

Hardware Recommendations for Neurala VIA Software

Neurala’s VIA software offers the most flexible implementation of any vision AI inspection software on the market today. That flexibility provides a wide variety of options and choices when it comes to hardware. The data below outlines the minimum hardware requirements, as well as examples where there may be other hardware options or constraints.

OS	Either Microsoft Windows 10 (Brain Builder and Inspector) or Ubuntu 18.04 (Inspector only)		L4T 32.6.1
Platform	PC w/ Nvidia GPU	PC w/o discrete GPU	Nvidia Jetson
VIA Component*	Brain Builder and / or Inspector	Brain Builder and / or Inspector	Inspector only
Minimum Variant	N/A	N/A	TX2 / Nano
Minimum GPU	GTX 900	None	N/A
Minimum GPU RAM	6GB	N/A	N/A
Minimum CPU	Any x86-64	Intel Xeon w/ AVX2/512, Core w/ AVX2, or Atom w/ SSE	N/A
Minimum RAM	16GB	8GB	N/A
Recommendation	Core i7 Skylake/later, GTX 2080/better 16GB RAM	Core i7 Skylake/later 16GB RAM	Jetson Xavier

The following table outlines parameters for inspection system dimensioning and hardware selection.

Ethernet Ports**	Suggested 1 per camera, and one configurable output over industrial networks
Supported Cameras	Supported Cameras GigE Vision and USB3 Vision
Supported Pixel Types	Supported Pixel Types Mono8, Bayer BG8, Bayer GB8, Bayer GR8, YUV422
Maximum Number of Cameras	4 (synchronous or asynchronous operation)
Maximum Models per Camera	10 classifiers or anomaly recognizers
Acquisition Speed***	10 inspections per second with 4 classifiers or anomaly recognizers in parallel (1-4 cameras)
Supported Communication Protocols	Modbus TCP, EtherNet/IP, HTTP API and C++ Plug Ins.

* Configuration without Nvidia GPU not recommended for detector training / inference, Brain Builder on Windows 10 only

** If integrating more than 2 cameras, a managed switch or a high performance NIC (e.g. the Intel Pro/1000) with a dedicated port for each camera, is suggested.

*** Acquisition Speed/Frame rate varies based on hardware and system attributes. The number listed here is listed as 4 synchronous cameras with Core i7 & GTX 1060 & 16GB

Camera & Lens Recommendations

Neurala VIA is compatible with GigE Vision and USB3 Vision cameras. For broad applicability to a variety of use cases, the preferred camera should be color, not less than 2 Megapixels, and support a frame rate of at least 20 fps. We find that most applications can be solved using a 2-5 Megapixel camera. If the application in question were to have very small defects and utilize many ROIs, a higher resolution camera may work better. When choosing the right camera, the goal should be ensure that all ROIs cover an area of at least 256 pixels by 256 pixels.

In order to minimize the effects of motion blur when using Neurala VIA on a moving production line (assuming a speed of 4 ft/s and a 2 MP camera), the camera should have a shutter speed of 200 microseconds or less.

In Neurala's experience, most GigE Vision cameras with CMOS sensors and a global shutter will be sufficient. Some representative recommended cameras that meet these requirements are:

- [Teledyne DALSA GenieNano 1930](#)
- [Basler Basler Ace 2](#)
- [Teledyne FLIR Blackfly](#)

In addition to the cameras, appropriate lenses and lighting will be needed. Lighting requirements vary in each use case. Neurala recommends at least one lighting source with a diffuser to minimize the glare. While AI can adapt more to variability than traditional machine vision, the quality of the image will still directly impact overall performance.

Choosing Hardware for the Speed of the Application

The achievable speeds of processing within Inspector can vary based on the hardware and architecture of the system. The variables include: number of cameras, number of models active per camera, size of the model, if the cameras are operated in a synchronous mode or not, if inspection lops are being saved, if images are being saved, amount of memory available, speed of the CPU, speed of the GPU, etc.

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