Liquid level monitoring solutions based on ST Time-of-Flight ranging sensors

Features

- Complete technical package including:
  – Application example codes ready to use
  – Technical application notes
- Three FlightSense Time-of-Flight (ToF) products are supported, including:
  – VL53L4CD ToF high-accuracy proximity sensor
  – VL53L5CX ToF 8x8 multizone ranging sensor with wide field of view
  – VL53L8CX ToF 8x8 multizone ranging sensor with wide field of view
- Liquid level monitoring systems based on FlightSense technology have:
  – Very high accuracy whatever the liquid.
  – No mechanical parts, and are a more robust solution.
  – Low complexity and small-scale design.
  – The ability to monitor a large variety of liquids.
  – No physical contact with liquid limiting corrosion and rust.
  – An all-in-one, easy to integrate sensor, which can be hidden behind a dark cover glass.
  – Low-power consumption and are easy to integrate into any architecture

Product status link
STSW-IMG039

Application

- Liquid level measurement solutions working on a wide variety of liquids (water, milk, soda, oil, and fuel).
- Home appliance devices:
  – Coffee machine water tanks
  – Teapots and tea machines
  – Smart bottles
- Industrial applications:
  – Fuel tanks, rainwater tanks, used oil tanks
  – Mopping robots (water and/or detergent tanks)
  – Soda/drink dispensers, alcohol distillers
- Smart farming (rice paddies, milk collectors, food containers for pet feeding)
- Sanitary devices:
  – Soap and sanitizer dispensers
  – Smart toilets (flush)
- Smart housing and smart buildings:
  – Swimming pool smart pumps, septic tanks
  – Air fresheners and other aerosol spray tanks

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For further information, contact your local STMicroelectronics sales office.

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Description

Based on the ST Time-of-Flight ranging sensor, the liquid level monitoring solution can work with the VL53L4CD ToF high-accuracy proximity sensor, and the VL53L5CX or VL53L8CX ToF 8x8 multizone ranging sensors.

This innovative ST solution using FlightSense technology allows the user to use a nonmechanical sensor to measure the level of a liquid, reducing the risk of corrosion and rust.

The ST solution provides highly accurate measurements for a wide range of liquids, from transparent ones like water to dark liquids like fuel.

The solution includes three ready-to-use example application codes. With the associated technical documentation, it is very simple to start evaluation and integration. A complete ecosystem based on both sensors is available to help the customer to create his own application. To run the example code, an expansion board (X-NUCLEO-53L4A1, X-NUCLEO-53L5A1, or X-NUCLEO-53L8A1) is required with a NUCLEO-F401RE. You can also use the breakout boards (SATEL-VL53L4CD, VL53L5CX-SATEL, or VL53L8CX-SATEL) for easy and fast prototyping.

Specifically designed for proximity and short-range measurements, the VL53L4CD provides very accurate distance measurements from only 1 mm up to 1300 mm. A new generation laser emitter with 18° field of view (FoV) improves performance under ambient light, with ranging speeds up to 100 Hz.

The VL53L5CX and VL53L8CX allow multizone distance measurements with up to 8x8 real-time native zones and a wide 65° diagonal FoV. Each zone of the sensor can measure the distance to a target at up to 4 meters, with a maximum frequency of 60 Hz.

ST's patented histogram algorithms enable the VL53L5CX and VL53L8CX to detect multiple objects within the FoV and ensure immunity to cover glass crosstalk beyond 60 cm. Furthermore, the VL53L8CX has high ambient immunity up to 285 cm (under 5 klx).

Revision history

Table 1. Document revision history

Date	Version	Changes
14-Oct-2022	1	Initial release
13-Mar-2025	2	Updated cover image. Added VL53L8CX product. Updated the diagnol FoV from 63° to 65°.

IMPORTANT NOTICE – READ CAREFULLY