BOARD SUPPORT PACKAGE

For Connect Tech NVIDIA® Jetson AGX Orin™ Carriers

BSP Version: ORIN-AGX-35.4.1 V009
Last Updated: 2024/04/19

1. Introduction

This Board Support Package adds support for the Connect Tech Jetson AGX Orin™ family of carrier boards to Linux4Tegra. It includes any extra files required to use all the features of Connect Tech carriers.

Please check Section 3 for supported features for your board and Section 8 for the changes made between versions. You can check which version of the BSP you have installed by running:

cat /etc/cti/CTI-L4T.version

Check for the Latest Version of the CTI-L4T BSP at:
https://connecttech.com/resource-center/l4t-board-support-packages/

2. Requirements

- x86/x64 based host machine running Ubuntu 18.04 or 20.04
- JetPack 5.1.2 / L4T 35.4.1 installed (see Section 4)
- AGX Orin™ module
- Connect Tech AGX Orin™ Carrier
- USB Cable for flashing

  *L4T version can be found in /etc/nv_tegra_release and will look like this:
  # R35 (release), REVISION: 4.1

3. BSP Features

3.1 Supported Modules in BSP

- AGX Orin™ 32GB
- AGX Orin™ 64GB

- AGX Orin™ Industrial

3.2 Supported Cameras in BSP (All Carriers)

- Econ NileCAM21
- Econ NileCAM82
- Econ NeduCAM25
- Econ NileCAM25/STURDeCAM25
- Econ STURDeCAM31
- Econ STURDeCAM20
- Framos IMX462
- Framos IMX568
- Leopard HAWK
- Leopard OWL
- Tier4 C1 (ISX021), C2
- Stereolabs ZED X
- Leopard IMX390
- FLIR Boson ADK

3.2.1 Installing ZED X camera SDK

The ZED SDK is required to operate the ZED X camera. To use the SDK, Nvidia's CUDA, along with a few other dependencies, must first be installed (It is not installed automatically with this BSP). To install these dependencies, run this command:

"sudo apt install zstd libqt5network5 libqt5opengl5 libqt5sql5 libqt5xml5 cuda libcudnn8"

The ZED SDK can then be downloaded onto the AGX Orin™ from the Stereolabs website here: https://www.stereolabs.com/developers/release/

Click on "SDK Downloads", then the link for "ZED SDK for JetPack 5.1.2 (L4T 35.4)".
Note: ZED X drivers are already included in this BSP and do not need to be downloaded.

Once you have downloaded the executable onto your AGX Orin™ system, follow the rest of the instructions under "Download and Install the ZED SDK" at this link: https://www.stereolabs.com/docs/installation/jetson/

Additional questions about the SDK and camera applications can be answered by Stereolabs at https://support.stereolabs.com/hc/en-us/

3.3 Product Specific Details

AGX201 (Forge)

o 10G and 1G ethernet Support.
o CAN Support.
o Display Port Support.
o USB 3.2 Support.
o USB OTG Support.
o I2C Support.
o SPI Support.
o UART Support.
o RS232/485 Support.
o GPIO Support.
o M.2 pcie Support.
o Key E 2230 Wifi/BT.
o Key B 3042/3052 LTE/5G with micro SIM.
o Micro SD support.
o Oculink support
o MIPI Camera support
o Endpoint Mode not Supported
o JCB002 GMSL adapter support.
o Framos fpa4a adapter support.
o JCB006 FPDLink adapter support.
o JCB003 adapter support.

AGX202 (Rogue-Orin)

o x2 10G ethernet Support.
o CAN Support.
o HDMI Support.
o USB 3.2 Support.
o USB OTG Support.
o I2C Support.
o SPI Support.
o UART Support.
o GPIO Support.
o M.2 pcie Support.
o Key E 2230 Wifi/BT.
o Micro SD support.
o MIPI Camera support.
o JCB002 GMSL adapter support.
o Framos fpa4a adapter support.
o JCB006 FPDLink adapter support.
o JCB003 adapter support

3.4 Limitations and Known Issues

1. Due to firmware and bootloader limitations there is no way to

move a module flashed from one AGX Orin™ carrier to another without reflashing.
This includes the NVIDIA® Devkit. This means a module flashed for the AGX Orin™
Devkit cannot be used with a CTI carrier without reflashing the module.

2. Master mode (internal trigger) for the Leopard Hawk and OWL is currently
running at 45FPS, even though the streaming mode is set to 30FPS in the device
tree. By default we are shipping configs for Hawk and OWL to use trigger mode
so that the appropriate FPS can be achieved.

example. set pwm01 to 30FPS on Forge before streaming
cd /sys/class/pwm/pwmchip3
echo 0 > export
echo 33333333 > pwm0/period
echo 1000000 > pwm0/duty_cycle

You may also use this technique to achieve a custom trigger rate.

4. Installation

4.1 Obtaining NVIDIA® Jetpack

Before Installing the BSP you will need to install JetPack 5.1.2 on the host
system using NVIDIA® SDK Manager (section 4.1.1) or from
the NVIDIA® Embedded Download Center (section 4.1.2)

4.1.1 Installing JetPack from SDK Manager

Please follow installation steps from kdb373 for Jetpack 4.2+
https://connecttech.com/resource-center/kdb373/

4.1.2 Installing JetPack from NVIDIA® Embedded Download Center

1. Create a new directory for installing the Jetpack. Referred to as <BSP_ROOT>
in these instructions.

2. Go to Jetpack Release Page https://developer.nvidia.com/embedded/jetson-linux-r3541

3. Download the "L4T Driver Package (BSP)" and "Sample Root Filesystem" files for
AGX Orin™

4. Put the "L4T Driver Package (BSP)" and "Sample Root Filesystem" in <BSP_ROOT>.
Afterwards, you should have the following files in <BSP_ROOT>

- jetson_linux_r35.4.1_aarch64.tbz2
- tegra_linux_sample-root-filesystem_r35.4.1_aarch64.tbz2

5. Extract the "L4T Driver Package" tarball:

cd <BSP_ROOT>
sudo tar -jxf jetson_linux_r35.4.1_aarch64.tbz2

6. You should now have a new directory called Linux_for_Tegra in your <BSP_ROOT> folder. Extract the "Sample Root Filesystem" into Linux_for_Tegra/rootfs.

sudo tar -C Linux_for_Tegra/rootfs/ -xjf tegra_linux_sample-root-filesystem_r35.4.1_aarch64.tbz2

4.2 CTI BSP Installation

1. Copy the CTI-L4T-ORIN-AGX-35.4.1-V###.tgz package into <BSP_ROOT>/Linux_for_Tegra.

If you are using Nvidia's SDK manager then "<BSP_ROOT>" will be:
~/nvidia/nvidia_sdk/<JetPack_Version>_Linux_JETSON_AGX_ORIN_TARGETS/

Otherwise if manually installing from the NVIDIA® Embedded Download Center
<BSP_ROOT> will be the folder created previously

cp CTI-L4T-ORIN-AGX-35.4.1-V###.tgz <BSP_ROOT>/Linux_for_Tegra

2. Extract the BSP: tar -xzf CTI-L4T-ORIN-AGX-35.4.1-V###.tgz
cd <BSP_ROOT>/Linux_for_Tegra
sudo tar -xzf CTI-L4T-ORIN-AGX-35.4.1-V###.tgz

3. Change into the CTI-L4T directory:
cd <BSP_ROOT>/Linux_for_Tegra/CTI-L4T

4. Run the install script (as root or sudo) to automatically install the BSP files
to the correct locations:

sudo ./install.sh
#return to Linux_for_Tegra
cd ..

5. The CTI-L4T BSP is now installed on the host system and it should now be able
to flash the AGX Orin™ module.

5. Flashing AGX Orin™ Modules

1. Connect the AGX Orin™ and Carrier to the computer via USB, following the instructions in the appropriate manual.

2. Put the system to be flashed into recovery mode, following the instructions in the appropriate manual

3. There are two options for flashing Jetson modules:

Using CTI's automated script:
./cti-flash.sh

Follow the menu and select your desired configuration. Once selected,

the device will start to flash.

Using the Manual Method:

Note do not add the ".conf" file extension to the <config> parameter:

Manual Flash: ./flash.sh cti/<module>/<boardname>/<config> mmcblk0p1

<module> is orin-agx or orin-agxi (orin-agx industrial)

Example:
./flash.sh cti/orin-agx/forge/base mmcblk0p1
./flash.sh cti/orin-agxi/forge/base mmcblk0p1

4. Once the flashing has completed, the AGX Orin™ will reboot

6. Upgrading to a New Package Release

Upgrading L4T or CTI-BSP verisons without reflashing is not currently supported.

7. Switching Profiles on AGX Orin™

1. Open a terminal on the AGX Orin™

2. Run "sudo cti-orin-agx-fdt.sh"

3. Select the profile you wish to switch to from the menu

4. Restart the system

Note: This script updates the dtb by appending/replacing the FDT variable in extlinux.conf

8. Change Log

Version ORIN-AGX-35.4.1-V009 April 19, 2024
- Added support for NILECAM/STURDeCAM25
- Fixed issues with LI-OWL and LI-HAWK

Version ORIN-AGX-35.4.1-V008, April 15, 2024
- Fixed issue with FLIR ADK

Version ORIN-AGX-35.4.1-V007, April 1, 2024
- Added STURDeCAM20 support.

Version ORIN-AGX-35.4.1-V006, February 9, 2024
- Added JCB003 support.

Version ORIN-AGX-35.4.1-V005 January 18, 2024
- Added Leopard Owl Support.
- Added STURDeCAM31 Support
- Fixed PTP clock bug

Version ORIN-AGX-35.4.1-V004 December 21, 2023
- Added Framos IMX568 support
- Fixed Stereolabs ZED X camera detection to detect both hardware revisions

Version ORIN-AGX-35.4.1-V003 October 27, 2023
- Added NileCAM82 support
- Confirmed Stereolabs ZED X camera works

Version ORIN-AGX-35.4.1-V002 October 10, 2023
- Updated hawk driver so that the camera can be synced using a PWM to achieve a 30FPS framerate.
- Updated hawk driver to allow for up to 8 hawk sensors with the JCB002 platform.

Version ORIN-AGX-35.4.1-V001 September 19, 2023
- Initial Release of Orin-AGX/Orin-AGXi on Jetpack 5.1.2.
- Added AGX Orin™ industrial configs.

Contact Connect Tech

If you have any problems, questions or suggestions regarding the Board Support Package and hardware, please feel free to contact Connect Tech Inc.

Connect Tech

Contact Information	
Support	Please go to the <u>Connect Tech Resource Center</u> for product manuals, installation guides, device drivers, BSPs and technical tips. Submit your <u>technical support</u> questions to our support engineers. Technical Support representatives are available Monday through Friday, from 8:30 a.m. to 5:00 p.m. Eastern Standard Time.
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