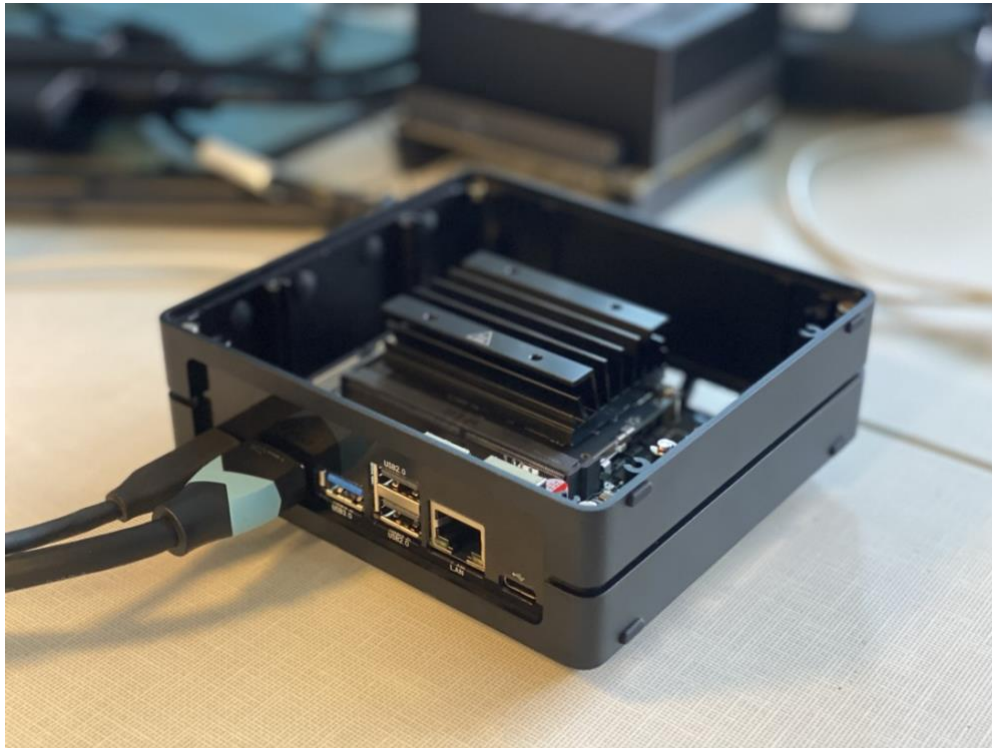


Week 4

Setup NVIDIA Jetson Xavier NX Development Kit

Thursday, February 2nd 5:30 PM – 6:45 PM

DUE: Tuesday, February 14th



DESCRIPTION

The use of edge devices is becoming increasingly popular for solving real-world problems. Although various different edge devices exist, a popular choice amongst industry and researchers is NVIDIA. Modern NVIDIA edge device / development kits have an onboard GPU capable of running intense computations that are essential for various tasks for example: computer vision, data collection, real-time communication, etc. The purpose of this assignment / lab is for students to obtain and setup the development kit that is comprised of:

1. NVIDIA Jetson Xavier NX Development Kit
2. Power adapter
3. 256 GB NVMe SSD using M2 expansion
4. Wi-Fi Adapter
5. Jumper Wires
6. Camera sensor
7. GPS module
8. IMU sensor
9. Temperature/Humidity Sensor
10. Soil Moisture Sensor

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PREREQUISITES

Obtain lab kits from the instructors.

LEARNING OBJECTIVES

By the end of this course, students will:

1. Have a personal development kit that will be used during the semester
2. Boot their edge device computers
3. Be familiar with different LINUX commands that are necessary to obtain system statistics
4. Install important libraries required for successfully complete the assignments
5. Run a simple program to ensure correct libraries are installed

ASSIGNMENT

Part 1: Setup

The following are required for each student with the associated impact on the final grade:

1. Obtain edge device
2. Remove the 4 screws at each corner of the edge device in order to remove it from the case
3. Add the SSD expansion using the M2 key as explained in this tutorial from **minute 2:57 – 3:47**:
https://www.youtube.com/watch?v=pHS_pgN-Afs&t=202s
4. Power the device using the adapter included in the box
5. Connect HDMI to a monitor
6. Wait 10 seconds for device to boot up:

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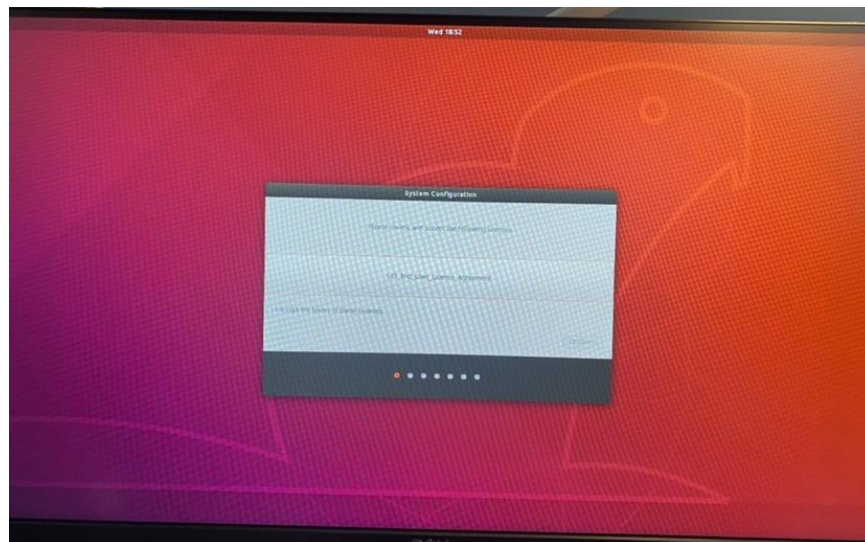
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```
1.070966] tegradc tegradc.1: dtd enable lockup fail:-19
1.237602] host read timeout at address 045c00c4
1.777440] imd19 7-0010: imd19_board_setup: error during i2c read probe (-
[21]
1.785085] imd19 7-0010: board setup failed
1.819499] imd19 8-0010: imd19_board_setup: error during i2c read probe (-
[22]
1.821020] imd19 8-0010: board setup failed
2.673041] cgroup: cgroup2: unknown option "nodelegate"
3.227622] using random self ethernet address
3.733266] using random host ethernet address
3.951177] random: crng init done
3.954542] random: 7 urandom warning(s) missed due to reinitializing
4.100552] using random self ethernet address
4.154279] using random host ethernet address
6.138199] Please complete system configuration setup on the serial port pro
vided by Jaelen's USB device mode connection, e.g. /dev/ttyUSBx where x can 0, 1
, 2 etc.
[23] 12 of 23 A start job is running for t1on (Debconf UI) (21s / no limit)[
27.747550] edit invalid
27.790798] edit invalid
[24] 11 of 23 A start job is running for End-user configuration after initial ODM installation (min 25s / no limit)
```

7. Connect mouse and keyboard to the development kit from the lab computers
8. Follow steps on the screen



- a. Accept license
- b. English language setting
- c. English (US) keyboard layout
- d. Select New York time zone
- e. Enter account information
- f. Select Default Nvpmodel

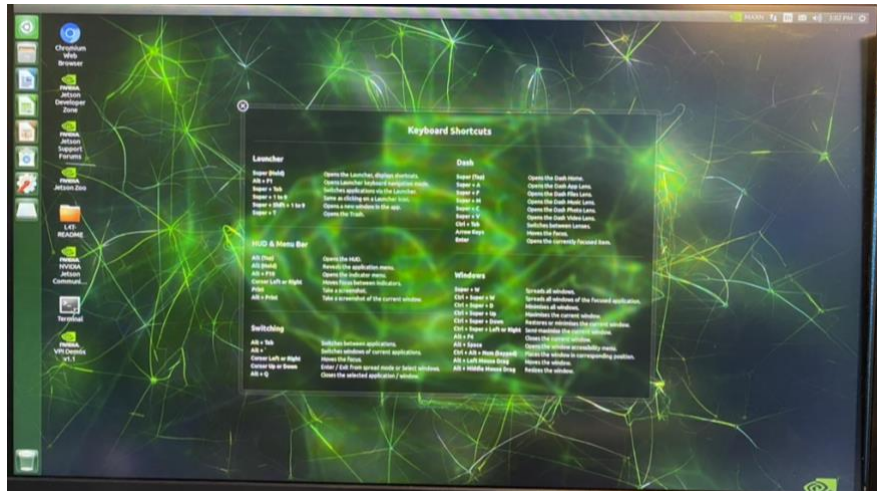
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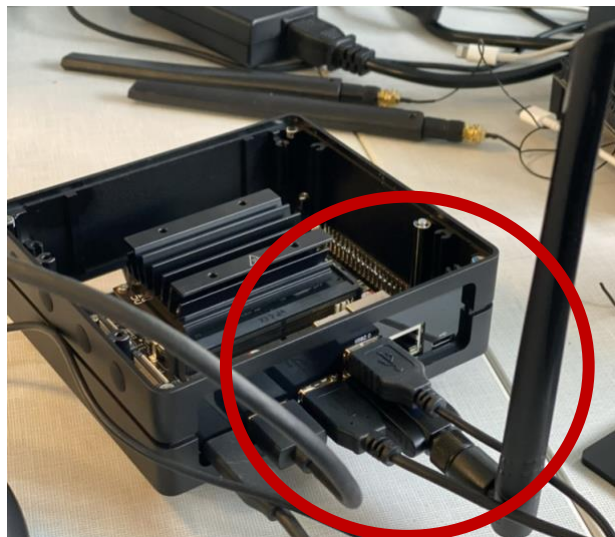
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- g. System will now install which may take up to 5 minutes
- h. System will automatically reboot
- i. Now it will look like...



9. Connect the WiFi module using USB 2.0 connection as shown in the image:



10. Click the connectivity button on the top right corner of the screen:
- a. Now you should be able to see multiple available networks
 - b. Connect to either “eduroam” or “pal3.0”:
 - i. Click “no CA certification required”
 - ii. Enter Purdue Username
 - iii. Enter the Password (not the Two Key Authentication)

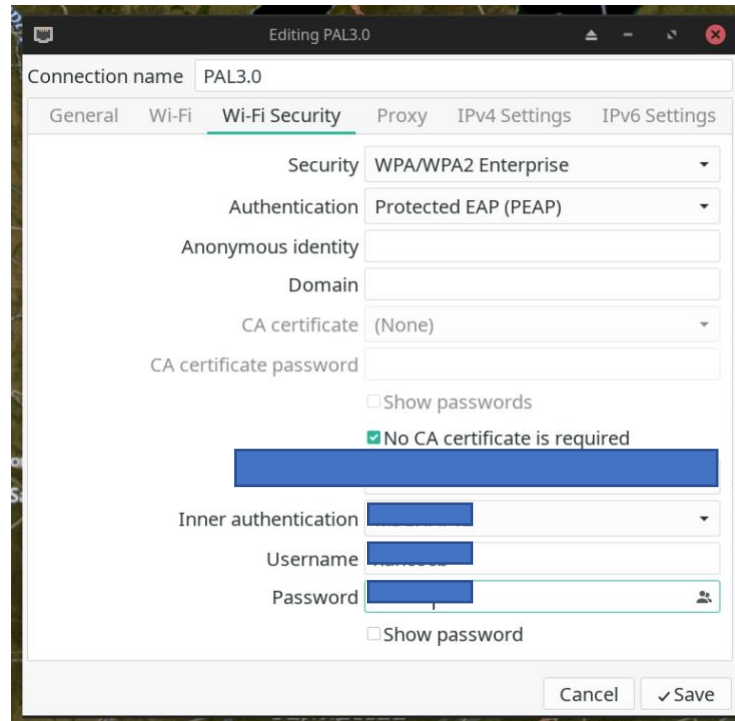
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- iv. For Inner Authentication, select: “MSCHAPv2 (no EAP)”



v.

11. Install pip to be able to install all applications:

- a. `sudo apt update`
- b. `sudo apt-get install python-pip python3-pip`

12. For monitoring device stats:

- a. https://github.com/rbonghi/jetson_stats - This link provides details about the jetson-stats tool used for monitoring and controlling your NVIDIA device
- b. `sudo -H pip install --no-cache-dir -U jetson-stats`
- c. `jtop`
- d. To get out of `jtop`, just enter “ctrl + c”
- e. `sudo reboot`

13. Install Anaconda and Jupyter Notebooks:

- a. <https://www.sahilramani.com/2021/11/how-to-setup-python3-and-jupyter-notebook-on-jetson-nano-faster/> (This link provides details for installing python and jupyter notebook on your NVIDIA device)
- b. Follow these steps:
 - i. `cd ~`

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- ii. `wget https://github.com/conda-forge/miniforge/releases/latest/download/Miniforge3-Linux-aarch64.sh .`
- iii. `chmod a+x Miniforge3-Linux-aarch64.sh`
- iv. `./Miniforge3-Linux-aarch64.sh`
 1. Continue to press “enter” when prompted
 2. Then type “yes” when prompted
 3. Then press “enter” when prompted
 4. Type “yes” again when prompted
- v. `conda config --set auto_activate_base false`
- vi. `conda create -n jupyter python=3.6`
 1. This step will essentially help create a conda environment called “jupyter” with Python3.6
- vii. `conda activate jupyter`
 1. This command will activate the conda environment called “jupyter”
- viii. `conda install -c anaconda jupyter`
 1. finally, we will install “Jupyter Notebooks” in this conda environment
- ix. `jupyter notebook`
 1. This command will help launch Jupyter Notebook
- x. Now you may exit Jupyter Notebooks by entering “ctrl + c”

Part 2: Homework Tasks

Your task is to ensure that the correct libraries are installed and to check if Python is working by completing 3 tasks:

1. You will run the command from “Step 12 (c)” above for monitoring device stats:
 - a. Run `jtop` in the terminal
 - b. Take a screen shot using “Alt + PrintScreen” (or you may take an image from your smartphone)
 - c. To get out of `jtop`, just enter “ctrl + c”
 - d. Name the image “lab1_UserName.png”
2. You will be creating a simple Python program:
 - a. Create a python file by running: `geddit lab1.py`
 - b. Write the code in the window: `print(“Hello World”)`
 - c. Close the Python Window
 - d. Within the terminal, execute the python file by typing: `python lab1.py`
 - e. Name the file “lab1_UserName.py”
3. You will also create the same simple Python program in Jupyter Notebooks:
 - a. Within the “Jpyter” conda environment run: `jupyter notebook`
 - b. This will launch Jupyter Notebooks in the browser

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- c. On the top right corner, click on “New”
 - d. Then click on “Python3”
 - e. Now a new window will automatically open
 - f. In the first box, write the same python code: `print(“Hello World”)`
 - g. Click the “run” button in the menu
 - h. Save the Jupyter Notebook as “lab1_UserName.py”
4. Finally, combine you are required to submit the following three files on Brightspace:
 - a. “lab1_UserName.py”
 - b. “lab1_UserName.png”
 - c. “lab1_UserName.ipynb”

REFERENCES / ADDITIONAL RESOURCES

1. Devices used for this course: <https://www.seeedstudio.com/reComputer-J2021-p-5438.html>
2. Tutorials and explanations: https://www.youtube.com/watch?v=pHS_pgN-Afs&t=202s

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