

Smart cup detection solution using Time-of-Flight (ToF) sensors VL53L7CH and VL53L8CH with compact normalized histogram (CNH)



Product status link

[STSW-IMG051](#)

Features

- The STSW-IMG051 includes the following six functions:
 - Cup detection: Detects cup presence, and distinguishes between real cups vs non-cup objects
 - Cup size and positioning: Measures cup height, diameter, and the x/y cup position
 - Detects any type of cup, irrespective of the size and material
 - Provides user safety: Stops filling when a hand is detected
 - Steam mitigation, in the presence of steam
 - Liquid level monitoring: Measures the liquid level as the cup is filled
- To make it easy to use and configure these advanced algorithms, the technical package includes:
 - Graphical user interface (GUI)
 - User guide for the GUI
- The package supports two FlightSense products:
 - VL53L7CH: ToF, 8x8 multizone ranging sensor, with 90-degree FoV
 - VL53L8CH: low-power high-performance 8x8 multizone ToF sensor
- The smart cup detection based on FlightSense technology offers several benefits:
 - Competitive solution: Innovative function with various features
 - "All-in-one sensor" is easy to integrate, and can be hidden behind a dark cover glass
 - Low power consumption and ease of integration in any architecture

Description

Smart cup detection is an innovative solution that uses a compact normalized histogram to accurately detect the presence and position of cups. This solution includes advanced algorithms that offer six unique features to enhance system efficiency and the user experience. This solution reliably detects the presence and position of a cup, irrespective of the size and material of the cup. It also monitors liquid level and steam mitigation, and ensures user safety by stopping to fill when a hand is detected.

This solution is customizable to suit diverse applications and products. It is ideal for professional beverage dispensers such as soda and hot/cold-water dispensers in restaurants, offices, and schools, as well as home appliances like refrigerators, coffee machines, and water dispensers.

Based on ST's fourth generation of FlightSense sensors, the STSW-IMG051 software package works with 8x8 multizone Time-of-Flight (ToF) sensors: the VL53L7CH or the VL53L8CH, using the same unique software. The performance is not affected by target reflectance, making it suitable for use in low light conditions. The sensors are small and can be easily integrated and hidden behind a dark cover glass.

To run the GUI, a Nucleo expansion board (X-NUCLEO-53L7A1, X-NUCLEO-53L8A1) is required, with a NUCLEO-F401RE Nucleo board. In addition, you can use the breakout boards (SATEL-VL53L7CH or SATEL-VL53L8) connected to the STM32 Nucleo board.

Revision history

Table 1. Document revision history

Date	Version	Changes
22-May-2025	1	Initial release

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