

User Manual

**Nvidia Jetson Series Carrier board
Aetina AX710**

Document Change History

Version	Date	Description	Authors
V1	2019/09/26	Initial Release.	Eric Chu

1. Introduction

Support for NVIDIA® Jetson™ AGX Xavier and Jetson™ AGX Xavier 8GB. You can quickly emulate the functionality of your desired end product for software development and hardware verification.

To build a functional prototype of your target system you will need:

- Nvidia Xavier / Xavier 8GB module
(Aetina's P/N: NSO-MD-Xavier-B/NSO-MD-XavierL)
- Carrier board (Aetina's P/N: AX710)
- Power adaptor 12-20 DC/5A

Note: Partial support TX2i function.

1.1 Features

- Specifically designed for high performance and low-power envelope AI computing
Additional driver to support Embedded peripheral modules for multiple I/O expansion capability
- On-board 2x HDMI, 1x M.2 M Key, 1x M.2 E Key and 3x RJ45 to support rich multimedia.
- Extended temperature range -40°C to 85°C
- Suitable for general robotics, UAV, industrial inspection, medical imaging and deep learning.
- 4x iPEX connector to support Aetina MIPI CSI-II adapter

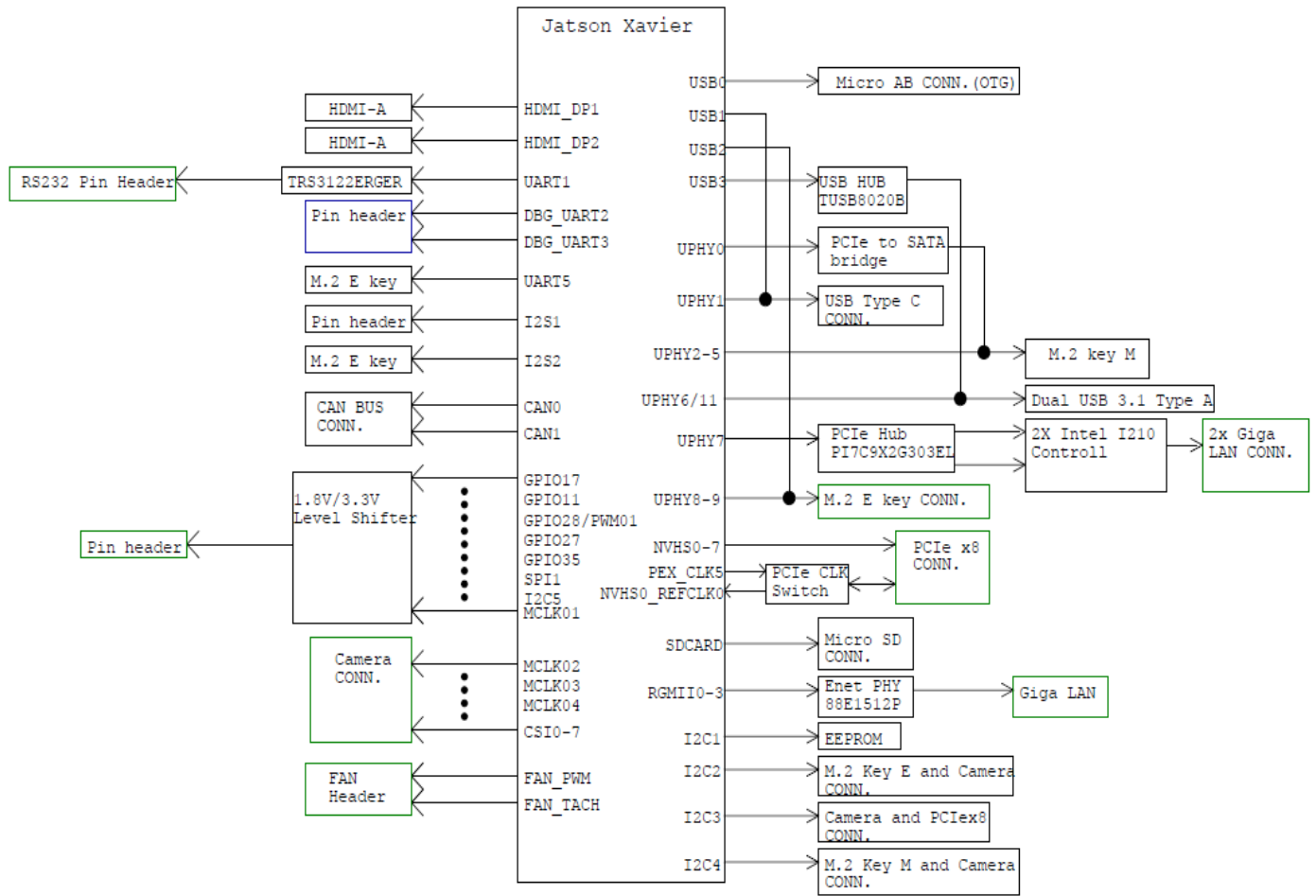
1.2 Board

- 8-layer printed circuit board(PCB)
- Physical dimensions: 112mm x 107mm

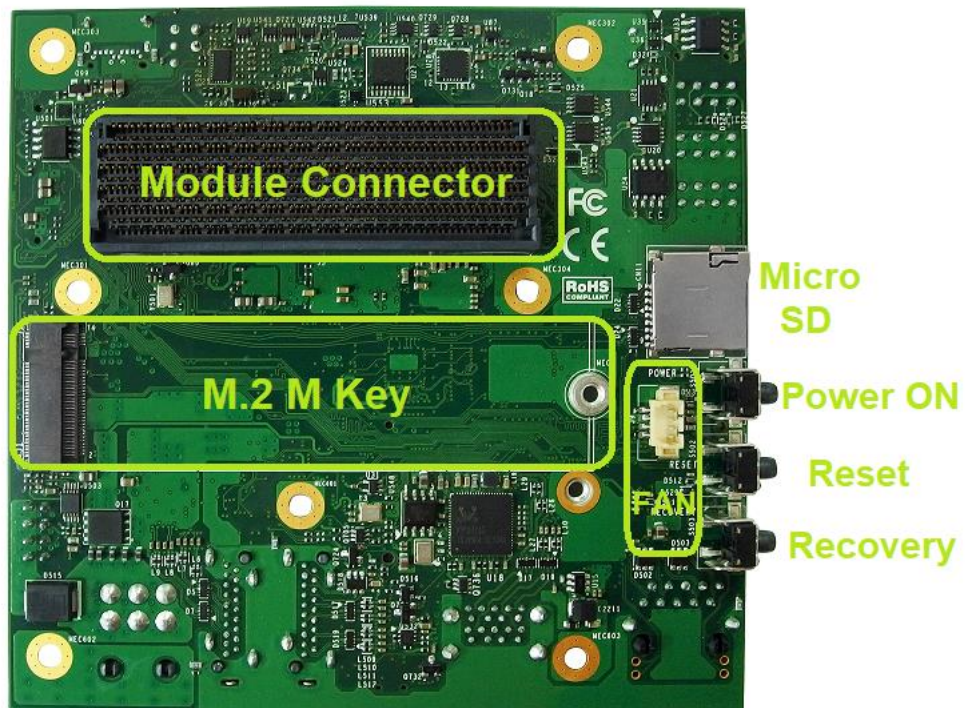
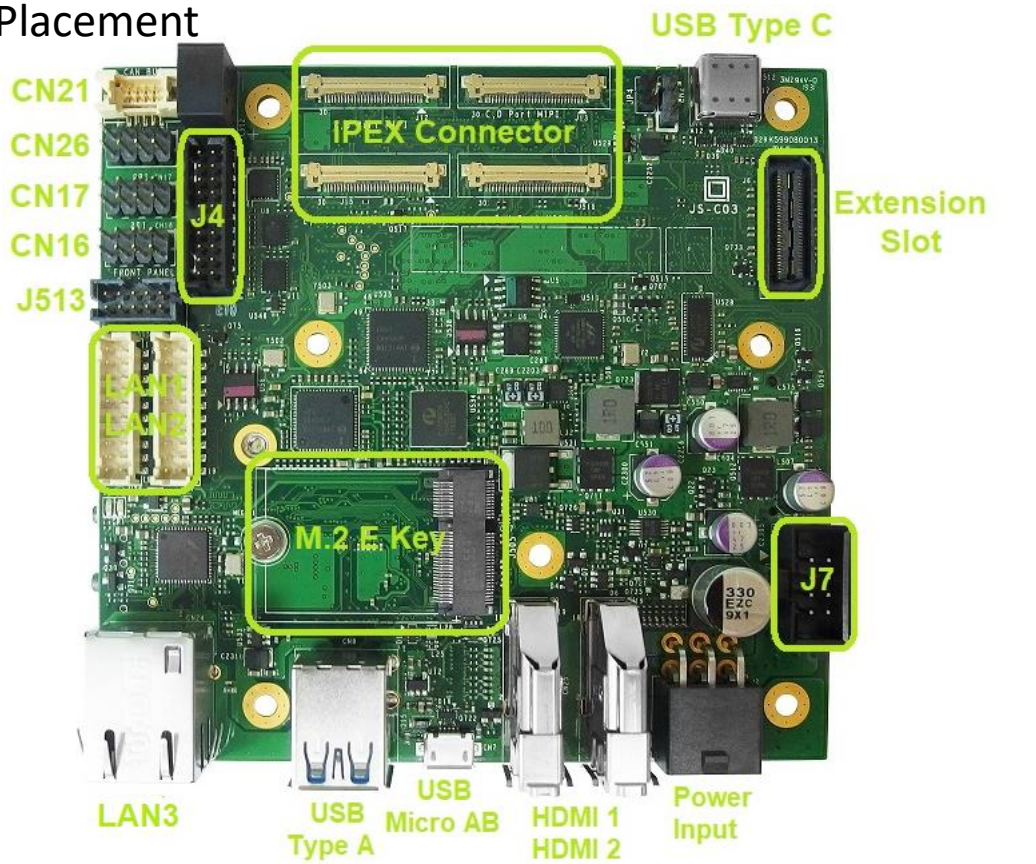
2. Board Specification

Specification	AN310 Description
Module Compatibility	Nvidia Jetson AGX Xavier / Nvidia Jetson AGX Xavier 8GB
GPU	Jetson AGX Xavier : <ul style="list-style-type: none"> - Nvidia Volta™, 512 CUDA cores/64 Tensor cores. Jetson AGX Xavier 8GB: <ul style="list-style-type: none"> - Nvidia Volta™, 384 CUDA cores/48 Tensor cores.
CPU	Jetson AGX Xavier: <ul style="list-style-type: none"> - HMP Quad ARM® V8.2 CPU/2MB L2/4MB L3 Jetson AGX Xavier 8GB: <ul style="list-style-type: none"> - HMP Triple ARM® V8.2 CPU/2MB L2/4MB L3
Dimension	110mm x 107mm
Display	- 2 x HDMI
Audio	- HDMI Integrated / I2S
Ethernet	- 3 x Gigabit Ethernet(1x internal and 2x daughter board)
USB	- 2 x USB3.1 Type A - 1 x USB TypeC (Support USB2.0) - 1 x USB OTG Micro AB
SD CARD	- Micro SD CARD Slot
UART	- 2 x UART
RS232	- 1 x RS232
I2C	- 1 x I2C
GPIO	- 5 x GPIO
CAN Bus	- 2 x CAN
Input Power	- 9-20V / 5A DC input
Operating Temperature	- -40°C to + 85°C
Storage Temperature	- -40°C to + 125°C
Warranty	- 14 Months

3. Block Diagram

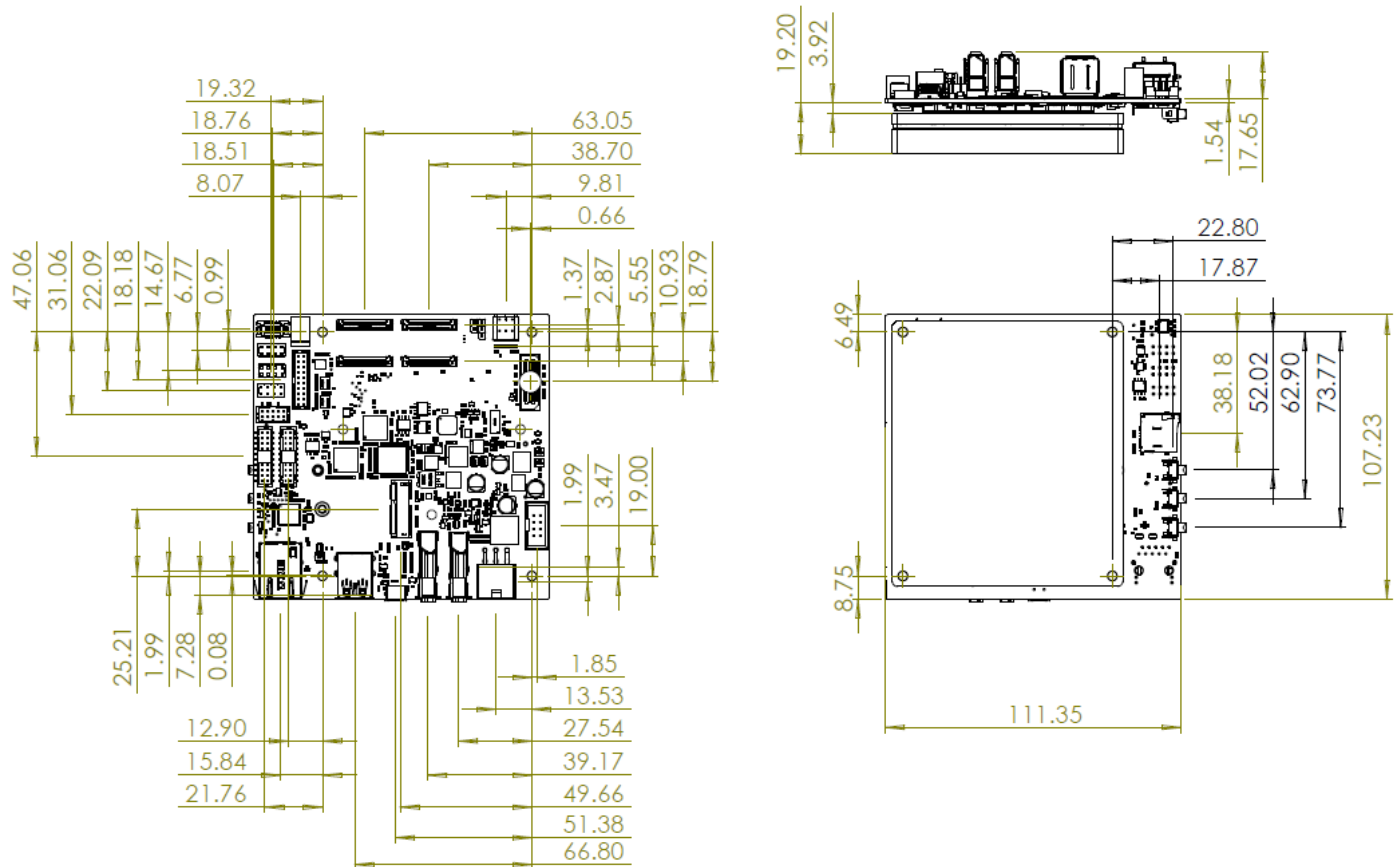


3.1 Board Placement



Module Connector	Compatible with Jetson AGX Xavier/Xavier 8GB
HDMI 1/ HDMI 2	Type A
M.2 M Key	Support PCIe/mSATA function device
M.2 E Key	Support PCIe/USB2.0 function device
USB Type A	Support up to USB3.1 device
USB Micro AB	Support OTG function only
USB Type C	Support USB2.0 function
LAN1/LAN2	Support Dual Isolated GbE LAN extension board
LAN3	Support 10
iPEX Connector	Support MIPI(CA-B01)/ FPD-LINKIII(CA-C01) daughter board.
CN16	Support I2S function.
CN17	Support SPI function.
CN21	Support CAN BUS function
CN26	AC OK/I2C
J513	Front Panel
J4	Extension IO
J7	DC output
Power Input	6 pins connector

3.2 Mechanical Dimensions



4. Connectors and Pin-outs

4.1 J513

Pin Define	PIN	PIN	Pin Define
Power On	1	2	GND0
Reset	3	4	GND1
Recovery	5	6	GND2
Sleep	7	8	GND3
LED+	9	10	LED-



*** In order to boot up the system, please quickly short-circuit Pin1 and Pin2.**

4.2 CN26

Pin Define	PIN	PIN	Pin Define
AC OK	1	2	GND
SOC_LED+	3	4	GND
+3V3	5	6	I2C_GP1_DAT_3V3
GND	7	8	I2C_GP1_CLK_3V3



* **Disable Pin1 and Pin2 can enable Auto power on function.**

4.3 J4

Pin Define	PIN	PIN	Pin Define
UART0_RXD_HDR_3V3	1	2	RS232_RXD
UART0_TXD_HDR_3V3	3	4	RS232_TXD
UART0_RTS_HDR_3V3	5	6	RS232_RTS
UART0_CTS_HDR_3V3	7	8	RS232_CTS
GND0	9	10	GND1
GPIO0	11	12	GND2
GPIO1	13	14	GND3
GPIO2	15	16	GND4
GPIO3	17	18	GND5
GPIO4	19	20	GND6

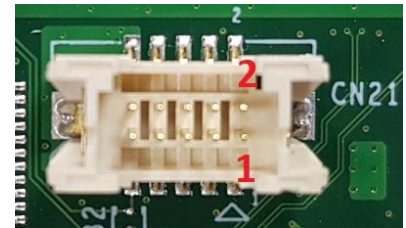


* **GPIO Pin define.**

H/W	Sysfs GPIO(Xavier/Xavier 8GB)
GPIO_0	GPIO17
GPIO_1	GPIO11
GPIO_2	GPIO28
GPIO_3	GPIO27
GPIO_4	GPIO35

4.4 CN21

CN21 Pin number	Define
PIN 1	CAN0H
PIN 2	CAN1H
PIN 3	CAN0L
PIN 4	CAN1L
PIN 5	CAN1_STBY
PIN 6	CAN1_STBY
PIN 7	CAN0_EN
PIN 8	CAN1_EN
PIN 9	CAN_WAKE
PIN 10	GND



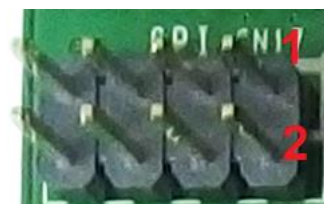
4.5 CN16

Pin Define	PIN	PIN	Pin Define
MCLK01_1V8	1	2	I2S1_FS_1V8
I2S1_DOUT_1V8	3	4	I2S1_DIN_1V8
SYS_RST_IN#	5	6	AUDIO_CDC_IRQ
I2S1_SCLK_1V8	7	8	GND



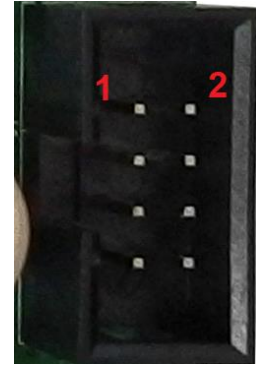
4.6 CN17

Pin Define	PIN	PIN	Pin Define
SPI1_SCK_3V3	1	2	N/A
SPI1_MISO_3V3	3	4	SPI1_MOSI_3V3
SPI1_CS0_3V3	5	6	SPI1_CS1_3V3
VDD_3V3	7	8	GND



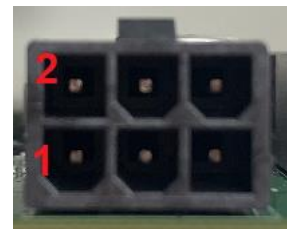
4.7 J7

Pin Define	PIN	PIN	Pin Define
VCC_SRC	1	2	GND
VCC_SRC	3	4	GND
VCC_SRC	5	6	GND
VCC_SRC	7	8	GND



4.8 Power Input

Pin Define	PIN	PIN	Pin Define
VCC_SRC	1	2	GND
VCC_SRC	3	4	GND
VCC_SRC	5	6	GND



5. BSP&DTB patch SOP.

SOP description

1. Download Nvidia SDK Manager from Jetson Download Center.
<https://developer.nvidia.com/embedded/downloads>
2. Install BSP by Nvidia SDK Manager (JetPack_4.2_Linux_P2880 folder)
Please refer to below link for Nvidia BSP download method.
For the BSP installation, please skip Step 5.
<https://docs.nvidia.com/sdk-manager/install-with-sdcm-jetson/index.html>
3. The SOP is based on NVIDIA SDK Manager version 0.9.14.4961.
4. The SOP is applied for Xavier R32.1 BSP and DTB patch file.
5. BSP folder path: ~/nvidia/nvidia_sdk/JetPack_4.2_Linux_P2888
(Home/nvidia/nvidia_sdk/JetPack_4.2_Linux_P2888)

Environment requirement:

1. Xavier Module and AX710 carrier
2. PC or Laptop (Include Ubuntu18.04)
3. USB Type A(Male) to Micro USB Type B(Male) OTG cable.

Process(Example AX710)

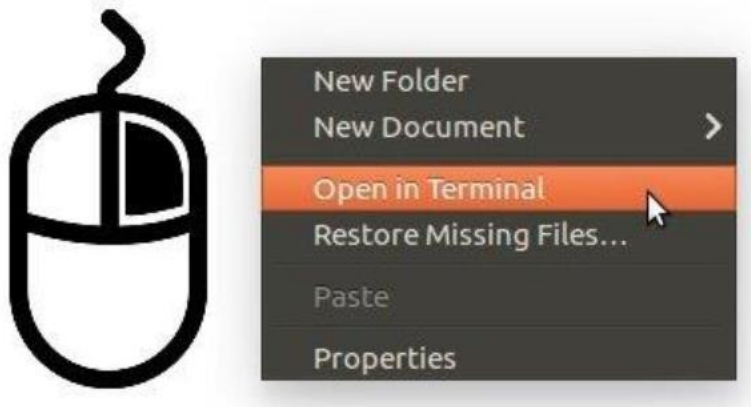
1. After download Nvidia BSP, enter "Home/nvidia/nvidia_sdk". Will find two folders.
Refer to below photo.



2. Copy DTB patch file to "Home/nvidia/nvidia_sdk". Refer to below photo.



3. Enter Terminal mode.



4. Type below command in Terminal mode.

`tar -zxvf patch file name`

EX: SOP example is for AX710 , DTB patch file name is R32_1_0_Xavier_AX710_1.tar.gz

Un-zip command: `tar -zxvf R32_1_0_Xavier_AX710_1.tar.gz`

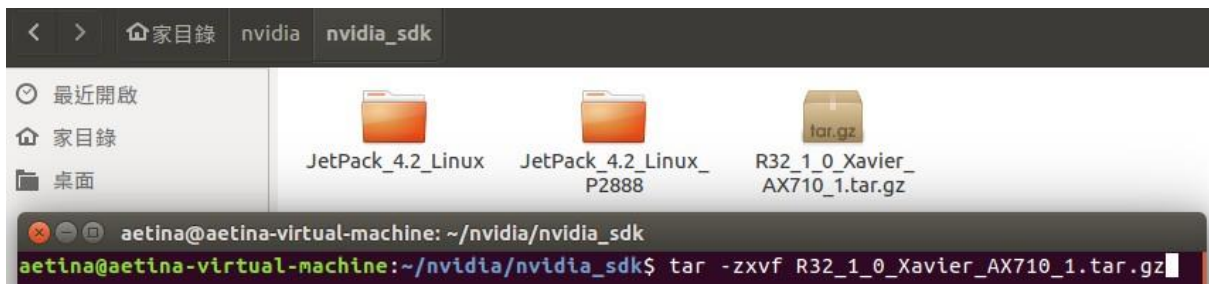
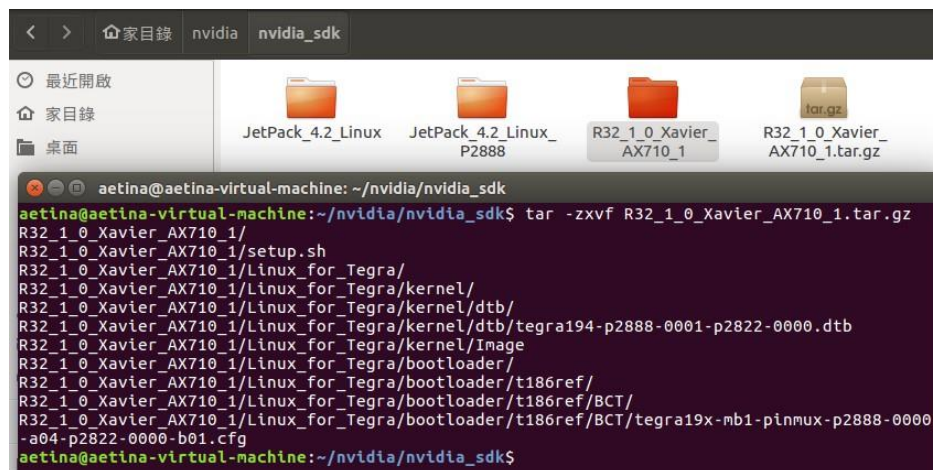


圖 1

5. After un-zip, will find R32_1_0_Xavier_AX710_1 folder. Refer to below photo.



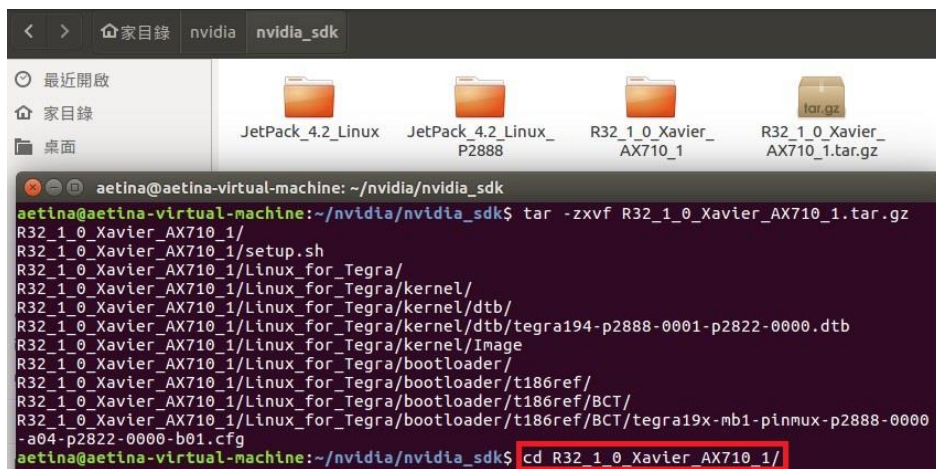
6. Enter DTB patch folder. Enter “R32_1_0_Xavier_AX710_1” folder. Refer to photo 1. After execution, refer to photo 2.

cd DTB patch folder name

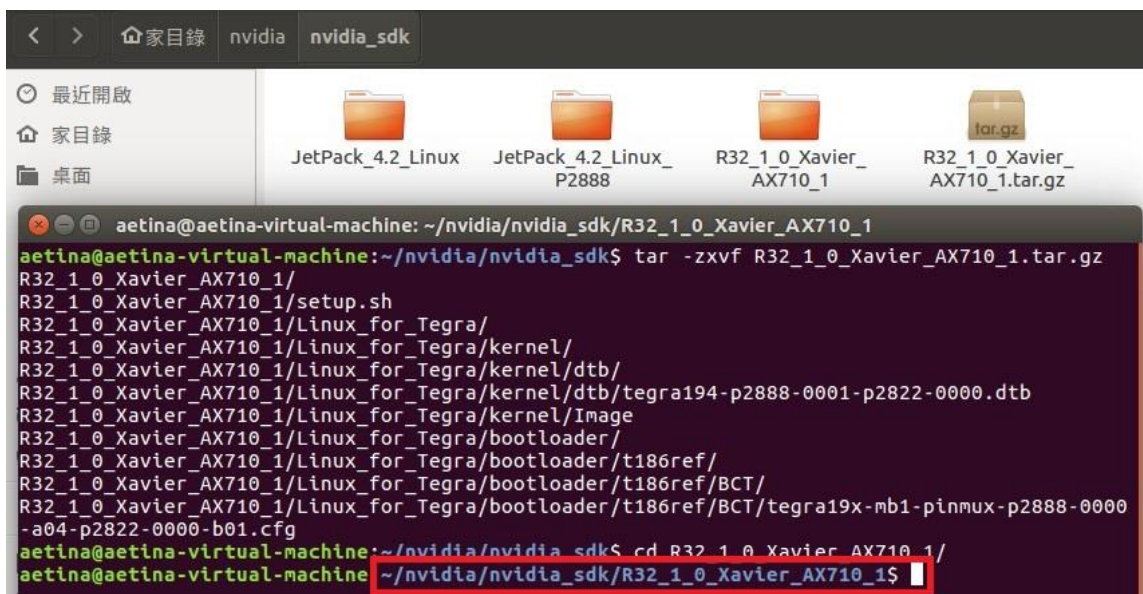
EX: SOP example is for AX710. DTB patch folder name is “R32_1_0_Xavier_AX710_1”

Enter DTB patch folder command:

cd R32_1_0_Xavier_AX710_1/

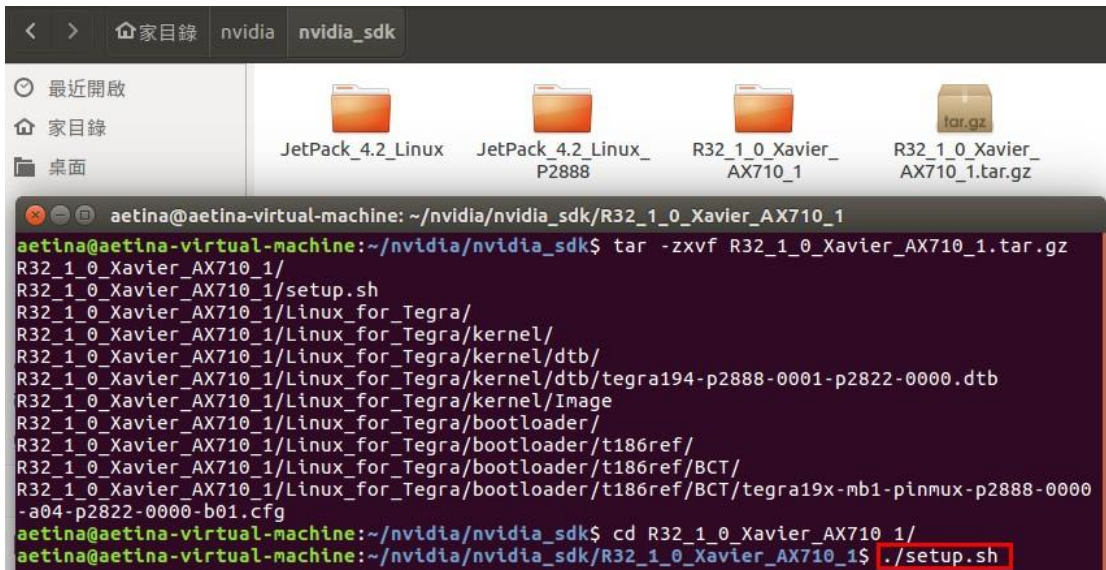


After enter DTB patch folder, terminal will be as below photo.

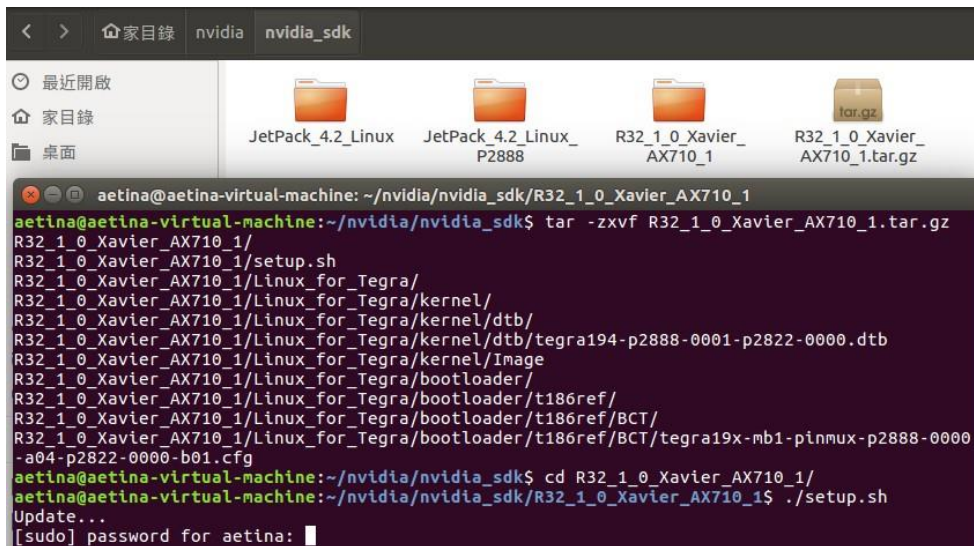


7. Enter patch install command. Refer to below photo.

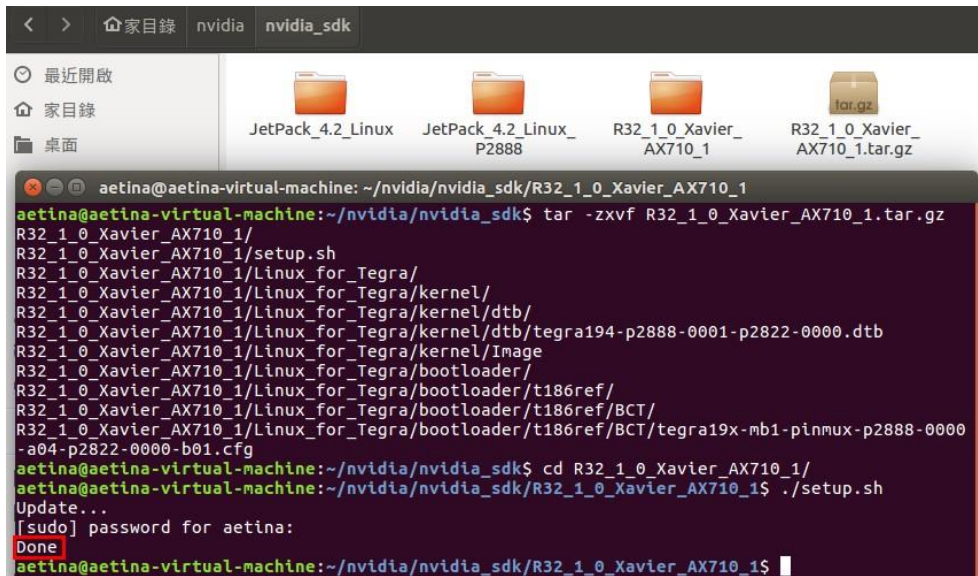
./setup.sh



8. Type Ubuntu user password. Refer to below photo.



9. Finish DTB Patch process.



10. Confirm if the patch works or not, you can check “Image” and “tegra194-p2888-0001-p2822-0000.dtb” revised time. If those files are changed, the patch file should be implemented.

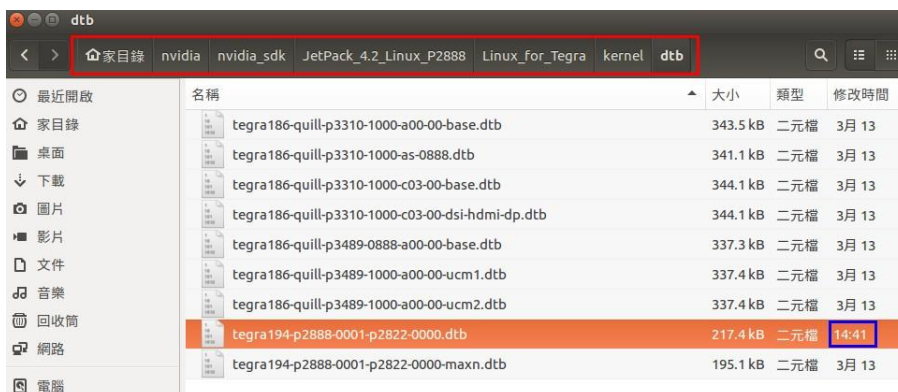
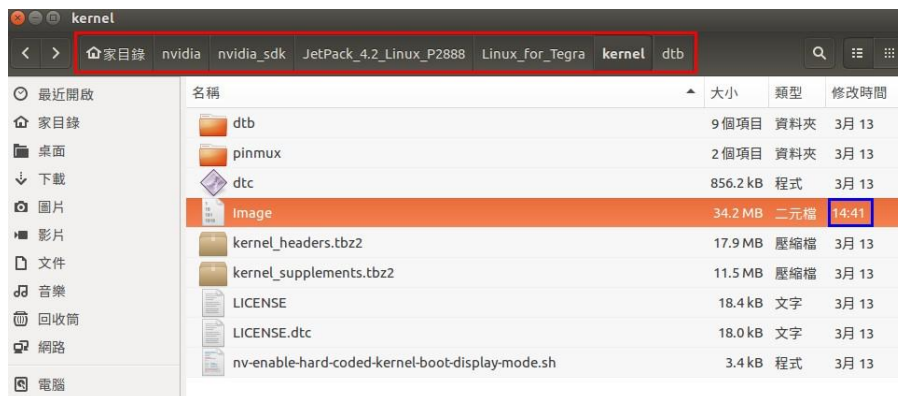
SOP example folder patch.

~/nvidia/nvidia_sdk/JetPack_4.2_Linux_P2888/Linux_for_Tegra/kernel

(Home/nvidia/nvidia_sdk/JetPack_4.2_Linux_P2888/Linux_for_Tegra/kernel)

~/nvidia/nvidia_sdk/JetPack_4.2_Linux_P2888/Linux_for_Tegra/kernel/dtb

(Home/nvidia/nvidia_sdk/JetPack_4.2_Linux_P2888/Linux_for_Tegra/kernel/dtb)





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