

Education Kit User Manual

JAKA Lens X JAKA MiniCobo



Document version: V1.0.0

1 Notes:

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The pictures in this manual are for reference only.

If the hardware is modified or disassembled, JAKA is not responsible for the after-sales.

Users are reminded to use safety equipment and comply with safety regulations when using and repairing cameras.

Programmers, visual system designers, and debuggers of the JAKA Education Kit must be familiar with the programming methods and system application installation of JAKA robots and JAKA Lens X.

About the Manual

This manual mainly contains basic methods for using the education kit.

This manual mainly provides guidelines for the overall project and function construction of the JAKA

education kit. For more detailed instructions on JAKA MiniCobo and JAKALensX, please consult the product user manual.

This manual is intended for users who have received basic mechanical and electrical training. This is helpful in installing and using the camera.

II

More Information

For more product information, please scan the QR code on the right to visit our official website www.jaka.com.



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Product catalog (Education Kit)

Name	Quantity
Lens 2D camera	1
Composite wire	1
Visual calibration board	2
2.5D positioning plate	2
Gigabit switch	1
European standard converter	1
camera mounting flange	1
Quick Start Manual	1
Accessories bag	1

Product Catalog(Lens 2D Camera)

Name	Quantity
Lens 2D camera	1
Composite wire	1
Visual calibration board	2
2.5D positioning plate	2
Gigabit switch	1
European standard converter	1
camera mounting flange	1
Quick Start Manual	1
Accessories bag	1

1. Foreword

JAKA collaborative robot will serve you wholeheartedly. Wherever the eyes go, there goes the body.





1.1 Introduction

JAKA Lens X is a visual system using JAKA robot camera, with the control system inserted in the robot control cabinet. The camera is equipped with JAKA's self-developed visual operation software: the algorithm layer runs under the JAKA robot's 64-bit system control cabinet; the interface uses a Web page to support cross-platform access. Enter the IP address of the control cabinet in the browser to run the camera's operation interface. The new generation of machine vision software uses a fully graphical interface. Users can complete vision applications including disordered grabbing, loading and unloading, depalletizing, visual guidance positioning/assembly, defect detection, measurement, AGV-equipped visual high-precision positioning and other advanced machines without writing code.

The software has three major features: simplicity, powerful functions, and multilingual support. Simplicity: graphical, code-free interface, simple UI design, and clear functional partitions; users do not need any professional programming skills, just "add algorithm module - configure module parameters - connect module connections" to complete Construction of visual engineering. Powerful function: it contains a wealth of visual algorithm modules (2D general processing algorithms, 2D feature processing, 2D matching, measurement and other special algorithms, etc.), which can be applied to multiple typical actual scenarios and supports parallel processing to maximize the use of computer hardware resources to improve software operation efficiency. Multilingual support: Chinese and English language packs are available in the software, and software language can be switched by one clicking.

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2. Software and hardware installation configuration

2.1 Device preparation

1) A laptop. It is recommended to use Win7 or plus system and install Google Chrome;

2) A set of JAKA education kit.

2.2 Hardware installation

2.2.1 Installation position for each component

The relative installation positions of components such as the Minicab, switches, power strips, light source controllers, power adapters, and robot mounting bases in the kit and the base plate, as well as the installation positions of the cover plate and operating panel are as shown below.



Figure 2.2-1



Figure 2.2-2

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2.2.2 Robot installation

Installation direction: The power cable at the base of the main body should face the direction of the right table, as shown in the figure below.





2.2.3 End tool installation

1. Install the 2D camera and the camera adapter board together. When installing, pay attention to the installation direction of the 2D camera. The relative position of the camera's wiring harness interface and the adapter board is as shown below.



Figure 2.2-4

2. Install the ring light source on the camera adapter board. During installation, it is recommended that the wiring harness interface of the ring light source be in the same direction as the camera wiring harness interface as shown below to facilitate wiring harness bundling.

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Figure 2.2-5

3. Install the camera bracket and VAC electric chuck at the end of the robot flange. The offset direction of the camera bracket and the offset direction of the VAC electric chuck form an angle of 90°. First adjust the angles of each joint of the robot to: J1: 0°, J2: 0°, J3: -90°, J4: 0°, J5: -90°, J6: 0°. In this robot posture, the offset direction of the VAC electric suction cup is outward and the offset direction of the camera bracket is to the right.



2.2.4 Hardware wiring

After the camera is assembled, fix the camera on the end flange of the robot.



The camera cable is a composite cable (including network cable and power cable). Connect the network cable at one end of the composite cable to a gigabit router/switch on the same network as the robot. The other two power cables are connected to 24V in white and 0V in black, such asFigure 2.2-8is shown.



Figure 2.2-8

As shown in Figure2.2-9, when the camera power supply is normal and the network is connected normally, the indicator light lights up blue. If the camera's power supply is normal but the communication is abnormal, the indicator light will light up blue; when the camera is taking pictures, the indicator light will light up blue and flash. The indicator light on older versions of the camera lights up green when powered normally.



Figure2.2-9

The camera control system consists of multiple parts. Figure 2.2-10 is an example of the JAKA Lens X system.

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- 1. Windows devices
- 2. Gigabit switch
- 3. JAKA control cabinet
- 4. JAKA Lens 2D camera
- 5. Gigabit network cable 1
- 6. Gigabit network cable 2: Please connect the MiniCab control cabinet to LAN2.

7. JAKA Lens 2D cable: Connect the crystal head to the Gigabit switch, and connect the 24V power cord to the control cabinet.



Note: The camera network cable, debugging PC network cable, and robot controller are all connected to the same Gigabit switch.

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2.3 Software Basic Configuration

2.3.1 Robot Zu APP Configuration

1. Configure the LAN2 network port IP of the robot control cabinet to 192.168.1.10, as shown below. It is not recommended to set other IPs, as other IPs will complicate the configuration of subsequent robot programs.

<				Log Signal Str JKROBOT
() System Settings	vstem Settings Operation Setting Settings Additional Program Ugrade Firmware Upgrade Controller Settings Additional Program Ugrade Firmware Upgrade Controller Settings Get IP Address Automatically Use the Following IP Notice: IP Address: 192.168.1.1 Default Gateway: 192.168.1.1 Confirm			
Initial Settings Netwo	Additional Prog Managemen	am Upgrade Firmware U	Ipgrade Controller Syst	tem Backup User Management
	Get IP Add Use the Fol Address IP Address Subnet Mask: Default Gatew	ress Automatically lowing IP	68 . 1 . 10 55 . 255 . 0 68 . 1 . 1	•
		Confirm		

2. Set the TCP coordinates of the VAC electric suction cup. Since the size, the relative position of the electric suction cup and the TCP data are. The data can be set by manual input without a need for four-point calibration. The specific data can be set to X: -9.5, Y: -42, Z: 100, as shown below.

<		Log Signal St. JKROBOT
System Settings	(C) Operation Setting 🕞 Safety Settings 🔗 Program Settings	Hardware And Communication
TCP Settings	Tool Center Point Setting	Fault Diagnosis
Name	Input Settings O Four-Point Settings O Six-Point Settings	
电吸盘		
TCP2	Name 电吸盘	
TCP3	X Y 7	
TCP4	Position -9 500 mm -42 000 mm 100 000 mm	
TCP5		+ Y
TCP6	RX RY RZ	
TCP7	Pose 0.000 0.000 0.000	Z
TCP8		
TCP9		
TCP10	Cancel OK	Y

Figure 2.3-2

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3. Set the output voltage of the end IO to 24v and set it to enable state, as shown below.



Figure 2.3-3

4. Set the output mode of the two outputs DO1 and DO2 on the tool end to PNP type.

<		ई ्रि Settings	Log Help Signal St JKROBOT
Control Cabinet Tool end			Edit Run
Digital Input	I/O Settings	1	Click Name to Edit
DI1 DI2	ID: 0	DFF 2	
Analog Input	Name: DO1 Function Selection Mode Setting		Click Name to Edit
486.000 484.000 Al1 Al2	Cancel OK		
	^		
	Figure 2.3-4		

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ntrol Cabinet	Tool end				Settings Log	Help iignal Stri JKRO
Digital Input		Click Name to Edit	Digital Output			Click Name to Edit
Control Cabinet	Modbus		Control Cabinet Mo	dbus		
O DI1	O O DI2 DI3 DI4	OI5	DO1	OFF DO2	OFF DO3	OFF DO4
0 D16	0 DI7		DO5	DOFF DO6	D07	
Analog Input		Click Name to Edit	Analog Output			Click Name to Edit
Control Cabinet	Modbus Integer Modbus Signed	Modbus Float	Control Cabinet Modbu	ıs Integer	Modbus Signed	Modbus Float

Figure 2.3-5

6. Connect the five wire harnesses of the touch button to the user terminals of the Minicab respectively. The connection sequence is as shown in the table below.

Color	Description
Drown	Connected to user terminal No. 3 terminal
BIOWII	channel , 24V
Dhua	Connect to user terminal No. 4 terminal
Blue	channel, GND
Vallow	Connect to user terminal No. 7 terminal
Tellow	channel, DO4
Dad	Connect to user terminal No. 9 terminal
Keu	channel, DO3
Groon	Connect to user terminal No. 11 terminal
Green	channel, DO2
White	Connect to user terminal No. 13 terminal
white	channel, DI1

2.3.2 LensX authorization

When you use JAKA Lens X for the first time, you need to contact the JAKA technician to get authorization. The steps are as follows:

1) Query the robot IP address on JAKA ZU APP, open the browser, log in to "control cabinet ip:1880" to access

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the Lens X software interface, for example: 172.30.0.143:1880.

2) Drag out a Lens X node on the left, click Deploy, and double-click to enter the node



3) After entering the node, the following interface will pop up, copy this authorization information. If there is no pop-up window, please try to re-enter the node. Send the authorization information to the JAKA technician, get the lic file and upload it. If successful, the upload completion popup will appear.





3. General function description

The project import and camera configuration involved in this chapter are necessary processes for all projects and will be explained here.

3.1 Camera configuration

3.1.1 Configure camera IP

Camera IP can be configured in the "Camera Management" node. The steps are as follows:

1) Drag a camera management node into the process, click Deploy, and then double-click to enter the camera management node, such asFigure 3.1-1.



Figure 3.1-1

2) Double-click to enter the camera management node, and click camera management, as shown in Figure 3.1-2.

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3) If the camera IP, the debugging PC and the robot are not in the same network segment, there will be a corresponding display in the "Camera Status". Click the edit button ∠to edit the camera IP.

Edit camera node						
Delete						Cancel Don
Captured Picture	× Camera Management					
	Camera Sequence	Camera IP	Camera Vendor	Camera Status	Edit	Operation
	DSGP502001432	192.168.1.20	DO3THINK	Off	Z	
6						
/						

Figure 3.1-3

4) Modify the camera IP to the same network segment as the robot and debugging PC. After saving, you can use the camera normally.

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Captured Picture	imes Camera Management						
	Camera Sequence	Came	lp settings	×	amera Status	Edit	Operation
	DSGP502001432	192.1	Acquisition methods: O Automatic Manual		H		
			• IP: 192.168.1.203				
			S	ave			

Figure 3.1-4

3.1.2 Camera focus aperture adjustment

Before adjusting the camera focus, you need to determine the robot's camera posture and ensure that the height and field of view meet the camera conditions, and then follow the steps as shown in the figure. The camera posture has been adjusted in the robot program provided in the resource package. The camera height used in all projects is the same and does not need to be adjusted repeatedly.

1) After configuring the camera IP in 3.1.1, click the button under the "Operation" column to open the camera.



3) Select continuous acquisition, configure the appropriate exposure and gain, and click Preview to see the

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camera's real-time interface on the left. If the image is overly dark, please adjust the camera aperture first. The JAKA Education Kit provides **an additional light source** for the camera; please do not use the camera flash as it can only illuminate a small area directly below the camera.



Figure 3.1-6

4) Unscrew the camera back cover and adjust the camera aperture and focus with reference to the live image.



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Figure 3.1-8

3.2 Project import

JAKA Lens X software has built-in basic project example processes, which can be used immediately after importing.



Select "Education Kit.json" inFigure 3.2-2to import the preconfigured visual program.

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After importing, it will look like Figure 3.2-3.



The robot program can be obtained by downloading the compression package, as shown in Figure 3.2 4.

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Figure 3.2-4

Connect the robot and power on, click the programming control button, enter the programming interface, and then click the folder on the right sidebar to open the programming list.



Click the import program button as shown in the figure, and find the decompression robot program under the computer path (the figure path is the native path, for reference only)

<		● ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	■ ⑦ III 日志 単助 通讯强度	 JAKA_ZU],
(5.4)	编程项目列表	€ ∃ ī	j 📽 🗙	+
	名称		÷	
	E RaMain5	2024-10-12 16:04:44 15K	B KR	
1271	RaMain7	2024-09-12 10:02:05 7KB		
it W	RaMain6	2024-09-12 09:17:24 16K	в	1 1 1 1
学校	RaMain4	2024-09-11 17:44:22 26K 2024-09-11 17:42:12 26K	B	লি
10 20 m	RaMain2	2024-09-11 17:23:29 11K	в	
	RaMain1	2024-09-11 17:21:42 11K	B	
		10.000 mag		

Figure 3.2-6

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Figure 3.2-7

Select the robot program, and click the OK button, the program import can only import one program at a time. Program import was successful in Figure 3.2 8As shown

扁程项目列表			₩ ×
名称	导入成功	♣ 大小	\$
🗐 newguiji	2024-10-12 16:17:09	52KB	1
HuaTuGet	2024-10-12 16:16:43	22KB	
RaMain5	2024-10-12 16:04:44	15KB	
三 实训12角度补偿	2024-09-26 15:48:04	225KB	
RaMain7	2024-09-12 10:02:05	7KB	
RaMain6	2024-09-12 09:17:24	16KB	
RaMain4	2024-09-11 17:44:22	26KB	
RaMain3	2024-09-11 17:42:12	26KB	
PaMain7	2024.09.11 17:23:29	11KR	
		隐藏备份文件	

Figure 3.2-8

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4. Project Configuration - Digital Block Sorting

This chapter is the construction guide for digital block sorting of JAKA Education kit. Before reading, please ensure that the contents of chapters 2-3 have been completed.

4.1 Automatic N-point calibration

1) Open the robot program [LensX positioning and grabbing N points], and move the robot to the photo point [Photo].



2) Find the related process of [Calibration] in the vision page and open [Camera Management].

🔀 LensX						自定义界面		≡
۹ filter nodes	educatio	1	Tic-Tac-Toe		+ -	i info	i 🖉 🕸	۰. پ
~ image					·		Q Search flows	×
camera		Inction 50	】相机智理:DSGP502001432 Socket Created	● ② 定位:111 ● Socket Created	p	 ✓ Flows → edu ✓ I c-² 	cation Tac-Toe	Î
 localization 							timestamp tcp:3003 switch	
template match		_					tcp: function 9 相机管理: DSGP5020014	32
find line	000 ((1)) tions	2	Calibration	Car	nera Management:	5	function 19	Ŧ
find circle		((y)) ((y))	tcp:9999	ion 4		를 educa	ation	Q
• localization			T time:	tamp		Flow	"f12cef71f8d3f48a"	
●× intersect line to line								
distance calculate	•				*			
A 1	• 2				() – 0 +			

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Figure 4.1-2

3) Place the calibration plate in the center of the field of view, adjust the camera exposure and gain, obtain an image with appropriate brightness and click [Finish] to save the settings. As shown inFigure 4.1-3.

Delete			Cancel Done
Captured Picture	DownloadImage	Camera Information	Camera Management
Ceptured Picture	DownloadImage	Camera Information Camera Name: DSGP50200 Camera Name: DSGP50200 Camera Sequence: DSGP502 Shoot Mode: Shoot Once Image Format: BayerG88 Light Control: triggerOff Exposure: 50006 Gain: 1 And trigger mode: Close	Camera Management

Figure 4.1-3

4) Open the calibration node, such as Figure 4.1-4, configure the calibration parameters, and ensure that [Start Calibration] after the robot is powered on and enabled. If the calibration board exceeds the field of view, please appropriately enlarge and reduce the motion step coefficient. After successful calibration, click [Finish].

oration Pictures	Calibration Params Calibration Management
A	Calibration Name: Npoint
	Calibration Type: NPoint_EyeInHand
8	• Preprocess: No 🗌 Yes
8-	Calibration Board Type: Custom Fixed
	* Calibration Board Size: RectangleMark_3mm
	- Calibration Method: 🔿 Manual 💿 Automatic
	• Robot IP: 192.168.1.10
	Motion Step Coefficient: 0.5
	Automatic Calib Count: 9
	Start Calibration

Figure 4.1-4

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4.2 Positioning and grabbing visual configuration

1) Find the related process of [Digital Block Capture] on the visual page and open [Camera Management].



2) Place all the digital blocks in the center of the field of view, adjust the camera exposure and gain, obtain an image with suitable brightness and click [Finish] to save the settings. As shown in Figure 4.2-2.



Figure 4.2-2

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3) Temporarily connect [Camera] and [Template Matching 1], click the [Timestamp] connected to [Camera] to trigger a photo.





Figure 4.2-3

4) Open the [Template Matching 1] node. For example, Figure 4.2-4 configure template matching parameters. Click Run to create a template for Number Block 1.

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~ calibration





Figure 4.2-5

5) Click Finish to save the template. Delete the connection between [Camera] and [Template Matching 1], temporarily connect [Camera] and [Template Matching 2] together, repeat the third and fourth steps, and create templates for all digital blocks 1-8.

6) Keep the connection between [Camera] and [Template Matching 1] only, open the [Calibration Conversion] node, and select the calibration file created in 4.1. Click Finish.

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t calib	transform node						
elete						Cancel	D
ms							
	Calibration Files biaoding						
1	Robot capture position: Robot capture position						
	Calib Transform Params						
	x	у			rz		
	1597.3251589513202	559.5087117113891					
					[Run	
÷,	Transform result					_	
	x	у	rx	ry	rz		
_							

Figure 4.2-6

7) As shown in Figure 4.2-7, click the [Timestamp] connected to [Camera] to trigger a photo and enter the [Calibration Conversion] node. As shown in Figure 4.2-6, click Run, record the calibration conversion results, and click [Finish] to end the visual end configuration.



1 iguic 4.2-7

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4.3 Positioning and grabbing robot program configuration

1) Set the calibration conversion result recorded in the previous step to the user coordinate system [Visual Base Point].



Figure4.3-1





Figure 4.3-2



3) Set the reference point. Set the base point under the [Visual Base Point] coordinate system and [TCP] set in 2.3.1.

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4) Ensure that the sucking position of the suction cup is the same as the setting position of the [Template Matching] node setting sight.

- <		/		()		(c
- 移动	y usertrause • • • • • • • • • • • • • • • • • • •	参进值: 0.10 🔽 am/*	(E)	世界 USRFRM1 税党基点 USRFRM3 USRFRM4	步进值: 连续 <u>关节六</u> 136.796	
694 IO	ER RYSE		请切换到视觉基点坐标系	示教	关节	
自己	100207 1+ 302 600 12 10722 mm + 200207 1+ 53.90190 3+ 12 42 34 + 2040 (1) 10722 mm				关节网 54.307	0-
	818420704 784 (0) 9722 00 8722 (0) 9722 82 14 (0) 9722 82 () 818420784 784 (7940) (0) 9752 428 () 85 (7) 9752 6286 ()	01 O RE		x	<u> </u>	
	11 F. M 11 F. M 11 MARK - 12 M 2 MOUTT 1 - 202 - 11 MARK - 12 MARK - 12 MAR 2 M. MARK 2000007 1 - 201 -	RY RX (RK 〇 RD) (R) (R) (R) (R) (R) (R) (R) (R) (R) (R	mm -14.482 mm 5.126 mm -179.999	RY RZ -0.001 -444.776	关节二 116.523	
t	ILCOR 26 - UAAR (FROM CS) IN MARK Store RX H72R3 (78882308 286 1) A728 pers RX M72R3 (78882308 286 1)	IT Hist			2.020)
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子程序	22217422 (*) 2722 value Dice (** 1245 2005/00 22 (*) 2592 value (*)		示教视觉其占	_		
		28776 O 13876 O 1876 O	小环边地坐示			
	你不定天王们又扩化我一ZN	~	_	6		(=) (+)
0:01:54			0			0:01:00
ロシ		f10 ▷ f30	D	6	2 @ v	×

5) After the setting is completed, run the robot program and the 8 digital blocks will be placed on the right side of the tray in order.

Figure

5. Project configuration-2.5D correction

This chapter is a guide for building the 2.5D function of JAKA Education kit. Before reading, please make sure that the contents of chapters 2-3 have been completed.

5.1 Automatic hand and eye calibration

1) Open the robot program [LensX Side Shot 25 Positioning] and move the robot to the photo point [shoot_ref_pose].



2) Find the related process of [Calibration] in the vision page and open [Camera Management].

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3) Place the calibration plate in the center of the field of view, adjust the camera exposure and gain, obtain an image with appropriate brightness and click [Finish] to save the settings. As shown in Figure 5.1-3.

relete			Cancel Do
ptured Picture	DownloadImage	Camera Information	Camera Management
A		Camera Name: DSGP502001	1432
		Camera Sequence: DSGP502	
8		* Shoot Mode: Shoot Once	Continuous Mode
8	E-6-71.050-49	Image Format: BayerGB8	
	6.440.09080	* Light Control: triggerOff	
		* Exposure: 50006	
	86	• Gain: 1	
8888	88	• hard trigger mode: 🖲 Close	O OPEN
			Previe

Figure 5.1-3

4) Open the calibration node, such as Figure 5.1-4, configure the calibration parameters, and ensure that [Start Calibration] after the robot is powered on and enabled. If the calibration board exceeds the field of view, please appropriately enlarge and reduce the motion step coefficient. After successful calibration, click [Finish].

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Kommentiert [L22]: 2.5D 应该使用手眼标定,中文版 图片有误,已提供正确版本

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Figure 5.1-4

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5.2 2.5D positioning configuration

The use of the 2.5D side shot function is divided into two stages: Debug and Online. In Debug mode, users manually trigger the run and can observe the corresponding results after each run to determine whether the positioning function is running normally. In Online mode, positioning is triggered through socket network communication, which is suitable for the actual running process of the project.

1) First set the Debug mode. Set the coordinate system to the world coordinate system, TCP to the suction cup TCP set in 2.3.1, and set the value of the program variable debug_mode to the number "1". If a different IP is set in 2.3.1 than in the manual, please modify all IP addresses in the robot program.



2) Run the robot program and wait for it to block. Don't stop the robot program, perform visual configuration.3) Find the related process of [2.5D positioning] in the vision page and open [Camera Management].

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4) Place the AlignMark in the center of the field of view, adjust the camera exposure gain, obtain images suitable for the two images, and click [Finish] to save the settings. Image quality reference in Figure 5.2-3.

5) Double-click to open the positioning node (as shown in Figure 1-2) and set the positioning node parameters. Among them: 1 is the customized positioning name; 2 the hand-eye calibration file is the calibration file created in Chapter 5.1; 3 the feature code type, it is recommended to use the feature code in the education kit, which is 36h11_50; 4 the tool TCP number is the one created in 2.3.1 The number of TCP; 5 robot IP is the robot IP set in 2.3.1; 6 is the advanced parameter, the default is No, and there will be no further explanation here. After the parameters are configured, click 7 to save the pose, and finally click Run.



Figure 5.2-3

6) After the robot moves in place, the upper left corner returns to the theoretical positioning error. coarse_trans_error is the translation deviation of the feature board in the camera coordinate system, coarse_rot_error is the rotation deviation of the feature board in the camera coordinate system, coarse_corner_error is the pixel

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deviation of the feature board in the camera coordinate system, and loc_coarse_num is the number of robot adjustments in Debug mode. Finally, click on complete at the upper right corner.

Edit localization node		
Delete		Cancel
ealtime Image Result Image	Params Tool Manageme	nt
coarse_trams_error: 0.003806, 0.015441, 0.015493	- Step 1	
coarse_corrac_arror: 0. 255708. 0. 293198. 0. 403305. 0. 356792	Please move the robot, try to place the marker at the center of the image and ensure that the image is clear. When robot arrives, create a new user frame in the Robot APP and obtain the reference pose of marker w.r.t. the robot.	8
Sehi - Se	Step 2 * Tool Name: 111	
	Calibration File: handeye	~
	* Marker Type: O Custom	
	* Marker Type: 36h11_50mm	×
	* TCP ID: 7	
	* Robot IP: 192.168.1.10	
	* Plane Adjust: No Yes	÷

Figure 5.2-4

7) Switch back to the robot program and set the value of the program variable debug_mode to the number "2". After the setting is completed, run the robot program and the robot will adjust its posture to ensure that the relative posture between the camera and AlignMark remains unchanged.

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6. Project Configuration-Visual Identity

This chapter is a guidance for setting up visual inspection of JAKA Education Kit. Before reading, please make sure that the contents of chapters 2-3 have been completed.

6.1 Distance Calculation

6.1.1 Length area calibration

1) Open the robot program [Education Kit] and move the robot to the photo point [Distance Measurement].



2) Find the related process of [Calibration] in the vision page and open [Camera Management].

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3) Remove the top board of the education kit, place the calibration board in the center of the field of view, adjust the camera exposure and gain, and click [Finish] to save the settings after obtaining an image with appropriate brightness. As shown in Figure 4.1-3.

Delete			Cancel Dor
ptured Picture	DownloadImage	Camera Information	Camera Management
AKA		Camera Name: DSGP5020014	32
8		Shoot Mode: Shoot Once	Continuous Mode
8		Image Format: BayerGB8	
		* Light Control: triggerOff	
18		* Exposure: 50006	
200000		• Gain: 1	OPEN
		 nard trigger mode. Close <liclose< li=""></liclose<>	Preview

4) Open the calibration node, such asFigure 4.1-4, configure the calibration parameters, and ensure that [Start Calibration] after the robot is powered on and enabled. If the calibration board exceeds the field of view, please appropriately enlarge and reduce the motion step coefficient. After successful calibration, click [Finish].

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Kommentiert [LZ3]: 距离计算应该使用长度面积标定, 中文版图片有误,已提供正确版本

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Figure 6.1-4

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6.1.2 Vision program configuration

1) Find the [Distance Calculation] related process in the vision page and open [Camera Management].



2) Put the top board of the education kit back, place the JAKA slider in the center of the field of view, adjust the camera exposure and gain, and click [Finish] to save the settings after obtaining an appropriate image.

DownloadImage	Camera Information	Camora Managamon
		Camera Management
	Camera Name: DSGP5020014	132
	Camera Sequence: DSGP5020	
	* Shoot Mode: Shoot Once	Continuous Mode
	• Image Format: BayerGB8	
	* Light Control: triggerOff	
	* Exposure: 50006	
	• Gain: 1	
	• hard trigger mode: Close	OPEN
		Previe
		 Camera Sequence: DSGPS02 Shoot Mode: ● Shoot Once Image Format: BayerG88 Light Control: triggerOff Exposure: 50006 Gain: 1 hard trigger mode: ● Close

Figure 6.1-6

3) Open the [Template Matching] node and configure the template matching parameters. Click Run to create a template for the JAKA slider.

4) Open the [Edge Finding] node and configure the edge finding parameters.

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5) Open the [Line Intersection] node and configure the line intersection parameters.

- 6) Open the [Distance Calculation] node and configure distance calculation parameters.
- 7) Open the [Calibration Transformation] node and select the calibration file created in 6.1.1.

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6.2 Color recognition

1) Open the robot program [Education Kit] and move the robot to the photo point [Color Recognition]. nal Str JKROBOT () Run < 12 Move \oplus Ð 6 \leq Ē Ø 5 @ Q ≡ € Figure 6.2-1

2) Find the related process of [Color Recognition] in the vision page and open [Camera Management].



Figure 6.2-2

3) Place the colored block in the center of the field of view, adjust the camera exposure and gain, and click [Finish] to save the settings after obtaining a suitable image.

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Figure 6.2-3

4) Open the [Color Recognition] node and configure color recognition parameters.

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6.3 Scan code text recognition

1) Open the robot program [Education Kit] and move the robot to the photo point [Scan QR Code Character Recognition].



2) Find the related process of [Code Scanning Text Recognition] on the visual page and open [Camera Management].

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3) Remove the top board of the education kit, place the scanned text recognition board in the center of the field of view, adjust the camera exposure and gain, obtain an image with appropriate brightness and click [Finish] to save the settings.

erere			Cancer
stured Picture	DownloadImage	Camera Information	Camera Management
		Camera Name: DSGP50200	1432
		* Camera Sequence: DSGP50	
8		* Shoot Mode: Shoot Once	Continuous Mode
8	7	Image Format: BayerGB8	
8-10-10-10-10-10-10-10-10-10-10-10-10-10-		* Light Control: triggerOff	
		* Exposure: 50006	
		• Gain: 1	
		• hard trigger mode: 🖲 Close	O OPEN
			Preview

4) Configure the front, open the [Template Matching: Front] node, and configure the template matching

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Edit comore unde

parameters.

5) Open the [Code Scanning Recognition] node in sequence and configure the QR code recognition parameters.

6) Open the [Text Recognition] node in sequence and configure the text recognition parameters.

7) Configure the back side, open the [Template Matching: Back Side] node, and configure the template matching parameters.

5) Open the [Code Scanning Recognition] node in sequence and configure the QR code recognition parameters.

6) Open the [Text Recognition] node in sequence and configure the text recognition parameters.

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7. Project Configuration-Tic Tac Toe Interactive Game

This chapter is a guide for setting up the Tic-Tac-Toe interactive game of the JAKA Education Kit. Before reading, please make sure that the contents of Chapters 2-3 have been completed.

Instructions: In this game, the robot plays circle chess and the player plays cross chess. There will be different robot actions and interactive button lights for draws, robot wins, and player wins. After the player touches the button after completing the chess game, the robot will execute the next move. When the robot action is completed, the button will light up green and the player can perform the next move.

1) Open the robot program [Tic-Tac-Toe] and move the robot to the photo point [Photo]. Set the coordinate system to the world coordinate system, and set the TCP to the sucker TCP established in 2.3.1.



2) Find the related process of [Tic-Tac-Toe] in the visual page and open [Camera Management].



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3) Place the tic-tac-toe board in the center of the field of view and insert a cross. Adjust the camera exposure and gain, and click [Finish] to save the settings after obtaining a suitable image.



Figure 6.32-5

4) Open the [Template Matching] node, configure the template matching parameters, and create a template for Cross Chess.

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8. Customized interactive interface configuration

VISUALIC is a custom interactive interface paired with JAKA Lens X, designed to visualize the execution results of vision software. This chapter is a guide for building custom pages used in the JAKA education kit. It will display some functions that require intuitive visualization on the Web side. Before reading, please ensure that the contents of Chapters 2-7 have been completed.

8.1 Configure the main page

Configure the main page and jump button

8.2 Digital block scraping page

Placeholder

8.3 Distance calculation

Placeholder

8.4 Color recognition

Placeholder

8.5 Identify the front

Placeholder

8.6 Identify the flip side

Placeholder