Time-of-Flight ranging sensor with programmable field of view and multi object detection software expansion of STM32Cube

Application	Ranging measurement example
Hardware abstraction	STM32Cube hardware abstraction layer (HAL)
Hardware	STM32 Nucleo expansion board X-NUCLEO-53L1A2 (sense)
	STM32 Nucleo development board

Features

- Driver layer (VL53L1 application programming interface) for complete management of the VL53L1 ranging sensor integrated in the X-NUCLEO-53L1A2
- Easy portability across different microcontroller families, on the strength of STM32Cube
- Free, user-friendly license terms
- Example code for getting started with a simple ranging measurement
- Data logging capabilities through serial communication over a USB

Description

The X-CUBE-53L1A2 software package is an expansion of the STM32Cube, to go with the X-NUCLEO-53L1A2 expansion board for STM32 Nucleo.

The source code of this package is based on the STM32Cube and is aligned with its "multi platform" file and directory structure to ease portability and code sharing across different STM32 microcontroller families.

The VL53L1 is a state-of-the-art, ToF (Time-of-Flight), laser-ranging, miniature sensor enhancing STMicroelectronics' FlightSense product family. Housed in a miniature and reflowable package, it integrates a SPAD (single photon avalanche diode) array, physical infrared filters, and optics to achieve the best ranging performance in various ambient lighting conditions, with a wide range of cover windows.

With patented algorithms and ingenious module construction, the VL53L1 is also able to detect different objects within the FoV (field of view) with depth understanding at 60 Hz.

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1   What is STM32Cube ?

The STMCube represents an original initiative by STMicroelectronics to ease the life of developers by reducing development effort, time and cost. The STM32Cube covers the STM32 portfolio. Version 1.x of the STM32Cube includes:

- STM32CubeMX, a graphical software configuration tool that allows the generation of C initialization code using graphical wizards.
- A comprehensive embedded software platform, delivered per series (such as the STM32CubeF4 for STM32F4 series).
- STM32Cube HAL, an STM32 abstraction layer embedded software, ensuring maximized portability across the STM32 portfolio:
  – A consistent set of middleware components, such as RTOS, USB, and TCP/IP graphics
  – All embedded software utilities, including a full set of examples

2 How does X-CUBE-53L1A2 software complement STM32Cube

The proposed X-CUBE-53L1A2 software is based on the STM32CubeHAL, the hardware abstraction layer for the STM32 microcontroller. The package extends the STM32Cube by providing a BSP (board support package) for the X-NUCLEO-53L1A2 expansion board and a VL53L1 API (application programming interface) component (in the Drivers\BSP\Components\vl53l1 directory) to program, control and get ranging values from the VL53L1 device.

One example project for the STM32F401 and STM32L467 is included in the Projects\Multi\Examples\VL53L1 directory. The developer can use this example to start experimenting with the code using a basic ranging measurement.

This example is ready to be compiled using Keil (MDK-ARM), IAR (EWARM) or the STM32 workbench (SW4STM32). Precompiled binaries are also available (which can be dragged and dropped onto the STM32 Nucleo to start the demonstration).

Typical settings are available in the API to address the most common use cases.

Ranging data logging is also available through a virtual serial port over a USB.

Revision history

Table 1. Document revision history

Date	Version	Changes
19-Jun-2020	1	Initial release

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