Getting Started Guide

mmWave Studio CLI Tool

Overview

This tool is a demonstration of controlling mmwave sensor using command line interface (CLI). Here is the list of features this tool provides

- Command line interface to configure the mmwave sensor device over UART.
- It uses all the CLI inputs from a text config file, so user can control the tool's functionalities from this file.
- It supports CFG or JSON input file format for mmwave sensor configuration parameters.
- Configures the DCA1000EVM and capture the ADC data from mmwave sensor to PC over Ethernet.
- Capture the monitoring report generated from mmwave sensor to JSON files and later plot those data.
- Post process the captured ADC data using Matlab tool.

Requirements

1. **Hardware and Software Requirements**

Item	Details
Device	AWR1843BOOST, IWR1843BOOST, AWR1642BOOST, IWR1642BOOST AWR6843ISK, IWR6843ISK with Industrial mmWave Carrier Board. Or any custom mmWave Sensor board which has RS232 UART interface available over COM port. And DCA1000EVM for ADC Data capture.
Computer	PC with Windows 7 or 10. If a laptop is used, please use the 'High Performance' power plan in Windows.
Micro USB Cable	Micro USB cable for mmwave sensor and DCA1000EVM board.
Power Supply	5V, >3.0A with 2.1-mm barrel jack (center positive). One for mmwave sensor EVM and another for DCA1000EVM board.

Software

Tool	Version	Required For	Download Link
TI mmWave SDK	3.5.0.x	Compilation of device application for different device variants.	TI mmWave SDK 3.5.0.x and all the related tools are required to be installed as specified in the mmWave SDK release notes
Uniflash	Latest	Quickstart Firmware	Download offline tool or use cloud version

Python	3.8+	To Plot the Monitor Report JSON files. Other libraries: ▪ Scipy ▪ Matplotlib ▪ Numpy	Download Use Pip for library downloads.

Quickstart

The quickstart guide will cover setting up the EVM, flashing firmware, and running the demo.

1. **Setup the EVM for Flashing Mode**
   - For xWR1xxx: follow the instructions for Hardware Setup of xWRXXXXBOOST for Flashing Mode
   - For xWR6843ISK in Standalone/Modular Mode: Follow the instructions for Hardware Setup of xWR6843ISK/ODS for Flashing Mode
   - For MMWAVEICBOOST + Antenna Module setup: Follow the instructions for Hardware Setup for Flashing in MMWAVEICBOOST Mode

> **Note**:
> i. Same flashing steps for AWR and IWR EVMs.
> ii. Disconnect DCA1000EVM MIPI connector from mmWave Sensor board while flashing using UniFlash.

2. **Flash the EVM using Uniflash**

Flash the binary associated with the EVM platform listed below using UniFlash. Follow the instructions for using UniFlash

Platform	BIN Name	Location
18xx	mmwave_Studio_cli_xwr16xx.bin	<MMWAVE_PLATFORM_TOOLBOX_INSTALL_DIR>\mmwave_platform_toolbox_<ver>\tools\studio-cli\src\pre-built-Binaries\
68xx	mmwave_Studio_cli_xwr68xx.bin	<MMWAVE_PLATFORM_TOOLBOX_INSTALL_DIR>\mmwave_platform_toolbox_<ver>\tools\studio-cli\src\pre-built-Binaries\
16xx	mmwave_Studio_cli_xwr16xx.bin	<MMWAVE_PLATFORM_TOOLBOX_INSTALL_DIR>\mmwave_platform_toolbox_<ver>\tools\studio-cli\src\pre-built-Binaries\

3. **Setup the EVM for Functional Mode**

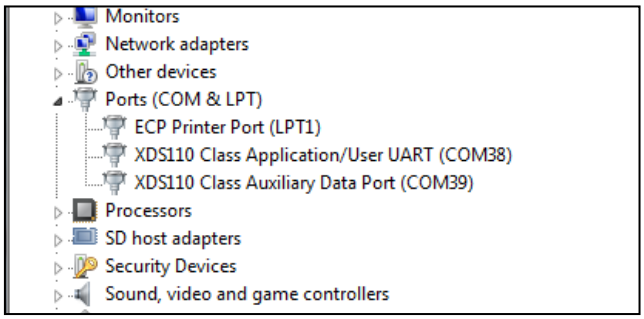
   - For IWR6843ISK in Standalone/Modular Mode: Follow the instructions for Hardware Setup of IWR6843ISK/ODS for Functional Mode
   - For 18xx: Follow the instructions for Hardware Setup of IWRXXXXBOOST for Functional Mode
   - For MMWAVEICBOOST + Antenna Module setup: Follow the instructions for Hardware Setup of MMWAVEICBOOST + Antenna Module for Functional Mode
   - Connect DCA1000EVM with mmWave Sensor EVM using Blue MIPI Connector and USB cable to J1 [RADAR_FTDI].

At this point, the EVM + DCA1000EVM should be powered, connected to the PC, flashed with the demo, and put in functional mode. The hardware setup is now complete.

4. Run the Tool

- CLI Tool uses 'mmwaveconfig.txt' file for input parameters available at '\gui\mmw_cli_tool\' path. So user needs to set at least device type (MMWAVE_DEVICE_VARIANT) and COM port number (COM_PORT_NUM). Refer Developer's Guide to get each parameter detail of mmwaveconfig.txt file.

  - User COM port number which is enumerated as 'XDS110 Class Application/User UART' in the device Manager.



- To Capture the ADC data using DCA1000EVM with this tool
  - Connect DCA1000EVM with mmWave Sensor EVM.
  - Connect Ethernet cable from DCA1000EVM to PC and set PC IP address to 192.168.33.30 & Sub Net Mask as 255.255.255.0. DCA1000EVM Quick Start Guide.
  - Set 'ENABLE_DCA_CAPTURE' to '1' in mmwaveconfig.txt file.

List of parameters to change in mmwaveconfig.txt for each type device variants.
For xWR18xx: MMWAVE_DEVICE_VARIANT=AWR1843 (or IWR1843) CONFIG_FILE_FORMAT=1 CONFIG_JSON_CFG_PATH=..\..\src\profiles\profile_monitor_xwr18xx.cfg DCA_LVDS_LANE_MODE=2
xWR68xx: MMWAVE_DEVICE_VARIANT=AWR6843 (or IWR6843) CONFIG_FILE_FORMAT=1 CONFIG_JSON_CFG_PATH=..\..\src\profiles\profile_monitor_xwr68xx.cfg DCA_LVDS_LANE_MODE=2
xWR16xx: MMWAVE_DEVICE_VARIANT=AWR1642 (or IWR1642) CONFIG_FILE_FORMAT=1 CONFIG_JSON_CFG_PATH=..\..\src\profiles\profile_monitor_xwr16xx.cfg DCA_LVDS_LANE_MODE=2

Note: Refer developer's guide for detailed info for each parameters of mmwaveconfig.txt file.

- Execute the CLI TOOL located in:
  - ***\ gui\ mmw_cli_tool\ mmwave_studio_cli.exe***
  - The executable provided only works in a Windows OS

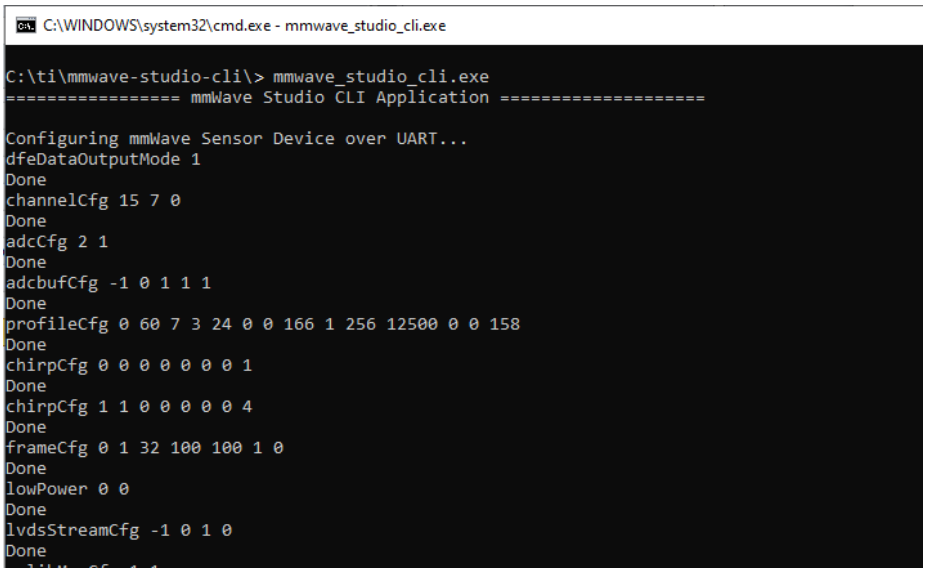


Figure 1 CLI Tool Execution

- Based on default setting of mmwaveconfig.txt file CLI tool will first configures the mmWave Sensor over COM port, setup DCA1000EVM for Data capture. At frame trigger (sensorStart), it will start DCA1000 for ADC data capture and in parallel capture the Monitor Reports (ENABLE_MONITOR_CAPTURE=1) over the same UART to JSON files.
- If limited number of frames are given in *.cfg or *.json file then after those are over, CLI tool will proceed further and process the captured ADC data using mmw_post_proc\mmwave_postproc.exe

As such, mmwave_postproc Tool requires a specific Matlab runtime engine (v8.5.1 32-bit) to properly install.

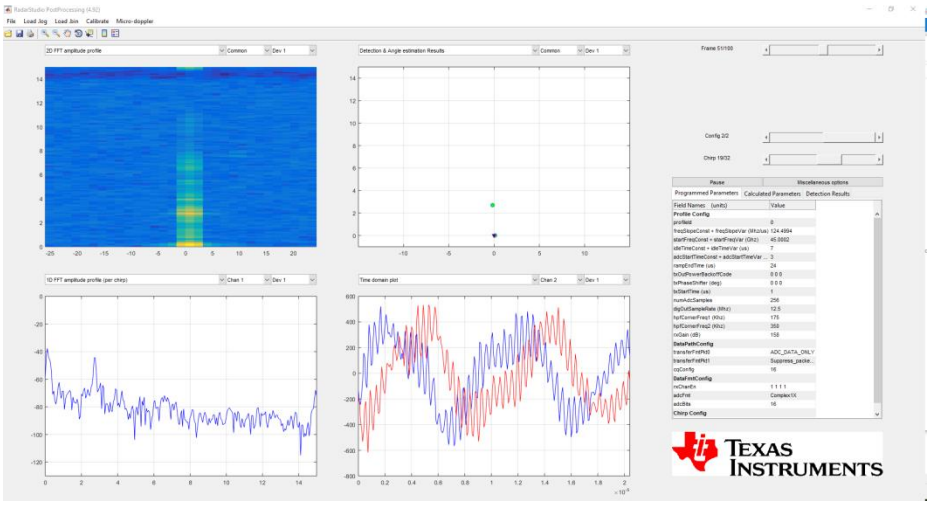


Figure 2 Post Processing Utility

- Provide ‘quit’ command in CLI prompt to terminate this exe.
- If ENABLE_MONITOR_CAPTURE=1 in mmwaveconfig.txt file then this tool stores each monitor report to individual JSON file at the path defined as MONITORING_JSON_PATH in the mmwaveconfig.txt file.
- Later user can plot the captured monitor JSON file using script available at ‘gui\monitor_plot_tool’ directory. Follow readme.txt file for pre-requisite. Command to run this script-

- plots_gui.py [<path_to_JSON_reports>]

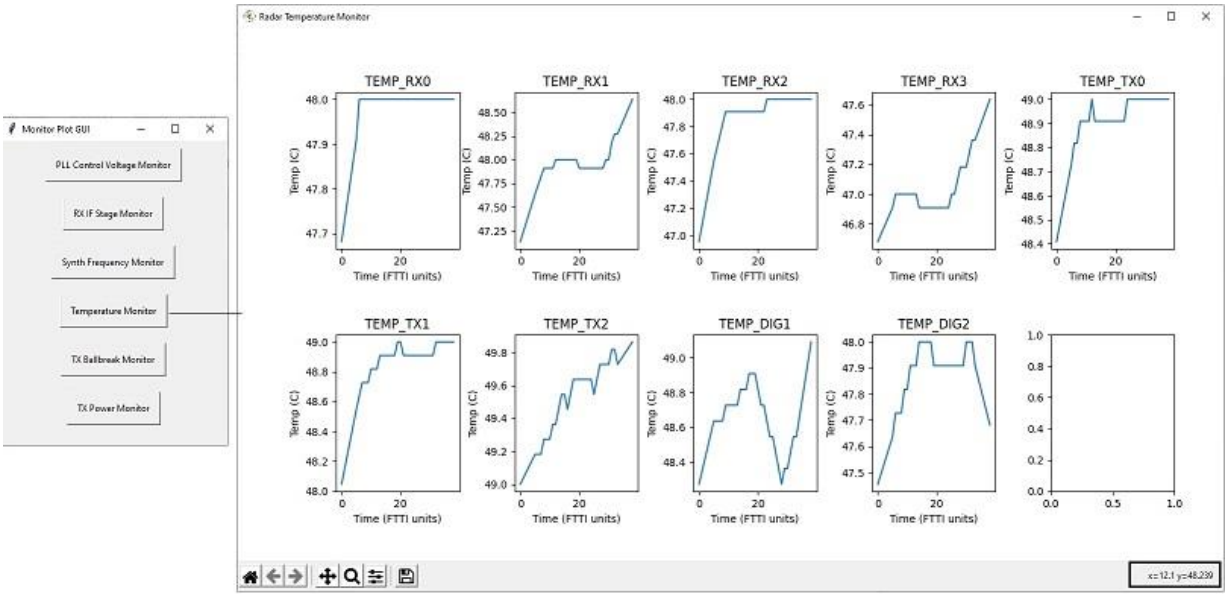


Figure 3 Monitor Report Plots

Appendix

- Refer Release Notes for limitation and known issues.
- Refer Developer's Guide for in depth detail of this tool.