How to setup and run the VL53L5CX-SATEL using an STM32 Nucleo64 board

Introduction

The purpose of this document is to describe how to set up and run the VL53L5CX-SATEL directly connected to an STM32 Nucleo-64 board.

The VL53L5CX-SATEL breakout boards can be used for easy integration into customer devices.

The PCB section supporting the VL53L5CX module is perforated so that developers can break off the mini-PCB for use in a 3.3 V supply application using flying wires. This makes it easier to integrate the VL53L5CX-SATEL breakout boards into development and evaluation devices due to their small size.

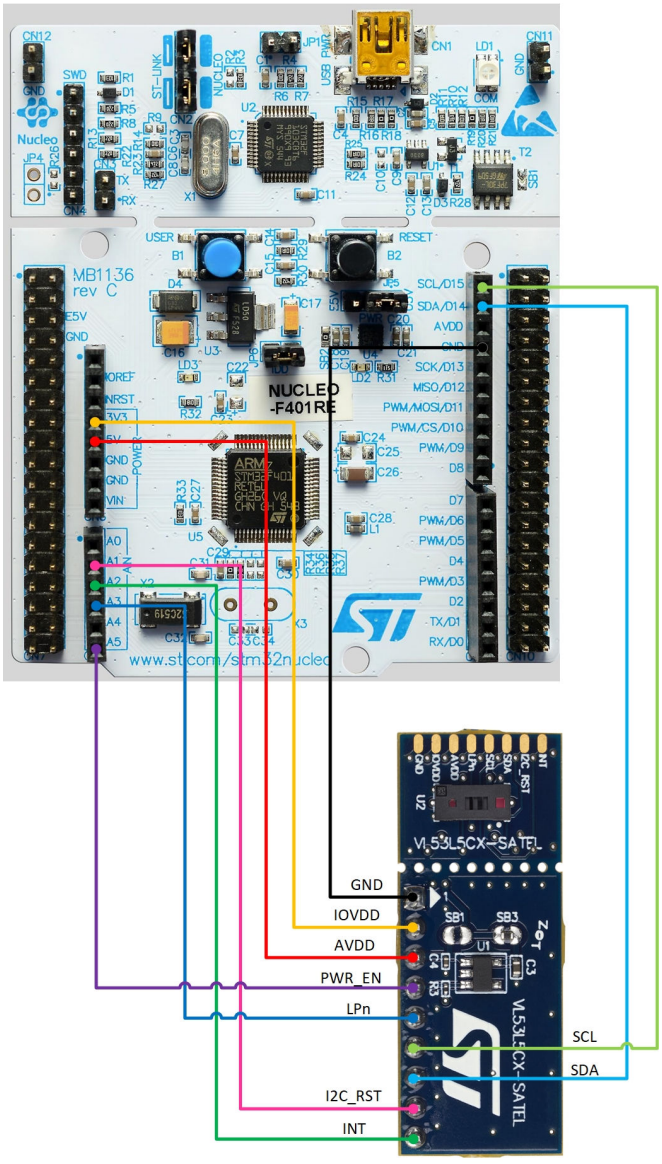
The VL53L5CX-SATEL is designed to connect remotely the VL53L5CX sensor to any type of electronic controller. To quick-start such an application, this document explains where to connect this board to the NUCLEO-F401RE board, where to find the dedicated code example, and how to make it operate.

1 Hardware connections guidelines

1.1 Connecting the VL53L5CX-SATEL to a NUCLEO-F401RE board

The Figure 1. VL53L5CX-SATEL flying lead connection to NUCLEO-F401RE shows the schematic to connect directly a VL53L5CX-SATEL board to a NUCLEO-F401RE board without the X-NUCLEO-53L5A1 expansion board.

Figure 1. VL53L5CX-SATEL flying lead connection to NUCLEO-F401RE



The pin list connection between the boards is described in Table 1. Connections between VL53L5CX-SATEL and NUCLEO-F401RE.

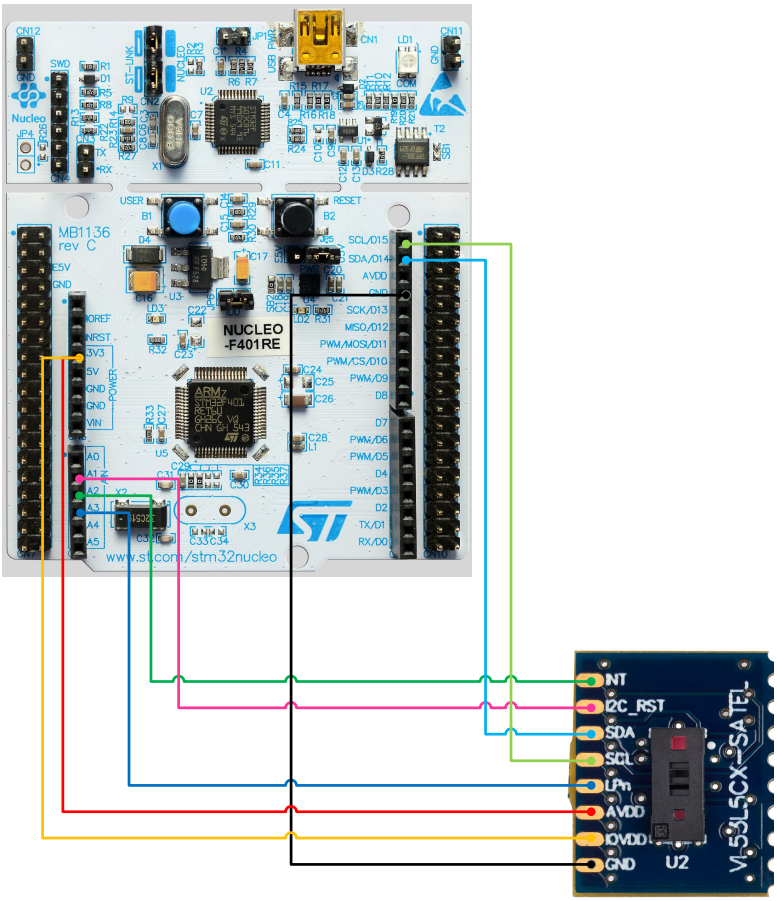
Table 1. Connections between VL53L5CX-SATEL and NUCLEO-F401RE

LEFT connectors					RIGHT connectors				
CN No.	VL53L5CX-SATEL	Pin No.	Pin name	MCU pin	MCU pin	Pin name	Pin No.	VL53L5CX-SATEL	CN No.
-	-	-	-	-	PB8	D15	10	SCL	CN5 Digital
-	-	-	-	-	PB9	D14	9	SDA	
-	-	-	-	-	-	AREF	8		
-	-	-	-	-	-	GND	7	GND	
CN6 Power	-	1	NC	-	PA5	D13	6		
	-	2	IOREF	-	PA6	D12	5		
	-	3	RESET	NRST	PA7	D11	4		
	IOVDD	4	+3V3	-	PB6	D10	3		
	AVDD	5	+5V	-	PC7	D9	2		
		6	GND	-	PA9	D8	1		
		7	GND	-	-	-	-		-
		8	VIN	-	PA8	D7	8		CN9 Digital
-		-	-	-	PB10	D6	7		
CN8 Analog		1	A0	PA0	PB4	D5	6		
	I2C_RST	2	A1	PA1	PB5	D4	5		
	INT	3	A2	PA4	PB3	D3	4		
	LPn	4	A3	PB0	PA10	D2	3		
		5	A4	PC1	PA2	D1	2		
	PWR_EN	6	A5	PC0	PA3	D0	1		

1.2 Connecting the breakout VL53L5CX-SATEL to a NUCLEO-F401RE board

For the mechanical integration purpose, the user may use the satellite breakout PCB with its miniaturized size and solder the wires on the PCB to connect to the NUCLEO-F401RE. Refer to Figure 2. VL53L5CX mini-PCB flying lead connection to NUCLEO-F401RE.

Figure 2. VL53L5CX mini-PCB flying lead connection to NUCLEO-F401RE



2 Programming guidelines

The software project to make the sensor board work directly with the NUCLEO-F401RE is available on ST website.

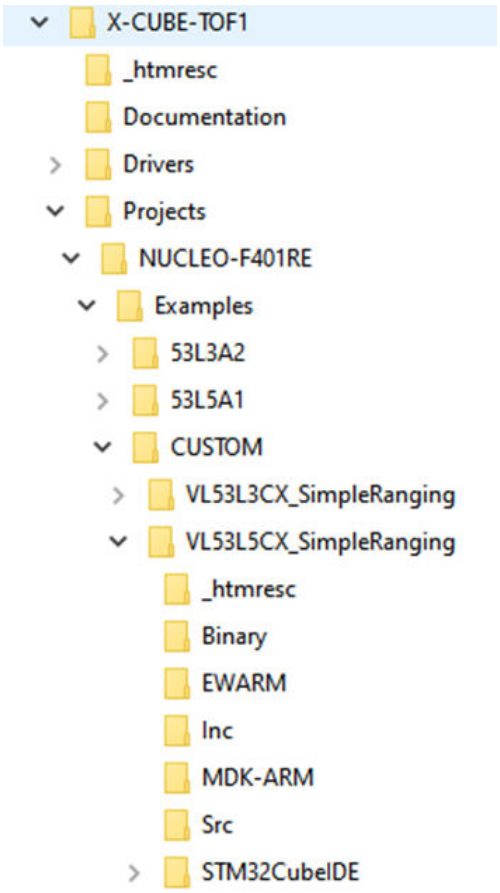
The user must download the package X-CUBE-TOF1, then install the X-CUBE-TOF1 software pack in CubeMX.

The precompiled software project is available under:

C:\Users\username\STM32Cube\Repository\Packs\STMicroelectronics\X-CUBE-TOF1\2.0.0\Projects\NUCLEO-F401RE\Examples\CUSTOM\VL53L5CX_SimpleRanging.

A VL53L5CX-SATEL board project for NUCLEO-F401RE is available in the directory tree as shown in the following figure. The difference between ST common expansion board X-NUCLEO-53L5A1 and this board is the classification name. This project is part of the “CUSTOM” directory.

Figure 3. X-CUBE-TOF1 directory

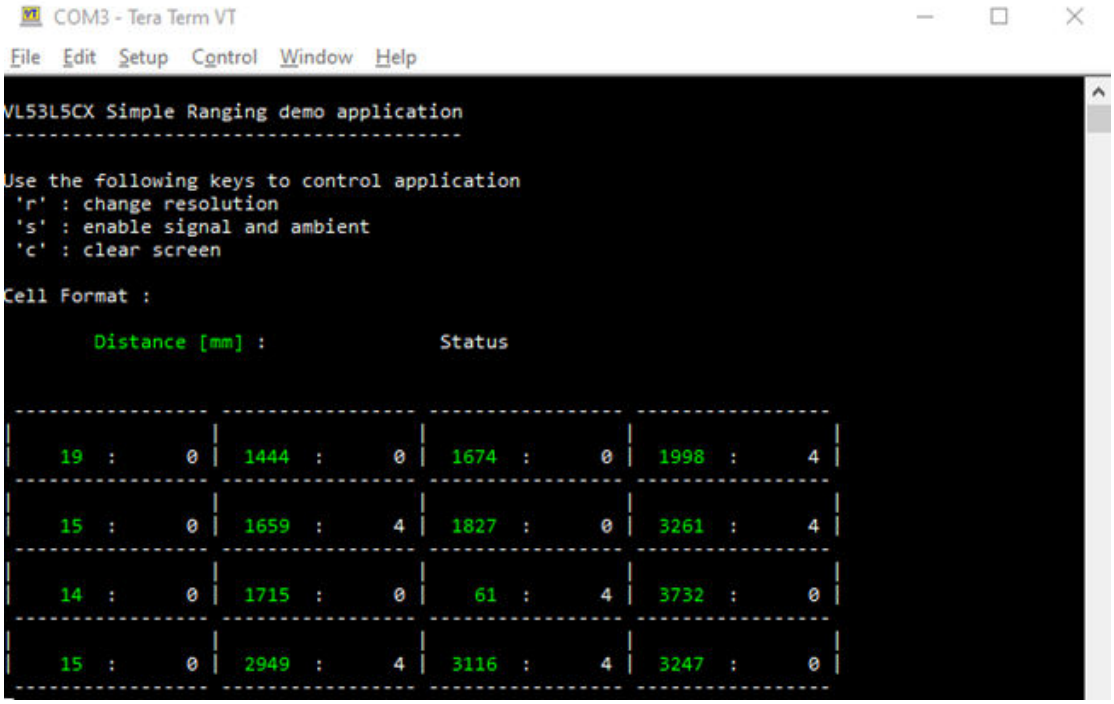


The project is developed for IAR, Keil®, and STM32CubeIDE toolkits. The user can select any software development kit and make it run.

Another method is to push directly the embedded software binary file. For such a task, the user can simply drag and drop the binary file "VL..." located in the `Binary` directory, into the STM32 target represented by "NODE_F401RE" in the PC file tree.

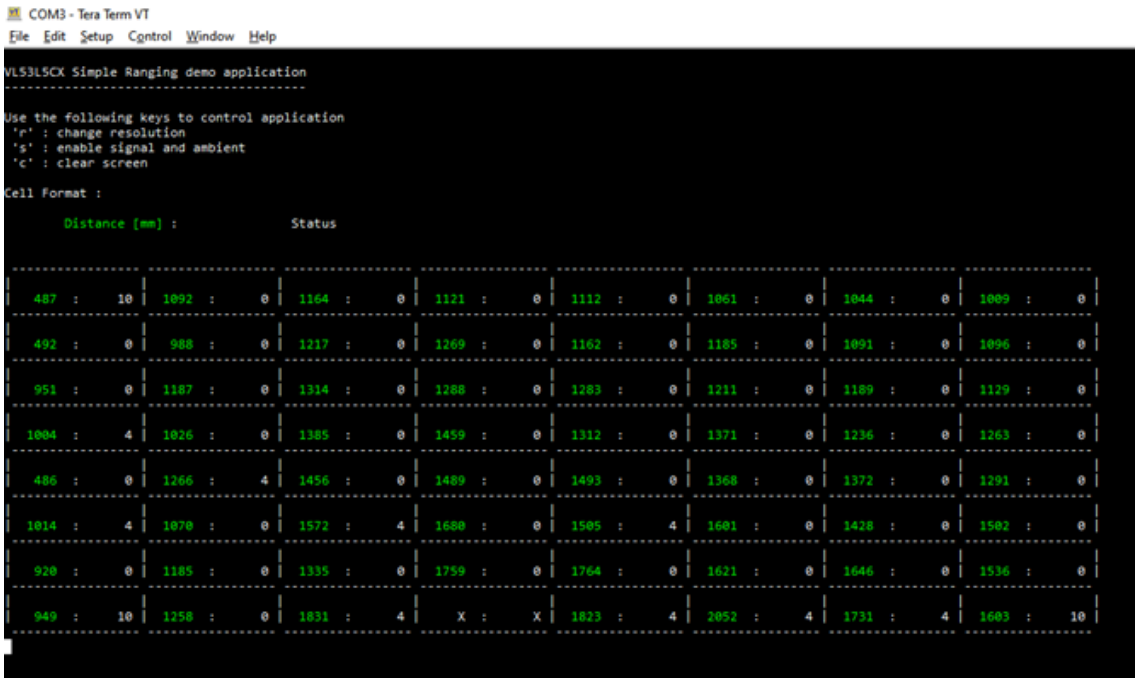
By default, the software programs the sensor in 4x4 mode. The result can be rendered using a serial tool (such as Tera Term) to access the Nucleo COM port, as shown in Figure 4. Display rendering by default 4x4 mode.

Figure 4. **Display rendering by default 4x4 mode**



This project embeds a bidirectional communication by UART. By default, some options can be triggered like the resolution, for example, by typing “r”. It is switched to 8x8 mode as shown in Figure 5. Display rendering for 8x8 mode.

Figure 5. **Display rendering for 8x8 mode**



Revision history

Table 2. **Document revision history**

Date	Version	Changes
14-Oct-2021	1	Initial release
09-Dec-2021	2	Added information regarding breakout board in Section Introduction. Added Section 1.2: Connecting the breakout VL53L5CX-SATEL to a NUCLEO-F401RE board.
09-Sep-2024	3	Section 1.2: Connecting the breakout VL53L5CX-SATEL to a NUCLEO-F401RE board: Removed the note and updated the image.
16-Dec-2024	4	Updated Figure 2. VL53L5CX mini-PCB flying lead connection to NUCLEO-F401RE.

Contents

1 **Hardware connections guidelines** 2
1.1 Connecting the VL53L5CX-SATEL to a NUCLEO-F401RE board 2
1.2 Connecting the breakout VL53L5CX-SATEL to a NUCLEO-F401RE board 4
2 **Programming guidelines** 5
Revision history 7

IMPORTANT NOTICE – READ CAREFULLY

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgment.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, refer to www.st.com/trademarks. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2024 STMicroelectronics – All rights reserved