

arivis Vision4D is an imaging tool specialized in handling large, high dimensional scientific images. By its unique software design, users are able to handle very large image data (in the Terabyte range) on small computers and even notebooks interactively regardless of available system memory (RAM).

Nevertheless, the arivis Vision4D is a software product that benefits from up-to-date hardware and software components. Depending on the typical use cases, we recommend different hardware setups for pure Visualization (3.) or for combined Visualization and Analysis (4.).

1. Supported platforms:

arivis Vision4D has been tested and is recommended on

- Microsoft Windows 8/8.1 (64 bit)
- Microsoft Windows 10 (64 bit)

A 32-bit version is available as well but not recommended.

sVision4D may work on other Windows versions (e.g. Windows Vista or Windows Server).

Vision4D must be installed with admin user rights; however, no admin rights are necessary while using arivis Vision4D.

2. Required software components and drivers:

The following software components are required and will be automatically installed by the Vision4D installer if necessary:

- Microsoft .NET Framework 4.0
- Visual C++ 2012 Redistributable Package (x86)
- Sentinel HASP SRM driver (installed automatically)

3. Recommendations for Vision4D Visualization (Vision4D Base Package):

- Visualization and exploration profits most from CPUs with a good balance between individual speed and number of cores for parallelization.
- Professional and consumer GPUs are very similar in architecture and offer more or less the same functionality. The latter tend to provide significantly higher performance for the same cost. We recommend NVIDIA GPUs.
- Fast hard drives and SSDs speed up Vision4D a lot. They are, however, more expensive so choose a combination of SSDs and regular hard drives to get a good speed/price value.

3.1 Example for a workstation offering solid performance for Vision4D visualization:

This hardware level enables 3D/4D visualization with a solid performance:

- **Processor:** AMD or Intel quad-core CPU with hyper-threading
- **RAM:** 8+ GB DDR3/4 memory
- **GPU:**
 - NVIDIA: "GeForce GTX 1070" with the latest NVIDIA drivers
 - AMD / ATI: "Radeon RX 580" with the latest AMD drivers
- **Drives:** at least 1 TB disk space for system installation (without any image data) and fast internal or external disks for image storage



3.2 Example for a workstation offering high-end Vision4D visualization:

For the best 3D/4D experience, these hardware specifications are recommended:

- **CPU:** same as above
- **RAM:** 16+ GB DDR4 memory
- **GPU:** Latest generation NVIDIA or AMD high performance consumer GPUs like the NVIDIA GeForce RTX 2080 or the AMD Radeon RX 5700 with the latest drivers
- **Drives:** In addition to the requirements mentioned above, a high performance 1TB SSD like the Samsung 860 EVO is recommended as a scratch disk for temporary data storage

4. Recommendations for Vision4D Visualization & Analysis (Vision4D Analysis Package):

For complex image analysis tasks, powerful hardware will increase the speed significantly.

Here are some technical insights and rules of thumb for hardware well suited for Vision4D analysis tasks.

- Do not buy the fastest hardware you can get, always choose a good trade-off of price and speed/power.
- Due to its unique approach, Vision4D does not need to store the whole dataset in RAM for any operation. However, more RAM will speed up some operations in analysis as well as in the visualization of large time series and many annotations.
- Most image analysis operations in Vision4D benefit from hardware offering a high level of parallelization. Therefore, a large number of CPU cores is a good way to speed up analysis. For visualization and exploration, the core count of the CPU is not as significant but some operations do still profit from parallelization.
- Professional and consumer GPUs are very similar in architecture and offer more or less the same functionality. However, the latter tend to provide significantly higher performance for the same cost and are thus preferable. We recommend NVIDIA GPUs for their reliable driver software.
- Fast hard drives and SSDs speed up Vision4D a lot. They are expensive, however, so choose a combination of SSDs and normal hard drives to get a good speed/price value.

Recommended system for Vision4D Visualization & Analysis:

The effective performance of analysis in arivis Vision4D depends not just on the clock rate of the CPU but rather on a combination of the clock rate and the number of cores. Some operations benefit from higher clock rates while others scale very well with the amount of concurrent operations possible (i.e. number of CPU cores).

The way to go about finding the best-suited solution mostly depends on the budget available. You will therefore find two paths for some parts of the configuration. Please do not mix the paths.

As a rule of thumb: Put as much storage in your workstation as you can – you will need it.



Example for a high-performance analysis workstation

CPU:**Path 1**

Single-CPU setup with an
AMD RYZEN 9 3900X
twelve-core @ 3.8 GHz

Path 2

Dual CPU setup with one or two
Intel Xeon E5-2667 v4
eight-core CPUs @ 3.2 GHz

Note: Running a dual-CPU setup with only one active CPU (leaving the second CPU slot vacant) initially offers a more cost-efficient way to build the workstation while allowing a significant performance increase by adding a second CPU later on when the need arises.

RAM:**Path 1**

32 to 128 GB of DDR4 memory

Path 2

32 to 128 GB of DDR4 EEC memory

GPU:

- Latest generation high performance GPUs such as the NVIDIA RTX 2080Ti or the AMD Radeon RX 5700XT and the latest drivers

Drives:

- 250GB SSD for OS
- 2x 1TB NVMe SSD for scratch space (working and temp storage)
- 4x 6TB HDD in RAID mode for data storage (big storage, not a backup!) This depends on the usage of the PC and storage location of your image data. If your data is stored on a computer on your network, you will not need as much space. However, if this computer stores your image data, we also recommend an external storage for data safety.

Peripheral: Several USB3 and/or Thunderbolt

Monitor: 2x Full HD or higher resolution

