Get started with the OKdo Nano C100 Developer Kit and learn how to set up AI video facial recognition processing using a dual CSI camera setup with Python and OpenCV.

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The OKdo Nano C100 Developer KitOKdo Nano C100 Developer Kit | Okdo NVIDIA® Jetson Nano C100 Developer Kit Module | RS (rs-online.com) is based on the NVIDIA® Jetson Nano™ module fitted to a custom development board.

This small, powerful, single-board computer makes AI accessible to makers, learners, and embedded developers. It lets you run multiple neural networks in parallel for applications like image classification, object detection, segmentation, and speech processing.

Key features include a quad-core ARM A57 CPU, 128-core NVIDIA Maxwell GPU, 4GB 64-bit LPDDR4 RAM, 16GB on-board eMMC storage, dual MIPI-CSI camera connectors, Gigabit Ethernet, and a 40-pin GPIO header plus an M.2 E key slot for optional WiFi support.

OKdo provides an official OS image download via the OKdo | Software Hub | DesignSpark (rs-online.com) that is based on Ubuntu 18.04 LTS with NVIDIA Jetpack version 4.6.

This Getting Started guide will walk you through setting up your OKdo Nano C100 and demonstrate AI video facial recognition processing using a dual CSI camera setup with Python and OpenCV.

Let’s get started!

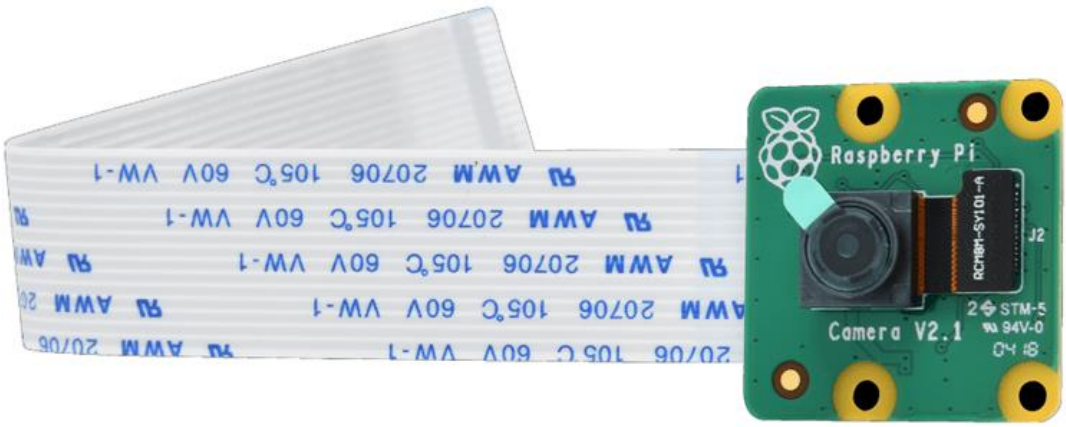
Difficulty: Medium Time: 2 Hrs Steps: 9 Credits: None License: None

Parts Needed to Get Started with the OKdo Nano C100 Developer Kit & CSI Cameras

OKdo Nano C100 Developer Kit

SHOP NOW

Official Raspberry Pi Camera V2.1



SHOP NOW

All parts needed to get started:

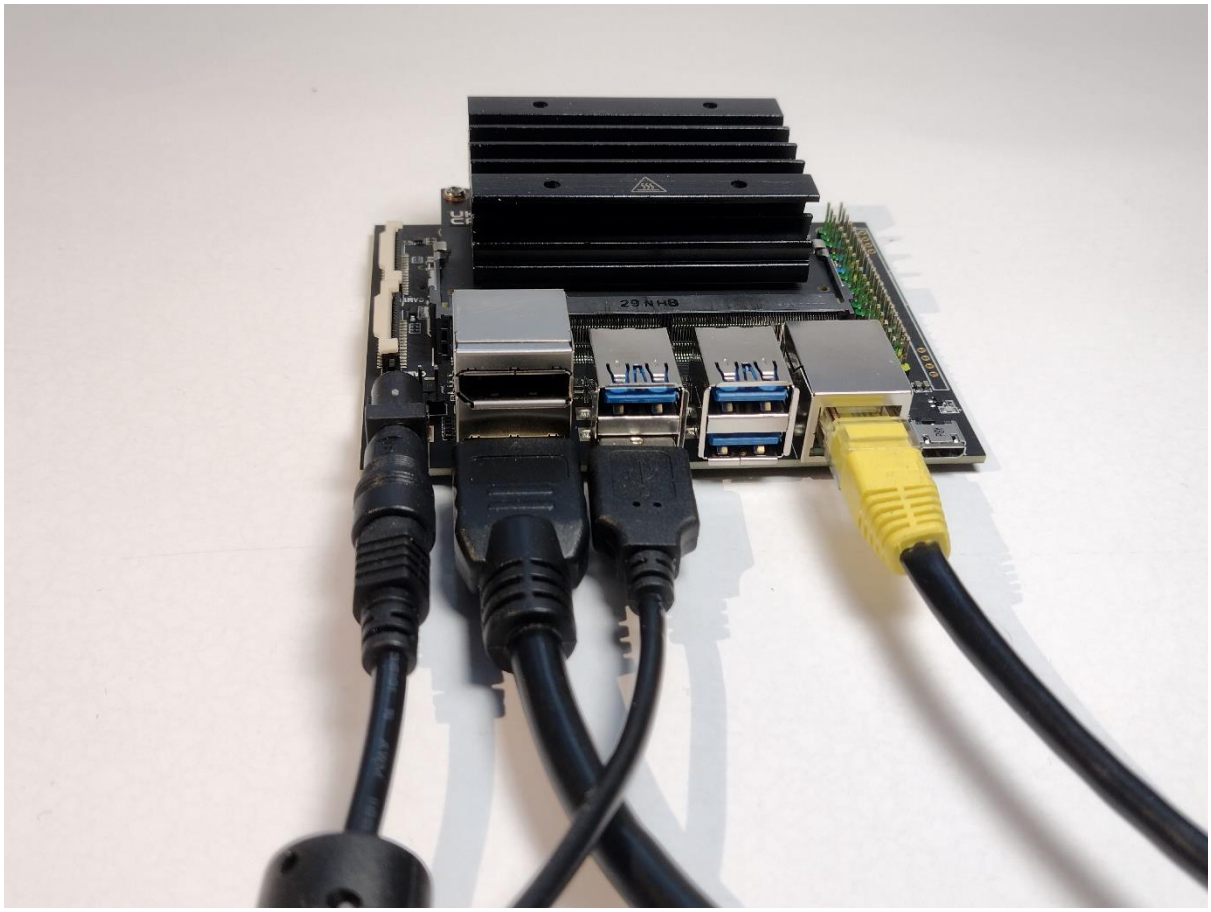
- OKdo Nano C100 Developer Kit
- Official Raspberry Pi Camera V2.1
- M.2 Wireless Module A8 for ROCK 3A, ROCK 5B, WiFi 6, BT5.2
- OKdo Multihead Plug-in AC/DC Adapter Universal Power Supply (PSU)
- 32 GB MicroSDHC Card Class 10 A1
- Host computer Windows/Mac/Linux
- HDMI monitor
- USB keyboard
- USB mouse
- HDMI cable
- Ethernet cable
- Internet connection and router

Step 1: Board Setup

Unbox the OKdo C100 Nano Developer Kit and attach the following cables and accessories. Cables, SD card, and power supply are not included with the kit.

- Attach an HDMI monitor (full-size connector), USB keyboard, and mouse.
- Ethernet is required if you want to update the OS.
- Optionally fit an M.2 E key wireless module by removing the Nvidia Jetson module and fitting the WiFi module to the base board before refitting the Jetson module.
- Connect a USB mouse and keyboard.
- Attach a good quality 5V / 4A (20W) power supply to the barrel jack (5.5mm by 2.1mm) but do not power on yet. The recommended power supply is the FJ-528H | Okdo Plug-In AC/DC Adapter 5V dc Output, 4A Output | RS (rs-online.com)
- The micro-USB port is for a serial console only.

Warning: *DO NOT place a jumper on the 2-pin header next to the barrel jack.*



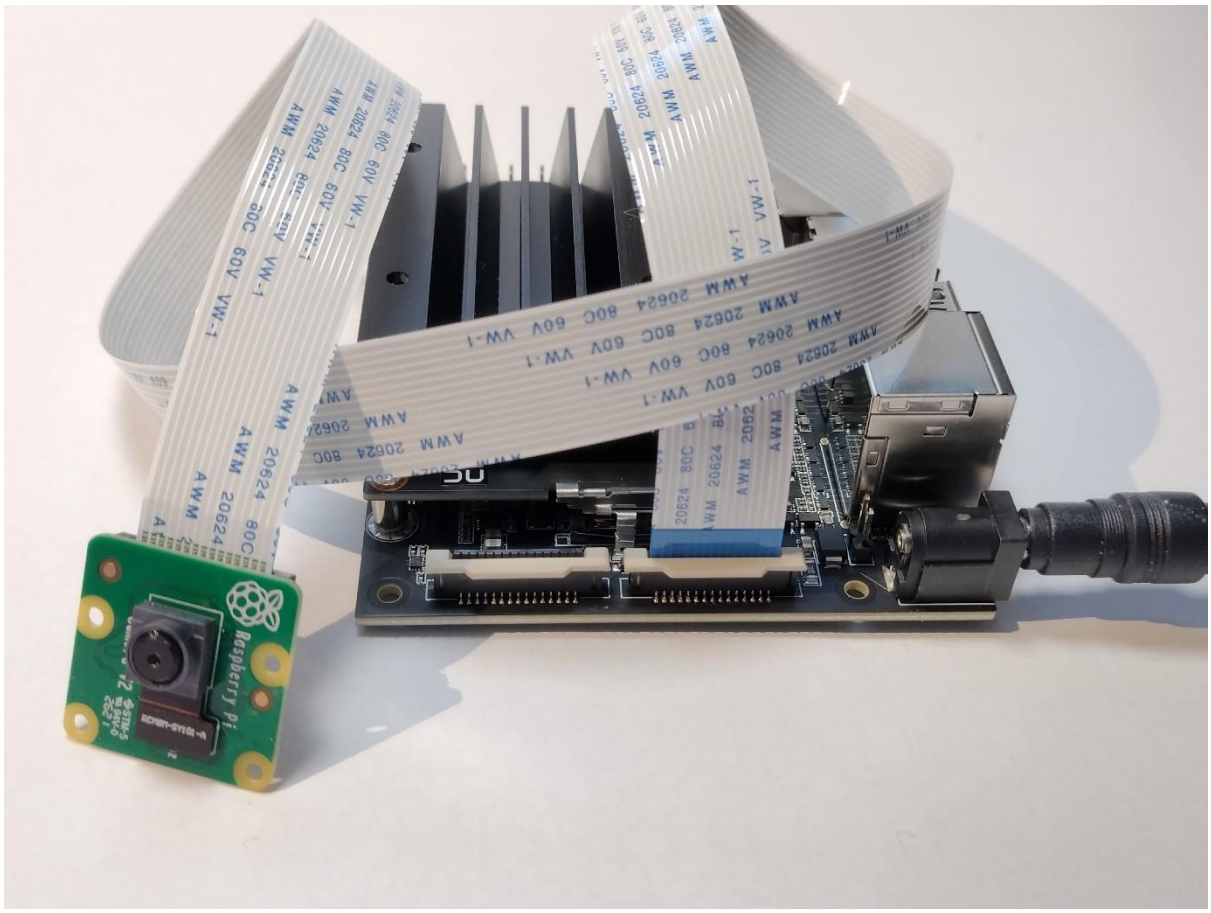
Step 2: Cameras

The Nano C100 has 2 MIPI-CSI camera ports and the software supports cameras based on imx219 (Raspberry Pi V2 camera) and imx477 sensors out of the box.

We are using two Pi V2 camera modules to showcase the board's capabilities, but you only need one to follow along.

- Open the CSI connector latch by lifting the tab.

- Slide the ribbon cable into the connector with the blue marking facing away from the heat sink. Gently push down on the latch to secure.



- Add a second camera if you have one.

Here’s the dual camera setup used for the subsequent demos:

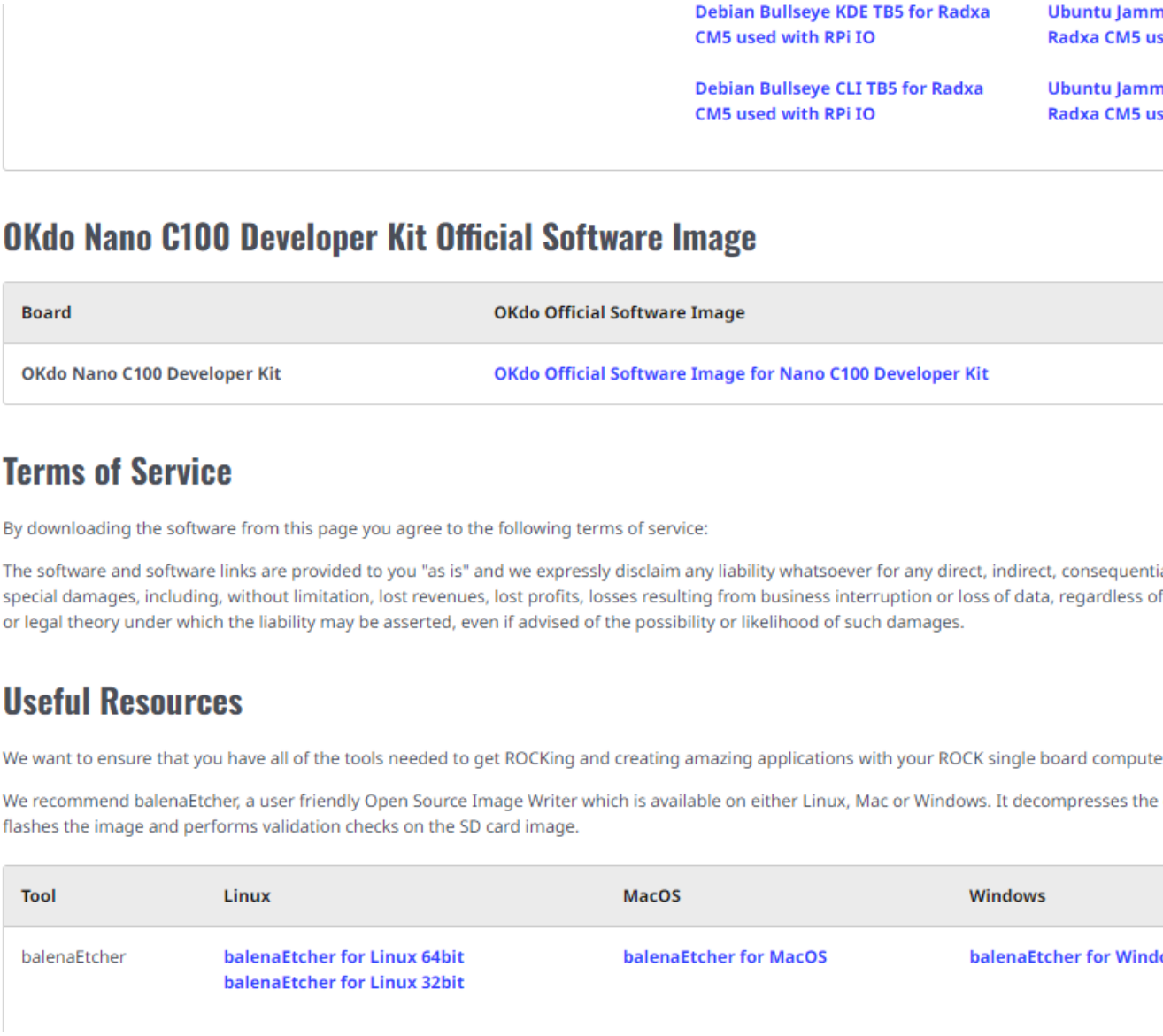
Step 3: Flash SD Card

The C100 uses the NVIDIA Jetson Nano module which comes with 16GB of onboard eMMC storage, but for development purposes, we are going to flash the system image to a micro SD card and boot from that. This increases the storage capacity for application development software.

You need a host PC (Mac / Windows or Linux) with a card reader or adapter to download and flash the image. Use a good quality microSD card 32GB or larger, Speed Class 10, A1 rated. We tested with a 32GB SanDisk Ultra.

BalenaEtcher which runs on Linux / Mac / Windows PCs is recommended for flashing and verifying the SD card image.

- Download the official OKdo Nano C100 Developer Kit OS image from the OKdo Software & Downloads hub (Near the bottom)



Debian Bullseye KDE TB5 for Radxa CM5 used with RPi IO

Ubuntu Jamm
Radxa CM5 us

Debian Bullseye CLI TB5 for Radxa CM5 used with RPi IO

Ubuntu Jamm
Radxa CM5 us

OKdo Nano C100 Developer Kit Official Software Image

Board	OKdo Official Software Image
OKdo Nano C100 Developer Kit	OKdo Official Software Image for Nano C100 Developer Kit

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By downloading the software from this page you agree to the following terms of service:

The software and software links are provided to you "as is" and we expressly disclaim any liability whatsoever for any direct, indirect, consequentia
special damages, including, without limitation, lost revenues, lost profits, losses resulting from business interruption or loss of data, regardless of
or legal theory under which the liability may be asserted, even if advised of the possibility or likelihood of such damages.

Useful Resources

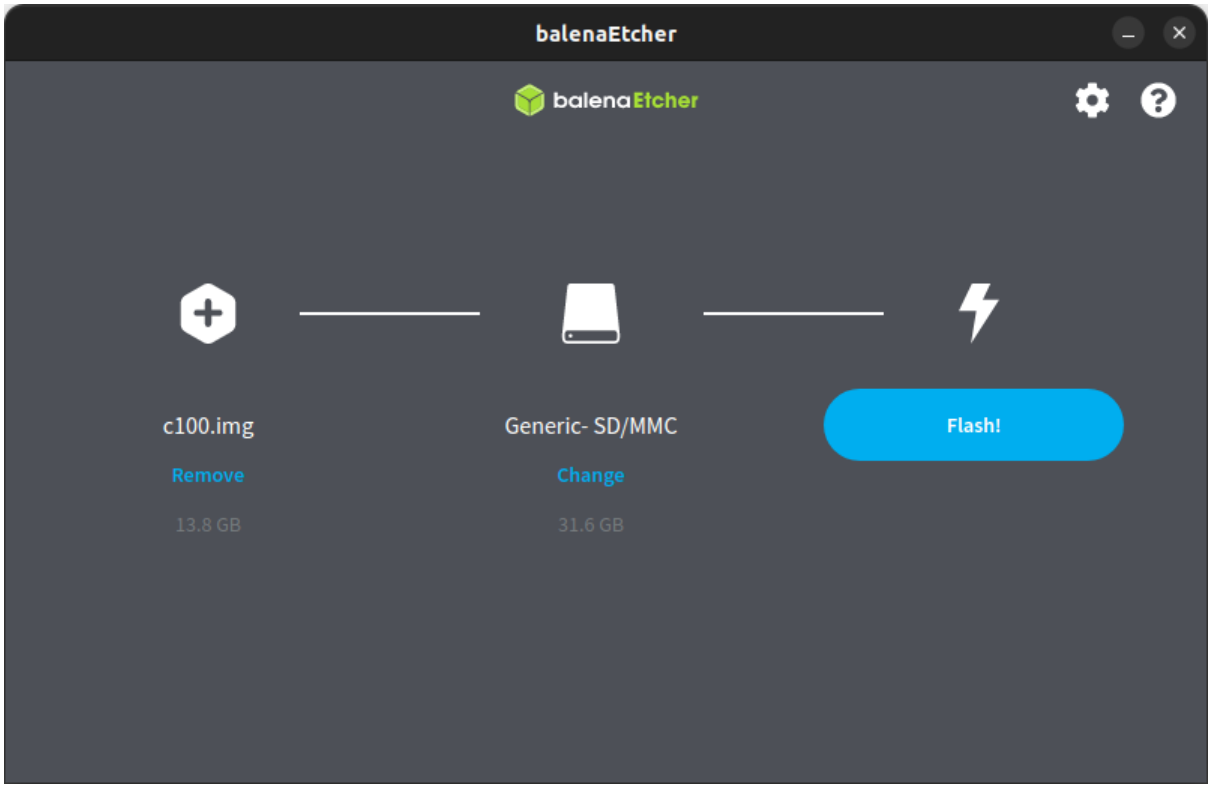
We want to ensure that you have all of the tools needed to get ROCKing and creating amazing applications with your ROCK single board compute

We recommend balenaEtcher, a user friendly Open Source Image Writer which is available on either Linux, Mac or Windows. It decompresses the
flashes the image and performs validation checks on the SD card image.

Tool	Linux	MacOS	Windows
balenaEtcher	balenaEtcher for Linux 64bit balenaEtcher for Linux 32bit	balenaEtcher for MacOS	balenaEtcher for Windo

- The download filename is c100.img.xz
- Insert the microSD card into the host's card reader
- Start balenaEtcher, select the C100 image and the SD card
- Select Flash and wait for the image to be written and verified - this is a coffee break command!
- Eject the SD card from the host and insert it into the C100 card slot under the Jetson Nano module

Warning: *Be careful to select the correct drive!*

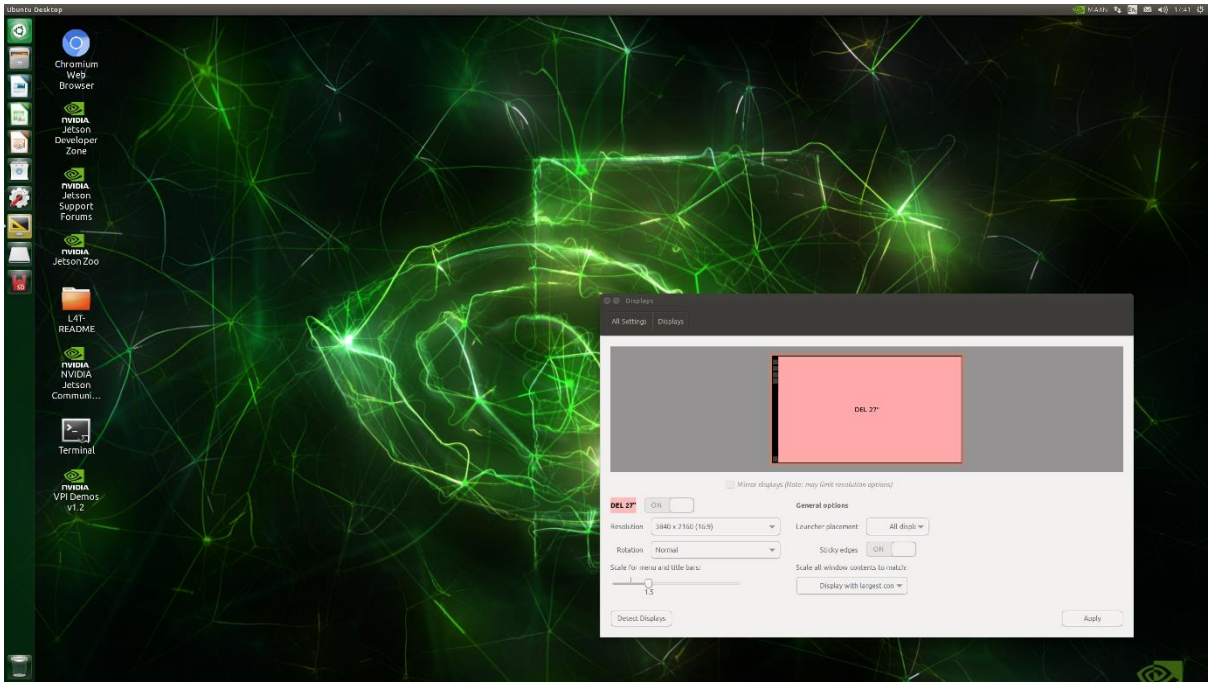


Step 4: First Boot

The initial boot will take you through the setup sequence, which includes accepting the NVIDIA end-user license, (EULA). Just follow the onscreen instructions and accept the default settings. This will give you the maximum software partition size and configure the module in MAX power mode.

- Plug in the power supply
- The green LED next to the micro USB connector will turn on
- Review and accept NVIDIA Jetson software EULA
- Select system language, keyboard layout, and time zone
- Create username, password, and computer name
- Accept APP partition size. It is recommended to use the max size suggested
- Accept MAX power setting

After a few seconds, the Bionic desktop will appear. If you need to adjust the monitor settings, click the Settings icon in the sidebar and change the Display settings to your liking.



Step 5: NVIDIA Jetpack

The image comes with NVIDIA's Jetpack version 4.6, which installs a range of useful applications for developing AI applications. They are custom-built and optimized to run on the Jetson Nano module and include:

Jetson Linux - bootloader, Linux kernel, Ubuntu desktop environment, and a complete set of libraries for the acceleration of GPU computing, multimedia, graphics, and computer vision.

TensorRT - a high-performance deep learning inference runtime for image classification, segmentation, and object detection neural networks.

CUDA Toolkit - provides a comprehensive development environment for C and C++ developers building GPU-accelerated applications.

Jetson Multimedia API package - provides low-level APIs for flexible application development.

Full details about the NVIDIA Jetpack can be found on the Jetpack page on the NVIDIA website.

Step 6: Install Jupyter Notebook

Jupyter Notebook is a development environment where you can mix code, text, and images.

The easiest way to install Jupyter Notebook and the required libraries is to use Conda.

- Open a Terminal window
- Follow the instructions at https://docs.conda.io/projects/conda/en/latest/user-guide/install/index.html to download and install Miniconda

- Install Jupyter Notebook by running the following command:

```
arduino
Copy code
sudo apt-get install jupyter-notebook
```

- You can now create a new notebook and start writing Python code.

Step 7: Test Camera Input

You can use Python and OpenCV to test the camera setup and confirm the CSI cameras are working correctly.

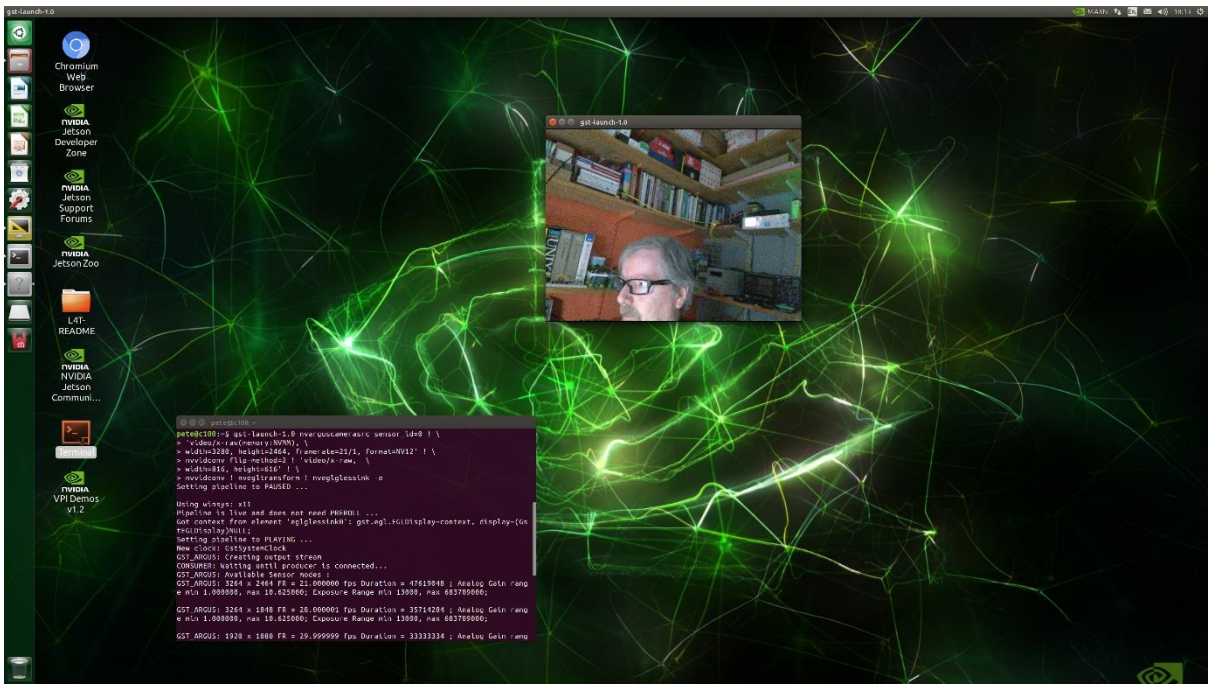
- Open Jupyter Notebook
- Create a new Python notebook
- Type and execute the following code:

```
python
Copy code
import cv2
cap = cv2.VideoCapture(0)

while(True):
    ret, frame = cap.read()
    cv2.imshow('frame', frame)
    if cv2.waitKey(1) & 0xFF == ord('q'):
        break

cap.release()
cv2.destroyAllWindows()
```

- A window should appear displaying the camera feed. Press 'q' to exit.



Step 8: Set Up Facial Recognition

Facial recognition requires a more sophisticated neural network model and Python libraries. In this example, we use a pre-trained Dlib facial recognition model.

- Follow the instructions at https://github.com/ageitgey/face_recognition to install Dlib and face_recognition Python libraries.
- Write a Python script to detect faces in real-time using your CSI camera.

```
python
Copy code
import face_recognition
import cv2

video_capture = cv2.VideoCapture(0)

while True:
    ret, frame = video_capture.read()
    rgb_frame = frame[:, :, ::-1]

    face_locations = face_recognition.face_locations(rgb_frame)
    for top, right, bottom, left in face_locations:
        cv2.rectangle(frame, (left, top), (right, bottom), (0, 0, 255), 2)

    cv2.imshow('Video', frame)

    if cv2.waitKey(1) & 0xFF == ord('q'):
        break

video_capture.release()
cv2.destroyAllWindows()
```

- Run the script and your camera feed will show detected faces with red rectangles around them.

Step 9: Future Development

The OKdo Nano C100 Developer Kit provides a powerful platform for developing AI applications with Python.

Some ideas for further development include:

- Object tracking
- Gesture recognition
- Pose estimation
- Real-time object detection
- Multi-camera processing

With the NVIDIA Jetson Nano and Jetpack SDK, the possibilities are endless. Enjoy experimenting!

This guide provides a comprehensive introduction to setting up the OKdo Nano C100 Developer Kit and using Python for AI video facial recognition. The step-by-step instructions should make it easy for developers to get started with this powerful tool. Enjoy exploring the many capabilities of this kit!