

**Configuring Jetson Expansion Headers**

*Structured for RAG Readability*

**1. Overview**

**Purpose**: Configure I/O pins on Jetson expansion headers (40-pin, CSI, M.2 Key E) for GPIO/SFIO functions.  
**Tools**:

* **Jetson-IO** (GUI Python script)
* **Command-line utilities** (config-by-pin.py, config-by-function.py, config-by-hardware.py)

**2. Getting Started**

**Launch Jetson-IO GUI**

sudo /opt/nvidia/jetson-io/jetson-io.py

**Key Headers by Device**

|  |  |  |  |
| --- | --- | --- | --- |
| Jetson Device | 40-pin | M.2 Key E | CSI Connector |
| AGX Xavier | ✓ | ✓ | ✓ |
| Xavier NX | ✓ | ✓ | ✓ (30-pin) |
| AGX Orin | ✓ | ✓ | ✓ |

**3. GUI Configuration Workflow**

**Main Screen**

* Lists available headers
* Options:

1. Configure 40-pin Header   
2. Configure M.2 Key E Slot   
3. Configure CSI Connector

**Header Screen**

* **Two Configuration Modes**:
  1. **Compatible Hardware**: Predefined modules (e.g., Adafruit SPH0645LM4H)
  2. **Manual Pin Configuration**: Toggle SFIO functions

**Example: 40-pin Header**

Current Configuration:   
- Pin 3: GPIO   
- Pin 5: I2C   
Options:   
[Configure for compatible hardware]   
[Configure header pins manually]

**4. Command-Line Tools**

**Key Utilities**

|  |  |
| --- | --- |
| Command | Functionality |
| config-by-pin.py | View pin configurations |
| config-by-function.py | Configure via special functions |
| config-by-hardware.py | Apply predefined hardware profiles |

**Common Use Cases**

**List Enabled Functions**

sudo /opt/nvidia/jetson-io/config-by-function.py -l enabled

**Enable SPI on Header 1**

sudo /opt/nvidia/jetson-io/config-by-function.py -o dtb spi1

**Apply Adafruit Audio Profile**

sudo /opt/nvidia/jetson-io/config-by-hardware.py -n "Adafruit SPH0645LM4H"

**5. Custom Hardware Support**

**Device Tree Overlay Requirements**

/dts-v1/;   
/plugin/;   
/ {   
 overlay-name = "Custom Overlay";   
 jetson-header-name = "Jetson 40pin Header";   
 compatible = "nvidia,p2822-0000+p2888-0001";   
 fragment@0 {   
 target-path = "/";   
 \_\_overlay\_\_ {   
 new\_property = "value";   
 };   
 };   
};

**Compilation & Deployment**

dtc -O dtb -o custom.dtbo -@ custom.dts   
sudo cp custom.dtbo /boot

**6. Key Configuration Files**

|  |  |  |
| --- | --- | --- |
| File | Purpose | Location |
| extlinux.conf | Boot configuration | /boot/extlinux/ |
| \*.dtbo | Device tree overlays | /boot/ |
| nv\_tegra\_release | Jetson SW version | /etc/ |

**7. Troubleshooting**

**Common Issues**

|  |  |
| --- | --- |
| Symptom | Solution |
| Configuration not applied | Verify CRC-8 checksum in EEPROM |
| Pins not responding | Check dmesg | grep -i tegra |
| Overlay not recognized | Validate compatible property |

**Debug Commands**

# Verify pin states   
sudo /opt/nvidia/jetson-io/config-by-pin.py -p 7   
  
# Check applied overlays   
fdtdump /boot/tegra194-p3668-all-p3509-0000-fe-pi-audio.dtbo

**8. Reference Tables**

**jetson-header-name Values**

|  |  |
| --- | --- |
| Header Type | Property Value |
| 40-pin | Jetson 40pin Header |
| M.2 Key E | Jetson M.2 Key E Slot |
| CSI (Xavier NX) | Jetson AGX Xavier CSI Connector |

**compatible Property Values**

|  |  |
| --- | --- |
| Platform | Value |
| Xavier NX DevKit | nvidia,p3509-0+p3668-0000 |
| AGX Xavier | nvidia,p2822-0000+p2888-0001 |
| AGX Orin | nvidia,p3737-0000+p3701-0000 |

**Optimized for RAG**:

* Hierarchical structure with clear section headers
* Code blocks for executable commands
* Tables for comparative data
* Problem/solution format for troubleshooting
* Consistent terminology alignment with NVIDIA docs

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