

RESEARCH & EDUCATION

HARDWARE GUIDE

Trossen Robotics designs affordable, flexible robotic kits used by top institutions like Google DeepMind, Stanford, and Hugging Face. From simple motion planning to cutting-edge imitation learning, reinforcement learning, and vision-language-action (VLA) model development, choosing the right hardware setup is critical for your project's success.



DEFINE YOUR PROJECT GOALS

Consider the following aspects of your project:

Project Type

Are you collecting data or using existing datasets? Training models or just running inference?

Environment

Are you working in a controlled lab setting (fixed lighting, fixed cameras) or dynamic field environments (kitchen, office)?

Scale

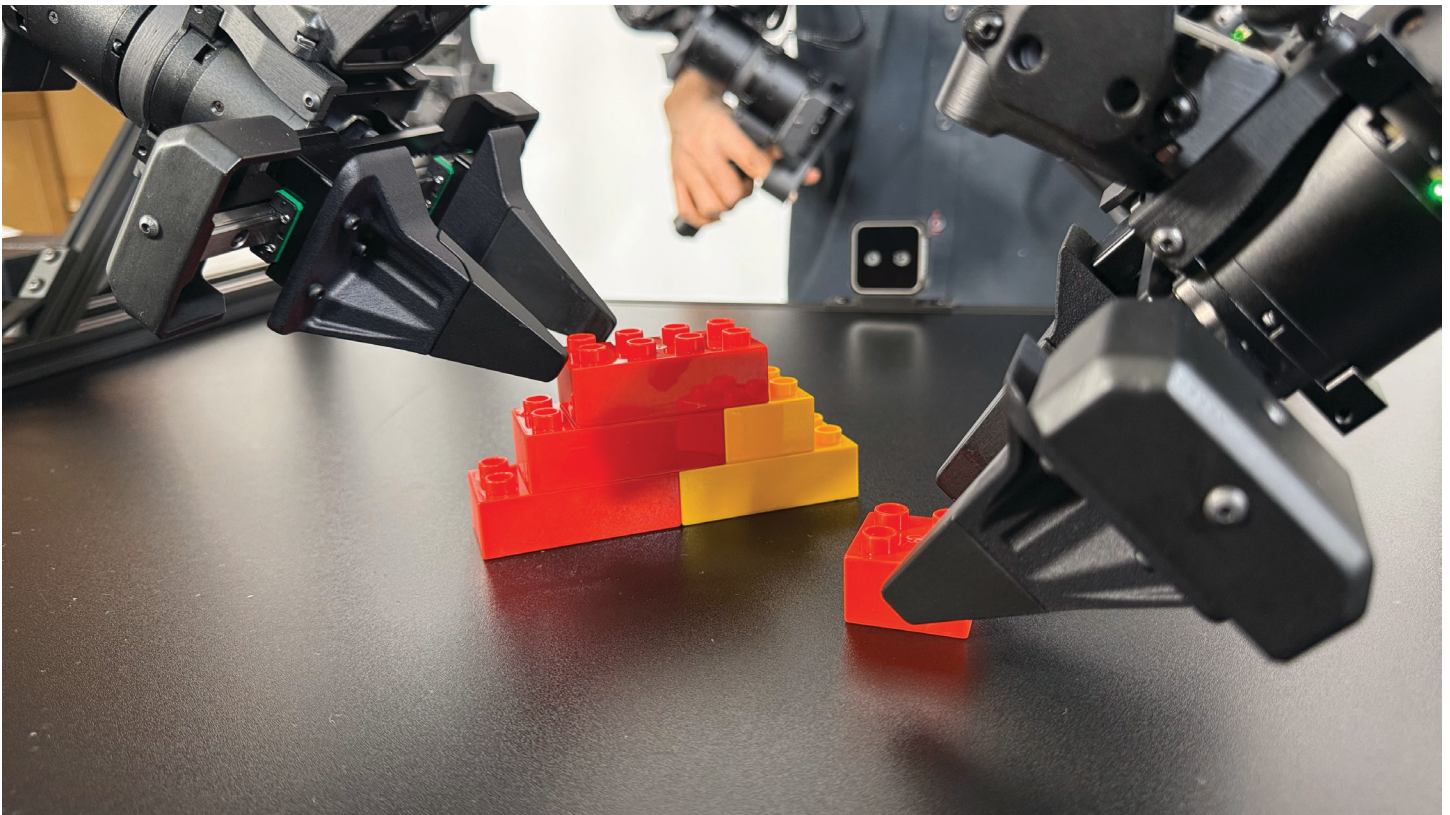
Will you need consistency across multiple kits/labs?

Mobility

Do you require a mobile base or are you working with a tabletop setup?

Task Scope

Are you working on bimanual manipulation? What is the weight and size of the objects being manipulated?



CHOOSE THE RIGHT HARDWARE



Solo AI

Our Solo AI is for those that need a flexible and affordable kit that delivers performance and ease of use in a variety of environments.

- Lightweight and portable.
- Single leader-follower pair for fine-grain manipulation.
- Teleop, motion planning, and field ML mass data collection



Stationary AI

Our Stationary AI is for those that require bimanual manipulation and a tightly controlled environment for data set consistency and reproducibility. It's the go-to kit for mass data collection and collaboration.

- Sturdy, rigid frame
- Dual leader-follower arm pairs for fine-grain bimanual manipulation
- Teleop and motion planning, and lab ML mass data collection.



Mobile AI

Our Mobile AI is for those that need bimanual manipulation for fine-grain tasks, but do so out in the field.

- Mobile base with encoder data feed for models
- Dual leader-follower arm pairs for fine-grain bimanual manipulation
- Teleop and motion planning, and field ML mass data collection.

WidowX AI

Powering all of our kits is the new WidowX AI, a next-generation manipulator made for the advanced requirements of robotic research and engineering. The WidowX AI is available as three stand alone models for those not needing the cost-savings bundling of kits.

- 1.5kg payload capacity
- ARM Cortex M7 powered iNerve® controller
- Hardware gravity compensation
- Industrial build quality and durability
- Ethernet based connectivity for easy scalability
- Hugging Face LeRobot support
- C++ driver with Python bindings for custom development
- Mac and Linux support



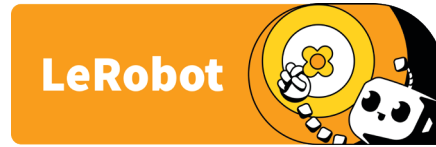
SOFTWARE & INTEGRATIONS



Data Collection

Every kit comes with a touchscreen and our free GUI data collection app. This makes it a breeze for even non-technical users to collect data sets and performance tasks. Don't want a kit, but still want to use our GUI app? It's totally free to download from our Github repository. See links at the end of the document

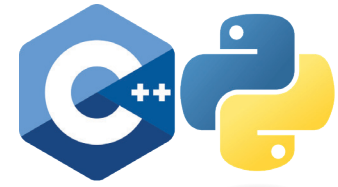
- Easy push button data collection
- Even for non-technical users



Hugging Face LeRobot

Our data pipeline is powered by Hugging Face LeRobot. It provides you an easy, free and cross-platform workflow for data collection, storage, sharing, and more.

- New models being added all the time
- Free up local storage with their free cloud hosting
- Public or private data repositories
- Completely open-source



C++/Python

For those wanting to go the custom route, we give you comprehensive low-level access with our C++ driver with convenient Python bindings. This makes it easy for non-developers to create custom workflows, models, and applications using the Trossen AI hardware.



Cloud Computing

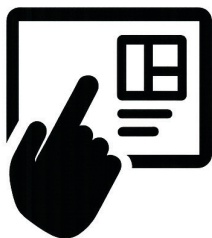
Regardless of your compute solution, you have access to our free Jupyter Notebook template for offloading model training to the cloud with Google CoLab.

- Cost effective and fast
- Easy to run
- Background execution w/ Pro+ tier



CHOOSING YOUR COMPUTE SOLUTIONS

Deciding on a compute solution comes down to the three core functions of machine learning: data collection, model training, and model evaluation. Each of these tasks places different demands on your system.



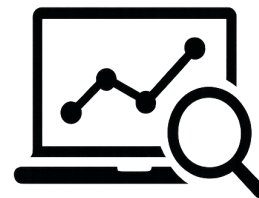
Data Collection

Data collection is typically the least demanding task when it comes to compute resources. It relies more on stable CPU performance for encoding and writing to disk, and reliable peripheral integration (e.g., cameras, arms, sensors) than raw processing power. Most modern laptops or desktops can handle data collection smoothly, as long as they support the necessary interfaces and bandwidth (e.g., USB 3.0, Ethernet).



Model Training

Model training is by far the most resource-intensive phase of the machine learning workflow. It relies heavily on your system's GPU, and most modern ML models require a high-end graphics card with at least 8GB of dedicated VRAM—often more. The larger and more complex the model (e.g., ACT++, Pi0, Gemini), the more critical your GPU becomes in reducing training time and ensuring stable performance. We recommend the use of cloud-based services like Google CoLab to augment your model training needs to increase the speed at which you can train your models.



Model Evaluation/Inferencing

Model evaluation—or inference—falls somewhere between data collection and training in terms of resource demand. The requirements vary depending on the model's size, architecture, and what it's being asked to do in real-time. Lightweight models like ACT can often run on mid-tier systems or CPUs with integrated GPUs, especially for proof-of-concept work.

However, more advanced models like Pi0, require very high-end dedicated GPUs to evaluate effectively and be utilized fully.

Preloaded Systems

We offer preloaded compute solutions through trusted partners like Asus, System76, and Dell—ensuring reliable performance right out of the box. Any system that is Ubuntu Certified (ubuntu.com/certified) can be sourced, preloaded, and shipped with your kit.

To see the minimum recommended hardware for your specific use case, visit trossenrobotics.com and view the product page for the kit you're considering.

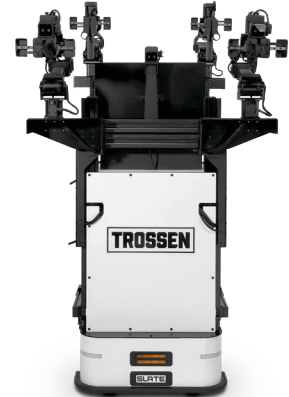
If you're evaluating alternative configurations or have unique compute requirements, we strongly recommend reaching out to our team. We'll work with you to align your project goals with the right system—ensuring optimal performance from day one; sales@trossenrobotics.com

Use Your Own Compute Solution

Prefer to bring your own hardware? No problem. All of our kits are fully compatible with customer-supplied compute solutions, and our entire software stack is 100% free to use—no licensing fees, subscriptions, or gated features.

As long as your system meets the technical requirements outlined in our documentation, you'll have full access to tools like the touchscreen GUI app, Hugging Face LeRobot integration, C++/Python SDKs, and more.

If you're unsure whether your system is up to the task—especially for tasks like model training or high-performance inference—we encourage you to contact our team. We're happy to review your setup and help align your hardware with your project's technical goals.



LET'S BUILD THE FUTURE

Why Trossen?

Lifetime Product Support

We're here when you need us, even years after your purchase.

1-Year Warranty

Peace of mind included with every kit.

Extensive Documentation

Developer-friendly guides, hardware specs, and integration support.

Step-by-Step Use Guides & Tutorials

Learn at your own pace with video walkthroughs and written resources.

Public CAD, STEP & Mesh Files

Customize, adapt, and innovate using our open resources.

Replacement Parts Readily Available

Keep your projects running with minimal downtime.

Trusted by Top Institutions

Including Google DeepMind, Stanford, Carnegie Mellon, U.C. Berkeley, Physical Intelligence, Hugging Face, & more.

Whether you're just exploring options or ready to place an order, our team is here to support you every step of the way. From helping you choose the right kit to ensuring your hardware and software are fully aligned with your project goals, we're committed to making your research and development process as smooth and successful as possible.

Have questions? Need a quote? Want help evaluating your compute setup?
Email us at sales@trossenrobotics.com to connect with a product expert.

FAQs

General Product Information

Q: What is the difference between the “Legacy” and New “AI” hardware kits?

A: The “Legacy” kits (such as Aloha Stationary and Mobile) were previously used by institutions like Google DeepMind and Stanford for the Aloha whitepapers. We have improved upon the Legacy hardware with the new AI lineup. Our AI lineup is still part of the Aloha project for low-cost research hardware. Please visit www.trossenrobotics.com/ai for details on the improvements

Q: Is the new AI hardware compatible with datasets collected from Legacy kits?

A: NO, datasets collected from Legacy kits are not directly compatible with the new AI hardware. You will need to use Legacy Aloha kits to use data from previous whitepapers or Aloha kits. Please keep in mind that new/upcoming whitepapers/research and public data sets will feature our new AI lineup. When making your decision, consider your project goals: if you MUST utilize past datasets, opt for a Legacy kit; if you CAN collect new datasets, use the AI lineup and recreate the previous work from the whitepapers.

Hardware & Configuration

Q: Can two Solo AI units be combined for bimanual manipulation tasks?

A: Yes, two Solo AI units can be combined for bimanual tasks. However, without a Stationary AI frame or a frame that you design and construct yourself, inconsistencies in arm and camera placements may occur, which could affect the quality of the datasets and the repeatability of your model evaluation.

Q: What additional hardware is needed to convert two Solo AI kits into a Stationary AI setup?

A: You would need the frame, mounting plates, cables, a network switch, and various 3D-printed accessories. We do not currently sell this conversion hardware separately. Therefore, it is more practical and economical to purchase the Stationary AI setup from the start and be able to use the arms from your Stationary AI as two Solo AIs.

Q: Can arms and cameras be repositioned or remounted on custom setups?

A: Yes, both arms and cameras can be detached and securely remounted according to the user’s requirements. Note that the WidowX AI arms are not designed to be mounted sideways like a human arm.

Software and Data Collection

Q: What software is included with the kits?

A: The kits include:

- Trossen Arm C++ driver with Python bindings
- Trossen Arm Controller firmware
- A GUI app for easy data collection
- Integration with Hugging Face’s LeRobot for data collection, dataset management, model training, and model inferencing
- Jupyter Notebook templates for model training on Google Colab

Q: What platforms and architectures are supported by the Trossen Arm?

A: The following platforms are supported:

- Linux Ubuntu 22.04 x86_64 and arm64
- MacOS 14 and MacOS 15 Apple Silicon

Computing

Q: Can customers supply their own computing solutions?

A: Yes, customers can provide their own computing solutions as long as they comply with the system compatibility requirements in our documentation at <https://docs.trossenrobotics.com>

Q: Can I order a custom computer from Dell or System76 through Trossen Robotics and have it come preloaded with my kit?

A: Yes, we can order any computer from Dell or System76 that is Ubuntu Certified (<https://ubuntu.com/certified>) for you, preload it, and ship it with your kit. The total cost and shipping will be adjusted per the computer of your choice. Please submit a quote for accurate pricing.

Q: How do I know which compute solution is right for me?

A: Depending on your needs, you may choose one compute solution over another. Outlined below is a general outline of hardware capabilities.

Intel-based NUC computer with built-in GPU

You can easily collect data and inference with a model like ACT.

Intel-based desktop or laptop with minimum Intel i7 or Ultra 7,

16GB+, and a dedicated NVIDIA RTX with 8GB+ VRAM

You can data collect, on-device model train, and do inferencing with a model like ACT.

Please note that as of (4/1/2025) the compute solutions we offer are only guaranteed to perform inferencing with ACT. Any other model may have different hardware requirements, and your performance may vary. E.G. Pi Zero requires an NVIDIA RTX 4090 or greater for basic inferencing and an NVIDIA H100 or equivalent to do the fine-tuning (full) <https://github.com/Physical-Intelligence/openpi>

Future support for AMD-based systems is currently in our development pipeline. (4/1/2025)

CAD and Design Resources

Q: Are CAD models available for customization purposes?

A: Yes, STEP files for grippers, camera mounts, and accessories are publicly available. However, arm models are simplified due to company policy.

Q: Where can the STEP files be accessed?

A: STEP files are available on Trossen Robotics’ public Google Drive.

https://drive.google.com/drive/folders/1D19FTClOn5A74k02u_UtRs57vlmEDWfA?usp=drive_link

STEP files are also available on the Trossen Arm Docs download page. https://docs.trossenrobotics.com/trossen_arm/main/downloads.html

Q: Where can I find URDF and STL mesh files?

URDF robot description and STL mesh files can be found on the `trossen_arm_description` GitHub repository. Both `xacro` files and generated URDF files are provided for each variant.

https://github.com/TrossenRobotics/trossen_arm_description

Miscellaneous

Q: Can Trossen AI kits be customized for specific research or commercial needs?

A: Yes, Trossen can accommodate custom orders, including specialized computing solutions and hardware setups. Please chat with us before making a purchase.

Q: Can I pair any controller with any arm?

A: When doing factory calibration, we fine-tune parameters for each arm and store them on the controller. We recommend keeping each arm paired to the controller with the same serial number; otherwise, you may experience degraded performance.