AN13705

How to Enable 2D Solution in SLN-VIZN3D-IOT

Rev. 1 — 26 July 2023   **Application note**

Document Information

Information	Content
Keywords	AN13705, SLN-VIZN3D-IOT, 3D face recognition, 2D face recognition
Abstract	This document describes the way to switch from 3D to 2D face recognition

1 Introduction

The SLN-VIZN3D-IOT development kit implements NXP EdgeReady turnkey solution for 3D face recognition-based access control using a 3D Structured Light Module (SLM) camera. For more information, refer to *SLN-VIZN3D-IOT Kit User Guide* (document SLN-VIZN3D-IOT-UG). A high-performance member of the i.MX RT1170 microcontroller (MCU) family enables this solution. The MCU runs a Real-Time Operating System (RTOS) at up to 1 GHz clock rates, with 2 MB on-chip SRAM. This 3D face recognition solution Software Development Kit (SDK), also called SLN-VIZN3D-IOT, provides OEMs with a fully integrated, self-contained software and hardware solution. This solution includes pre-integrated machine learning face-recognition algorithms. It also includes all necessary drivers for all necessary peripherals, including memories, cameras, display, and Bluetooth Low Energy chipset.

2 Overview

The SLN-VIZN3D-IOT kit supports three different types of cameras as follows:

- 3D SLM camera required for 3D face recognition
- RGB camera to display user feedback
- IR camera required for optional 2D face recognition only

The SLN-VIZN3D-IOT kit supports two different face recognition configurations based on different combinations of cameras:

- 3D face recognition: 3D SLM (MIPI + MIPI to Parallel CSI bridge) + RGB (FlexIO)
- 2D face recognition: IR (Parallel CSI) + RGB (FlexIO)

The default setting of face recognition configuration is 3D face recognition. This document describes how to switch from 3D face recognition to 2D face recognition with hardware and software changes on the SLN-VIZN3D-IOT kit.

In the default configuration, the Orbbec camera is connected to the Toshiba TC358748XBG MIPI-to-CSI bridge. The Toshiba TC358748XBG MIPI-to-CSI bridge is connected to the CSI interface of the i.MX RT117H MCU. The GalaxyCore GC0308 RGB camera is connected to the FlexIO interface of the i.MX RT117H MCU. For further details, see the *SLN-VIZN3D-IOT-HDG* (document SLN-VIZN3D-IOT-HDG).
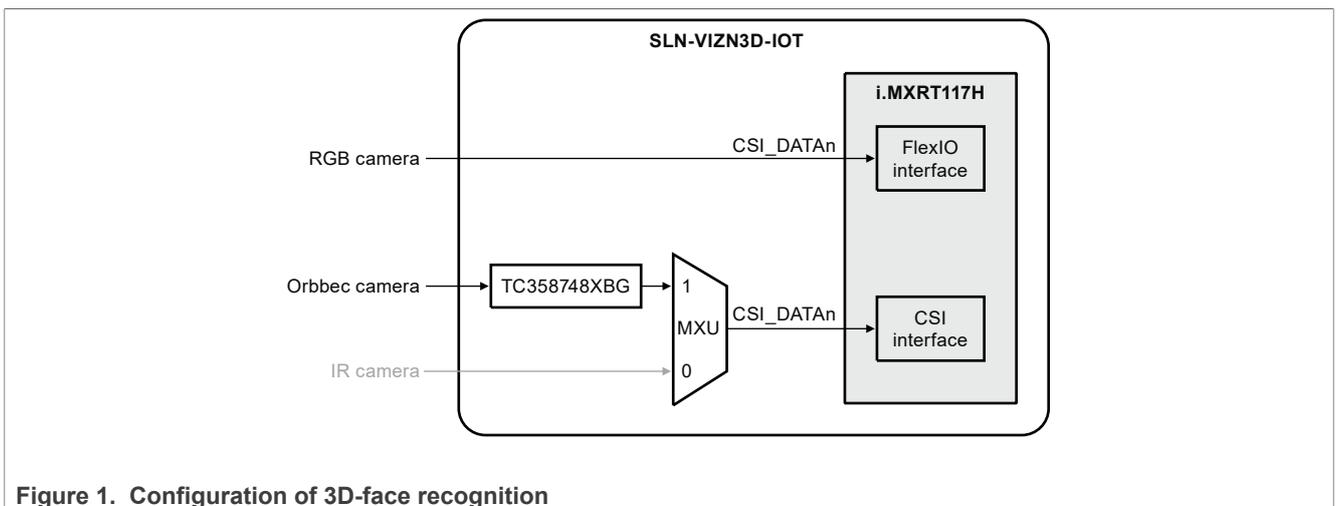
Figure 1. Configuration of 3D-face recognition

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3 Implement

This chapter introduces hardware and software changes to switch from 3D to 2D face recognition.

3.1 Hardware

This section explains the hardware changes on the SLN-VIZN3D-IOT kit required to switch from 3D to 2D face recognition as follows:

1. The camera multiplexer is composed of resistors. The developers must remove the resistors, as shown in Figure 2.
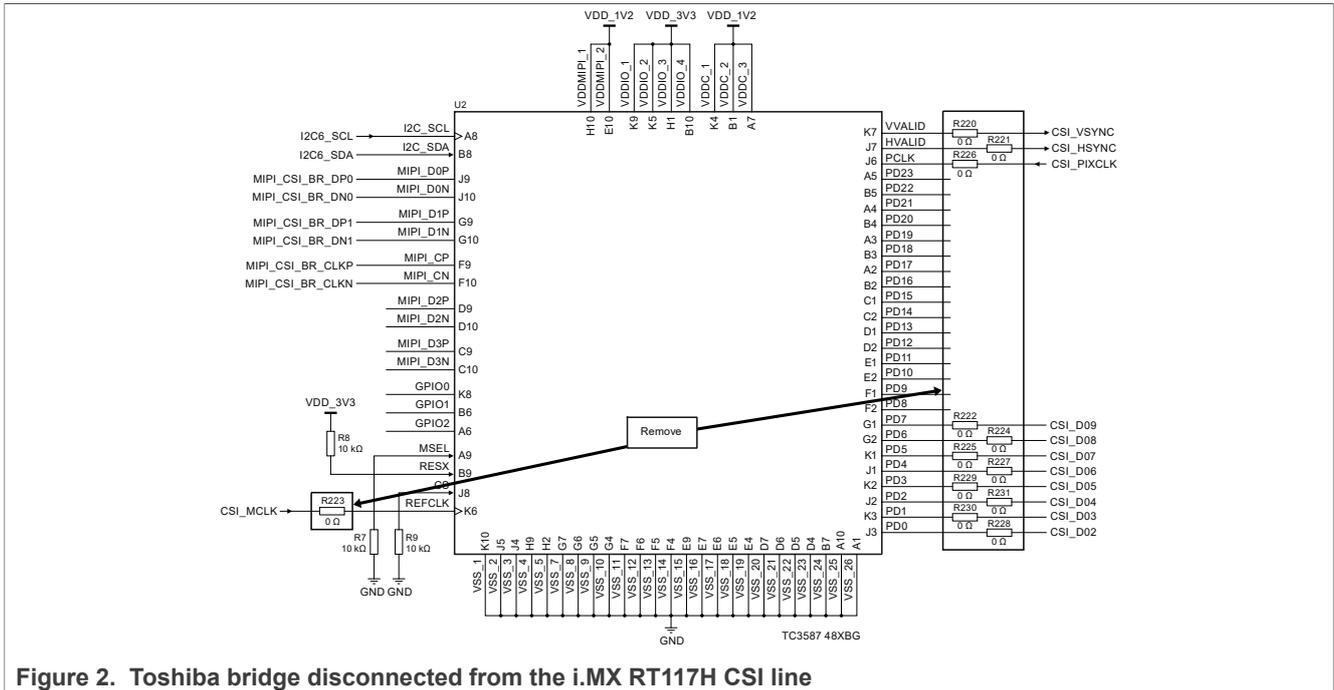
Figure 2. Toshiba bridge disconnected from the i.MX RT117H CSI line

2. Reroute the 3D SLM camera signals directly to the i.MX RT117H MIPI pins by populating and depopulating the 0 Ω resistors, as shown in Figure 3.
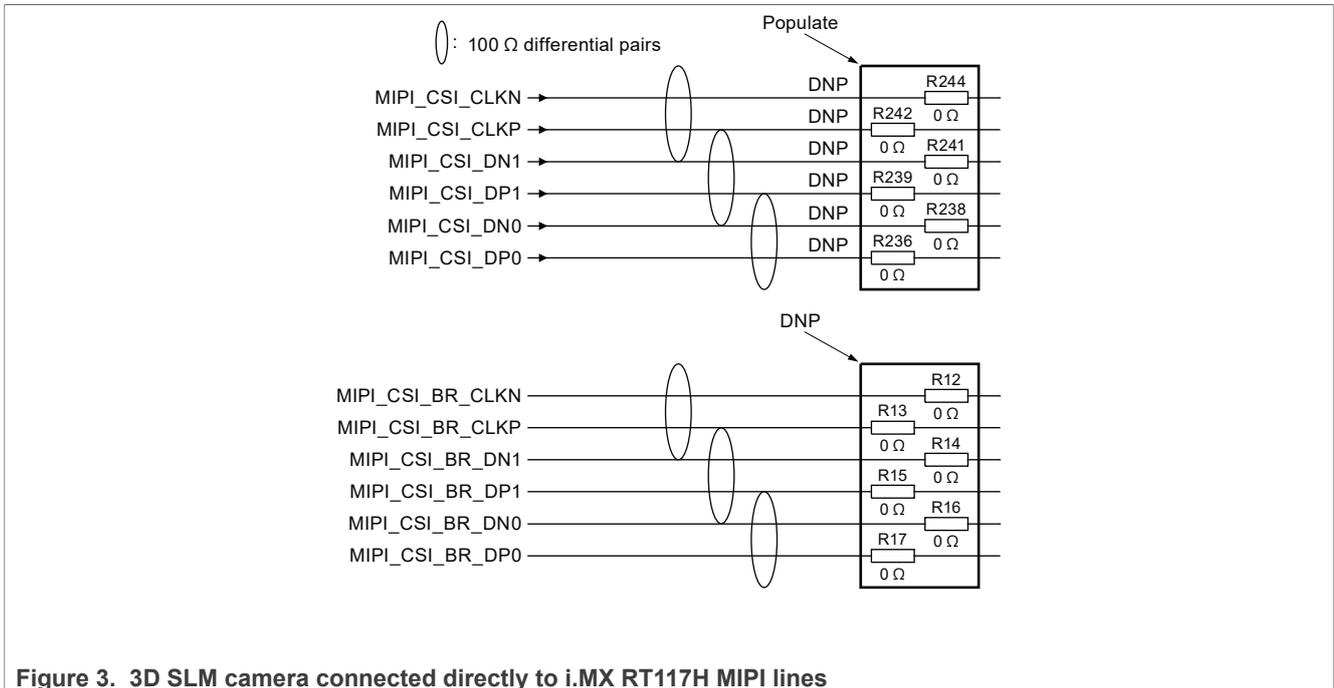
Figure 3. 3D SLM camera connected directly to i.MX RT117H MIPI lines

3. Connect the IR camera to the 24-pin PFC connector (J3).
   Note: IR camera is an add-on that comes with the SLN-VIZN3D-IOT kit.
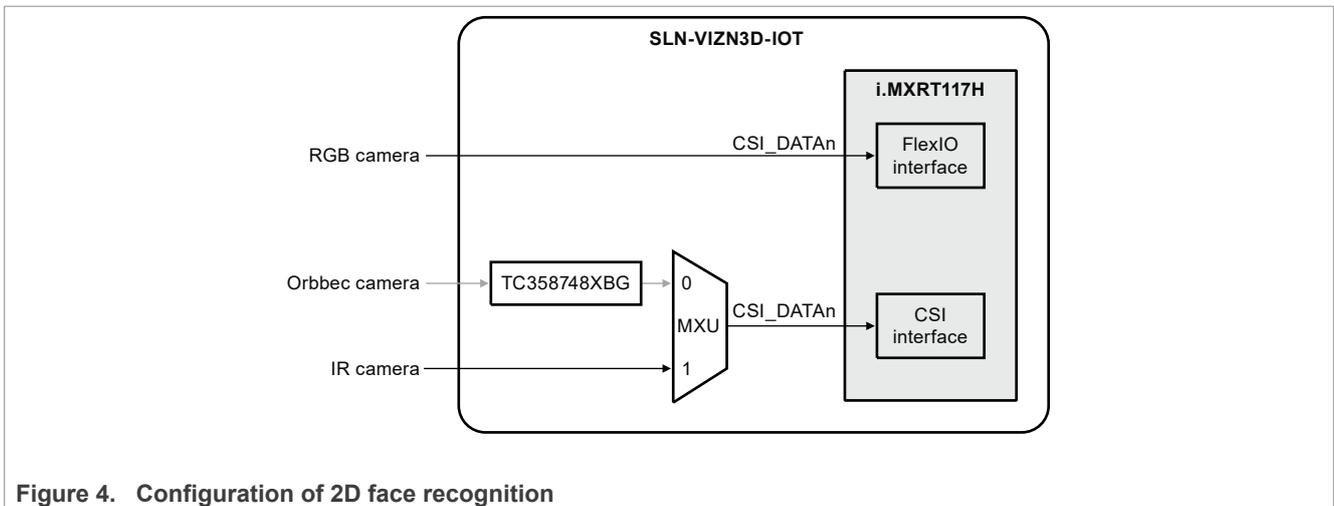
Figure 4. Configuration of 2D face recognition

3.2 Software

This section explains the software changes on the SLN-VIZN3D-IOT kit required to switch from 3D to 2D face recognition as follows:

1. Right-click on the project `sln_vizn3d_iot_smart_lock` in the project explorer tab of MCUXpresso IDE and select **Properties** at the bottom of the screen.

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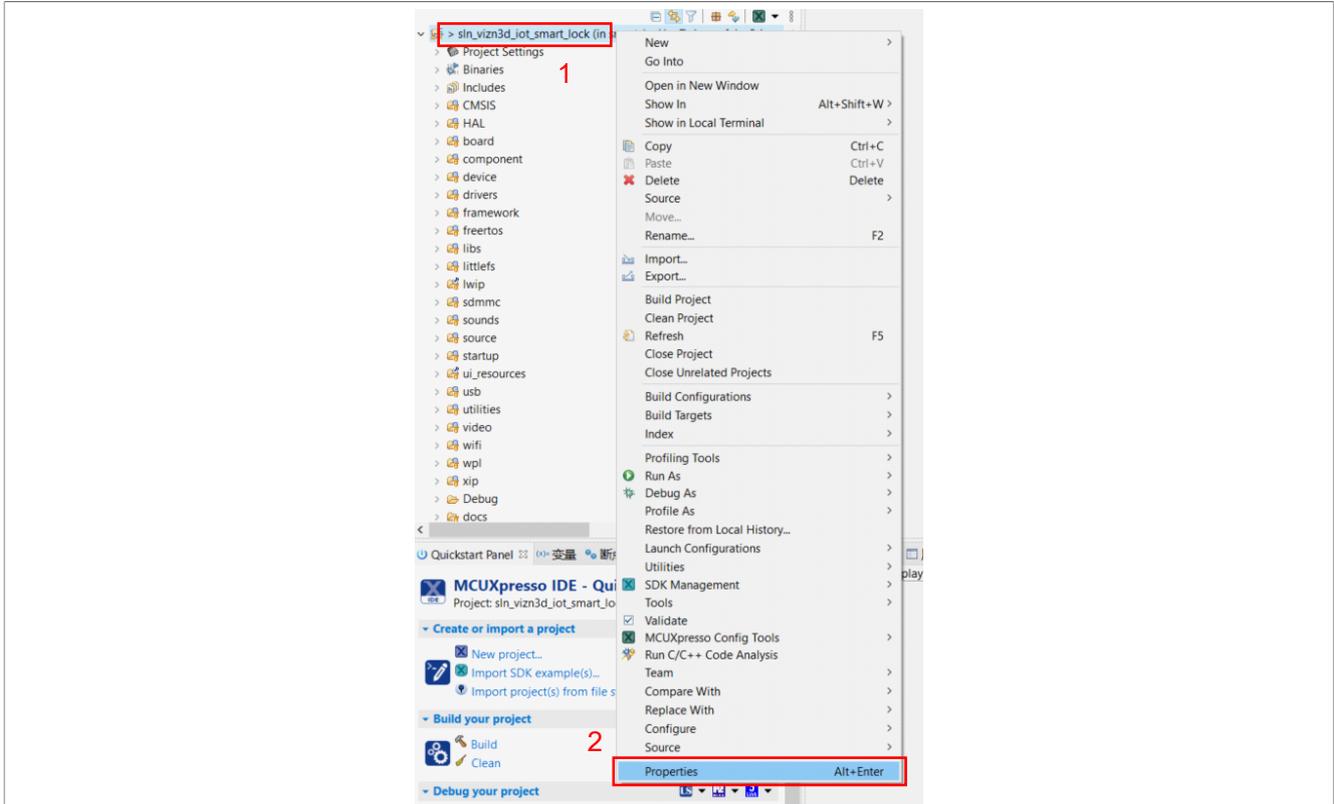
Figure 5. SLN_VIZN3D_IOT space setting in MCUXpresso IDE

2. Navigate to **C/C++ Build > Settings > Preprocessor**. Update the preprocessor definition from `SMART_LOCK_3D` to `SMART_LOCK_2D` (or `SMART_ACCESS_2D`) for both MCU C Compiler and MCU C++ Compiler.
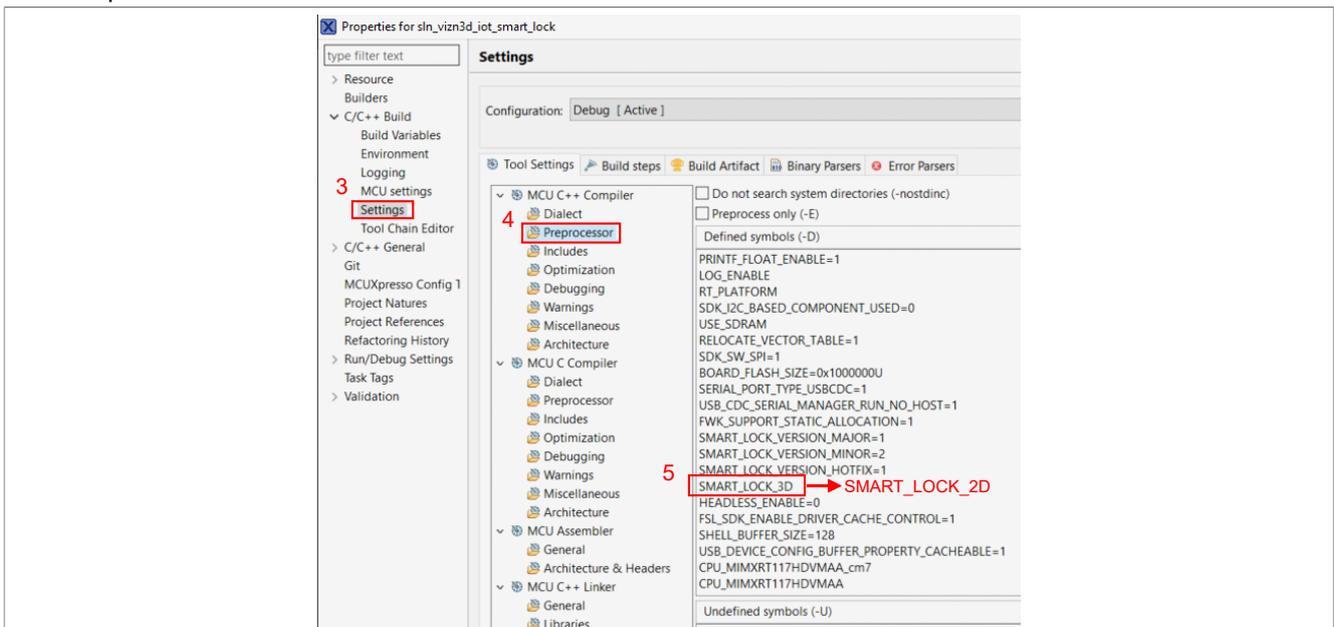
Figure 6. Update the preprocessor definition for MCU C Compiler

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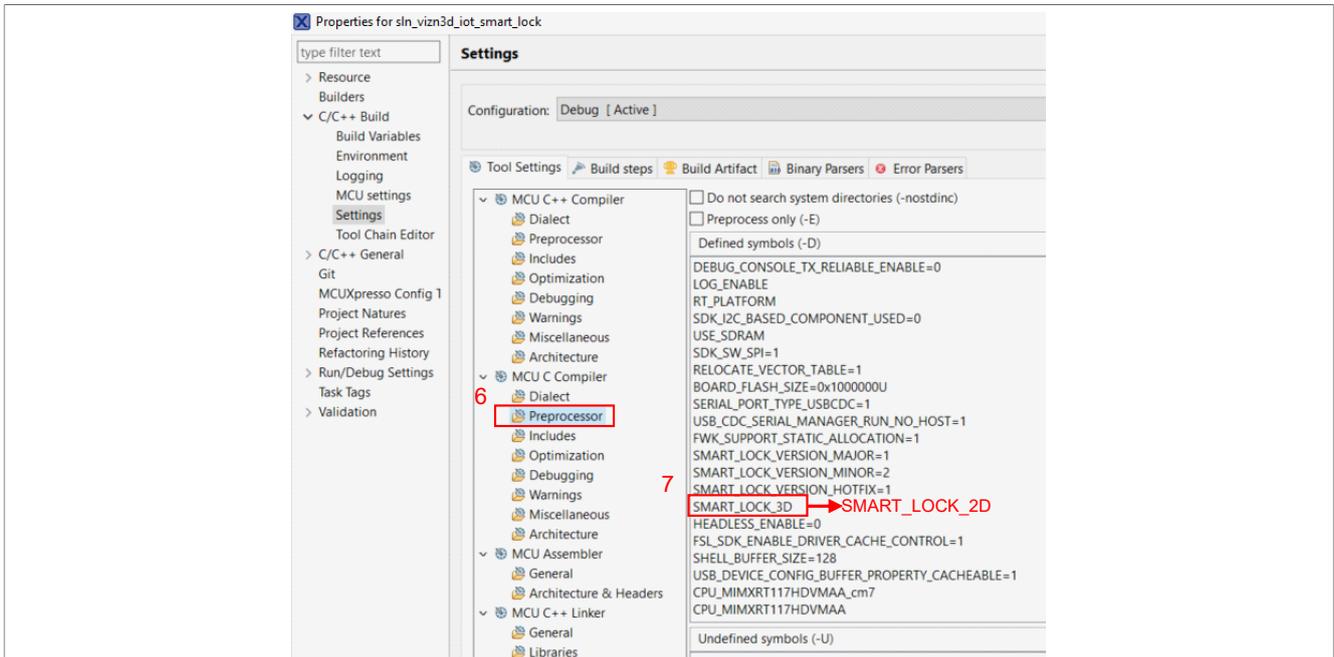
Figure 7. Update the preprocessor definition for MCU C++ Compiler

3. Navigate to **C/C++ Build > Settings > MCU C++ Linker > Libraries**. Update the `oasis_lite` library `oasis_lite3D_DEFAULT_117f_ae` to `oasis_lite2D_DEFAULT_117f_ae`.
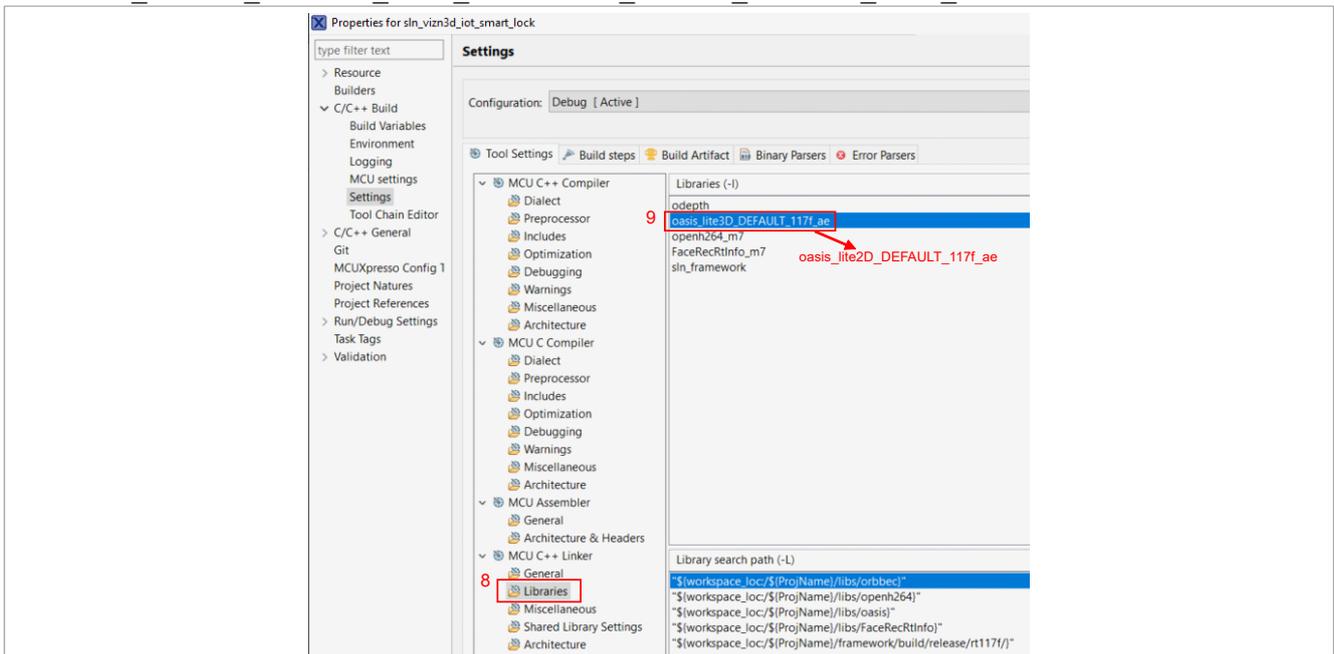
Figure 8. Update the library

4. Build the project and burn binary into flash.

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4 Test environment

Table 1 lists the recommended computer configuration for SLN-VIZN3D-IOT. The SLN-VIZN3D-IOT SDK requires an up-to-date computer that runs MCUXpresso Integrated Development Environment (IDE) version 11.4 or higher. It also requires a terminal program to communicate with the device via USB.

Table 1. Supported computer configurations

Computer type	OS version	Terminal program
Apple	Mac OS	PuTTY
PC	Windows 7/10	PuTTY/Tera Term
PC	Linux	PuTTY

5 Conclusion

This application note describes how to switch from 3D to 2D face recognition. This switch is done by implementing hardware and software changes on the SLN-VIZN3D-IOT kit. To implement the hardware changes successfully, remove the necessary resistors, then populate and depopulate the 0 Ω resistors. For implementing software changes, update the `oasis_lite` library directly to obtain the desired 2D face recognition.

6 References

The following references are available to supplement this document:

- *SLN-VIZN3D-IOT Home Page* (document VIZN3D)
- *SLN-VIZN3D-IOT Kit User Guide* (document SLN-VIZN3D-IOT-UG)
- *SLN-VIZN3D-IOT-HDG* (document SLN-VIZN3D-IOT-HDG).
- MCUXpresso Integrated Development Environment (IDE)

7 Revision history

Table 2 summarizes the changes done to this document since the initial release.

Table 2. Revision history

Revision number	Release date	Description
1	26 July 2023	The Arm logo is removed from the first page of this document
0	16 August 2022	Initial public release

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