SENSE • CONNECT • CONTROL

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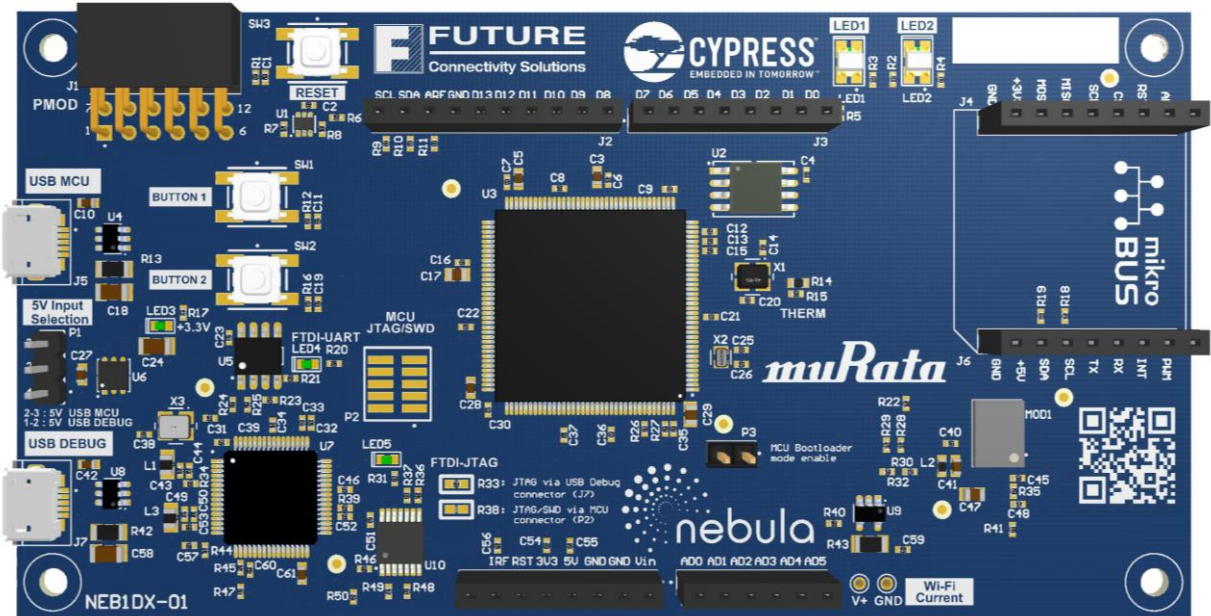
# Nebula IoT Reference Design Board

## The possibilities are endless!

- Use the different interfaces to add on development boards from our growing list of Future IoT ready boards
- Application Examples:
    - Sensors
        - Proximity
        - Ambient light
        - Motion
        - Temperature
        - Humidity
        - Pressure
        - Gesture Recognition
        - UVA/UVB
    - Motor Control

# Cypress Murata Certified WiFi + Bluetooth Combo Module

- Murata 1DX certified module  - Part Number LBEE5KL1DX-883

- Inside is a Cypress CYW4343W Wi-Fi and Bluetooth chipset radio

- Single Band 2.4GHz 802.11 b/g/n
    - Over SDIO Interface

- Dual Mode (Classic BT + BLE) Bluetooth v4.1 + EDR Radio
    - Over UART Interface

- Single ended RF port using single antenna

- Radio Regulatory Certifications
    - USA/Canada FCC ID : VPYLB1DX IC : 772C-LB1DX
    - Europe EN300328 v1.9.1
    - 4.2. Bluetooth® Qualification QDID: 7306
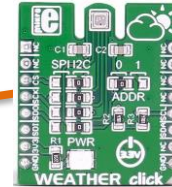
- Size: 6.95 x 5.15 x 1.1 mm
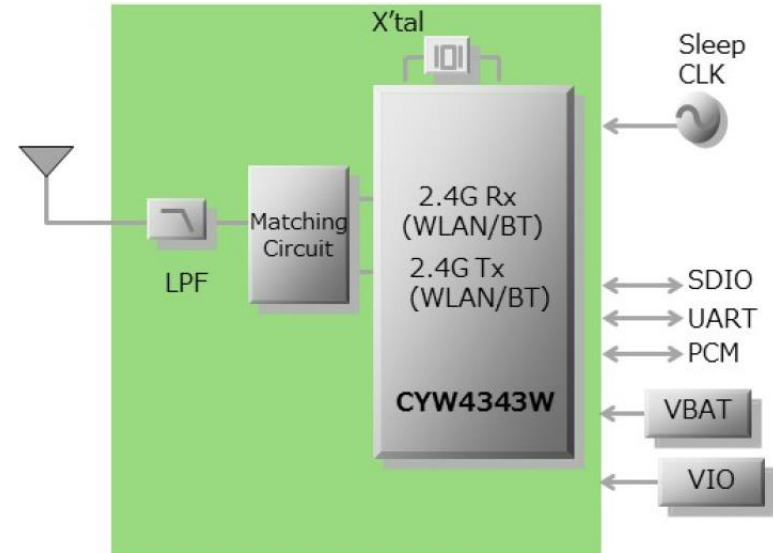
# Sensor add-on Shields-MikroBUS™ boards

## MikroBUS™ Sensor Shield Example
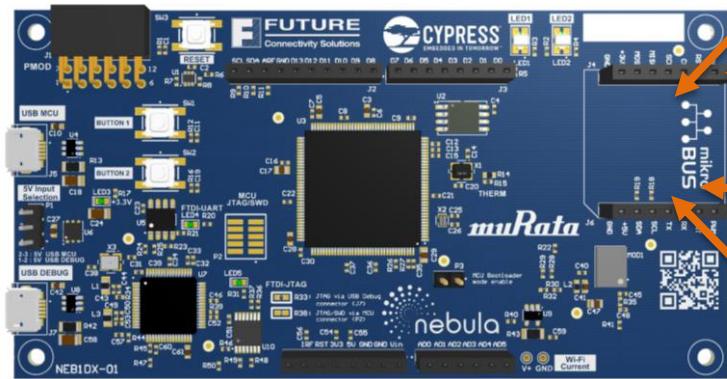


Proximity Sensor Shield
MIKROE-1897

Weather Click
MIKROE-1978

Magneto 2 Click
MIKROE-1938

SHT Click Sensor Shield
MIKROE-2101

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# Sensor add-on Shields-MikroBUS™ boards

- Shield based on ST Microelectronics' proximity sensor VL6180X
- Sensor consists of:
  - IR Emitter
  - Ambient light sensor
  - Range sensor
- Calculates distance by measuring the time it takes for a photon to travel to the nearest object and back
- Communicates with the Nebula board through mikroBUS I²C pins
- Size: 28.6 x 25.4 mm

VL6180X



Proximity Sensor Shield
MIKROE-1897

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# How to use the LightRanger Click board with the Nebula IoT Board

# Hardware Prerequisites

- 1 x Nebula IoT development kit (NEB1DX-01)
- 1 x LightRanger Click board (MIKROE-1897)

- 1x USB cable
- 1 PC



LightRanger Click board



Nebula IoT Development kit

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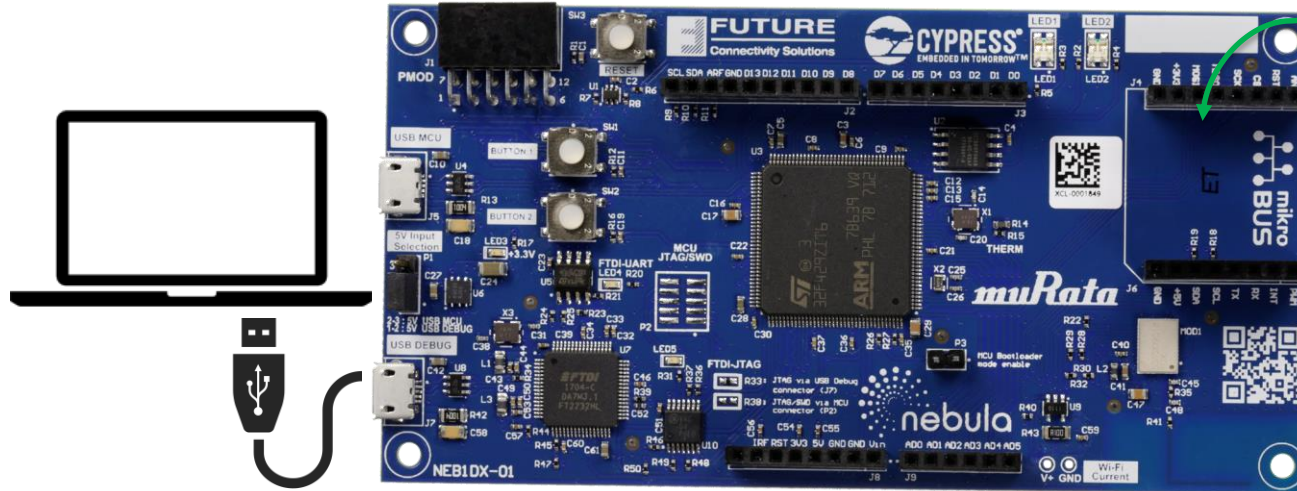
# Software Prerequisites

- Example code " vl6180x_test" make target built in WICED
- WICED Studio 5.2 ( and later)

Download Terminal Emulator ( if you don't have one)

- TeraTerm Pro is available (for free) at:
  - http://download.cnet.com/Tera-Term/3000-20432_4-75766675.html
  - Download "teraterm-4.89.exe'" (or later). Run it.
  - (The current installer is in the "Tools" subdirectory of the memory stick. )
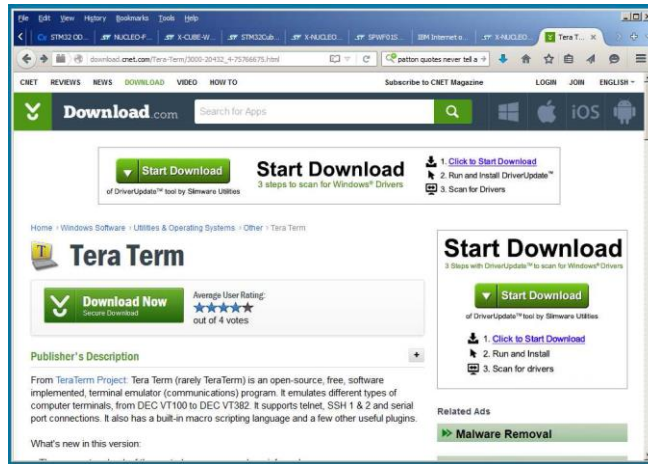
# WICED Walkthrough

# WICED Studio SDK: Download

Download **WICED Studio 5.2 or later**:

Windows:

https://community.cypress.com/docs/DOC-13651

Linux or OS X:

https://community.cypress.com/community/wiced-wifi/wiced-wifi-documentation

# WICED Studio: IDE Overview

**Device Selector**
Choose your device

**Debug Icon**
Launch debugger

**Editor**
Edit the firmware

**Workspace Perspective**
Switch between editor and debug views



**Make Target**
Build your application
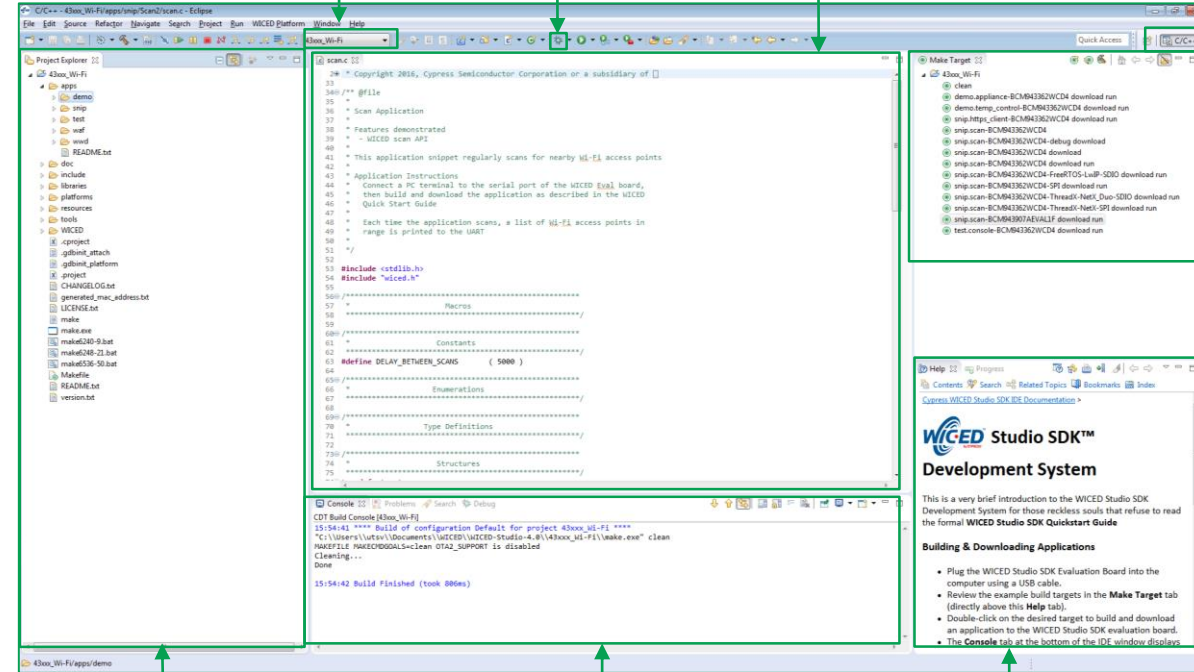
**Project Explorer**
Explore the SDK

**Console Window**
View the build output

**Help**
Learn how to build/run an application

# WICED Studio SDK: Device Selection

Use the pull-down menu to change the device
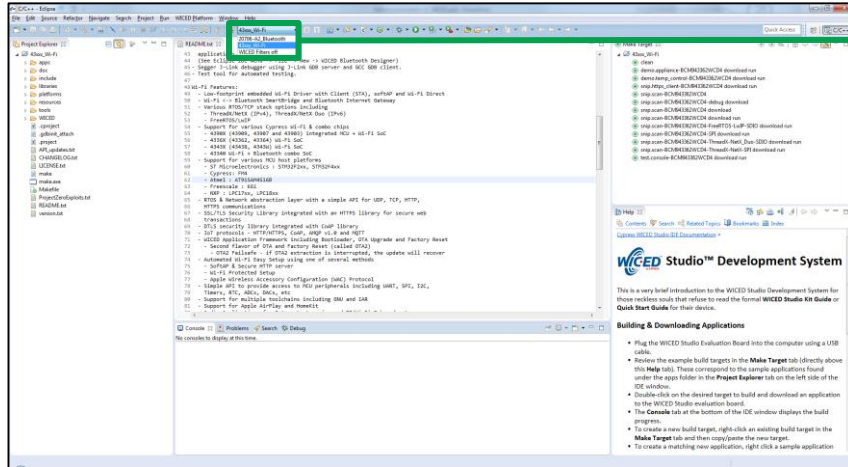


**Pull-down menu options:**

*20706-A2_Bluetooth* – Bluetooth (BR/EDR/BLE) SoC with ARM® Cortex®-M3

*43xxx_Wi-Fi* – Wi-Fi + Bluetooth Combo SoCs, Wi-Fi SoCs with integrated MCU, and Wi-Fi-only SOCs

*WICED Filters off* – Show all available devices

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# WICED Studio SDK: Example Applications

Choose the relevant sub-folder from the *43xxx_Wi-Fi -> Apps* folder in the *Project Explorer*

*Demo* – Advanced applications that combine multiple WICED features

*Snip* –    Application snippets that use various WICED APIs

*Test* –    Manufacturing/certification-related test applications and utilities

*WAF* –   Applications that are part of the WICED Application Framework (WAF) like bootloaders

*WWD* – Applications that use low-level APIs provided by the WICED Wi-Fi Driver (WWD) and do not use the WICED APIs provided by the WICED Application Framework

**Read the *README.txt* files to learn about the contents of the respective folder**

Apps folder

Demo folder

Snip folder

# WICED Studio SDK: Platform Selection

Browse the **43xxx_Wi-Fi** device folder to the **Platforms** folder in your **Project Explorer** to view the hardware platforms available for your device.

Read the README.txt file located within the folder for every platform for details about each hardware platform.
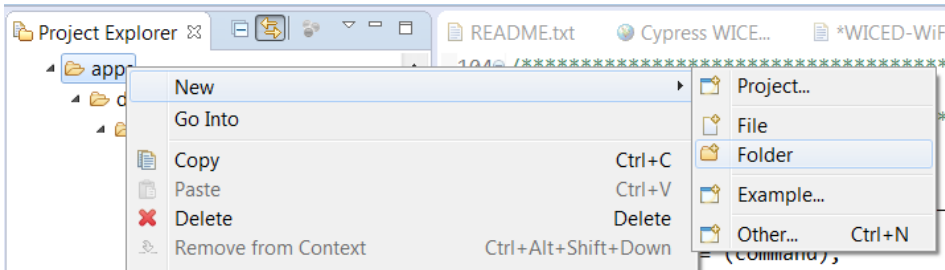
Wi-Fi/Wi-Fi + BT Platforms
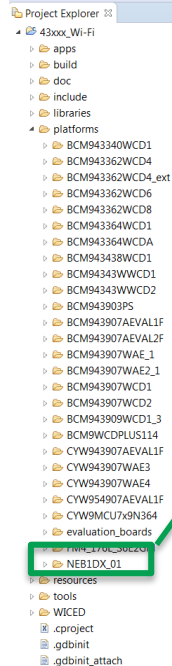
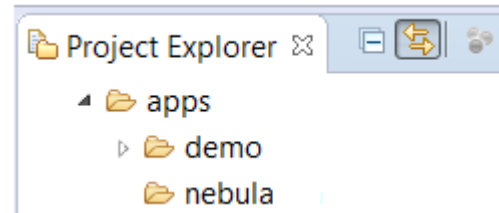Nebula Platform Folder with README.txt file
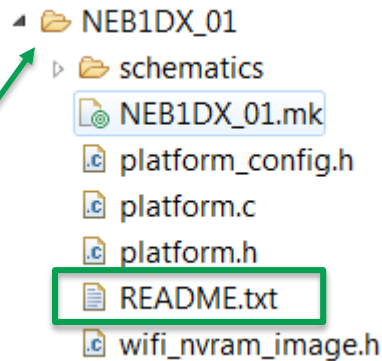
# WICED Studio SDK: Create and Build your Own Application

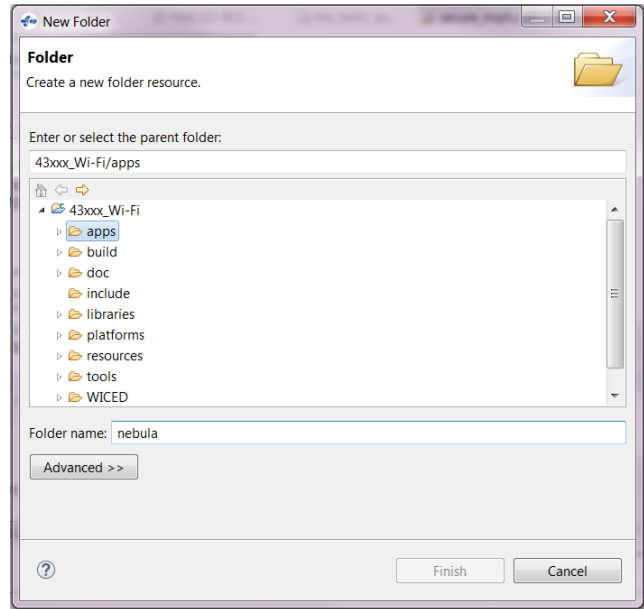**1** Create a new Folder in the *apps* folder called *nebula*.
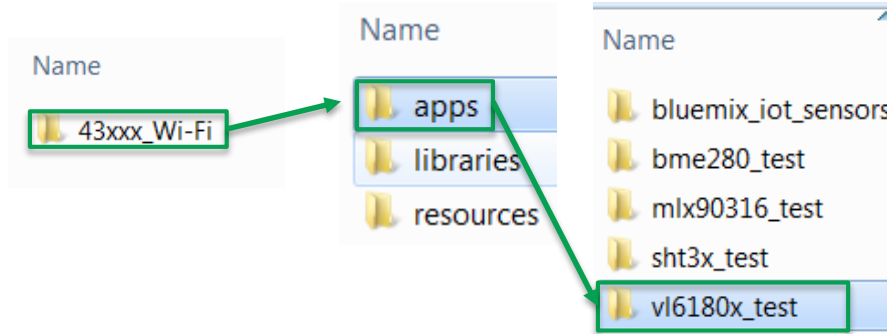
Creating a new folder in the *apps* directory



Creating a new folder in the *apps* directory
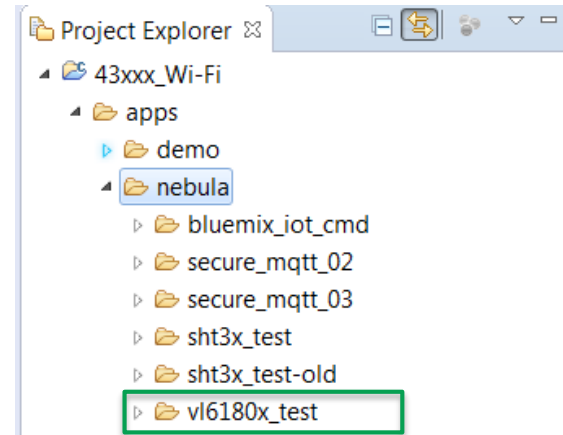


Expected result:

# WICED Studio SDK: Create and Build your Own Application

**2** Copy the example "vl6180x_test" code into the nebula folder.
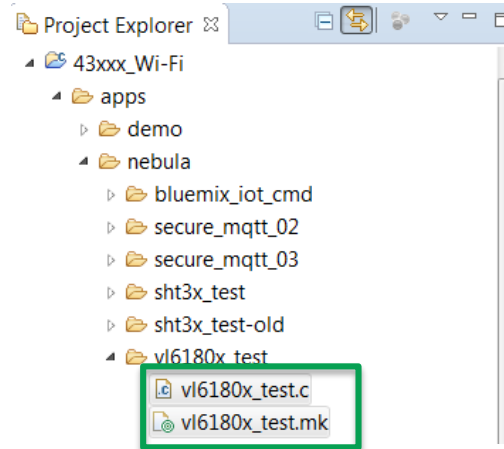
Vl6180x  application code

Vl6180x application is copied and pasted under *43xxx_Wi-Fi* → *Apps* → *nebula*

# WICED Studio SDK: Create and Build your Own Application

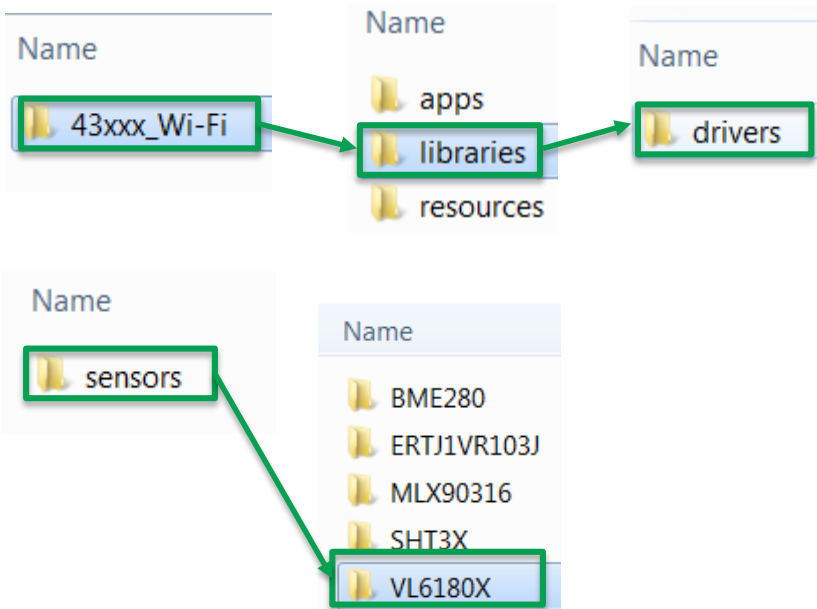**3** Ensure the .c and .mk files are in the directory

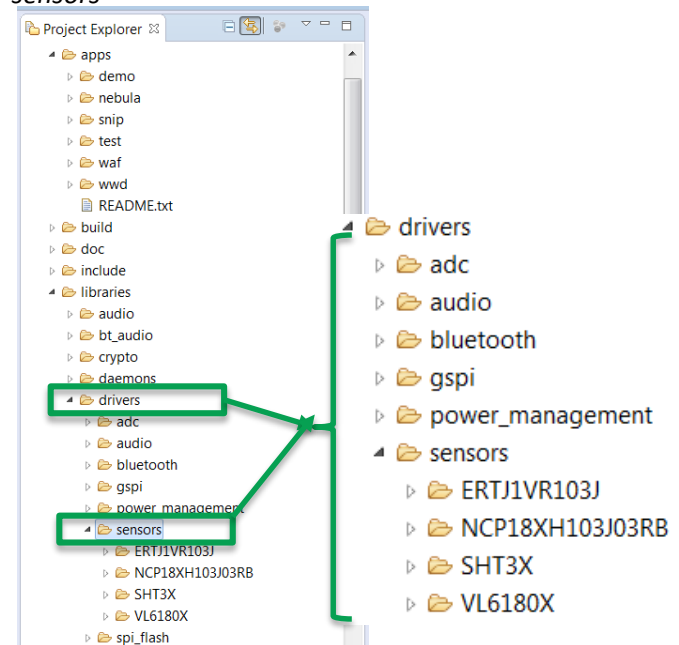*vl6180x_Test.c* and *vl6180_test.mk*

# WICED Studio SDK: Create and Build your Own Application

**4** Copy the VL6180X drivers into the WICED directory

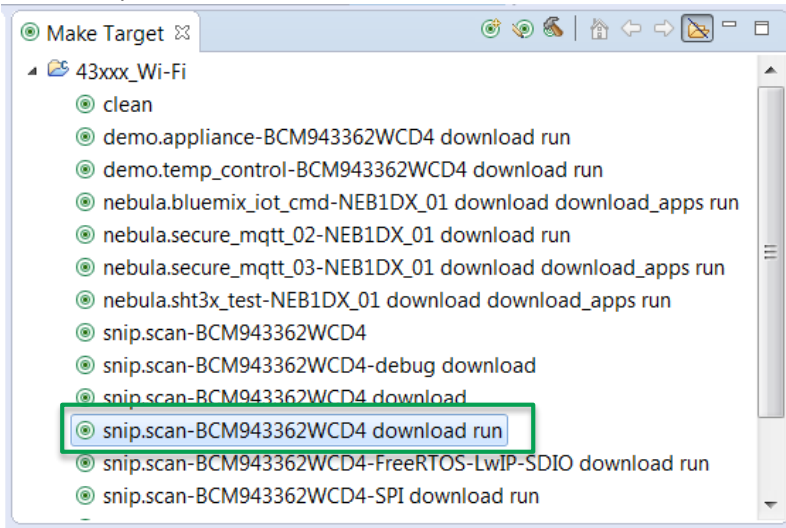Driver code is located under *sensor_code>libraries>drivers>sensors>VL6180X*

Paste it in WICED under *libraries > drivers > sensors*

# WICED Studio SDK: Create and Build your Own Application

**5** In the ***Make Target*** window right-click and copy an example build target that ends with ***download run.***

Select *snip.scan-BCM943362WCD4 download run*
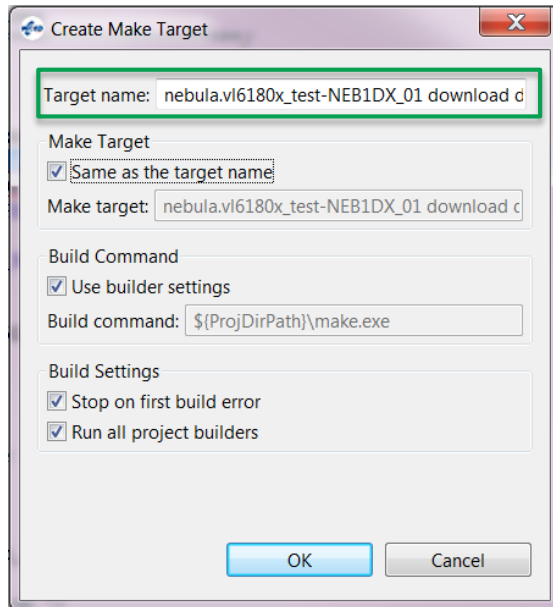


**6** Paste the example build target in the ***Make Target*** window. The ***Create Make Target*** window opens automatically to enable you to edit build options.
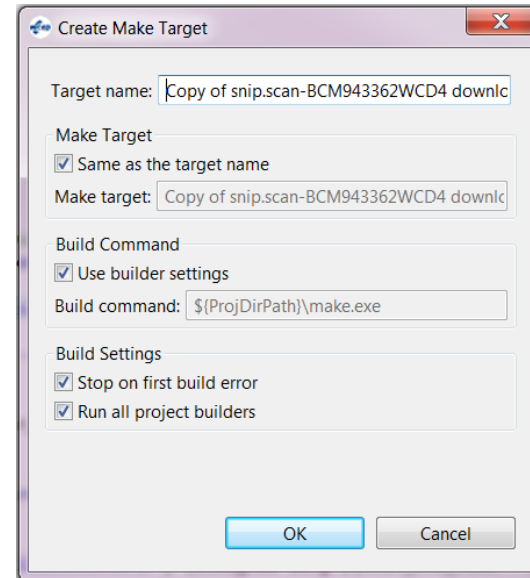
# WICED Studio SDK: Create and Build your Own Application

**7** Modify the ***Target name*** to match the following format:
*<application.folder.path>-<target platform> download download_apps run* and press *OK*.

The target name is modified to **nebula.vl6180x_test-NEB1DX_01 download download_apps run**

Create Make Target

Target name: nebula.vl6180x_test-NEB1DX_01 download d

Make Target
☑ Same as the target name

Make target: nebula.vl6180x_test-NEB1DX_01 download c

Build Command
☑ Use builder settings

Build command: ${ProjDirPath}\make.exe

Build Settings
☑ Stop on first build error
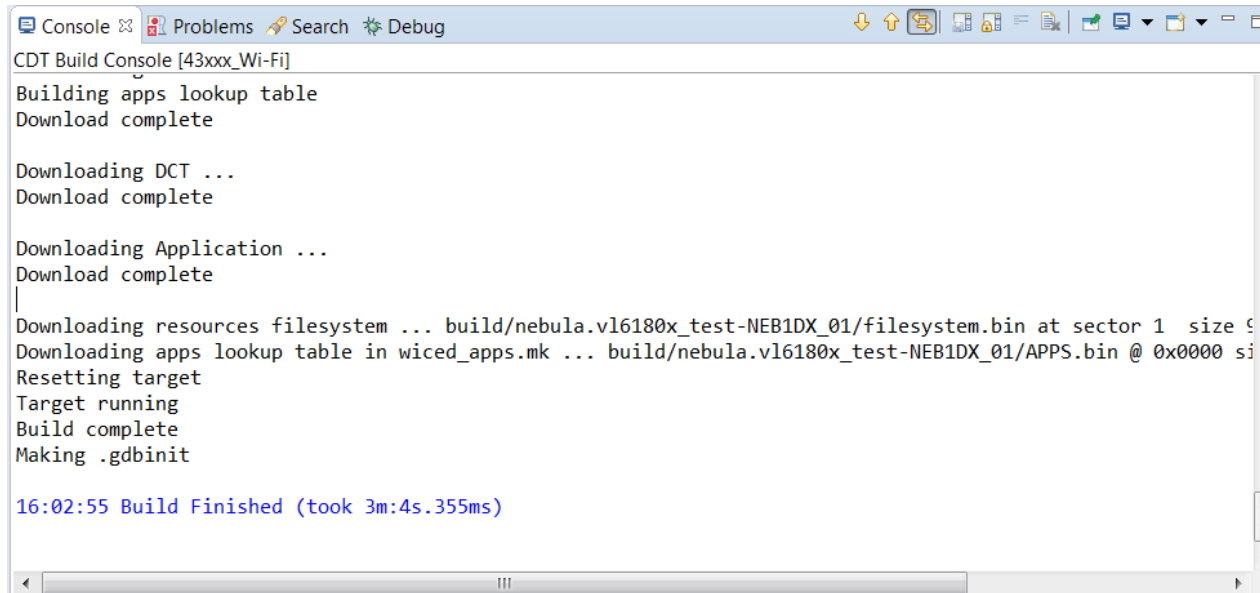☑ Run all project builders

OK        Cancel

You only need to include the **download_apps** option if you expect that the external flash needs to be updated. Since this is our first build and the Wi-Fi module firmware is a resource stored in the external flash, we need to include this to make sure it is properly programmed.

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# WICED Studio SDK: Create and Build your Own Application

**8** Double-click the newly created make target ***nebula.vl6180x_test-NEB1DX_01 download download_apps run*** to build, download, and run your application.

*Console* window showing build output

# WICED Studio SDK: Create and Build your Own Application

**9** Open a terminal program, observe output.

Expected result



Baud rate: 115200
Data: 8 bit
Parity: none
Stop: 1 bit
Flow control: none

Shine a flashlight near the proximity sensor on the click board and observe the ambient light reading.

# THANK YOU!