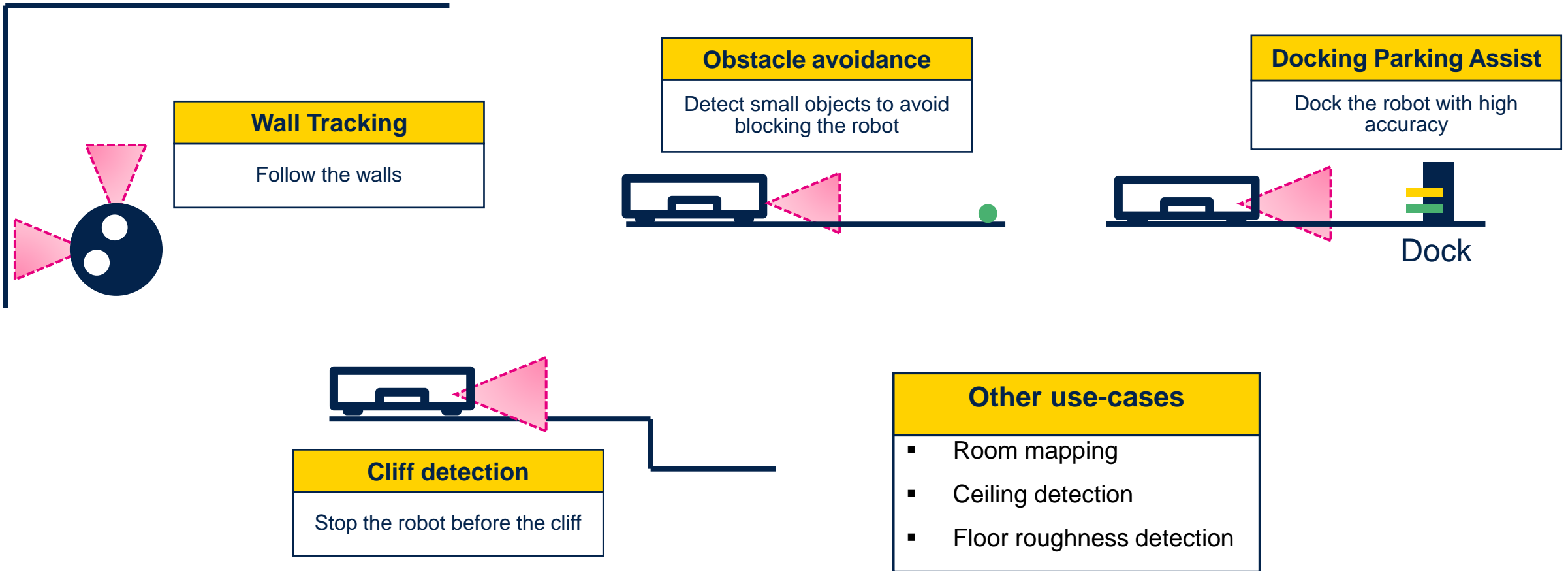
- Swipe the pages of the programming menu
- Tap to select the features
- Adjust the intensity of the fan or the air conditioner

Live example with a GUI and one VL53L5CX



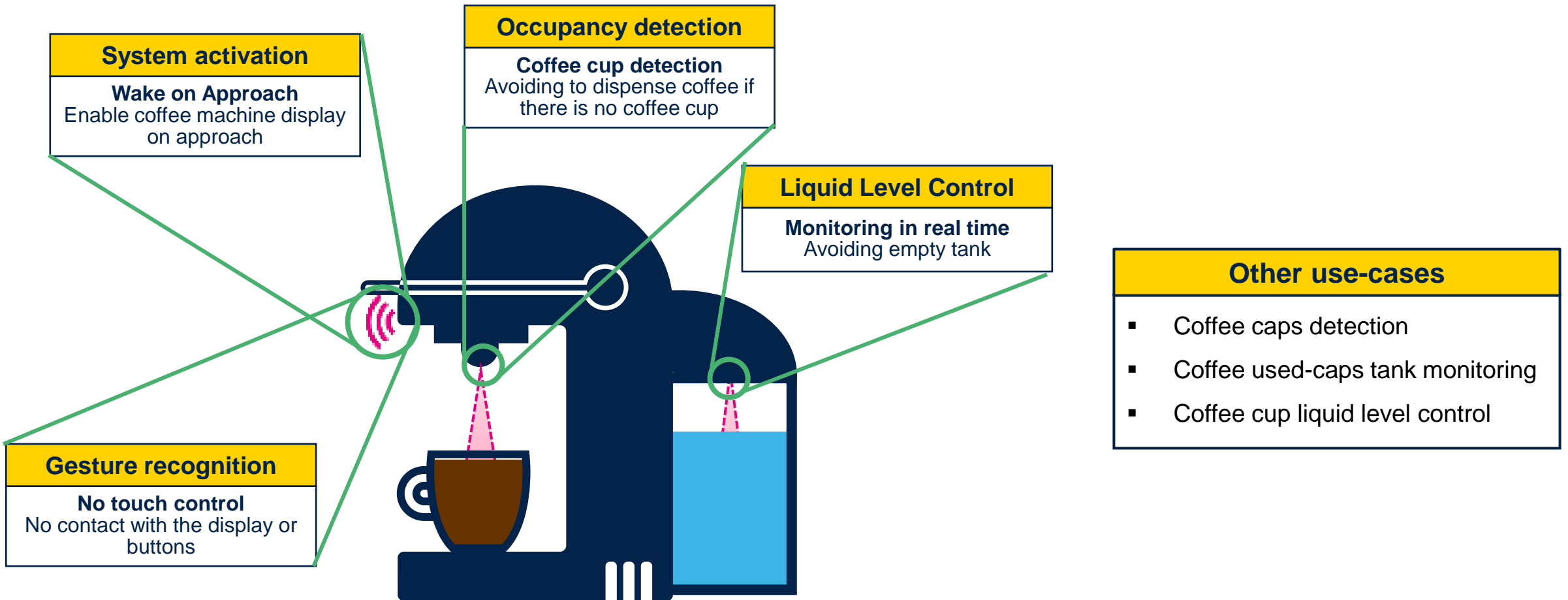


Cleaning robots performance enhanced by multiple VL53L5CX





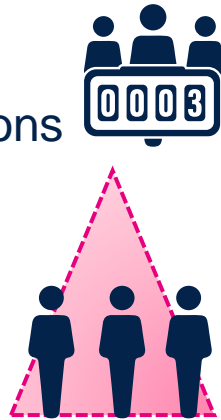
Using VL53L5CX can improve the user satisfaction when using a Coffee machine



Endless use-cases can be enhanced by VL53L5CX multi-zone sensor

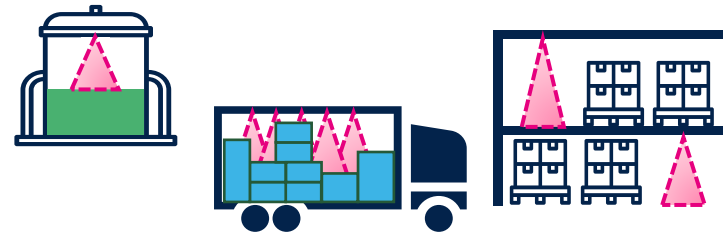
People counting

- Entry/Exit counting
- Distinguish two persons
- Know the direction



Content Level Monitoring

- Inventory management
- Content level monitoring



Object shape detection



Ordering codes and board pictures



Go to [st.com/en/imaging-and-photonics-solutions/VL53L5CX](https://www.st.com/en/imaging-and-photonics-solutions/VL53L5CX)

Item	Picture	Commercial Product (= Order Code)	Comments
VL53L5CX sensor		<u>VL53L5CXV0GC/1</u>	Delivery in T&R MOQ: 3.6ku With protective liner
VL53L5CX Expansion board		<u>X-NUCLEO-53L5A1</u>	To go along with STM32F401 Nucleo board. Comes with cover-glass holder, cover-window sample, 3x spacers
Pack: VL53L5CX Nucleo™ Expansion board + STM32F401 NUCLEO		<u>P-NUCLEO-53L5A1</u>	X-NUCLEO-53L5A1 expansion board delivered together with STM32F401 NUCLEO board
VL53L5CX Breakout boards		<u>VL53L5CX-SATEL</u>	2x Breakout boards delivered

Thank you

© STMicroelectronics - All rights reserved.

The STMicroelectronics corporate logo is a registered trademark of the STMicroelectronics group of companies. All other names are the property of their respective owners.



life.augmented