## video on transferring key for siemens automation license manager using ethernet

Yes. There is a good video that shows **exactly how to transfer a Siemens Automation License Manager (ALM) license between two PCs over Ethernet/network**:

That video demonstrates the **“Connect Computer”** method and transferring a floating license over Ethernet rather than using a USB stick.

**The basic procedure**

On **both computers**:

1. Install **Automation License Manager (ALM)**.
2. Connect the two PCs to the **same Ethernet network**.
3. Open **Automation License Manager** on the PC that currently has the license.
4. Select the license you want to move.
5. Choose **License Key → Transfer**.
6. Select **Network**.
7. Select or enter the **name/IP address of the other PC**.
8. Select the destination drive, normally **C:**.
9. Start the transfer.

Siemens' documentation confirms that ALM's **License Key → Transfer** function can use **Network** to select another computer, and the destination computer must have ALM installed.

**If the other PC isn't found**

This is the part that often causes problems. In newer ALM versions, the receiving PC may need to have **remote connections enabled** in:

**ALM → File → Settings → Connection**

There can also be a Windows Firewall issue preventing the two ALM installations from communicating. A current demonstration of this network method shows checking the ALM connection settings and firewall when the computers cannot connect.

**If you're trying to move your TIA Portal V20 license from one Windows 11 PC to another over an Ethernet cable, I can give you the exact settings on both PCs—including what to enter for the IP addresses and the ALM Connection settings.**

**how to download v20 of tia of siemens**

Yes. For **TIA Portal V20**, the safest way is to download it directly from Siemens.

**Official Siemens V20 download**

Siemens TIA Portal V20 / STEP 7 / WinCC download page

**To install V20 on your computer**

1. Open the Siemens page above.
2. Sign in with your **Siemens ID**.
3. Find **SIMATIC STEP 7 incl. Safety, S7-PLCSIM and WinCC V20**.
4. Download the V20 installation package.
5. Run the installer as Administrator.
6. For your **S7-1200 1215C**, select **STEP 7 Professional V20** if that is the license you have.
7. After installation, open **Automation License Manager (ALM)**.
8. Transfer your **V20 license** to the new PC, as we discussed earlier.

Siemens confirms that STEP 7 and WinCC V20 are available through its Industry Online Support download system.

**Important**

If you already have a **V20 license**, you can install the software even if the installer initially operates as a trial; your valid license in ALM activates the licensed functionality. Siemens also provides V20 updates separately.

**If you tell me whether you want the V20 download for STEP 7 Professional or STEP 7 Basic, I can give you the exact Siemens download page and tell you exactly which file to click.**

**a good tutorial on writing logic in xls**

If by **"XLS" you mean Microsoft Excel**, and you want to learn how to **write logic similar to PLC logic**, I would start with **IF, AND, OR, NOT, and nested IF statements**.

**Best tutorial to start with**

**Microsoft's official Excel tutorial:**
Using IF with AND, OR, and NOT in Excel

It is particularly good for learning logic because it shows:

- IF — if a condition is true, do this; otherwise do that
- AND — all conditions must be true
- OR — any condition can be true
- NOT — reverse a condition
- Combining them, such as IF(AND(...),...,...)

**For your PLC background**

I would learn Excel logic in this order:

| **PLC concept** | **Excel equivalent** |
|---|---|
| Normally open contact | A1=TRUE or A1=1 |
| Normally closed contact | A1=FALSE or A1<>1 |
| AND contacts | AND() |
| OR contacts | OR() |
| Coil/output | IF() result |
| Multiple branches | OR() / nested IF() |

| PLC concept | Excel equivalent |
| --- | --- |
| Interlock | AND() / NOT() |
| Compare value | A1>100, A1=50, etc. |

For example, a PLC-type condition:

**Motor runs if Start is ON AND Stop is OFF AND Pressure is OK**

could be written in Excel as:

=IF(AND(A2=1,B2=0,C2=1),"MOTOR ON","MOTOR OFF")

That is very similar conceptually to building a rung in ladder logic.

If you mean **writing actual Excel VBA code**, rather than formulas, I would use Microsoft's VBA If...Then...Else tutorial instead.

If you want, I can also give you a **PLC-to-Excel tutorial specifically designed for someone who already knows Siemens S7/TIA ladder logic**, with 10 progressively harder examples.

For spreadsheet logic tutorials, here’s an automation-focused tracker option.

**i want to teach how to write logic in xls to complement the cognex programming**

Yes — you mean **Excel spreadsheets used as part of Cognex Vision programming**, not Excel formulas in general.

For Cognex, particularly **In-Sight / spreadsheet programming**, the most useful tutorial would teach students how to build **vision logic directly in the spreadsheet**: image acquisition → tools → measurements → pass/fail decisions → outputs.

Since you're using Cognex in an industrial-automation teaching context, I'd structure it around **Cognex In-Sight Spreadsheet** rather than generic Excel.

A good course/tutorial sequence would be:

1. **In-Sight Spreadsheet fundamentals**
    - Cells and cell references
    - Functions
    - Data flow between cells
    - Constants vs. calculated values
    - Naming cells
2. **Boolean logic**
    - TRUE/FALSE
    - AND
    - OR
    - NOT
    - Combining conditions
3. **Decision logic**
    - IF
    - Nested IF
    - Pass/fail logic
    - Multiple inspection criteria
4. **Vision measurement logic**

- Locate a part
- Measure dimensions
- Compare measurement to tolerance
- Produce an OK/NG result

5. **PLC communication**
    - Convert inspection results to outputs
    - Send numerical results to the PLC
    - Triggering and handshaking
    - Good/Bad/Busy/Complete logic

**A very useful student exercise**

For example, have the Cognex camera measure a part diameter:

**Specification:** 25.00 mm ± 0.25 mm

The spreadsheet could implement:

Measured Diameter

↓

Is Diameter >= 24.75?

↓

Is Diameter <= 25.25?

↓

PASS

Then students build the actual Cognex spreadsheet logic rather than simply learning Excel.

I can put together a **complete Cognex In-Sight Spreadsheet programming tutorial**, starting with the basic cells and progressing to a **PLC-connected inspection**, including example screenshots/diagrams and exercises for your students.

For teaching Excel logic, here's one Excel training course option.

**yes**

Absolutely. Since your goal is to **teach Cognex programming**, I would make the tutorial specifically about **In-Sight Spreadsheet logic**, with the emphasis on how students think through an inspection—not on generic Excel.

**Cognex In-Sight Spreadsheet Logic — Teaching Tutorial**

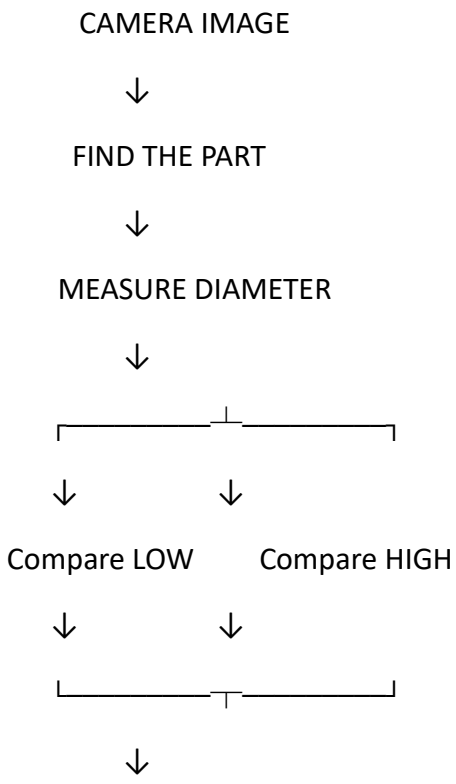
**1. Start with the basic idea**

Explain to students that the Cognex spreadsheet is essentially a **program made out of cells**.

Each cell can:

- Receive information from another cell
- Perform a calculation
- Make a decision
- Pass its result to another cell
- Ultimately control an output or communicate with a PLC

A simple inspection might look like:



PASS / FAIL

↓

PLC

---

**Lesson 1 — Understanding Cells**

Have students create a simple spreadsheet with:

| Cell | Function |
|---|---|
| A0 | Text: "Measured Diameter" |
| B0 | Measurement |
| C0 | Lower Limit |
| D0 | Upper Limit |
| E0 | Result |

For example:

B0 = 25.10

C0 = 24.75

D0 = 25.25

Then the logic becomes:

B0 >= C0

AND

B0 <= D0

The important teaching point is:

**Don't start by writing complicated formulas. First break the inspection into individual decisions.**

That's very similar to teaching PLC ladder logic.

**Lesson 2 — Comparisons**

Teach these first:

=

<>

>

<

>=

<=

For example:

B0 >= 24.75

asks:

**Is B0 greater than or equal to 24.75?**

The result is essentially a Boolean:

TRUE

or

FALSE

This gives students the foundation for inspection logic.

**Lesson 3 — AND Logic**

Suppose a part has to satisfy two requirements:

Diameter >= 24.75

Diameter <= 25.25

Both must be true.

Conceptually:

LOW LIMIT  HIGH LIMIT

| |

↓ ↓

TRUE TRUE

\ /

\ /

AND

↓

PASS

This is exactly the same thought process as a PLC rung with two series contacts.

**Lesson 4 — OR Logic**

Now give students a different problem.

A part can be rejected because:

- Diameter is too small **OR**
- Diameter is too large

Diameter < 24.75

|

├—— OR —— REJECT

|

Diameter > 25.25

This is a good opportunity to show students that **AND and OR are the building blocks of most inspection decisions.**

**Lesson 5 — IF Logic**

Now introduce the final decision.

Conceptually:

IF

Diameter >= 24.75

AND

Diameter <= 25.25

THEN

PASS

ELSE

FAIL

This is where the spreadsheet starts to look like a real inspection program.

**Lesson 6 — Build a Real Cognex Inspection**

I would make this the first major student project.

**Inspection**

A camera inspects a round machined part.

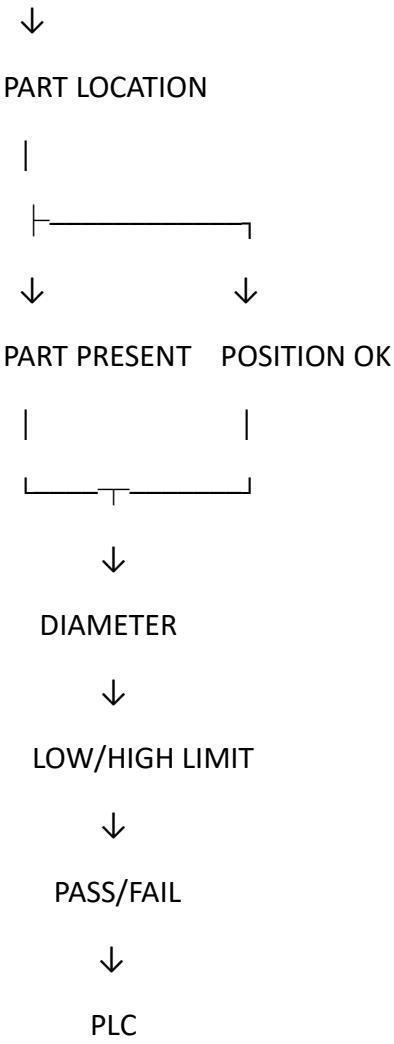
Requirements:

- Diameter: **25.00 mm**
- Acceptable range: **24.75–25.25 mm**
- Part must be present
- Part must be correctly located
- Diameter must be within tolerance

The spreadsheet could be organized conceptually as:

IMAGE

|




This teaches something very important:

**Separate measurement from decision.**

The Cognex tool should determine:

**What is the measured value?**

The spreadsheet logic should determine:

**What do I do with that value?**

That separation makes programs much easier for students to troubleshoot.

**Lesson 7 — Give Every Decision Its Own Cell**

This is something I would strongly emphasize in your course.

Instead of one huge formula, use intermediate cells.

For example:

Diameter

↓

Cell 1: Diameter >= Low Limit

↓

Cell 2: Diameter <= High Limit

↓

Cell 3: AND Cell 1 and Cell 2

↓

Cell 4: Part Present AND Position OK

↓

Cell 5: Final PASS

Then students can look at the spreadsheet and immediately see **where the problem occurred**.

That is very much like troubleshooting a PLC program rung-by-rung.

**Lesson 8 — Connect the Cognex to a PLC**

This would be especially valuable for your Siemens students.

Teach the handshake as a separate exercise:

PLC

├— Trigger

↓

Cognex

├— Acquire image

├— Locate part

├— Measure

├— Evaluate

↓

Inspection Comple

├— PASS

└— FAIL

↓

PLC

Then introduce:

- Trigger
- Busy
- Complete
- Pass
- Fail
- Measurement data
- Reset

Students can then see that **vision programming and PLC programming are two parts of the same machine-control problem.**

**A good 6-project course**

I would build your tutorial around these six projects:

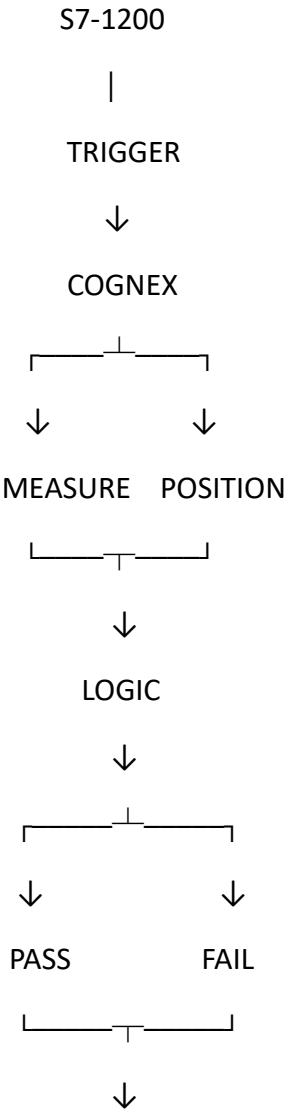
| **Project** | **What students learn** |
|---|---|
| **1. Cell Logic** | Values, references and comparisons |
| **2. Pass/Fail** | AND, OR and IF |
| **3. Dimensional Inspection** | Measurement + tolerance |
| **4. Part Presence & Location** | Combining multiple vision tools |

| Project | What students learn |
|---|---|
| **5. Multiple Defects** | Several independent rejection conditions |
| **6. Cognex + Siemens PLC** | Trigger, results and handshake |

**Project 6 could be your capstone**

For example:

**S7-1200 → Cognex → S7-1200**



S7-1200

This would make a very good **industrial-automation lab exercise**, because students would have to understand both the Cognex spreadsheet and the PLC side.

**Hi William,**

Thank you for reaching out. Here are the direct links to download the In-Sight software and related documentation links.

---ISE and IS7802---
In-Sight Explorer 6.5.1 Software
https://support.cognex.com/en/resources/software-firmware/cognex-in-sight-software-6-5-1/english/aCOos2o9ST-04oTJB_vqvA

In-Sight Explorer All Resources
https://support.cognex.com/en/products/in-sight-explorer-software

Get Connected
https://docs.cognex.com/is_651/web/EN/ezb/Content/EasyBuilder/Connect_Home.htm

Starting or Opening an EasyBuilder Job
https://docs.cognex.com/is_651/web/EN/ezb/Content/EasyBuilder/Connect_Job.htm?tocpath=Get%20Connected%7C_____2

Communicate with a PLC
https://docs.cognex.com/is_650/web/EN/ise/Content/How_To/communicate-with-plc.htm?tocpath=How%20To...%7CCommunicate%20with%20a%20PLC%7C_____0

Configure Robot Communications
https://docs.cognex.com/is_650/web/EN/ise/Content/How_To/Robot_Communications/configure-robot-comms.htm?tocpath=How%20To...%7CWork%20with%20Robots%20and%20Motion%20Systems%7CConfigure%20Robot%20Communications%7C_____0

---ISVS and IS3805---
In-Sight Vision Suite | v26.2.0
https://support.cognex.com/en/resources/software-firmware/cognex-in-sight-26-2-0/english/YXQoV2P1Q3uXg0911Q1unw

In-Sight Vision Suite All Resources
https://support.cognex.com/en/products/in-sight-vision-suite

Getting Started with In-Sight® EasyBuilder
https://docs.cognex.com/isvs_2621/web/EN/InSight_EZ/Content/Topics/GettingStarted/getstarted_ez.htm

Setting Up the Industrial Communications
https://docs.cognex.com/isvs_2530/web/EN/InSight_EZ/Content/Topics/IndustrialCommunications/comms-setup.htm?tocpath=Industrial%20Communications%7CSetting%20Up%20the%20Industrial%20Communications%7C_____0

Edge AI Tools
https://docs.cognex.com/isvs_2621/web/EN/InSight_EZ/Content/Topics/EZB/edge-ai.htm?tocpath=EasyBuilder%20Tools%7CEdge%20AI%20Tools%7C_____0

## Cognex Launches In-Sight Vision Controller Powered by NVIDIA

April 28, 2026

Download this Press ReleasePDF Format (opens in new window)

*Advanced AI Vision Controller delivers the modularity required to solve demanding, compute-intensive manufacturing applications without external PCs*

NATICK, Mass., April 28, 2026 /PRNewswire/ -- Cognex Corporation (NASDAQ: CGNX), the global technology leader in industrial machine vision, today announced the launch of the In-Sight® 6900 Vision Controller. The modular In-Sight Vision Controller gives manufacturers the freedom to configure cameras, optics, and lighting precisely for their inspection requirements, eliminating the compromises of fixed-configuration systems. Powered by NVIDIA Jetson technology, it delivers high-capacity AI processing at the edge, enabling the most demanding industrial workloads to run without external PCs or complex distributed architectures.

"As manufacturers accelerate their adoption of AI, they want solutions that are both powerful and easy to deploy," said Matt Moschner, President and CEO of Cognex. "The In-Sight Vision Controller delivers exactly that, combining NVIDIA's edge AI processing with Cognex's modular hardware and proven vision tools. This allows more customers to solve demanding inspection applications at the edge, without the cost and complexity of PC-based systems, and opens up applications that weren't possible before."

**Advanced AI Tool Modes for the Toughest Vision Challenges**
The In-Sight Vision Controller introduces Cognex's most advanced AI tool modes to date—purpose-built for challenging inspections, capable of handling parts of varying sizes, detecting highly variable defects, and delivering consistent results even in dynamic and unpredictable production environments.

Key capabilities include:

- **Modular Vision Architecture:** Support for interchangeable cameras, lenses, and industrial lighting enables precise system configuration, including Cognex's lenses, optics, cameras, and accessories (LOCA) portfolio.
- **Few Sample Classification:** Transformer-based classification models requiring as few as 10–20 training images, reducing data collection time and accelerating deployment.
- **Robust Segmentation:** Pixel-level segmentation that isolates critical features, delivering reliable analysis on challenging surfaces.

The In-Sight Vision Controller also integrates seamlessly with OneVision™, Cognex's collaborative AI platform that allows engineering teams to develop, refine, and scale inspection

applications globally from a single environment. Manufacturers can roll out improvements faster and maintain consistent quality across plants, production lines, and shifts.

**Powered by NVIDIA Jetson for Real-Time, High-Throughput AI at the Edge**
By incorporating the NVIDIA Jetson module, the In-Sight Vision Controller transforms from a traditional image processor into a high-performance AI engine capable of executing sophisticated neural networks directly at the edge.

Performance highlights include:

- **Parallel Processing for Complex Inspections**: Up to 157 TOPS of AI performance allows multiple high-resolution AI models to run simultaneously.
- **Real-Time Inference**: Optimized NVIDIA TensorRT integration helps ensure AI decision-making stays synchronized with the microsecond-level timing of high-speed production lines.

**About Cognex Corporation**
For over 40 years, Cognex has been making advanced machine vision easy, paving the way for manufacturing and distribution companies to become faster, smarter, and more efficient through automation. Innovative technology in our vision sensors and systems solves critical manufacturing and distribution challenges, providing unparalleled performance for industries from automotive to consumer electronics to packaged goods. Cognex makes these tools more capable and easier to deploy thanks to a longstanding focus on AI, helping factories and warehouses improve quality and maximize efficiency without needing highly technical expertise. We are headquartered near Boston, USA, with locations in over 30 countries and more than 30,000 customers worldwide. Learn more at cognex.com.

**what are the enhancements with Cognex One Vision over previous products**

Yes. **Cognex OneVision is a significant step beyond the traditional In-Sight/ViDi approach**, but it is important to understand that OneVision is primarily a **cloud-based AI development and management environment**, not simply a replacement for In-Sight Explorer.

Cognex now describes OneVision as the collaborative AI development environment within its broader **In-Sight Vision Suite**.

**The biggest enhancements**

| **Capability** | **Older In-Sight/ViDi approach** | **OneVision** |
|---|---|---|
| **AI training** | Generally train models within the individual vision system/software environment | **Web/cloud-based guided training** |
| **Data management** | More manual image collection and management | Centralized image collection, labeling and training |
| **AI labeling** | More manual | **AI-assisted labeling** and improved labeling workflow |
| **Model management** | Models tied more closely to individual jobs/devices | Centralized model/version management |
| **Multiple cameras/lines** | More duplication of work | **Reuse and deploy models across devices and locations** |
| **Collaboration** | Primarily project/job based | Multiple engineers can work with centralized projects |
| **Deployment** | Configure each vision system | Develop centrally and deploy to edge devices |
| **Version control** | More manual | Built-in project/model versioning |
| **AI complexity** | ViDi/Edge Learning tools depended on camera/model capability | More advanced AI models and guided workflows |
| **Hardware required for training** | Could require capable local PC/GPU for some AI work | **Cloud training eliminates the need for dedicated local AI training hardware** |

Cognex specifically says OneVision can centralize the AI lifecycle—from collecting and labeling images through refining models and deploying updates across a fleet of devices.

**One of the biggest improvements: AI training**

This is probably the most important difference for someone learning Cognex.

Instead of having to understand all the details of traditional vision programming and AI model development, OneVision provides **guided, web-based workflows** for:

**Images → Label → Train → Validate → Deploy**

Cognex says the guided interface is intended to make advanced AI accessible without requiring specialized AI expertise.

And OneVision has continued adding capabilities. For example, the 2026 releases added **trainable OCR, improved segmentation, model copying, improved project management, AI-assisted labeling, and enhanced anomaly detection**.

**Another major improvement: deployment to many machines**

This is where OneVision becomes much more valuable for an industrial company.

Suppose you develop an inspection for a particular part:

**Old approach**

Camera #1 → develop job
Camera #2 → duplicate job
Camera #3 → modify job
Plant #2 → duplicate and modify again

With OneVision, the idea is more like:

**Central AI project**
↓
Train/refine model
↓
Deploy to multiple Cognex systems
↓
Monitor/update versions centrally

Cognex reports that OneVision is designed to reduce duplication and maintain consistency across sites, lines and devices.

**Importantly: the inspection still runs locally**

This is an important point.

**OneVision does NOT mean your production line needs the Internet to inspect every part.**

The AI model can be developed and managed in the cloud, but once deployed, the actual inspection runs **at the Cognex vision system at the edge**. Cognex specifically states that cloud connectivity is not required during runtime and production images can remain local.

**For your Cognex 3800 work**

This is particularly relevant because you have been working with the **In-Sight 3800**.

The 3800 already has AI/Edge Learning capabilities, so OneVision isn't simply giving the 3800 "AI for the first time." The 3800 was already designed as an AI-capable vision system.

Instead, OneVision gives you a **much more powerful environment for developing and managing AI applications around the 3800**.

And Cognex's current software is moving toward a unified **In-Sight Vision Suite**. The April 2026 release made OneVision generally available within that environment.

As of October 2026, Cognex lists **In-Sight Vision Suite 26.2.1** as the current release for the 3800, released October 4, 2026.

**OneVision vs. In-Sight Explorer**

If your goal is **teaching Cognex programming**, I would think of them this way:

**In-Sight Explorer / Spreadsheet**

- Excellent for learning traditional Cognex vision logic
- Very good for deterministic measurements
- PatMax
- Blob
- Edge tools
- Calipers
- Math
- Logic
- PLC communications
- Spreadsheet programming

**OneVision**

- Much more focused on **AI-based inspection**
- Image datasets
- Labeling
- AI model training
- AI-assisted labeling
- Classification
- Detection
- Segmentation
- OCR
- Anomaly detection
- Model management
- Deployment and scaling

So I **wouldn't abandon spreadsheet programming**. In fact, for the type of Cognex/PLC training you have been considering, I think the best curriculum is:

**Traditional In-Sight Spreadsheet → Edge AI → OneVision → Advanced AI**

That gives students an understanding of **why** they would use conventional vision versus AI rather than simply teaching them to push an AI "train" button.

One other important development: Cognex's newest **In-Sight 3900 and 6900** systems are designed specifically to take advantage of this newer AI architecture, with the 6900 using NVIDIA Jetson processing for substantially more demanding AI workloads.

If you want, I can also give you a **side-by-side comparison of Cognex OneVision vs. In-Sight Explorer vs. VisionPro**, including **which software I would recommend teaching your students and whether your 3800 can run the OneVision tools**.

**what are the advantages of edge over insight**

If by **"Edge" you mean Cognex Edge Learning/Edge AI** compared with traditional **In-Sight rule-based tools**, the main advantage is that Edge can learn what a good or bad part looks like rather than requiring you to program every visual rule.

**Edge Learning vs. traditional In-Sight tools**

| | **Traditional In-Sight** | **Edge Learning** |
|---|---|---|
| How it works | You program rules | **You train it with images** |
| Programming skill | Higher | **Lower** |
| Handles appearance variation | Can be difficult | **Usually much better** |
| Lighting variation | Can require careful setup | Often more tolerant |
| Part-to-part variation | Rules may need adjustment | **Learns acceptable variation** |
| Defect inspection | Requires several tools/rules | **Very good for visual defects** |
| Training images | Not normally required | **Required** |
| Explainability | Very high | Lower |
| Processing speed | Often excellent | Usually very good |
| Deterministic measurements | **Excellent** | Not its primary strength |
| Exact dimensional measurement | **Excellent** | Not the best choice |
| Finding unusual defects | Can be difficult | **Major advantage** |

**A simple example**

Suppose you're inspecting a molded plastic part.

With traditional In-Sight programming, you might build:

**Blob → Edge → Pattern → Measurements → Math → Pass/Fail**

You have to define what constitutes a defect.

With Edge Learning, you might give Cognex:

- 100 good images

- 50 defective images

and train the system to recognize the difference.

The advantage becomes particularly large when the defect is **difficult to describe mathematically**.

For example:

"This surface doesn't look right."

That's difficult to program with conventional vision tools but is exactly the kind of problem where Edge Learning can be useful.

**Where traditional In-Sight is still better**

I wouldn't replace conventional In-Sight tools with Edge Learning for everything.

For example:

**“Is this hole 10.00 ± 0.10 mm?”**

Use conventional vision.

**“Is this label 5 mm from the edge?”**

Use conventional vision.

**“Is this bolt missing?”**

Either approach may work, but conventional tools may be simpler.

**“Does this molded surface have an unusual blemish?”**

Edge Learning may be substantially better.

**The biggest advantage for your students**

For the type of **Cognex training you have been considering**, I would teach students to ask:

**Can I describe the inspection with rules, or is it easier to show the system examples?**

If it can be described precisely:

**In-Sight tools → rules/measurements**

If it is primarily an appearance judgment:

**Edge Learning → train from examples**

And then **OneVision** takes this another step by making the AI-training/data-management process much easier and more centralized.

One important terminology point: **Edge Learning is a Cognex technology; "In-Sight" is the broader vision-system/software family.** So Edge isn't really an alternative to In-Sight. An **In-Sight 3800 can use Edge Learning alongside conventional In-Sight tools**.

**1. Best starting tutorial — Cognex official**

Cognex: Getting Started with In-Sight Spreadsheet

This is probably the **best tutorial for what you are trying to learn**. It explains how the In-Sight Spreadsheet works, including:

- Creating a job
- Inserting vision functions into cells
- Connecting functions together
- Cell references
- Pattern finding
- Edge finding
- Measurements
- Inputs/outputs
- Building more complex logic

Cognex describes the Spreadsheet as the environment for building simple through complex vision applications.

**2. Good video introduction**

This is an older video, but it gives you a **visual introduction to In-Sight Explorer and spreadsheet programming**.

**3. Video specifically on Spreadsheet programming**

This one goes further into **logic/programming inside the spreadsheet**, including scripting.

**4. The tutorial I think would be most useful for you**

Since you previously said you want to **learn how to write logic in the In-Sight spreadsheet to complement Cognex programming**, I would actually recommend learning in this order:

**Step 1:** Understand the Spreadsheet
→ cells, formulas, references

**Step 2:** Learn the basic vision tools
→ FindPatMax, Edge, Locate, Measure

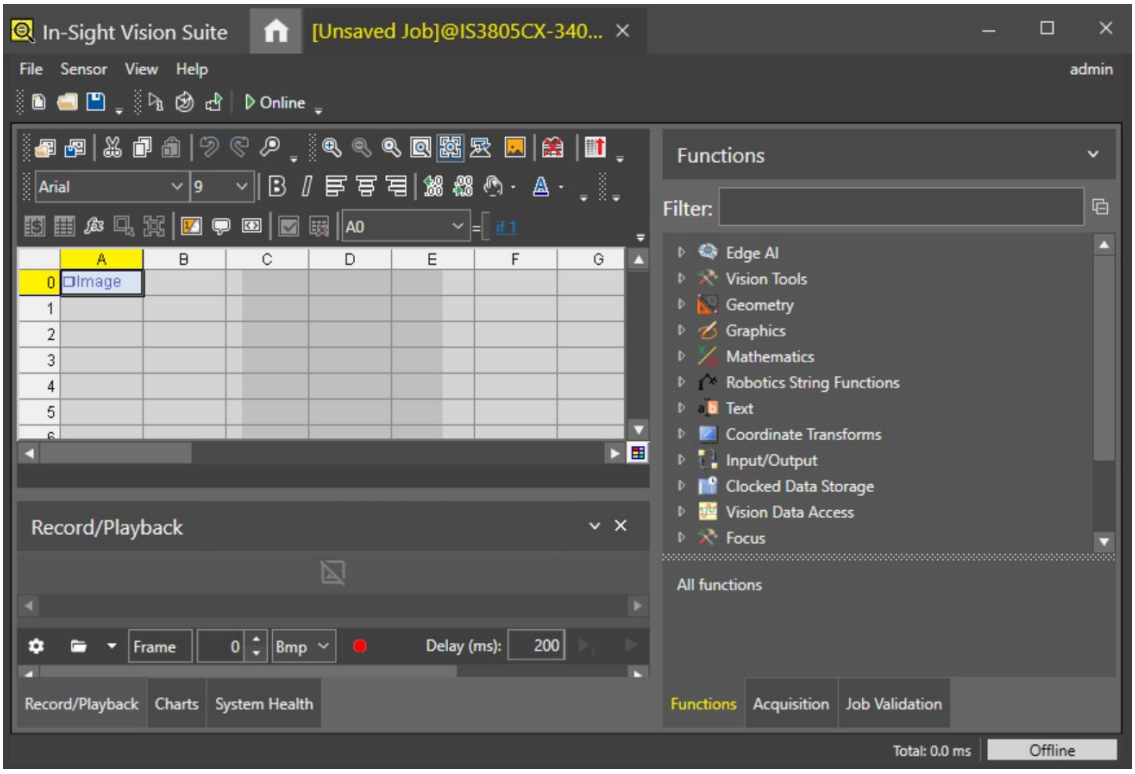
**Step 3:** Learn logic
→ IF, AND, OR, comparisons, arithmetic

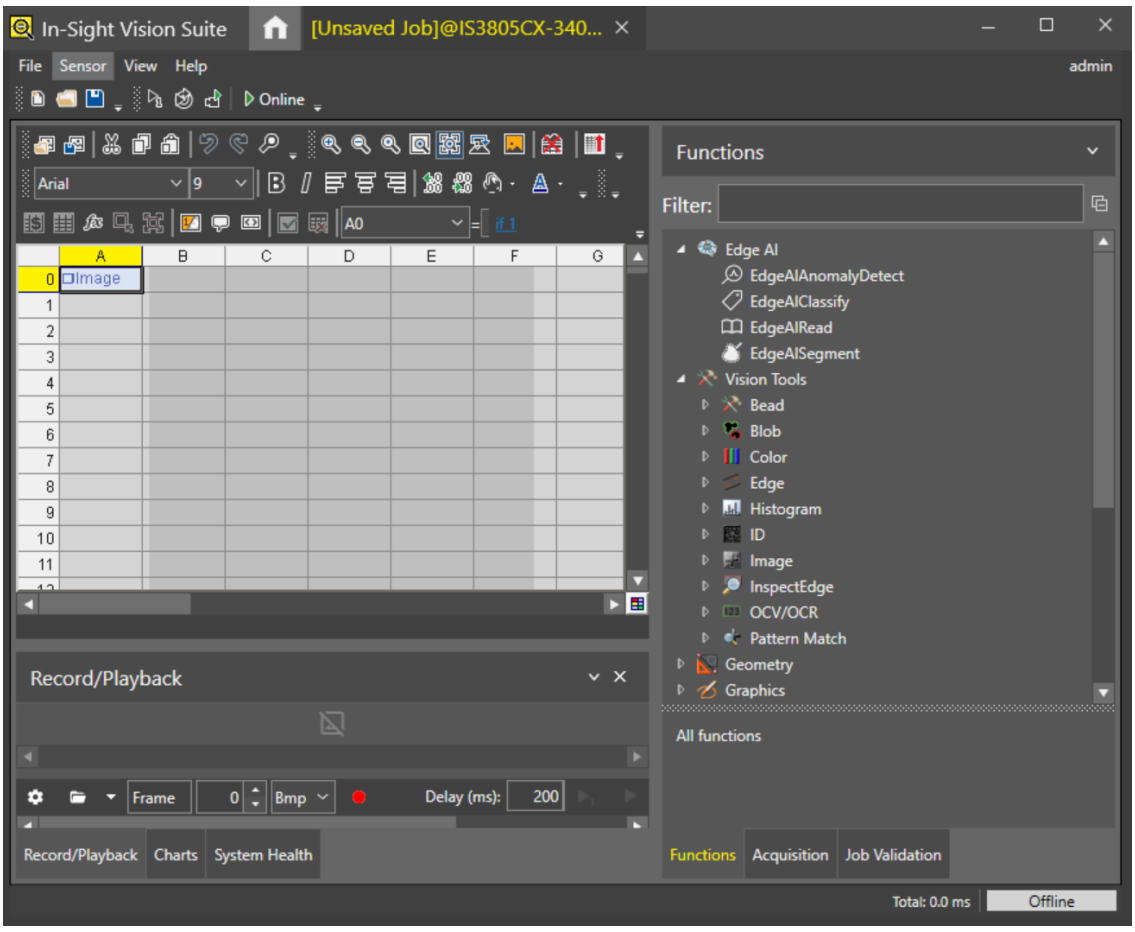
**Step 4:** Learn how to pass results between cells
→ e.g. B10 → C10 → D10

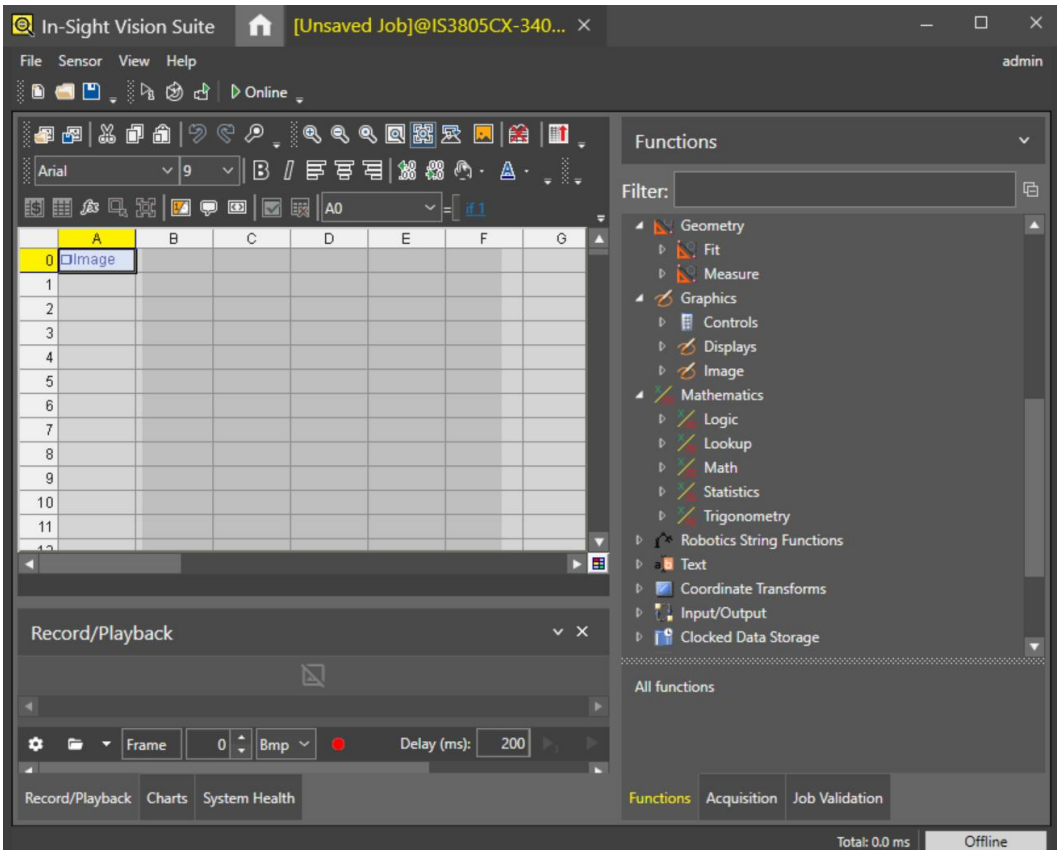
**Step 5:** Learn PLC communications
→ especially useful with your **Siemens S7-1200**

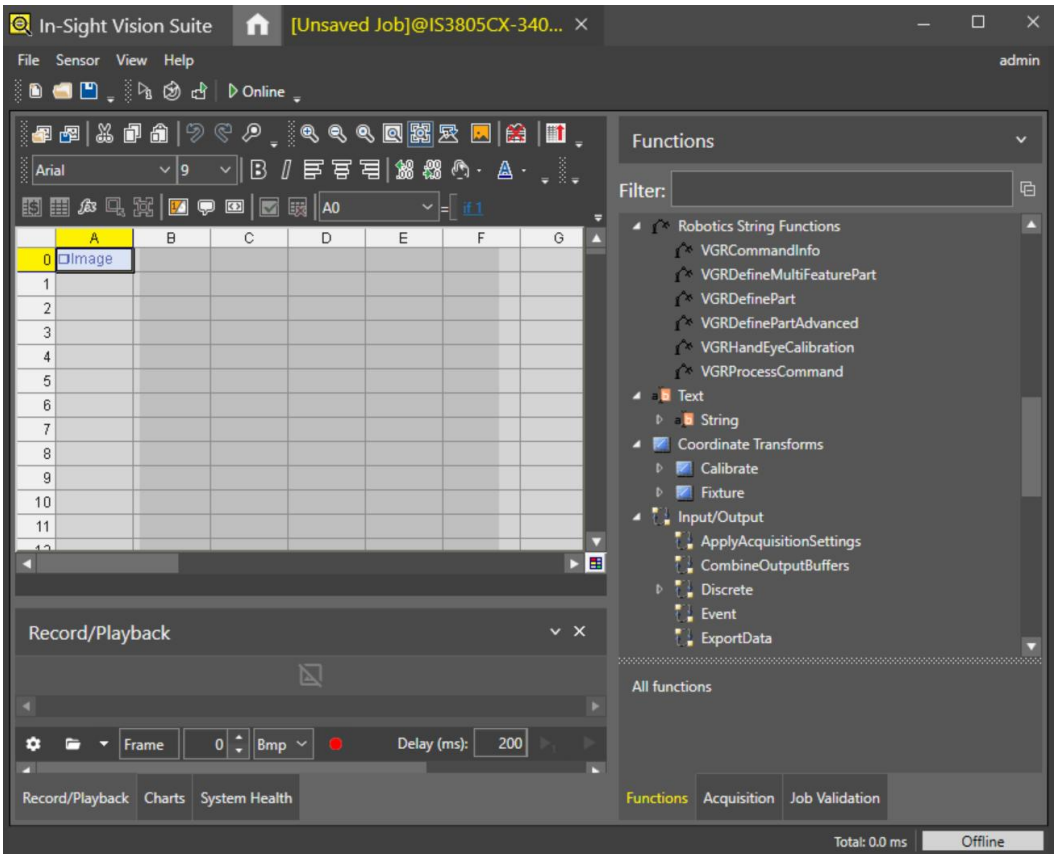
Cognex's documentation specifically describes the Spreadsheet as a cell-based programming environment where function outputs can become inputs to other functions.

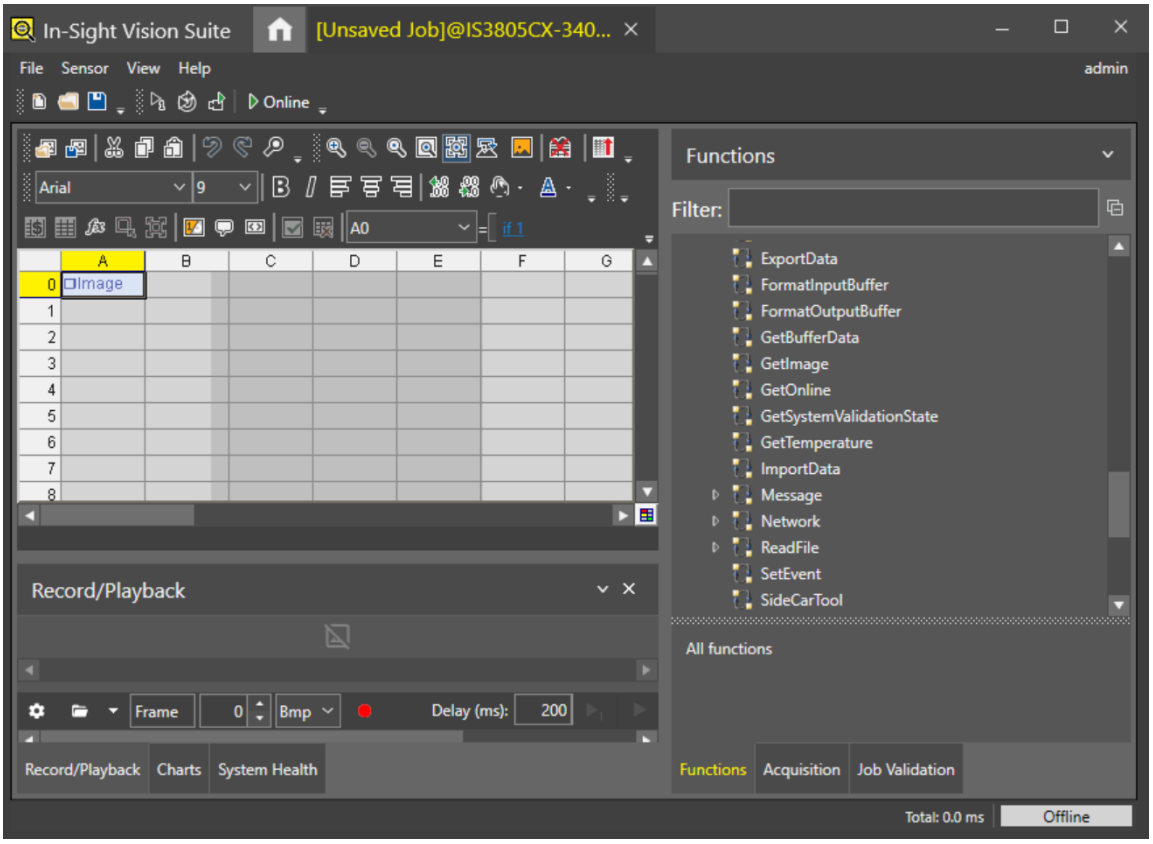
The next set of pages give the tabs of choices of functions for the In-Sight Vision Suite.

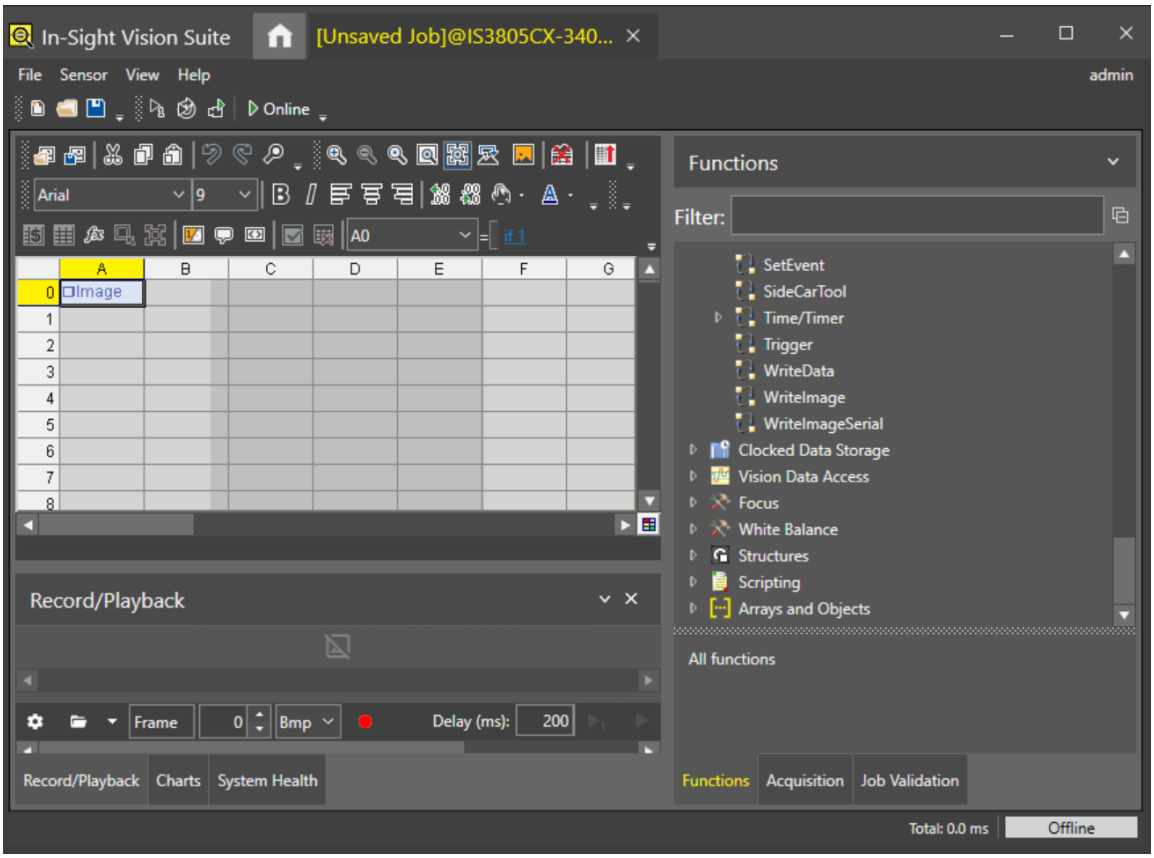

In-Sight Vision Suite
[Unsaved Job]@IS3805CX-340...
File Sensor View Help
admin
Online
Functions
Filter:
Edge AI
Vision Tools
Geometry
Graphics
Mathematics
Robotics String Functions
Text
Coordinate Transforms
Input/Output
Clocked Data Storage
Vision Data Access
Focus
All functions
Record/Playback
Frame
Bmp
Delay (ms):
200
Record/Playback
Charts
System Health
Functions
Acquisition
Job Validation
Total: 0.0 ms
Offline


In-Sight Vision Suite
[Unsaved Job]@IS3805CX-340...
File Sensor View Help
admin
Online
Functions
Filter:
Edge AI
EdgeAIAnomalyDetect
EdgeAIClassify
EdgeAIRead
EdgeAISegment
Vision Tools
Bead
Blob
Color
Edge
Histogram
ID
Image
InspectEdge
OCV/OCR
Pattern Match
Geometry
Graphics
All functions
Record/Playback
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Bmp
Delay (ms):
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Record/Playback
Charts
System Health
Functions
Acquisition
Job Validation
Total: 0.0 ms
Offline


In-Sight Vision Suite
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File Sensor View Help
admin
Online
Functions
Filter:
Geometry
Fit
Measure
Graphics
Controls
Displays
Image
Mathematics
Logic
Lookup
Math
Statistics
Trigonometry
Robotics String Functions
Text
Coordinate Transforms
Input/Output
Clocked Data Storage
All functions
Record/Playback
Frame
Bmp
Delay (ms):
Record/Playback
Charts
System Health
Functions
Acquisition
Job Validation
Total: 0.0 ms
Offline


In-Sight Vision Suite
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File Sensor View Help
admin
Online
Functions
Filter:
Robotics String Functions
VGRCommandInfo
VGRDefineMultiFeaturePart
VGRDefinePart
VGRDefinePartAdvanced
VGRHandEyeCalibration
VGRProcessCommand
Text
String
Coordinate Transforms
Calibrate
Fixture
Input/Output
ApplyAcquisitionSettings
CombineOutputBuffers
Discrete
Event
ExportData
All functions
Record/Playback
Frame
Bmp
Delay (ms):
Record/Playback
Charts
System Health
Functions
Acquisition
Job Validation
Total: 0.0 ms
Offline


In-Sight Vision Suite
[Unsaved Job]@IS3805CX-340...
File Sensor View Help
admin
Online
Functions
Filter:
ExportData
FormatInputBuffer
FormatOutputBuffer
GetBufferData
GetImage
GetOnline
GetSystemValidationState
GetTemperature
ImportData
Message
Network
ReadFile
SetEvent
SideCarTool
All functions
Image
Record/Playback
Frame
Bmp
Delay (ms):
200
Record/Playback
Charts
System Health
Functions
Acquisition
Job Validation
Total: 0.0 ms
Offline


In-Sight Vision Suite
[Unsaved Job]@IS3805CX-340...
File Sensor View Help
admin
Online
Functions
Filter:
SetEvent
SideCarTool
Time/Timer
Trigger
WriteData
WriteImage
WriteImageSerial
Clocked Data Storage
Vision Data Access
Focus
White Balance
Structures
Scripting
Arrays and Objects
All functions
Image
Record/Playback
Frame
Bmp
Delay (ms):
200
Record/Playback
Charts
System Health
Functions
Acquisition
Job Validation
Total: 0.0 ms
Offline

JetArm JETSON NANO Robot Arm ROS Open Source Vision Recognition Program Robot (Standard kit with Jetson Orin NX 8GB)

HiwonderSKU: RM-HIWO-08C
Manufacturer #: JetArm Standard kit with Jetson Orin NX 8GB

**Price ：**

Sale price $1,579.99

Price includes Tariffs (in USA). Shipping calculated at checkout.

Description

- Developed for ROS education, features Python support and deep learning with MediaPipe for AI projects like object recognition and voice interaction
- With a 6DOF design and 35KG torque servos, JetArm includes an HD camera for first-person object gripping
- Equipped with a 3D depth camera, JetArm utilizes RGB+D fusion for flexible 3D grabbing and AI applications
- JetArm ultimate kit features a microphone array and speaker for voice-controlled tasks, including navigation and gripping
- Provides multiple control methods, like WonderAi app (compatible with iOS and Android system), wireless handle, Robot Operating System (ROS) and keyboard

Product Description

JetArm is a desktop-level AI vision robotic arm developed by Hiwonder for ROS education scenarios. It is equipped with a 3D depth camera, combines 3D vision technology with robotic arm control, and is equipped with high-torque intelligent bus servos, NVIDIA Jetson Nano master control, High-performance hardware such as a 7-inch touch screen, far-field microphone array, and speakers can not only realize three-dimensional motion control of the robot, but also identify, track, and grab target objects in three-dimensional space.

1) Depth Vision, 3D Scene Flexible Grabbing

The end of the JetArm robot arm is equipped with a high-performance 3D depth camera, which can realize target recognition, tracking and grabbing. Through RGB+D fusion detection, JetArm can also realize flexible grabbing in 3D scene.

2) All-metal Structure, Bearing Base

The body of the robot arm adopts an all-metal structure, and the surface is anodized, making it exquisite and beautiful. The base uses industrial-grade bearings to meet high-demand grabbing projects.

3) Wrapped Structure Design, Beautiful Wiring

JetArm adopts a wrapped structure design, and the wiring of the servo can be hidden inside the fuselage, making the outside of the fuselage clean and tidy.

4) Circular Microphone Array

The circular microphone array is divided into a microphone array and a module motherboard. It has stronger overall performance and a sound pickup range of up to 10m.

1. 3D Depth Vision Al Upgraded Interaction

Equipped with a Gemini plus 3D depth camera, JetArm can effectively perceive environmental changes, allowing for intelligent Al interaction with humans.

1) 3D Depth Point Cloud Recognition

Through the corresponding APl of the depth camera, JetArm can obtain the depth map, color map and point cloud map of the detection environment, and then obtain the RGB data, position coordinates, and depth information of the target item to achieve shape recognition, color sorting, height measurement, material detection, etc.

2) Depth Camera Distance Ranging

By capturing depth point cloud data of an object, the depth camera can determine the distance between the object and the camera. This enables accurate object localization, sorting, and tracking.

3) Regional Target Height Measurement

By obtaining the depth point cloud data of the object, the height of the object can be identified, thereby realizing the gameplay of removing highly abnormal objects.

4) Regional Target Volume Measurement

By capturing depth point cloud data, the depth camera can measure the volume of an object after recognizing its shape and height.

2. Al Vision Recognition Target Tracking

JetArm's 3D depth camera is equipped with an RGB lens. The robot arm uses OpencV as the image processing library, supports Al intelligent image recognition, and can realize a variety of intelligent vision game such as color recognition and tag recognition.

1) Color Sorting

JetArm can recognize and sort color blocks of different colors. In addition to standard colors, JetArm can also recognize a variety of custom colors.

2) Tag Recognition, Intelligent Stacking

JetArm can recognize different AprilTags and determine the position of the tag block to achieve intelligent stacking.

3) Target Tracking

JetArm can locate and track targets, and we can also use machine learning to let JetArm track more trained target items.

3. RGB+D Integration for 3D Spatial Random Grasping

JetArm's 3D depth camera combines RGB and depth data to capture both the object's color and depth point cloud information, enhancing the spatial representation. Using the inverse kinematics algorithm, JetArm can perform advanced Al tasks such as 3D spatial random object grasping, sorting, and transport, enabling more complex and dynamic projects.

1) RGB+D 3D Spatial Random Grasping

2) Voice-Controlled 3D Spatial Grasping and Sorting

4. Upgraded Inverse Kinematics Algorithm

JetArm has a high-level inverse kinematics algorithm, which can move to any coordinate in 3D scene, and the path planning of the robot arm can also be realized by Python programming.

1) Target Detection, Joint Adaptive Adjustment

JetArm can detect target items within the recognition area and calculate the position coordinates and placement angle of the target item. Combined with the inverse kinematics algorithm of the robot arm, each joint angle is adaptively adjusted to achieve free grabbing.

2) 3D Scene Motion Control

JetArm can use inverse kinematics algorithms to achieve linear motion and path planning in 3D scene.

3) Provides Source Code for DH Model and Inverse Kinematics

Provide the inverse kinematics analysis, coordinate DH model and inverse kinematics function source code of the JetArm robot arm, and input the end coordinates of the robot arm greatly shortening the project development time.

5. Deep Learning Model Training

JetArm uses neural networks such as GoogLeNet, Yolo, and mtcnn, which can perform deep learning on the target to generate a trained model.

1) MediaPipe Development, Upgraded Al Interaction

JetArm utilizes MediaPipe development framework to accomplish various functions, such as human body recognition, fingertip recognition, face detection, and 3D detection.

2) Fingertip Trajectory Control

Based on the detection of the distance between fingertips, JetArm can perform corresponding actions.

3) Waste Sorting

JetArm's kit is equipped with garbage pattern blocks. By loading the corresponding model, JetArm can quickly recognize different garbage and place it in the corresponding classification area.

4) Item Sorting

By training models of daily items and generating correspond-ing models, with the support of depth camera, JetArm can quickly recognize and grab corresponding items by obtaining the depth information of the items.

5. Gazebo Simulation

The JetArm robotic arm is developed using the ROS framework and supports GAZEBO simulation. The robotic arm is controlled and algorithm verified in a virtual environment, which reduces the requirements for the experimental environment and improves experimental efficiency.

6. Various Control Methods

1) WonderAi App

2) PC Software

3) Wireless Handle

7. JetArm Configuration Selection Guide

The Jetson Nano provides essential AI inference capabilities, perfect for simple neural networks and deep learning models, making it ideal for entry-level AI applications. The Jetson Orin Nano offers 80 times the performance and computing power of the Jetson Nano, supporting more complex deep learning models and accelerated inference, making it well-suited for advanced edge AI applications. The Jetson Orin NX boosts computing power 2.5 times over the Jetson Orin Nano, offering top-tier AI inference performance for larger neural networks and real-time deep learning tasks. This performance upgrade enhances JetArm, unlocking exceptional capabilities in servo control, vision tasks, and deep learning across a wide range of applications!

What's Included

JetArm Standard Kit:

1* JetArm standard version (assembled)

1* 12V 5A power adapter (two-prong dc 4.0*1.7mm)

1* Card reader

1* Wireless handle

1* Suction cups

1* Screwdriver+Accessory bag

1* Waste Cards

1* Wooden blocks (4*4cm/3*3cm)

1* Colored blocks (3*3cm)

1* Tags (3*3cm)

1* Double-side tape

1* (Cuboid*2+Cylinder*2+Ball)

1* Map

1* User manual

Dimensions

339*165*532mm

Multimedia

Specifications

Size: 339*165*532mm

Weight: About 2400g(ultimate kit)

Material: Full-metal aluminum alloy bracket

Battery: 12V 5A DC adapter

Operating system: Ubuntu 18.04 LTS +ROS Melodic

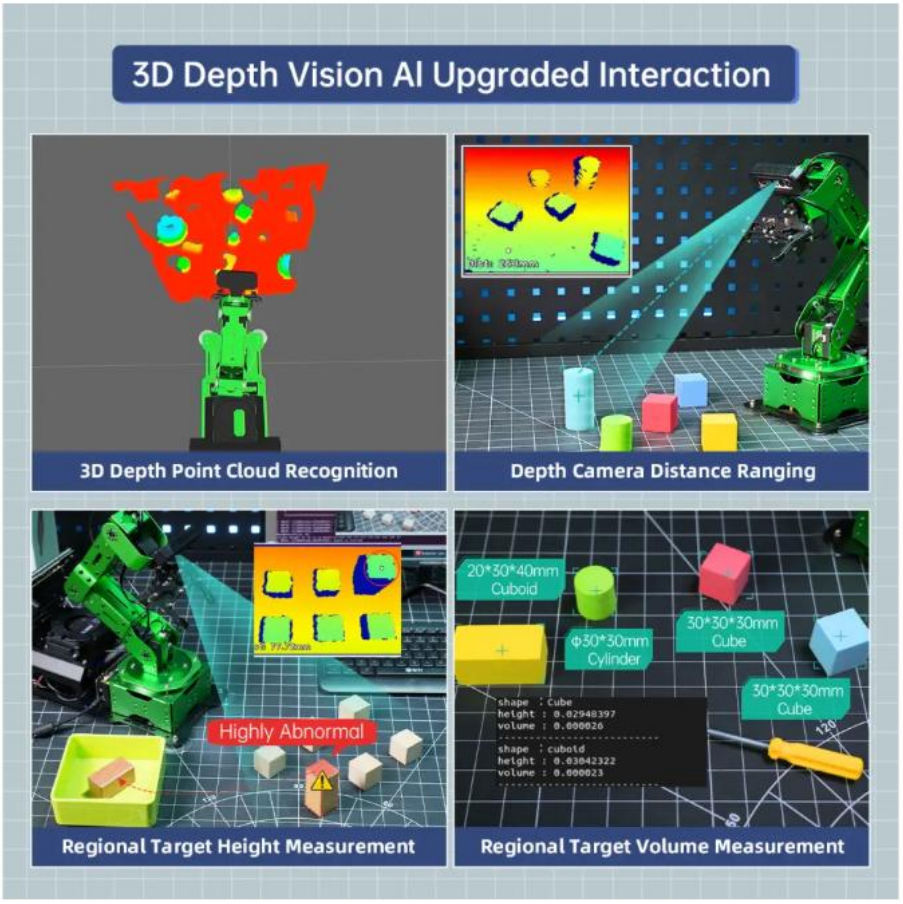
Software: IOS/ Android APP

Communication: USB/Wi-Fi/Ethernet

Programming language: Python/ C/ C++/ JavaScript

Servo: HTS-21H/HTD-35H/HX-12H bus servo




3D Depth Vision AI Upgraded Interaction
3D Depth Point Cloud Recognition
Depth Camera Distance Ranging
Highly Abnormal
Regional Target Height Measurement
20*30*40mm Cuboid
Φ30*30mm Cylinder
30*30*30mm Cube
30*30*30mm Cube
shape : Cube
height : 0.02948397
volume : 0.000026
shape : cuboid
height : 0.03042322
volume : 0.000023
Regional Target Volume Measurement


Android/ iOS APP Control
PC Software Control
Read deviation
Download deviation
Reset servo
Loop
Run
Manual
Read angle


JetArm 6DOF
Normal Mode
中文
English
ID:4
Down 500 Up
ID:10
Open 500 Close
ID:5
Right 500 Left
ID:3
Down 500 Up
ID:2
Down 500 Up
ID:1
Right 500 Left
Index Time ID:1 ID:2 ID:3 ID:4 ID:5 ID:10
1 800 200 500 50 728 526 125
2 800 200 500 50 728 526 500
3 200 200 500 50 728 526 500
4 800 200 500 50 728 526 125
5 200 200 500 50 728 526 125
6 400 500 500 50 728 526 125
7 200 500 500 50 728 526 125
Duration 1000 ms
Total durati 0 s
Manual
Add action
Update action
Action upward
Read angle
Delete action
Delete all
Insert action
Action down
Read deviation
Download deviation
Reset servo
Loop
Run
Open action file
Save action file
Integrate file
Action group: ok
Reflash
Erase single
All erase
Run action
Stop
Quit

# Function List



## Gemini Plus 3D Depth Camera

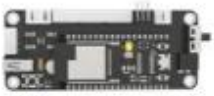
1. Camera calibration
2. RGB sensor data reading and display
3. YOLOv5 + TensorRT object recognition
4. Web real-time monitoring
5. AprilTag pose estimation
6. MediaPipe development
7. Tag stacking
8. Human body detection
9. Fingertips trajectory recognition
10. Gesture and emotion recognition
11. Face tracking
12. Mask identification
13. Color tracking
14. Hand tracking
15. KCF target tracking
16. Point cloud data processing
17. Distance measuring
18. 3D shape recognition
19. 3D object tracking
20. 3D scene positioning and gripping



## 6-Microphone Array

1. Far-field sound pickup, noise reduction recognition
2. Changeable voice command
3. Sound source localization
4. Voice-control color recognition
5. Voice-control color tracking
6. Voice-control waste sorting
7. Voice-control 3D shape recognition

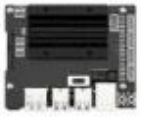




## STM32 Robot Arm Controller

1. STM32F407 high-performance microcontroller
2. 5V 5A current USBA external power supply port
3. 2-channel serial bus servo port
4. 2-channel PWM servo port
5. 2-channel direct current port
6. USBC-to-serial port
7. 2-channel IIC port
8. 2 4PIN GPIO expansion ports
9. Onboard power supply voltage detection circuit
10. Buzzer
11. 2-channel key input
12. 2-channel LED output
13. Overcurrent protection
14. Overheat protection

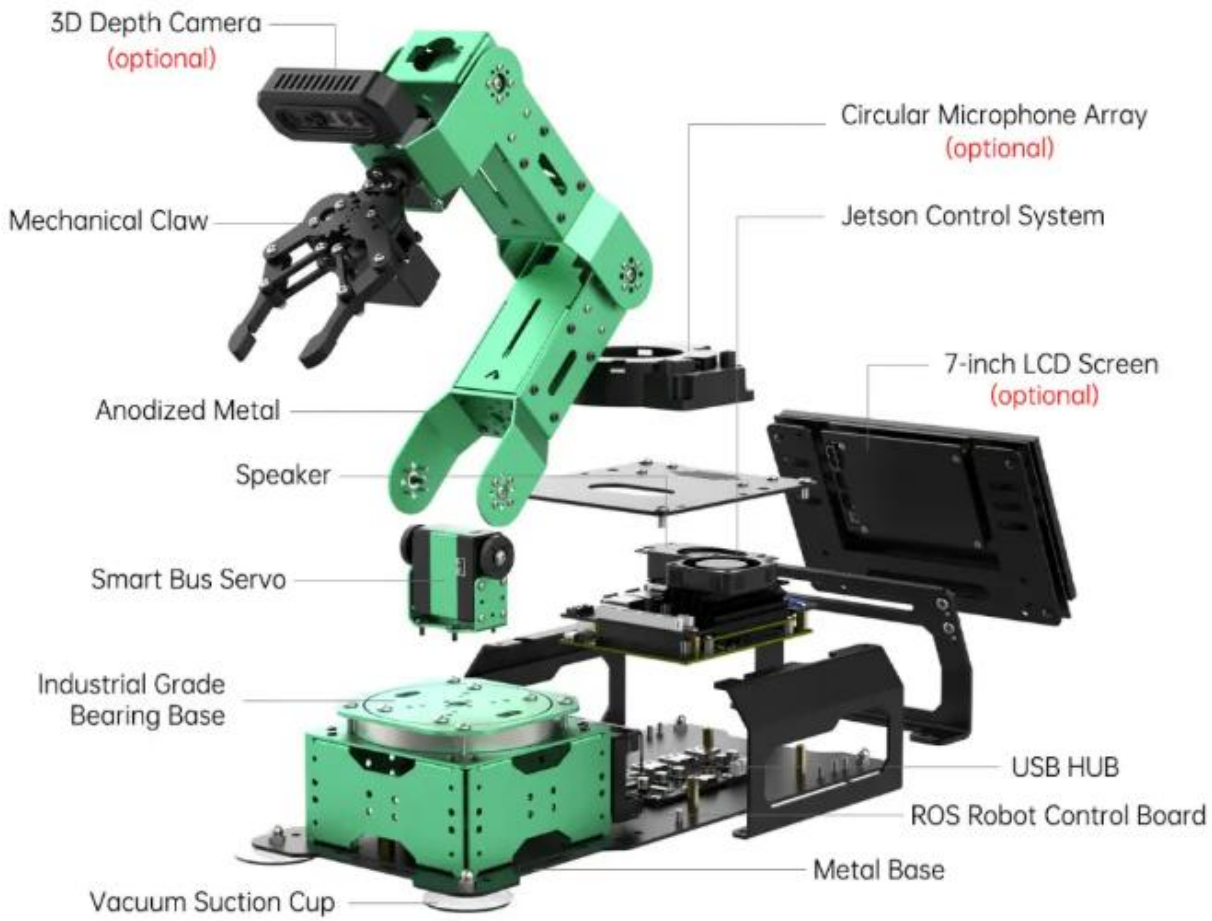
1. NoMachine remote control
2. SSH remote control
3. Wireless handle control
4. APP control
5. Action editor control
6. Multi-system communication configuration
7. YOLOV5 model training
8. TensorRT acceleration
9. GPU acceleration
10. WiFi AP and STA modes configuration
11. Serial port communication
12. Customized key control
13. Support IIC communication

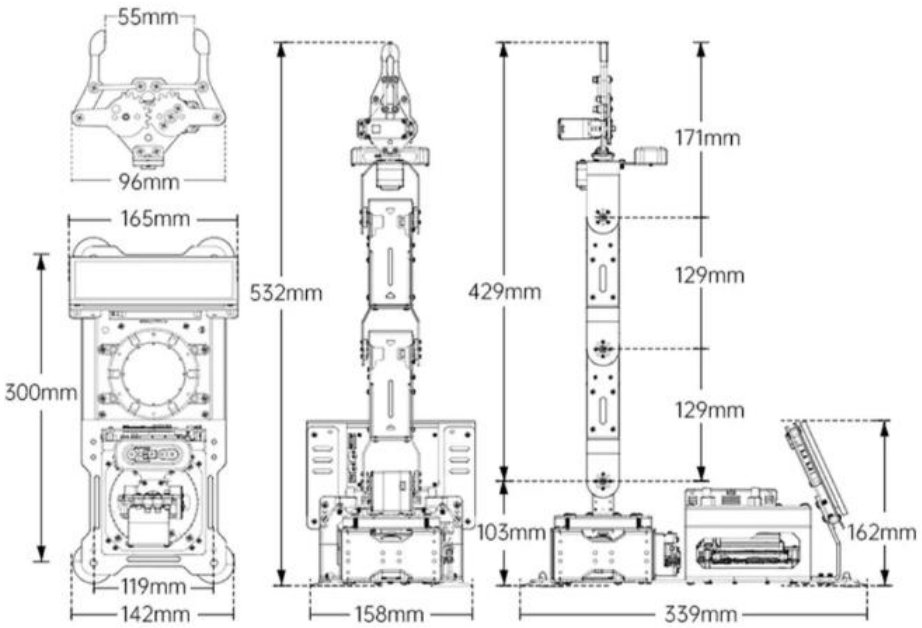


## ROS Control System

14. Customized LED
15. URDF model
16. MoveIt basic configuration
17. MoveIt driven
18. Gazebo operating and simulation

# Product Structure




55mm
96mm
165mm
300mm
119mm
142mm
532mm
158mm
429mm
171mm
129mm
129mm
103mm
162mm
339mm

# Controller Selection Recommendations

| ROS Controller |  Jetson Orin NX |  Jetson Orin Nano |  Jetson Nano |
|---|---|---|---|
| Memory | 8GB | 4G / 8G | 4G |
| Matching storage peripherals |  128G solid-state drive |  128G solid-state drive |  32G SD card |
| Performance | 70TOPS | 40TOPS | 0.5TFLOPS |
| CPU | 6-core Arm® Cortex®- A78AEv8.2 64-bit CPU 1.5MB L2 +4MB L3 | 6-core Arm® Cortex®- A78AEv8.2 64-bit CPU 1.5MB L2 +4MB L3 | Quad-Core ARM@Cortex D-A57MPCore processor |
| GPU | 1024-Core NVIDIA Ampere GPU with32 Tensor Cores | Equipped with a 1024-core NVIDIA Ampere architecture GPU featuring 32 Tensor Cores | 128-core NVIDIA MaxwellTM architecture GPU |
| Memory | 8GB 128-bit LPDDR5 102.4GB/s | 8GB 128-bit LPDDR5 68GB/s | 4GB 64-bit LPDDR4 25.6GB/s |
| Power consumption | 10W 20W | 7W 10W | 5W 10W |
| ROS1 system | Docker (ubuntu 20.04) | Docker (ubuntu 20.04) | Preinstalled in the Jetson system (Ubuntu 18.04) |
| ROS2 system | Preinstalled in the Jetson system (Ubuntu 22.04) | Preinstalled in the Jetson system (Ubuntu 22.04) | / |
| ROS running speed | Fast | Fast | Smooth |
| AI deep learning | Supports default algorithms; Supports deep secondary development | Supports default algorithms; Supports deep secondary development | Supports default algorithms |
| Recommendation | ★★★★★ | ★★★★ | ★★★ |

# Function Operation Difference

| Version |  Jetson Orin NX | |  Jetson Orin Nano | |  Jetson Nano | |
|---|---|---|---|---|---|---|
| | Program startup time | Program Running frame number | Program startup time | Program Running frame number | Program startup time | Program Running frame number |
| Startup time required | 48 seconds | / | 48 seconds | / | 65 seconds | / |
| System software opening time | 0.1-0.5 seconds | / | 0.1-0.9 seconds | / | 1-3 seconds | / |
| Deep model learning (Using YOLOv5 with 500 images, 12 categories; 100 training iterations) | 27 minutes | / | 40 minutes | / | 3.9 hours | / |
| Basic vision game | 10-11s | 30fps | 10-14s | 30fps | 20-25S | 30fps |
| Advanced 3D vision game | 10-11s | 30fps | 10-14s | 30fps | 27-30s | 15-20fps |
| Mediapipe developmen | 10-11s | 30fps | 10-14s | 30fps | 20-25S | 13-15fps |
| Simulation modeling | 10-18s | 30-60fps | 10-20S | 30-60fps | 17-35S | 15-60fps |
| Recommendation | ★★★★★ | | ★★★★ | | ★★★ | |

# Kit Difference

Jetson Nano and Jetson Orin Nano are the main controllers for robot operation and are indispensable. Users who already have a motherboard can choose not to choose.

| Kit |  Starter kit |  Standard kit |  Advanced kit |  Ultimate kit |
|---|---|---|---|---|
| Monocular camera | ● | ○ | ○ | ○ |
| Depth camera | ○ | ● | ● | ● |
| 7-inch LCD screen | ○ | ○ | ● | ● |
| Microphone array | ○ | ○ | ○ | ● |

1. Getting Ready(JetArm User Manual) — JetArm & JetArm Pro (Jetson Nano Version) v1.0 documentation
2. GitHub - Hiwonder/JetArm · GitHub
3. Hiwonder JetArm ROS1/ROS2 3D Vision Robot Arm, with Multimodal AI Mode

11. ROS2-Robot Arm Basic Control User Manual — JetArm & JetArm Pro (Orin Nano Version) v1.0 documentation

I have a hiwonder jetson nano nx robot controller and want to communicate with it via a computer using windows instead of using wifi. how do I do it

The simplest way is a **USB cable connection**—no Wi-Fi needed. Hiwonder's instructions use USB networking, then you connect from Windows with NoMachine for the desktop or SSH for a command line. The exact steps depend on whether your controller is a Jetson Nano or Orin Nano/NX. **hiwonder.com**

1. **Connect the cable**
    - Jetson Nano: use a **Micro-USB data cable**.
    - Orin Nano or Orin NX: use a **USB-C data cable**.
    - Power on the robot/controller. Make sure the cable supports data, not just charging. **hiwonder.com**
2. **Check Windows' network adapter**
    - Open **Device Manager → Network adapters**.
    - Look for the Jetson's **USB NDIS** network adapter.
    - If it is missing or has a warning icon, right-click it and choose **Update driver**. Hiwonder's setup guide specifically calls for updating the NDIS driver. **hiwonder.com**
3. **Connect to the controller**
    - For a remote desktop, install and open **NoMachine** on Windows, create a connection to **192.168.2.1**, and subnet mask 255,255,254,0 and log in.
    - For a terminal, open PowerShell or Windows Terminal and try:

bash

ssh ubuntu@192.168.2.1

Deep learning with MediaPipe is a way of teaching a computer to recognize and understand things it sees through a camera, using artificial intelligence (AI).

For example, it can teach a robot to:

- Recognize a human hand.
- Determine which fingers are raised.
- Recognize objects such as cups, bottles, and tools.
- Track a person's body movements.
- Recognize faces and facial expressions.
- Follow an object as it moves.

This is particularly useful for your Hiwonder JetArm with the Jetson Orin NX 8GB.

**1. What is deep learning?**

Deep learning is a branch of artificial intelligence that uses computer models called neural networks.

Think of it this way:

1. You show a computer thousands of pictures of different objects.
2. The computer learns patterns that distinguish those objects.
3. It develops a model that can recognize objects in pictures it has never seen before.
4. When connected to a camera, it can identify objects in real time.

For example, you could train a system to recognize an apple, a banana, and a bottle.

**2. What is MediaPipe?**

Build Your Own Hand Detection Tool in Sec | Medium

MediaPipe

MediaPipe is a software framework developed by Google. It provides ready-made AI models and tools that allow programmers to build computer vision applications without having to develop all the AI algorithms themselves.

For example, MediaPipe can identify 21 points on a human hand and track their movement.

That means you can program a computer to recognize gestures such as:

- Open hand.
- Closed fist.
- Pointing finger.
- Thumbs up.

**3. How this applies to your JetArm**

Hiwonder JetArm ROS1/ROS2 3D Vision Robot Arm, with Multimodal AI Mode

Robotic arm control by augmented reality-assisted object detection | Scientific Reports

Gemini Robotics-ER 1.5 | Gemini API | Google AI for Developers

9

Imagine putting a red plastic cup on a table in front of your JetArm.

The process would look like this:

1. The JetArm camera sees the table.
2. MediaPipe analyzes the camera image.
3. Its AI model recognizes the cup.
4. The software determines where the cup is located in the image.
5. Your Python program converts that information into robot coordinates.
6. ROS 2 sends commands to the JetArm motors.
7. The robot moves its gripper toward the cup and picks it up.

One important distinction: MediaPipe recognizes and locates objects, but ROS 2 and your robot-control software are responsible for translating that information into arm movements.

The object detector can provide object categories and bounding boxes, but accurate physical positioning requires additional camera calibration and depth information.

google-ai-edge.github.io+1

**4. Do you have to teach MediaPipe everything?**

No. This is one of its biggest advantages.

You can use pre-trained models that already recognize hands, body positions, faces, and certain objects. You can also customize some models for objects you want to recognize.

Google for Developers+1

**5. How I would teach you this on the JetArm**

I would approach it in stages, using NoMachine to work directly on your Jetson Orin NX.

| Lesson | What you learn |
|---|---|
| 1 | Ubuntu and Python basics |
| 2 | Accessing the JetArm camera |
| 3 | Installing and running MediaPipe |
| 4 | Recognizing objects with the camera |
| 5 | Determining an object's position |
| 6 | Connecting MediaPipe to ROS 2 |
| 7 | Programming the JetArm to pick up an object |

My recommendation: Start with a very simple exercise: use the JetArm camera to recognize your hand and display the locations of your fingers on the computer screen. Then progress to recognizing objects and eventually controlling the robot arm.

That will teach you computer vision, Python, AI, and eventually ROS 2 without overwhelming you.

MediaPipe Solutions guide

MediaPipe Solutions provides a suite of libraries and tools for you to quickly apply artificial intelligence (AI) and machine learning (ML) techniques in your applications. You can plug these solutions into your applications immediately, customize them to your needs, and use them across multiple development platforms. MediaPipe Solutions is part of the MediaPipe open source project, so you can further customize the solutions code to meet your application needs. The MediaPipe Solutions suite includes the following:

These libraries and resources provide the core functionality for each MediaPipe Solution:

- **MediaPipe Tasks**: Cross-platform APIs and libraries for deploying solutions. Learn more

- **MediaPipe Models**: Pre-trained, ready-to-run models for use with each solution.

These tools let you customize and evaluate solutions:

- **MediaPipe Model Maker**: Customize models for solutions with your data. Learn more
- **MediaPipe Studio**: Visualize, evaluate, and benchmark solutions in your browser. Learn more

Available solutions

MediaPipe Solutions are available across multiple platforms. Each solution includes one or more models, and you can customize models for some solutions as well. The following list shows what solutions are available for each supported platform and if you can use Model Maker to customize the model:

| Solution | Android | Web | Python | iOS | Customize model |
|---|---|---|---|---|---|
| Audio classification | ● | ● | ● | ● | |
| Audio transcription | ● | | | ● | |
| Decision maker | ● | ● | ● | ● | |
| Face detection | ● | ● | ● | ● | |
| Face landmark detection | ● | ● | ● | ● | |
| Gesture recognition | ● | ● | ● | ● | ● |
| Hand landmark detection | ● | ● | ● | ● | |
| Holistic landmark detection | ● | ● | ● | ● | |
| Image classification | ● | ● | ● | ● | ● |
| Image embedding | ● | ● | ● | ● | |
| Image segmentation | ● | ● | ● | ● | |
| Interactive segmentation | ● | ● | ● | ● | |
| Language detection | ● | ● | ● | ● | |
| LLM Inference API | | ● | | | ● |
| Object detection | ● | ● | ● | ● | ● |
| Pose landmark detection | ● | ● | ● | ● | |
| Semantic retriever | ● | ● | ● | ● | |
| Text classification | ● | ● | ● | ● | ● |
| Text embedding | ● | ● | ● | ● | |
| Text proofreading | ● | | ● | ● | |
| Text summarization | ● | | ● | ● | |
| Text-to-speech | ● | | | ● | |
| Universal embedding | ● | ● | ● | ● | |

Get started

You can get started with MediaPipe Solutions by selecting any of the tasks listed in the left navigation tree, including:

- audio
- decision
- genai
- retrieval
- text
- vision
- Python
- Web apps

**The Linux command line for beginners - Ubuntu**

1. Overview
2. A brief history lesson
3. Opening a terminal
4. Creating folders and files
5. Moving and manipulating files
6. A bit of plumbing
7. The command line and the superuser
8. Hidden files
9. Conclusion

3Blue1Brown

Neural Network

https://www.youtube.com/watch?v=aircAruvnKk&list=PLZHQObOWTQDNU6R1_67000Dx_ZCJB-3pi

Bayes

https://www.youtube.com/watch?v=HZGCoVF3YvM&list=PLZHQObOWTQDN52m7Y21ePrTbvXkPaWVSg&index=25

**Crash Course Artificial Intelligence – PBS**

Best broad introduction

Crash Course: Artificial Intelligence | Rocky Mountain PBS

rmpbs.org

This is particularly good if you want to understand the various subjects within AI rather than concentrate on just one.

It covers:

- What artificial intelligence is.
- Machine learning.
- Computer vision.
- Natural language processing.
- Recommendation systems.
- AI bias and ethical considerations.

Approximately 20 episodes, designed for general audiences.

USC AI Knowledge Hub

Student Work:

The communication took some work to set up, but once it was configured it was reliable. The PLC and the robot talk over Ethernet using Siemens S7 communication, the PLC's own protocol, through a Python library called python-snap7.

On the PLC side, three settings made it possible:

- PUT/GET access turned on, so an outside device can read and write PLC memory
- Full access with no password
- A non-optimized data block, so every value sits at a fixed byte address

That data block is the shared mailbox for the whole system. The robot writes its results to its own section (Done, the roll score, and whether the picks succeeded), the PLC writes its commands (Go, New turn, Abort) and the game status, and the laptop HMI writes the button presses. Each device only writes its own bytes, so they never overwrite each other. On the Jetson, a small Python script polls the PLC, runs a robot turn when Go comes on, and writes the result back.

Here is a quick summary of how the system works. The project is a game of Farkle played by the Hiwonder JetArm, with a Siemens S7-1200 PLC (CPU 1215C) running each turn. There are three parts, all on one Ethernet network through the PLC's built-in switch:

- PLC: runs the turn as a state machine (Idle, Robot turn, Check result, Wait for player, Farkle, Fault). It decides when the robot moves, checks the robot's result before adding any points, keeps the turn and total score, and faults if the robot times out or misses a pick.
- Jetarm: when the PLC sends a Go command, it reads the dice with the camera, scores the roll, and picks the scoring dice into a keep box. It then reports the roll score and whether the picks succeeded back to the PLC.
- Laptop HMI: a small Python window with Start, Reroll, Bank and Reset buttons and the live roll, turn and total score.

The HMI and the Jetarm never talk to each other directly. Both read and write a shared data block in the PLC over Ethernet, and the PLC decides what happens next. Each button only sends a request, and the PLC ignores it unless the game is in the right state. The robot step uses a Go/Done handshake, and a timeout catches a robot that never answers.

https://youtu.be/WjiLoAhE5A4