STSW-IMG035

Data brief

Turnkey gesture recognition solution based on VL53L7CX and VL53L8CX multizone Time-of-Flight (ToF) ranging sensors

Product status link
STSW-IMG035

Features

- The same, unique solution supports the:
  - VL53L7CX, ToF, 8x8 multizone range sensor, with 90-degree field of view (FoV)
  - VL53L8CX, low-power high-performance 8x8 multizone ToF sensor with a 65-degree FoV
- Gesture recognition, based on STMicroelectronics' ToF technology:
  - Hand-tracking: accurate real-time position of the user's hand in the cartesian coordinate system (X, Y, and Z)
  - Tap: single and double
  - Swipe: left, right, up, and down
  - Level control
  - Circular hand motion
- Ready-to-use solution allowing easy integration:
  - Complete application example for the STM32F401 microcontroller, showing the library integration in an MCU project, sensor configuration, and crosstalk calibration example
  - Turnkey gesture library on several Arm® Cortex® microcontroller units
- Intuitive GUI to discover the gesture recognition:
  - This solution is 100% compatible with the two products
  - Multiple graphical widgets (gesture recognition, hand tracker, photo viewer, slide show control, and more)
  - Data logging function to replay and debug
- Benefits of gesture recognition, based on FlightSense technology:
  - Full privacy, no image, no camera module
  - Independent of target reflectance. Gesture recognition performs well, even when wearing gloves
  - "All-in-one sensor" easy to integrate, and can be hidden behind a dark cover glass
  - Low power consumption and ease of integration in any architecture
- Both VL53L7CX and VL53L8CX ToF sensors are compatible with the standalone software (gesture recognition, hand posture recognition or smart presence detection) or the combined software application. The combined software can be found in the “Get Software” part of this page.

Application

- Home appliances and home automation:
  - Kitchen appliances (such as coffee machine, cooking plate, oven)
  - Smart home (thermostats, control panels, and so on)
  - Smart lighting
- Personal electronics:
  - Laptops
  - AR/VR headsets
  - Tablets and smartphones
  - Smart speakers
- Multiple other applications:
  - Robotics (service and educational robots)
  - Sanitary devices
  - Vending machines
  - Elevator call buttons

Description

Have you ever dreamed of controlling a machine using only hand gestures and postures? It is now possible with the help of ST's gesture and hand posture recognition software with ToF sensors as the hardware to run the program on.

The gesture software includes a complete development ecosystem with ready-to-use example code and an intuitive GUI for reduced design times.

The gesture recognition algorithms can detect multiple motions. They include single and double tap, swiping in four directions (left, right, up, and down), circular hand motion, and level control.

Thanks to the libraries available in the package, the application can run on microcontrollers that are based on Cortex® M0+, M3, M33, M4, and M7. The package includes: the GUI executable, example code for the NUCLEO-F401RE board, libraries for supported Cortex® cores, and an easy-to-read user manual.

To run the GUI, a Nucleo expansion board (X-NUCLEO-53L7A1 or X-NUCLEO-53L8A1) is required, with a NUCLEO-F401RE Nucleo board. In addition, you can use the breakout boards (SATEL-VL53L7CX or SATEL-VL53L8) connected to the STM32 Nucleo board.

One major advantage of this gesture solution is that it provides full privacy, thanks to the multizone computing distance information of STMicroelectronics' ToF sensors (no image, no camera module). The performances are independent of target reflectance. The solution works even with gloves, or in low light conditions, unlike camera-based solutions. The small size of the sensors makes them easy to integrate, and they can be hidden behind a dark cover glass.

Also available is a hand posture recognition software which is enabled via AI algorithms. These algorithms run on the STM32 microcontroller, with low processing complexity and low-power consumption. For more information, refer to STSW-IMG050 on st.com.

In addition, ST has developed a comprehensive library that integrates gesture recognition, hand posture recognition, and smart presence detection into a single software solution. This combined software is available in the "Get Software" section.

Download the STSW-IMG048 data brief to learn more about smart presence detection.

Revision history

Table 1. **Document revision history**

Date	Version	Changes
07-Apr-2022	1	Initial release
30-Jun-2022	2	Updated "Features" and "Description" with two more swiping possibilities.
24-Mar-2023	3	Included the VL53L7CX product in this document.
06-Jun-2023	4	Included support for the VL53L8CX
05-Mar-2025	5	Removed all references to the VL53L5CX and its dependencies. Updated cover image Added L8CX FoV, circular hand motion, and made additional small text changes to enhance readability.
18-Apr-2025	6	Updated cover image. Updated Features. Updated Description.
23-Apr-2025	7	Updated document links and made small text changes for improved readability.
25-Apr-2025	8	Features: Removed information about smart presence. Moved information regarding hand posture recognition to Application. Description: Reworded information regarding gesture recognition software, and included a link to the STSW-IMG050.