



CrossLink-NX Human Counting Demo

User Guide

FPGA-UG-02120-1.0

December 2020

Disclaimers

Lattice makes no warranty, representation, or guarantee regarding the accuracy of information contained in this document or the suitability of its products for any particular purpose. All information herein is provided AS IS and with all faults, and all risk associated with such information is entirely with Buyer. Buyer shall not rely on any data and performance specifications or parameters provided herein. Products sold by Lattice have been subject to limited testing and it is the Buyer's responsibility to independently determine the suitability of any products and to test and verify the same. No Lattice products should be used in conjunction with mission- or safety-critical or any other application in which the failure of Lattice's product could create a situation where personal injury, death, severe property or environmental damage may occur. The information provided in this document is proprietary to Lattice Semiconductor, and Lattice reserves the right to make any changes to the information in this document or to any products at any time without notice.

Contents

Acronyms in This Document	4
1. Introduction	5
2. Functional Description	5
3. Demo Setup	6
3.1. Hardware Requirements	6
3.2. Software Requirements	6
4. Programming the CrossLink-NX Voice and Vision SPI Flash	7
4.1.1. Erasing the CrossLink-NX Voice and Vision SRAM Prior to Reprogramming	7
4.1.2. Programming the CrossLink-NX Voice and Vision Board	8
4.1.3. Programming SensAI Firmware Binary to the CrossLink-NX Voice and Vision SPI Flash	11
4.1.3.1. Convert Flash SensAI Firmware Hex to Crosslink-NX Voice and Vision SPI Flash	11
5. Running the Demo	13
Technical Support Assistance	14
Revision History	15

Figures

Figure 2.1. Lattice CrossLink-NX Voice and Vision Board	5
Figure 4.1. Radiant Programmer – Default Screen	7
Figure 4.2. Radiant Programmer – Device Selection	8
Figure 4.3. Radiant Programmer – Device Operation	8
Figure 4.4. Radiant Programmer – Selecting Device Properties Options for CrossLink-NX Flashing	9
Figure 4.5. CrossLink-NX Voice and Vision Flashing Switch – SW4 Push Button	10
Figure 4.6. Radiant Programmer – Output Console	10
Figure 4.7. Radiant Programmer – Selecting Device Properties Options for CrossLink-NX Voice and Vision Flashing	11
Figure 4.8. Radiant Programmer – Output Console	12
Figure 5.1. Running the Demo	13

Acronyms in This Document

A list of acronyms used in this document.

Acronym	Definition
FPGA	Field-Programmable Gate Array
ML	Machine Learning
SD	Secure Digital
SPI	Serial Peripheral Interface
SRAM	Static Random Access Memory
USB	Universal Serial Bus

1. Introduction

This document provides technical information and instructions on setting up and running the CrossLink™-NX Human Counting demo. This document is compatible with the MobileNet v1, MobileNet v2, and VGG versions of the Human Counting demo.

Refer to the following documents for detailed information on Lattice development boards and kit:

- Lattice CrossLink-NX Voice and Vision Board

2. Functional Description

The CrossLink-NX Human Counting demo is designed to utilize the Lattice CrossLink-NX Voice and Vision Board, as shown in [Figure 2.1](#).

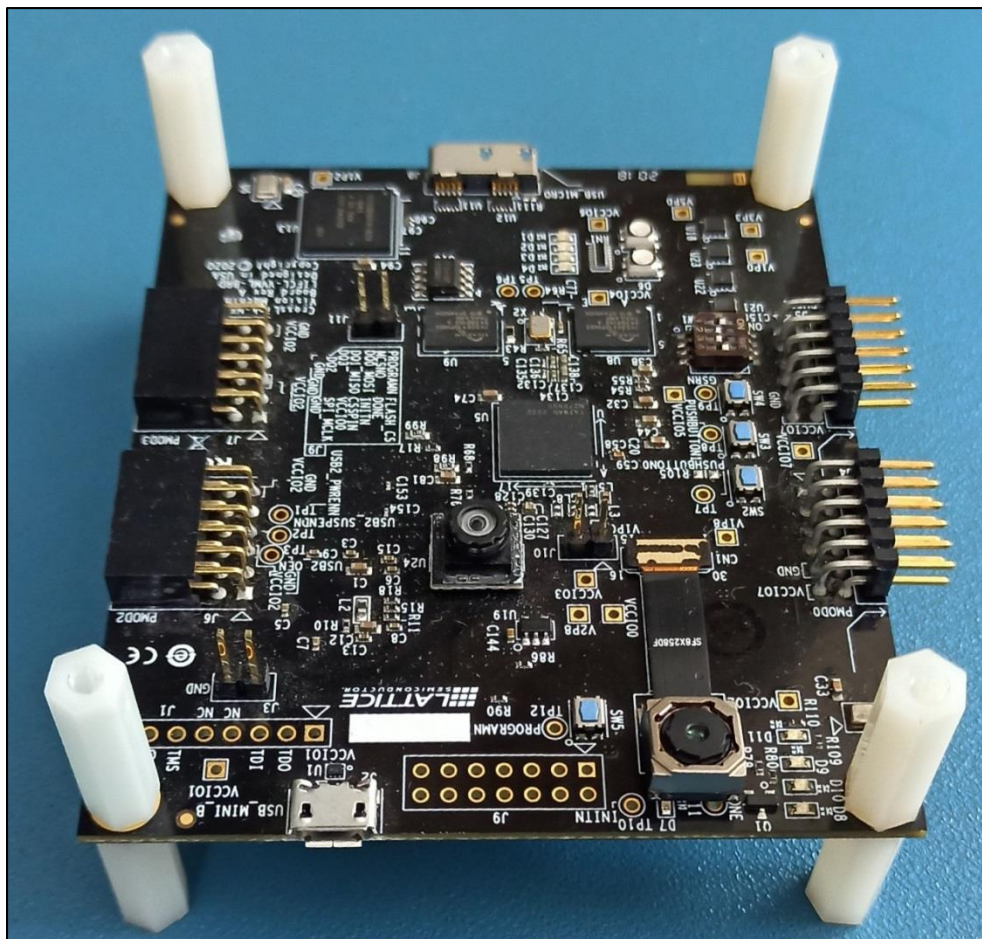


Figure 2.1. Lattice CrossLink-NX Voice and Vision Board

3. Demo Setup

This section describes the demo setup.

3.1. Hardware Requirements

- Lattice CrossLink-NX Voice and Vision Board
 - Micro-USB Cable
 - USB Micro B Cable

3.2. Software Requirements

- Lattice Radiant™ Programmer (refer to <http://www.latticesemi.com/Products/DesignSoftwareAndIP/FPGAandLDS/Radiant>)
- Video Player such as AMCap or VLC

4. Programming the CrossLink-NX Voice and Vision SPI Flash

4.1.1. Erasing the CrossLink-NX Voice and Vision SRAM Prior to Reprogramming

If the CrossLink-NX Voice and Vision device is already programmed (either directly, or loaded from SPI Flash), follow this procedure to first erase the CrossLink-NX Voice and Vision SRAM memory before re-programming the CrossLink-NX Voice and Vision's SPI Flash. If you are doing this, keep the board powered when re-programming the SPI Flash (so it does not reload on reboot).

To erase the CrossLink-NX Voice and Vision device:

1. Launch Lattice Radiant Programmer. In the Getting Started dialog box, select **Create a new blank project**.

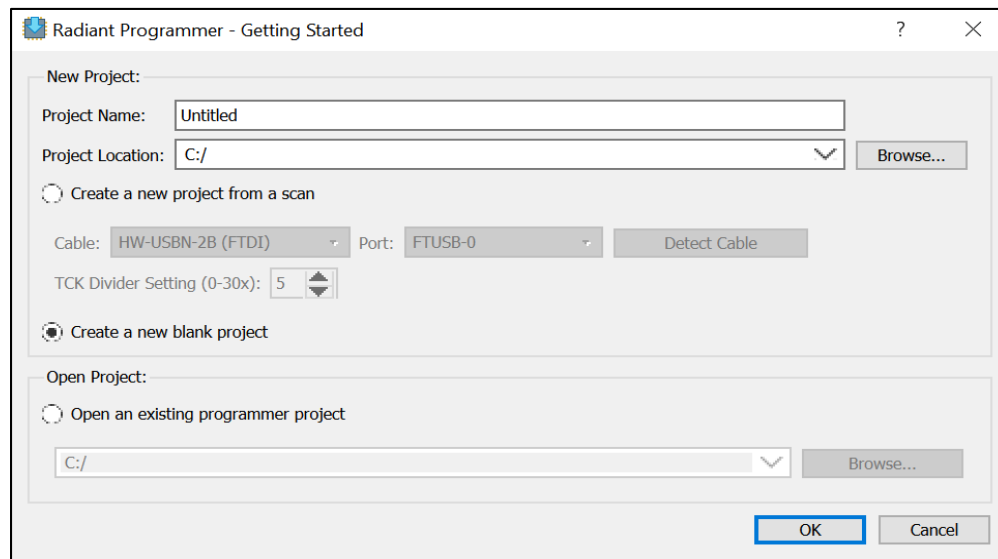


Figure 4.1. Radiant Programmer – Default Screen

2. Click **OK**.
3. In the Radiant Programmer main interface, Select **LIFMD** for Device Family, **LIFCL** for Device Vendor, and **LIFCL-40** for Device as shown in [Figure 4.2](#).

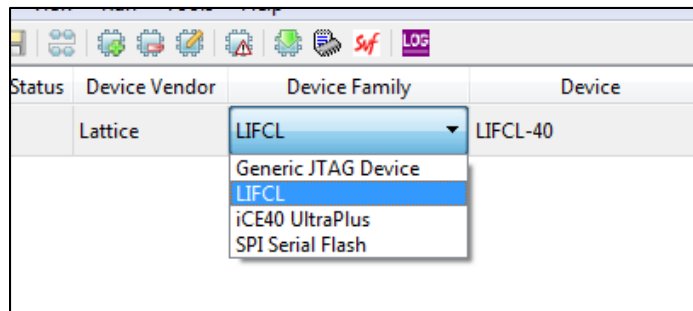


Figure 4.2. Radiant Programmer – Device Selection

4. Right-click and select **Device Properties**.
5. Select **JTAG** for Port Interface, **Direct Programming** for Access Mode, and **Erase Only** for Operation as shown in Figure 4.3.

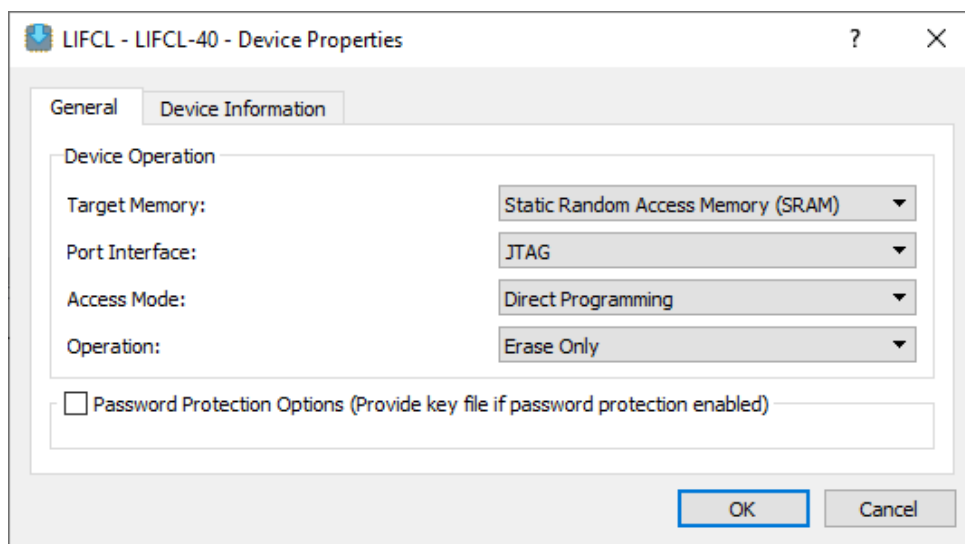


Figure 4.3. Radiant Programmer – Device Operation

6. Click **OK** to close the Device Properties dialog box.
7. Click the **Program** button  to start the erase operation.

4.1.2. Programming the CrossLink-NX Voice and Vision Board

To program the CrossLink-NX Voice and Vision SPI Flash:

1. Ensure that the CrossLink-NX Voice and Vision device SRAM is erased by performing the steps in [Erasing the CrossLink-NX Voice and Vision SRAM Prior to Reprogramming](#).
2. In the Radiant Programmer main interface, right-click the CrossLink-NX Voice and Vision row and select **Device Properties**.
3. Apply the settings below:
 - a. Under Device Operation, select the options below:
 - **Access Mode – Direct Programming**
 - **Operation – SPI Flash Erase, Program, Verify**
 - b. Under Programming Options, select the bitstream file .
 - c. For **SPI Flash Options**, select the **Macronix 25L12833F** device as shown in [Figure 4.4](#).

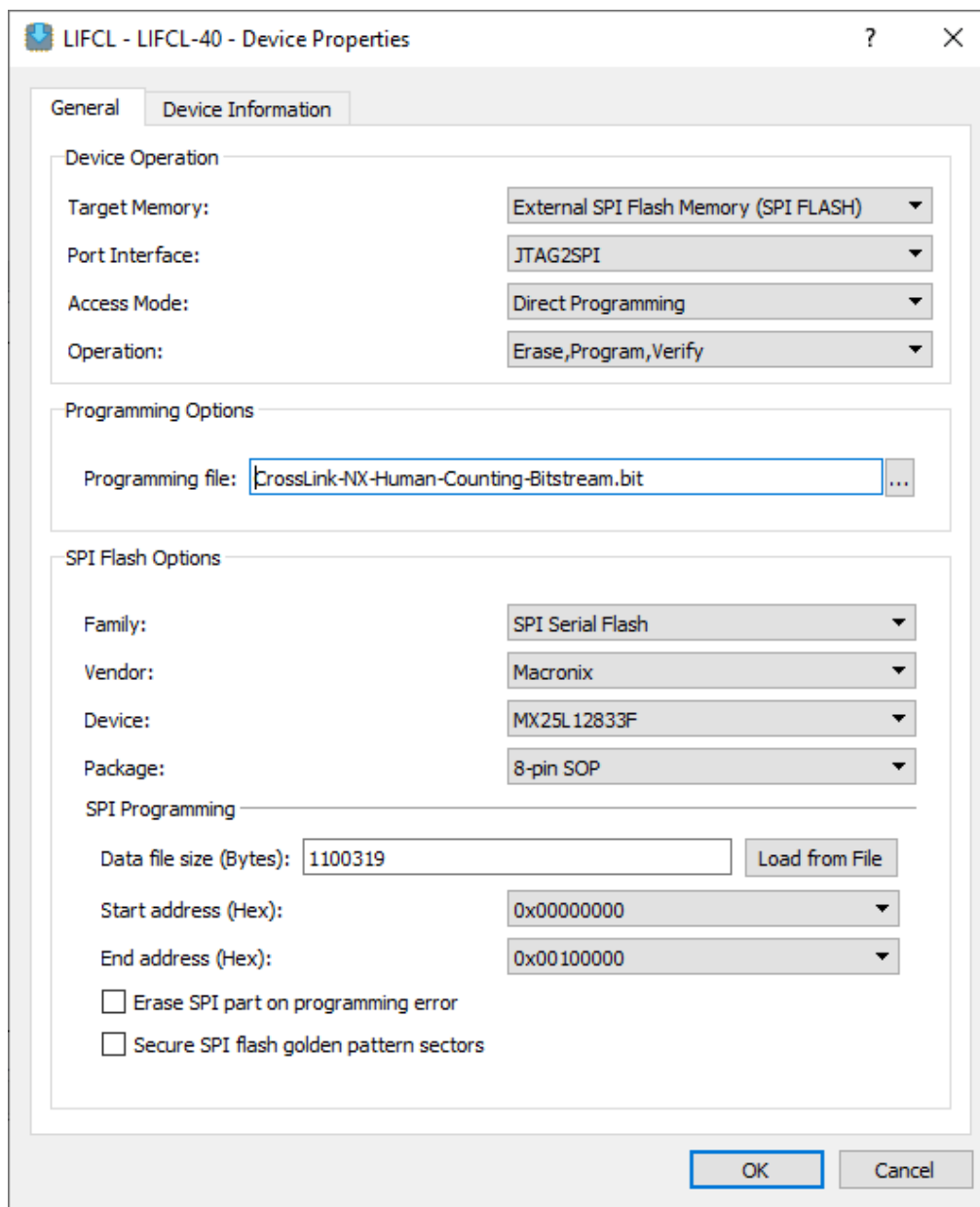


Figure 4.4. Radiant Programmer – Selecting Device Properties Options for CrossLink-NX Flashing

- d. Click **Load from File** to update the Data file size (bytes) value.
- e. Ensure that the following addresses are correct:
 - **Start Address (Hex) – 0x00000000**
 - **End Address (Hex) – 0x00100000**
4. Click **OK**.
5. Press the **SW4** push button switch before clicking the **Program** button as shown in Figure 4.5. Hold it until you see the *Successful* message in the Radiant log window.

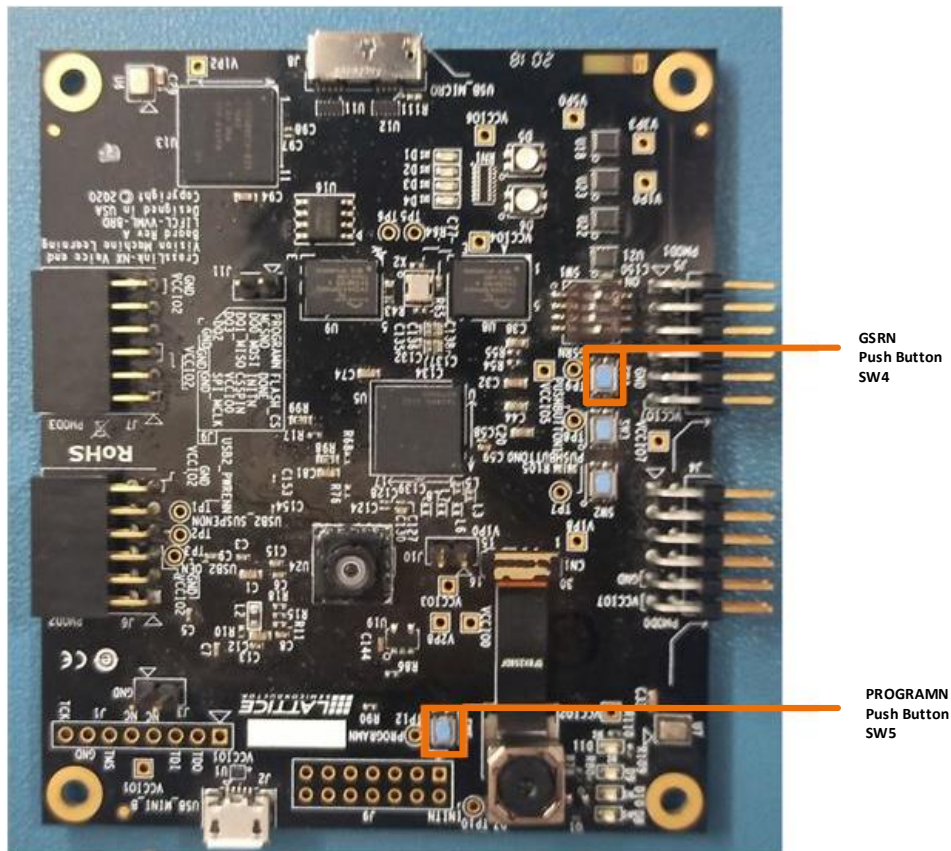


Figure 4.5. CrossLink-NX Voice and Vision Flashing Switch – SW4 Push Button

- Click the **Program** button  to start the programming operation.
- After successful programming, the **Output** console displays the result as shown in Figure 4.6.



Figure 4.6. Radiant Programmer – Output Console

4.1.3. Programming SensAI Firmware Binary to the CrossLink-NX Voice and Vision SPI Flash

4.1.3.1. Convert Flash SensAI Firmware Hex to Crosslink-NX Voice and Vision SPI Flash

To program the CrossLink-NX Voice and Vision SPI flash:

1. Ensure that the CrossLink-NX Voice and Vision device SRAM is erased by performing the steps in [Erasing the CrossLink-NX Voice and Vision SRAM Prior to Reprogramming](#) before flashing bitstream and SensAI firmware binary.
2. In the Radiant Programmer main interface, right-click the CrossLink-NX Voice and Vision row. Select **Device Properties to open the** dialog box, as shown in [Figure 4.7](#).
3. Select SPI FLASH for Target Memory, JTAG2SPI for Port Interface, and Direct Programming for Access Mode.
4. For Programming File, select the **CrossLink-NX SensAI firmware** binary file after converting it to hex (*.mcs).
5. For SPI Flash Options, follow the configurations as shown in [Figure 4.7](#).

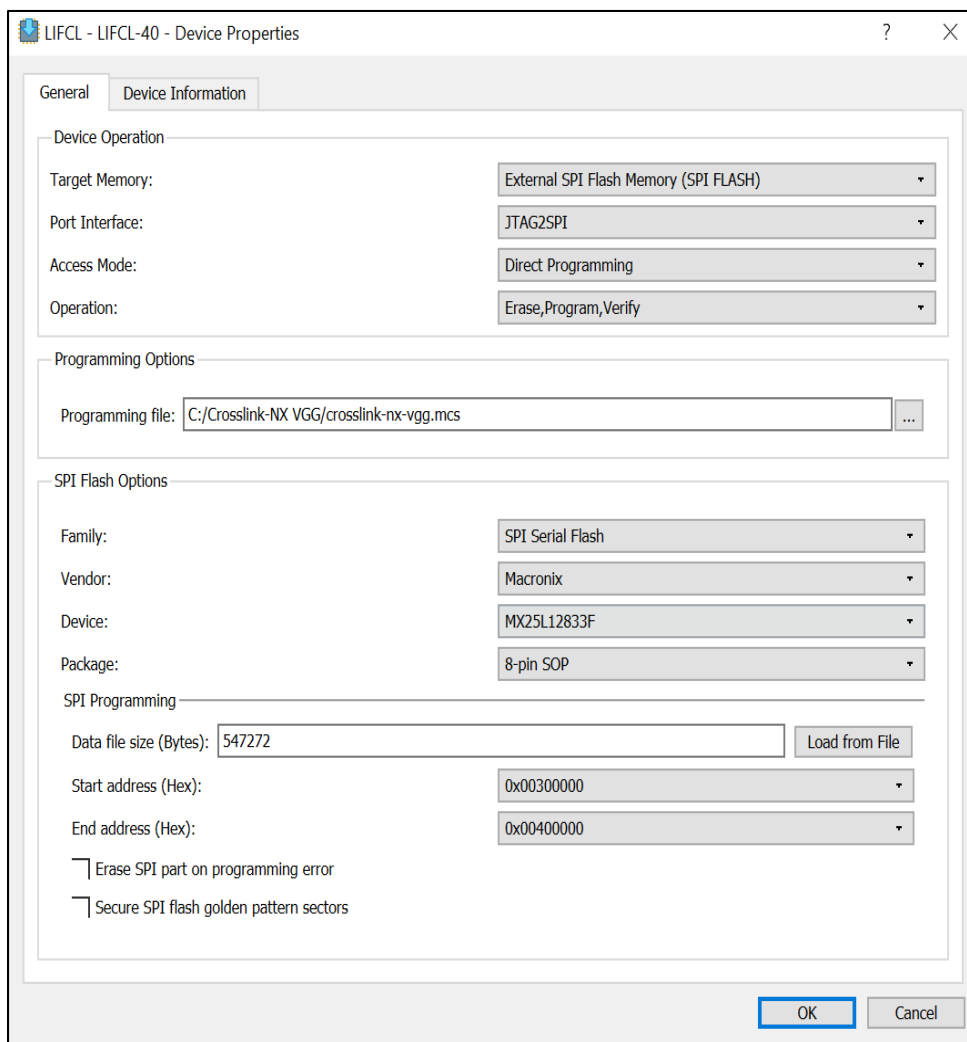


Figure 4.7. Radiant Programmer – Selecting Device Properties Options for CrossLink-NX Voice and Vision Flashing

6. Click **Load from File** to update the data file size (bytes) value.
7. Ensure that the following addresses are correct:
 - **Start Address (Hex) – 0x00300000**
 - **End Address (Hex) – 0x00400000**
8. Click **OK**.

9. Press the **SW4** push button switch. Click the **PROGRAMN** push button and hold it until you see the *Successful* message in the Radiant log window.
10. Click the **Program** button  to start the programming operation.
11. After successful programming, the **Output** console displays the result as shown in [Figure 4.8](#).



Figure 4.8. Radiant Programmer – Output Console

5. Running the Demo

To run the demo:

1. Cycle the power on the Voice and Visio board.
2. Make sure the position of SWITCH0 is **ON** to set FX3 to boot from I²C EEPROM.
3. Connect the Voice and Vision board to the PC through the board's USB3 port.
4. Open the AMCap or VLC application and select the **FX3** device as source.
5. The camera image is displayed on monitors, as shown in [Figure 5.1](#).



Figure 5.1. Running the Demo

6. The demo output contains bounding boxes for detected humans in a given frame. It also displays the total number of detected humans in a given frame on the PC.

Technical Support Assistance

Submit a technical support case through www.latticesemi.com/techsupport.

Revision History

Revision 1.0, December 2020

Section	Change Summary
All	Initial release



www.latticesemi.com