how to install xiMea software on jetson

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1. Ref.: https://www.ximea.com/support/wiki/apis/Linux_TX1_and_TX2_Support

2. check: Tegra version (>= 32.3.1)

3. Installing XIMEA API package

3.1 Run the following commands on Jetson:

```
sudo apt update
sudo apt install ca-certificates
wget https://www.ximea.com/downloads/recent/XIMEA_Linux_SP.tgz
tar -xf XIMEA_Linux_SP.tgz
cd package
./install
sudo gpasswd -a "$(whoami)" plugdev
if [ -f /etc/rc.local ]
then
sudo sed -i '/^exit/ d' /etc/rc.local
else
echo '#!/bin/sh -e'                                          | sudo tee    /etc/rc.local > /dev/null
fi
echo 'echo 0 > /sys/module/usbcore/parameters/usbfs_memory_mb' | sudo tee -a /etc/rc.local > /dev/null
echo 'exit 0'                                                | sudo tee -a /etc/rc.local > /dev/null
sudo chmod a+x /etc/rc.local
#enable controlling of memory frequency by user
echo 'KERNEL=="emc_freq_min", ACTION=="add", GROUP="plugdev", MODE="0660"' | sudo tee /etc/udev/rules.d/99-emc_freq.rules > /dev/null
#optional: allow user to use realtime priorities
sudo groupadd -fr realtime
echo '*         - rtprio   0' | sudo tee    /etc/security/limits.d/ximea.conf > /dev/null
echo '@realtime - rtprio  81' | sudo tee -a /etc/security/limits.d/ximea.conf > /dev/null
echo '*         - nice     0' | sudo tee -a /etc/security/limits.d/ximea.conf > /dev/null
echo '@realtime - nice   -16' | sudo tee -a /etc/security/limits.d/ximea.conf > /dev/null
sudo gpasswd -a "$(whoami)" realtime
sudo mkdir /etc/systemd/system/user@.service.d
echo '[Service]'                                                                        | sudo tee
/etc/systemd/system/user@.service.d/cgroup.conf > /dev/null
echo 'PermissionsStartOnly=true'                                                        | sudo tee -a
/etc/systemd/system/user@.service.d/cgroup.conf > /dev/null
echo 'ExecStartPost=-/bin/sh -c "echo 950000 > /sys/fs/cgroup/cpu/user.slice/cpu.rt_runtime_us"' | sudo tee -a
/etc/systemd/system/user@.service.d/cgroup.conf > /dev/null
#reboot
sudo reboot
```

3.2 PCIe support

On 64-bit version of Linux For Tegra (available since R24.1) it is possible to use PCIe cameras.
To enable support for PCIe in XIMEA API you need to run `install` script (see installation section) with `-pcie` flag:

```
./install -pcie
```

It may be necessary to run the following command beforehand:

```
sudo make -C /lib/modules/"$(uname -r)"/build modules_prepare
```

3.3 Memory bandwidth problems

By default, the memory frequency is controlled by the kernel dynamically, which means that sufficient memory bandwidth isn't available at all times.
This causes crashes, hangs and lost frames when PCIe or USB3 cameras are used.
The solution is to raise the lower limit for memory frequency when image acquisition is running.
The following wrapper script can be used for that:

```
#!/bin/bash
# TX1:
# # cat /sys/kernel/debug/clock/emc/possible_rates
# 40800 68000 102000 204000 408000 665600 800000 1065600 1331200 1600000 (kHz)
# TX2:
# # cat /sys/kernel/debug/bpmp/debug/emc/possible_rates
# 40800 68000 102000 204000 408000 665600 800000 1062400 1331200 1600000 1866000 (kHz)
# Xavier:
# # cat /sys/kernel/debug/bpmp/debug/emc/possible_rates
# 204000 408000 665600 800000 1065600 1331200 1600000 1866000 2133000 (kHz)
EMC_FREQ=1600000
exec 3> /dev/emc_freq_min
printf '%x' "$EMC_FREQ" >&3
exec "$@"
```

Save it to `~/emc_wrapper.sh` file and execute the following command:

```
chmod a+x ~/emc_wrapper.sh
```

4. Running sample applications

To do a simple validation that everything is working you can run xiSample:

```
~/emc_wrapper.sh /opt/XIMEA/bin/xiSample
```

To view a live picture from a camera start CamTool:

```
~/emc_wrapper.sh /opt/XIMEA/bin/xiCamTool
```

Alternatively streamViewer application can be used, but you need to compile it first:

```
cd /opt/XIMEA/examples/streamViewer
sudo apt update
sudo apt install libgtk2.0-dev libgstreamer-plugins-base1.0-dev gstreamer1.0-x
sudo make GST10=1
sudo make install
```

Then you can start the viewer:

```
~/emc_wrapper.sh /opt/XIMEA/bin/streamViewer
```

5. PCIe connection

https://www.ximea.com/support/projects/xib/wiki/PCIe_host_adapters