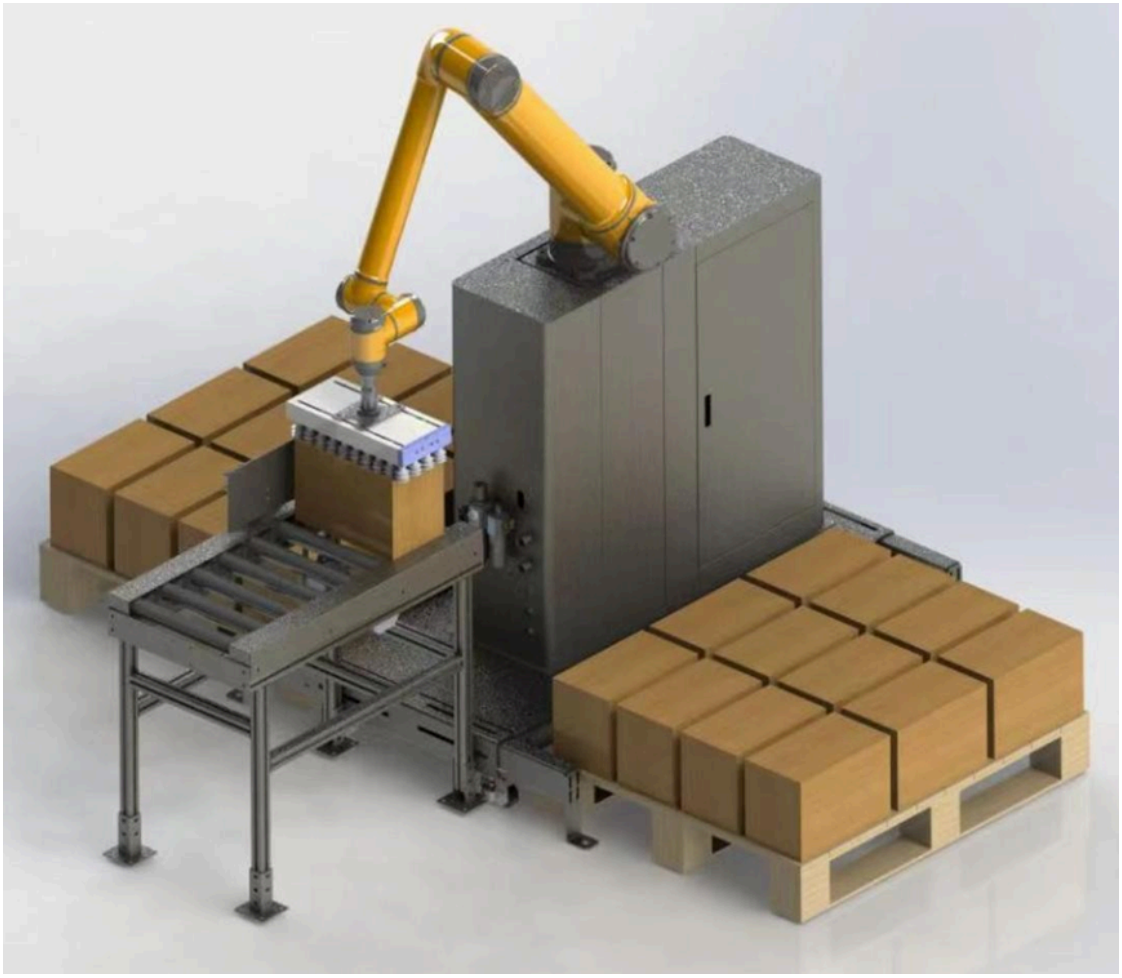
AUBO Robotics USA

Palletizing Workstation
User Manual



Version 1.1

This manual is applicable as of November, 2024. For details, please refer to the version information section of this manual. Please check the actual product version information carefully before use to ensure consistency.

Please read this manual before installation or use.

Please keep this manual to read and as reference any time.

The pictures in this manual are for reference only, please refer to the actual product received.

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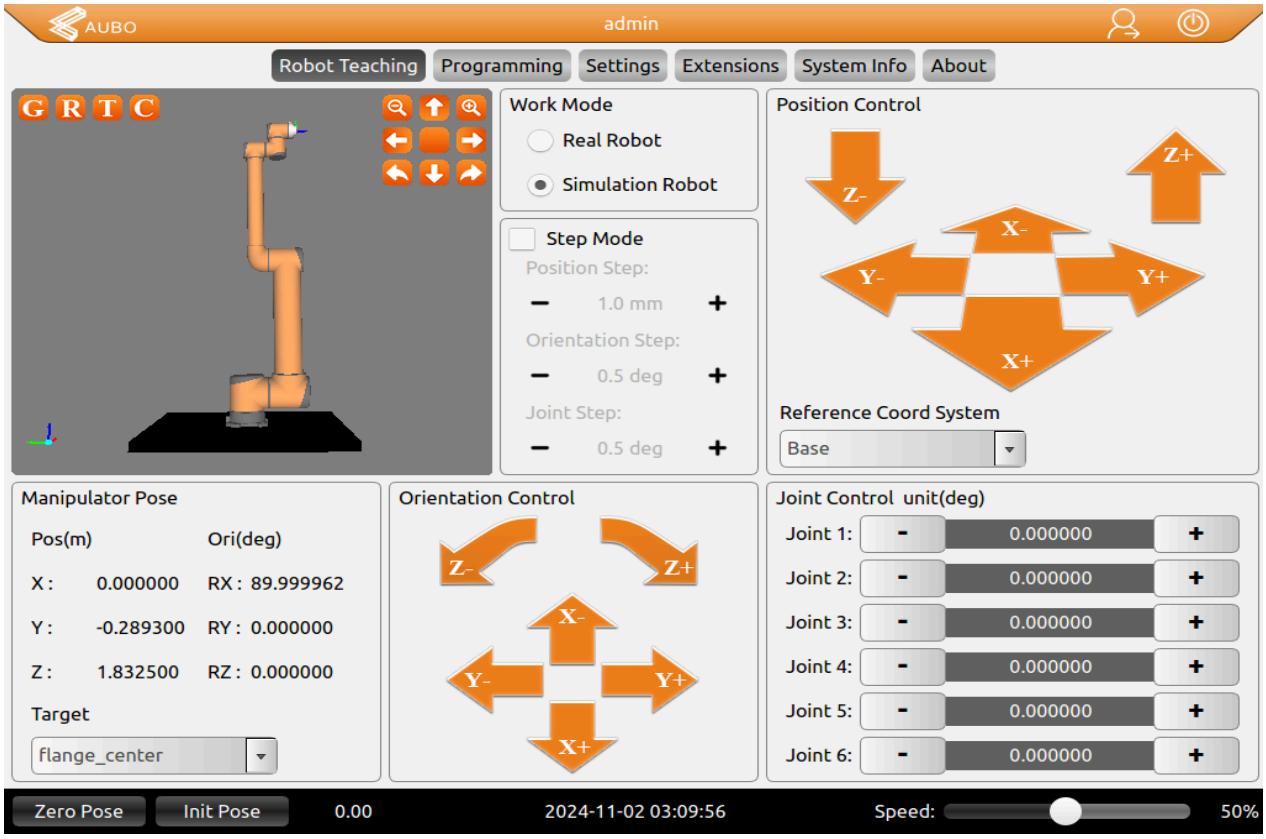
1. Installation for AUBO Palletizer Software

1.1 Upgrading the AUBO PE Software

Importing the IS20 Model

The upgrade package with the TP2 suffix is specifically for upgrading the IS series mini teaching pendant, which is currently the standard configuration for AUBO palletizer workstation.

After completing the upgrade of the AUBO PE software, verify that the model is the IS20.

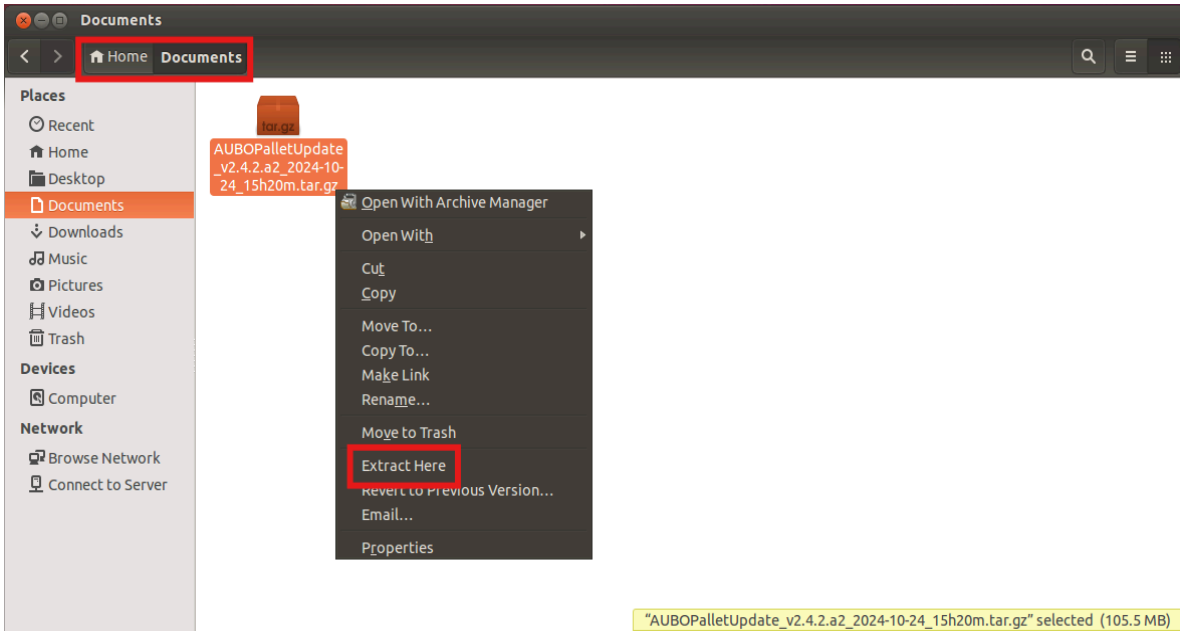

AUBO
admin
Robot Teaching
Programming
Settings
Extensions
System Info
About
G R T C
Work Mode
Real Robot
Simulation Robot
Step Mode
Position Step:
1.0 mm
Orientation Step:
0.5 deg
Joint Step:
0.5 deg
Position Control
Z-
Z+
X-
Y-
Y+
X+
Reference Coord System
Base
Manipulator Pose
Pos(m)
Ori(deg)
X : 0.000000
RX : 89.999962
Y : -0.289300
RY : 0.000000
Z : 1.832500
RZ : 0.000000
Target
flange_center
Orientation Control
Z-
Z+
X-
Y-
Y+
X+
Joint Control unit(deg)
Joint 1: 0.000000
Joint 2: 0.000000
Joint 3: 0.000000
Joint 4: 0.000000
Joint 5: 0.000000
Joint 6: 0.000000
Zero Pose
Init Pose
0.00
2024-11-02 03:09:56
Speed:
50%

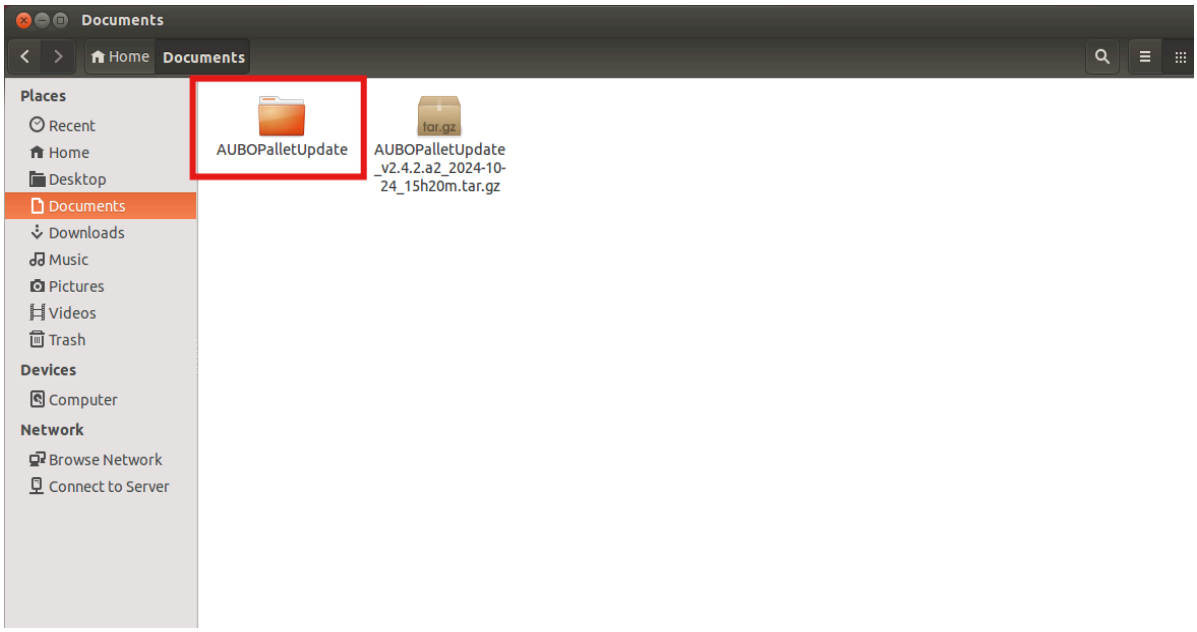

AUBO
admin
Robot Teaching
Programming
Settings
Extensions
System Info
About
About
Version
Disclaimer
AUBO
Teachpendant Version : V4.5.57-a16_0ed520c
Built on Mar 29 2024 at 17:30:03
Sdk Version : V2.5.3_813eebd
Server Version : V4.5.111.8502d12-Alpha
Copyright(c) 2015 - 2024
http://aubo-robotics.cn
Help
Zero Pose
Init Pose
0.00
2024-11-02 03:12:32
Speed:
50%

1.2 Upgrading the AUBO palletizer software

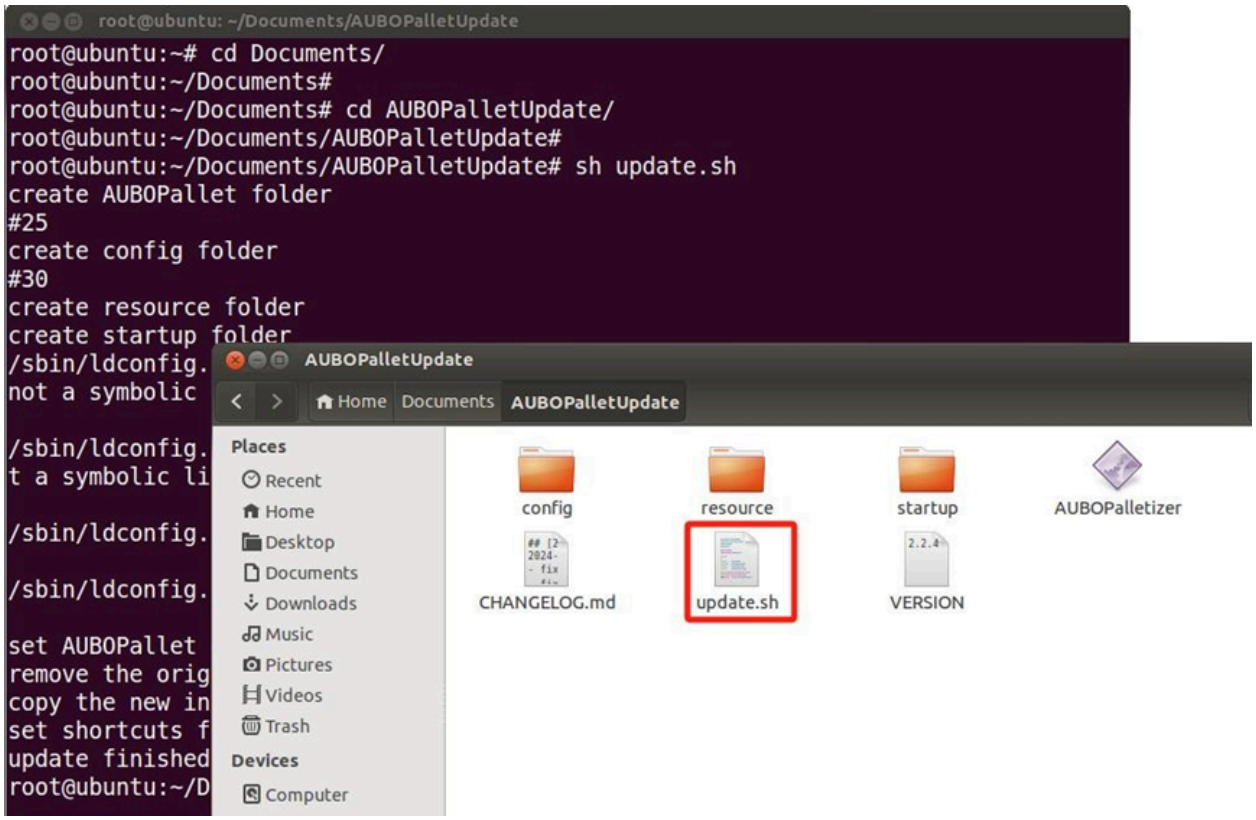
Export the AUBO palletizer software update package to the teaching pendant folder via a USB drive.

Unzip the Compressed Package



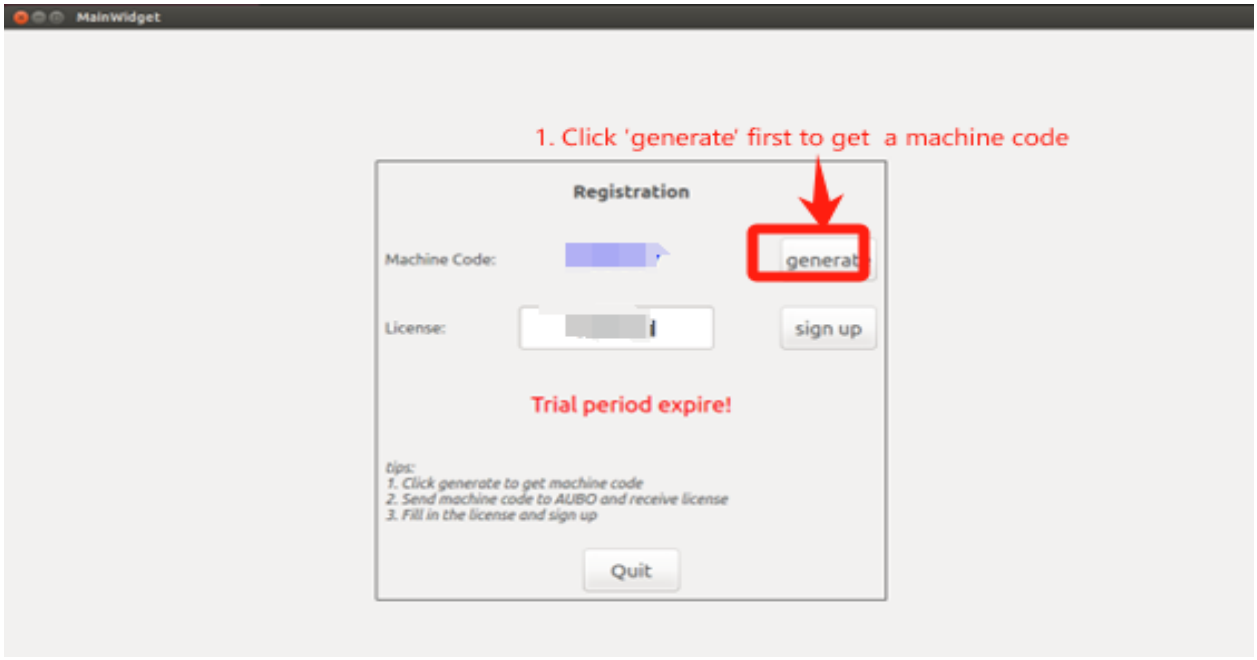


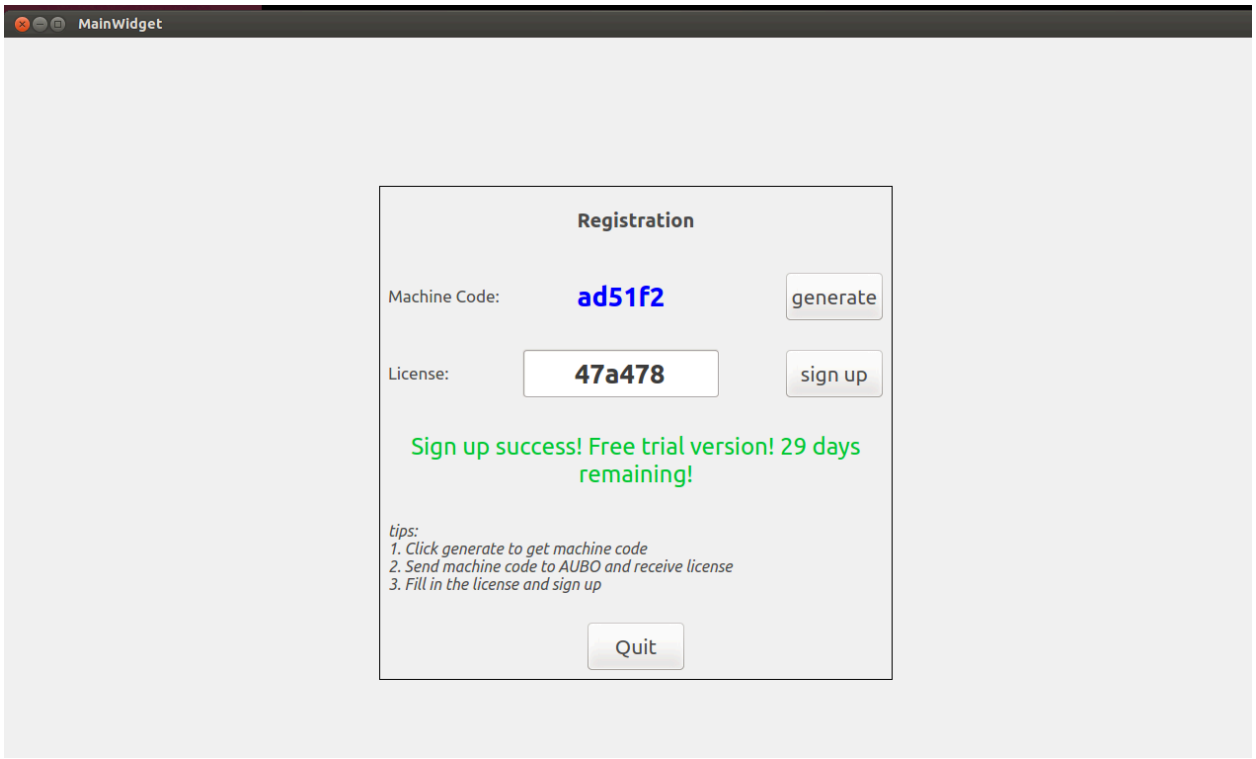
Install the AUBO palletizer software through console commands.



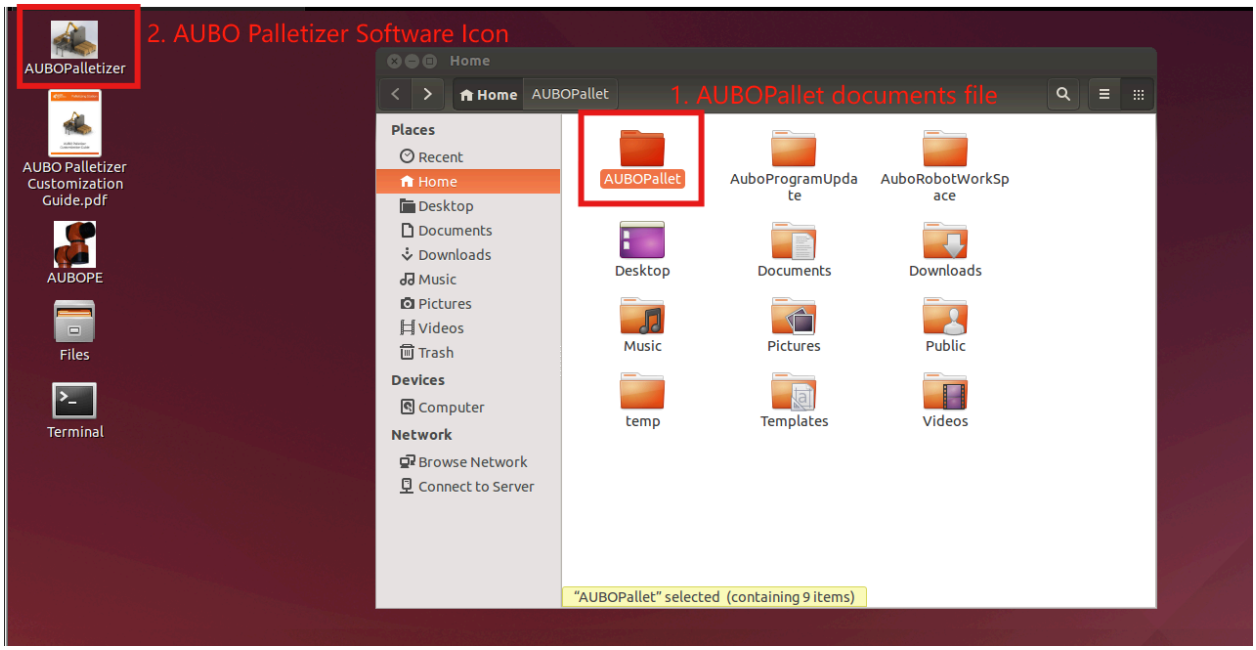
Restart the virtual machine. Upon the first startup, a registration interface will appear; send the Machine Code to AUBO after-sales support to generate a License code.

The factory-default AUBO palletizer software comes with a one-month trial version. Contact AUBO technical support for a registration code update based on on-site needs.

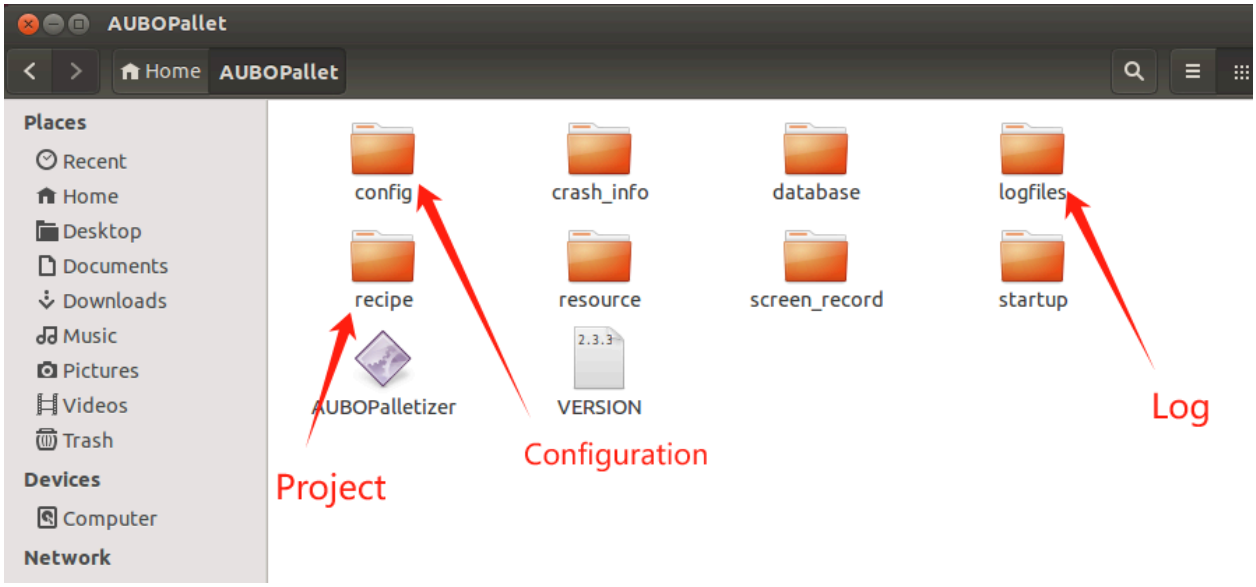




After successful installation, an AUBOPallet folder will be generated in the root directory, and an icon for the AUBO palletizer software will appear on the interface.



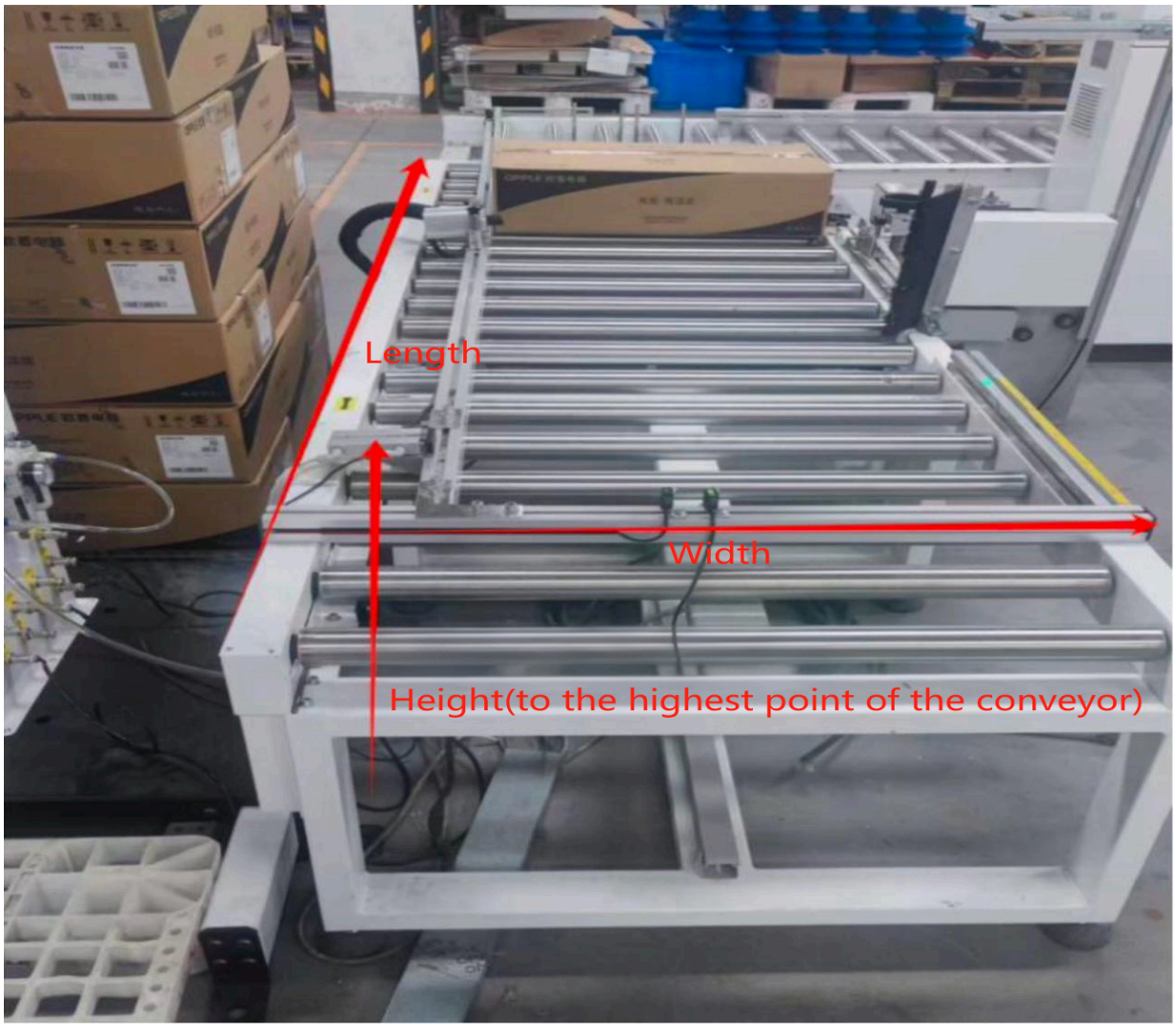
1.3 Overview of the AUBOPallet Folder

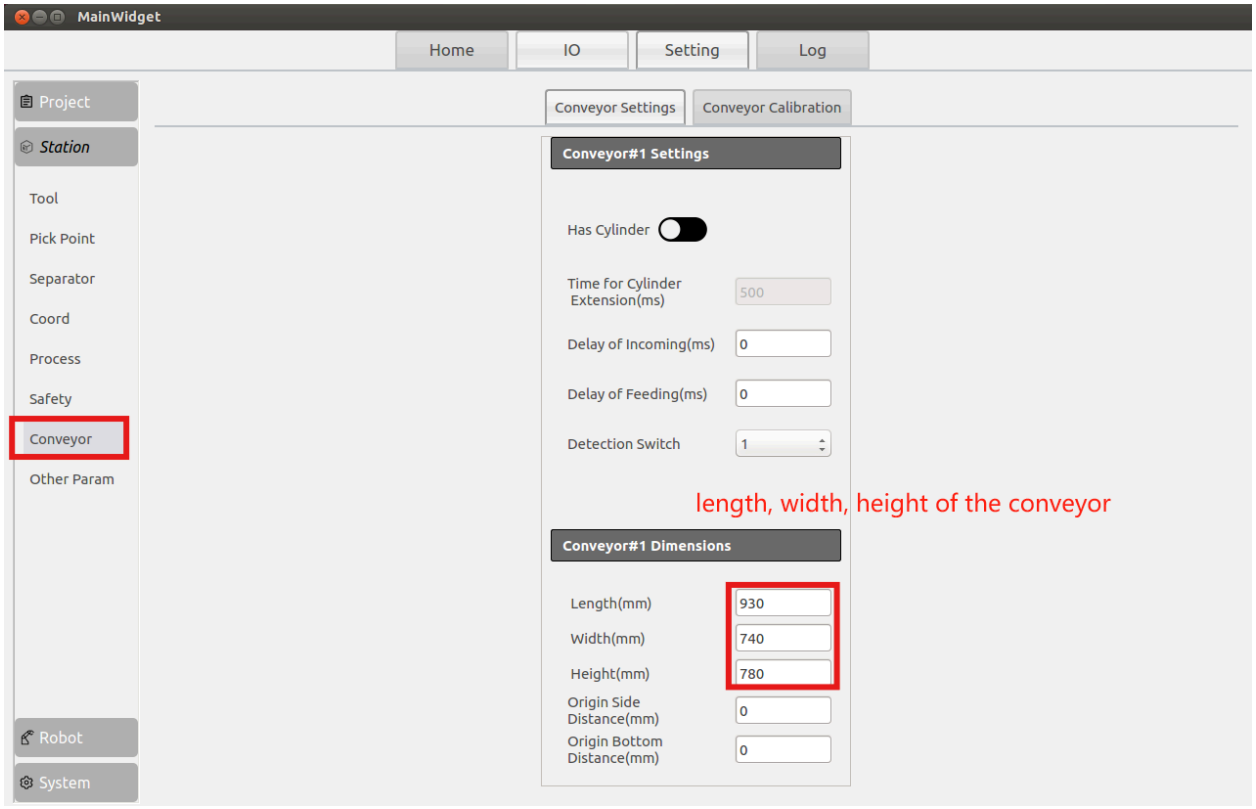


1.4 Conveyor Parameters Configuration

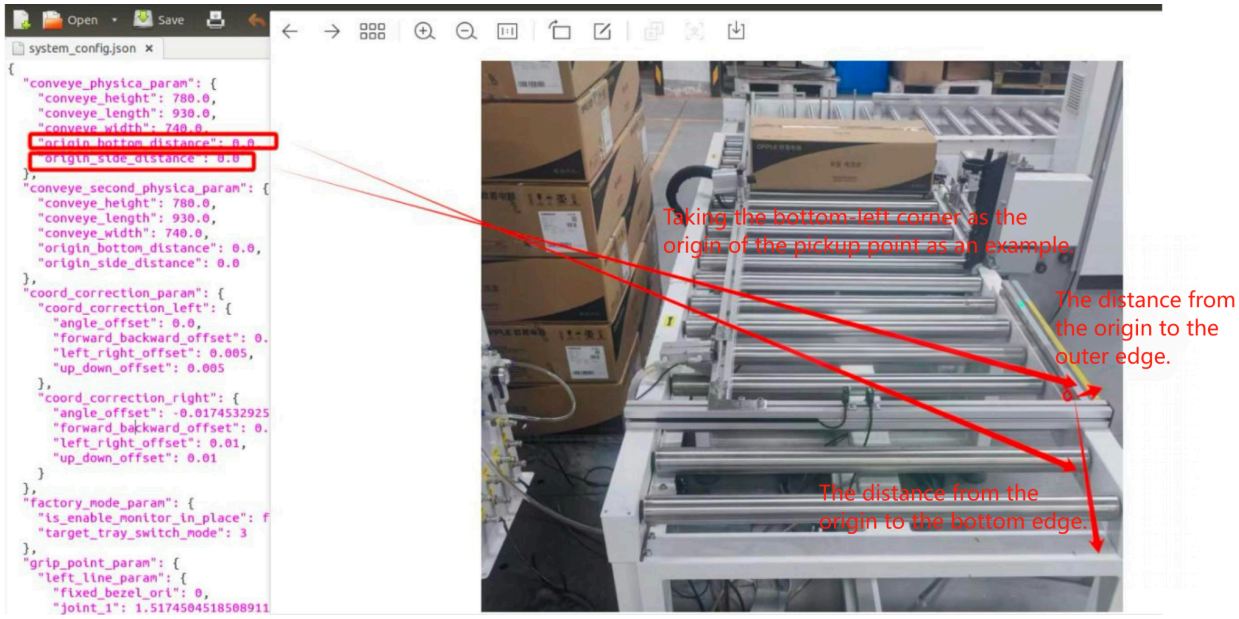
Measure the conveyor's dimensions on-site to adjust conveyor parameters (mainly to address potential interference issues between boxes and the robotic arm during palletizing).

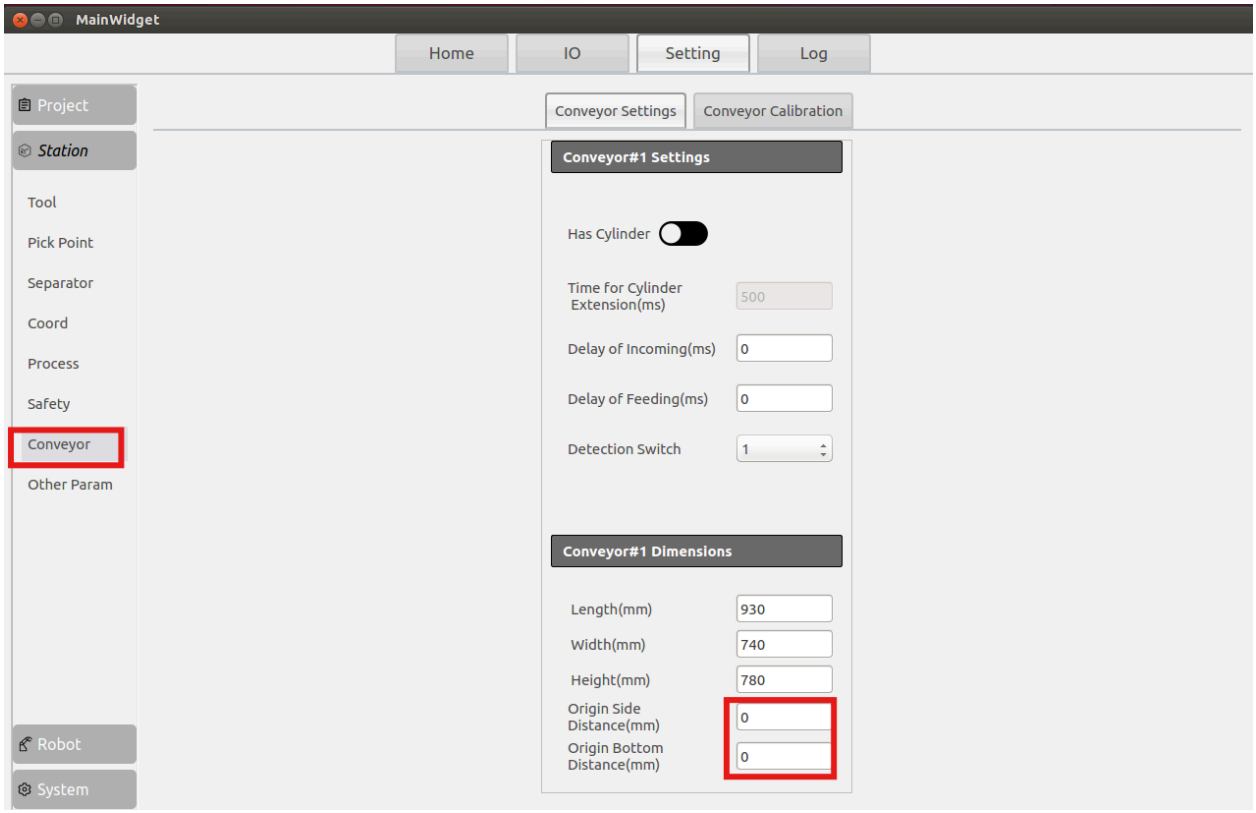
Key parameters include the length, width, and height of the conveyor.





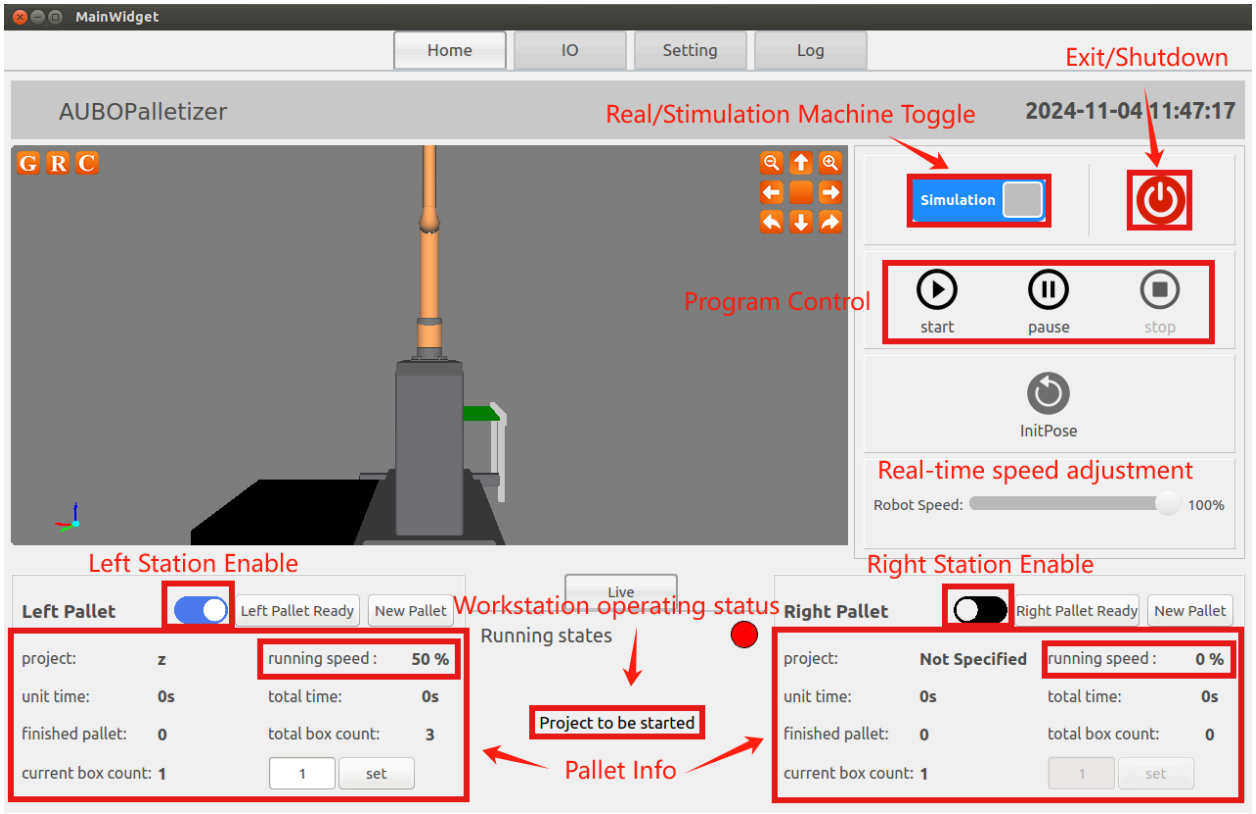
As well as the origin point of the pick-up position on the conveyor and the distance between the conveyor's base and its surroundings.




MainWidget
Home
IO
Setting
Log
Project
Station
Tool
Pick Point
Separator
Coord
Process
Safety
Conveyor
Other Param
Robot
System
Conveyor Settings
Conveyor Calibration
Conveyor#1 Settings
Has Cylinder
Time for Cylinder Extension(ms)
500
Delay of Incoming(ms)
0
Delay of Feeding(ms)
0
Detection Switch
1
Conveyor#1 Dimensions
Length(mm)
930
Width(mm)
740
Height(mm)
780
Origin Side Distance(mm)
0
Origin Bottom Distance(mm)
0

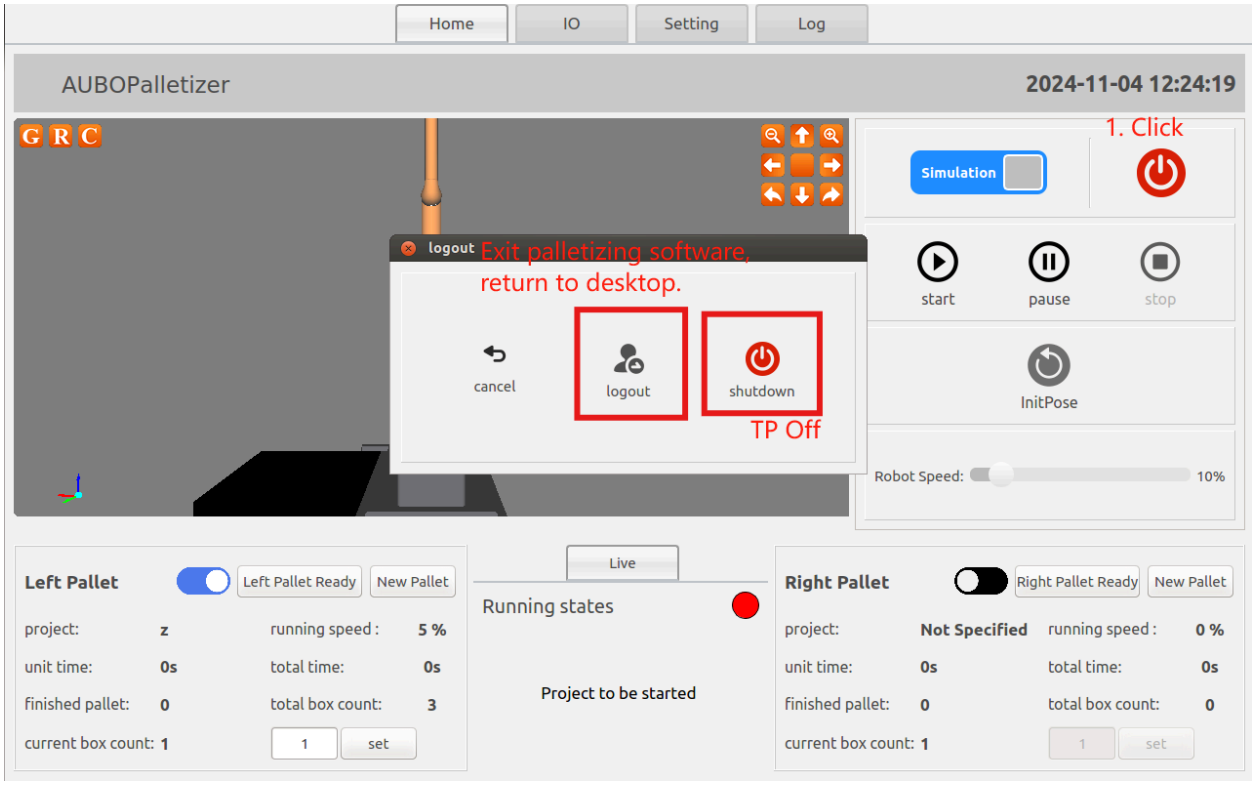
2. Overview of the AUBO Palletizer Software

2.1 Main Interface



Real/Simulation Mode Switching: Used to toggle between real cobot control mode and simulation mode. It is recommended to run the simulation mode after configuring palletizing information, and, if everything runs smoothly, switch to real mode for operation.

Exiting Software and Shutting Down:



Program Control: Manages the program's start, pause, resume, and stop functions.

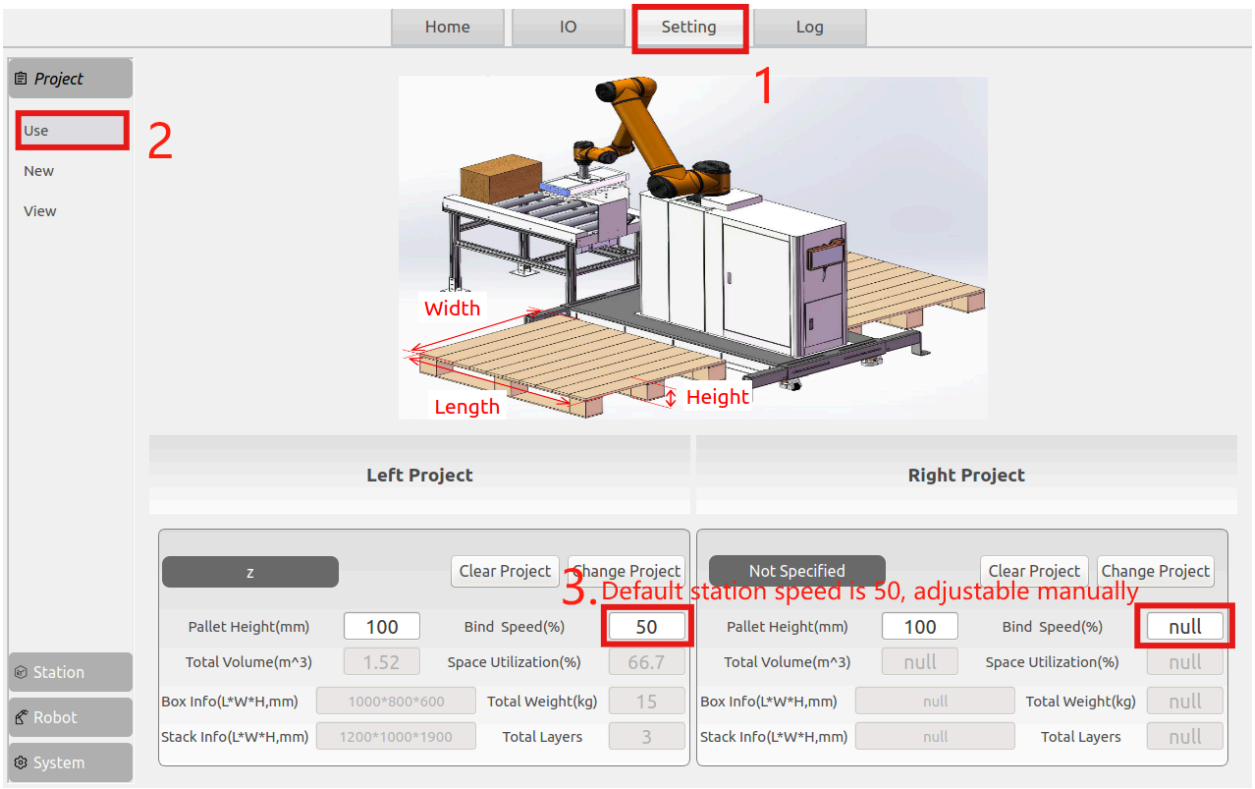
Operating Speed: The cobot arm's speed can be adjusted in real-time.

Enable Function: Left and right enable options. Palletizing operations can only proceed when the system is in an enabled state.

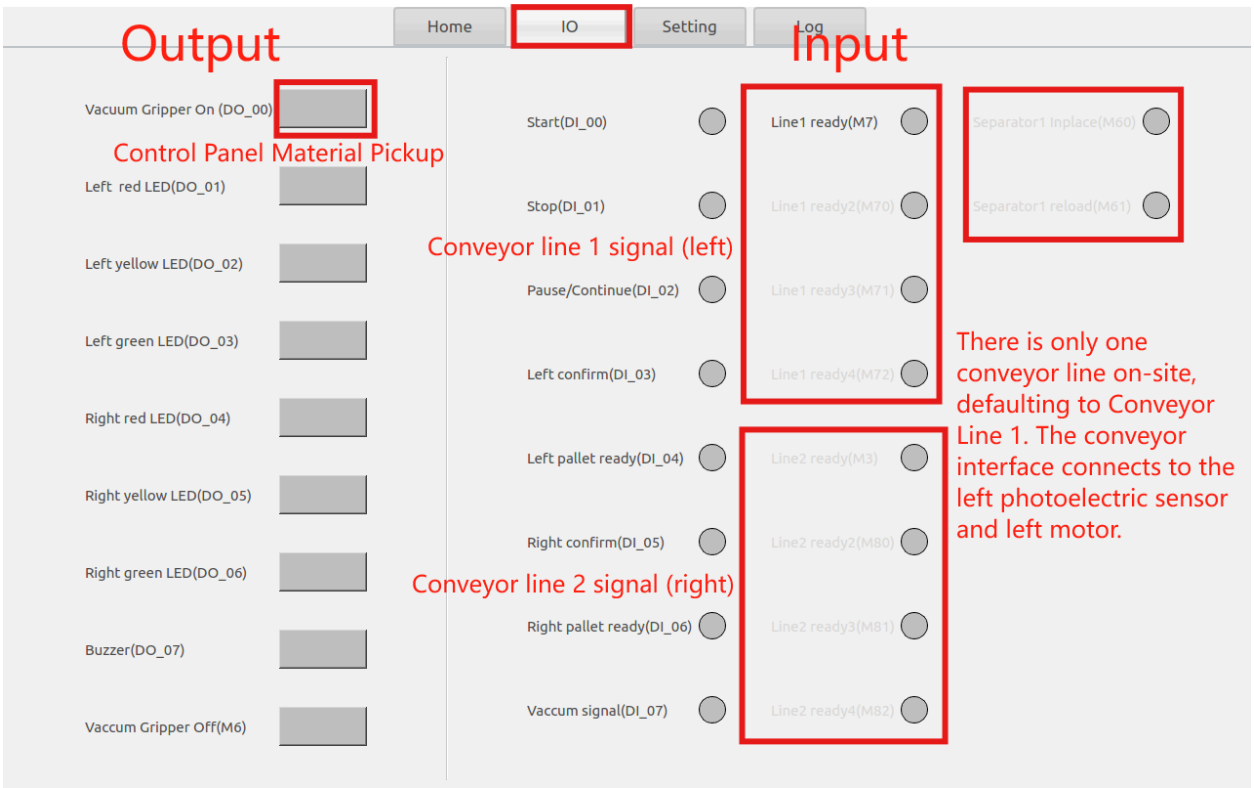
Operation Status Indicator: Displays status information during the palletizing process.

Palletizing Information: Shows details such as the recipe name, single-box duration, full-pallet duration, current box number, and total box count.

Operating Speed (Left/Right Station): In the project interface, the base operating speed for each recipe can be set (default is 50%). The left/right station speed equals the operating speed multiplied by the corresponding base speed for each station.



2.2 IO



Vacuum Gripper On(DO_01)**:** Controls the suction and release of materials with the suction cup.

Vacuum Gripper Off(M6)**:** Primarily used to blow air when releasing materials to prevent residual materials.

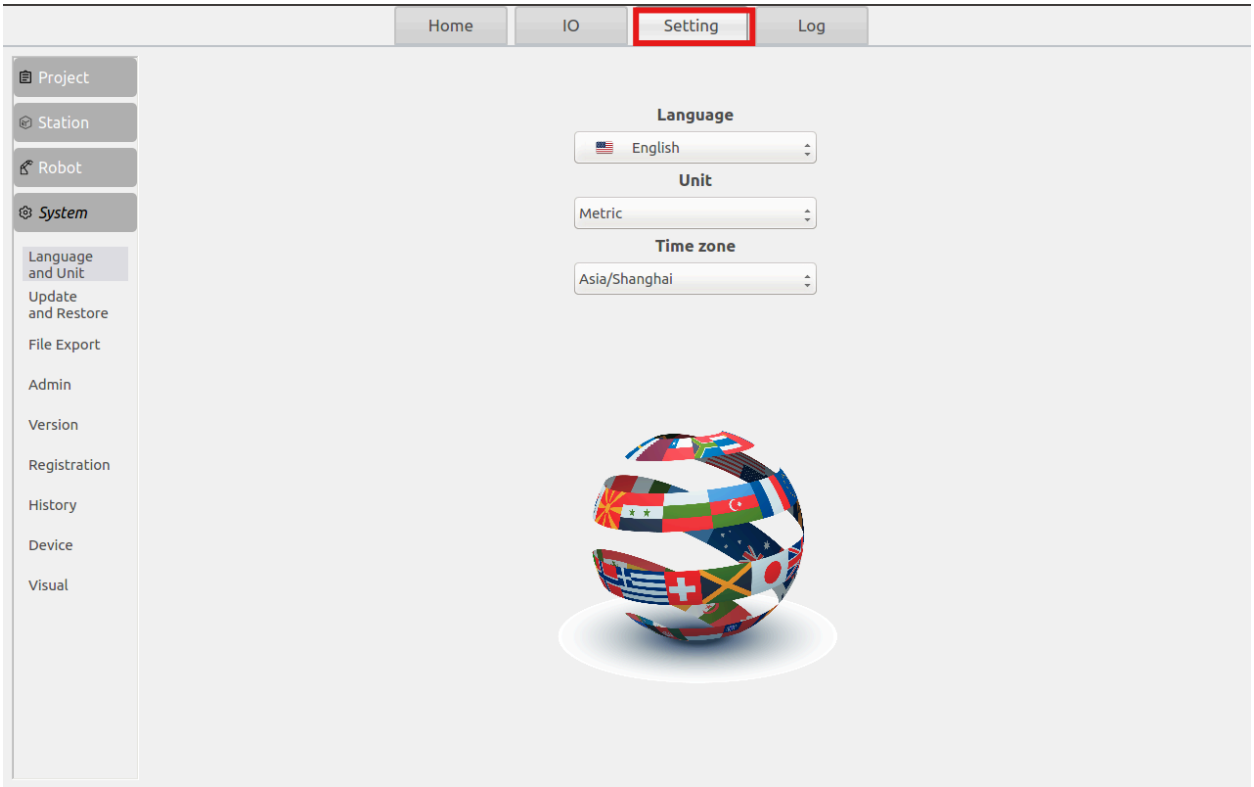
Left pallet ready(DI_04)**:** Detects whether the left pallet is positioned correctly (detects rising edge).

Right pallet ready(DO_06)**:** Detects whether the right pallet is positioned correctly (detects rising edge).

Conveyor Line 1 Material Positioning (supports up to 4 materials): Corresponds to the left photoelectric sensor and left motor in the conveyor's reserved interface. A single conveyor line defaults to using the left photoelectric sensor and motor interface.

Conveyor Line 2 Material Positioning (supports up to 4 materials): Corresponds to the right photoelectric sensor and right motor in the conveyor's reserved interface.

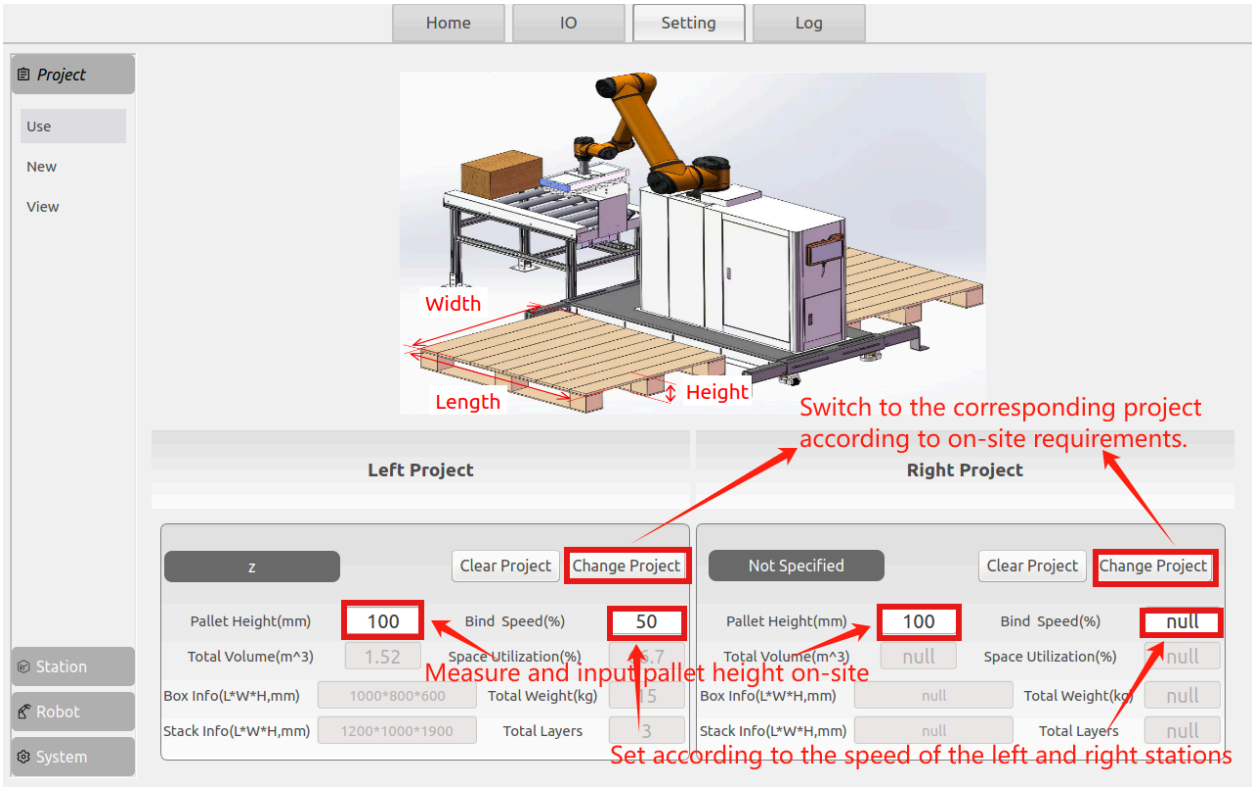
2.3 Setting

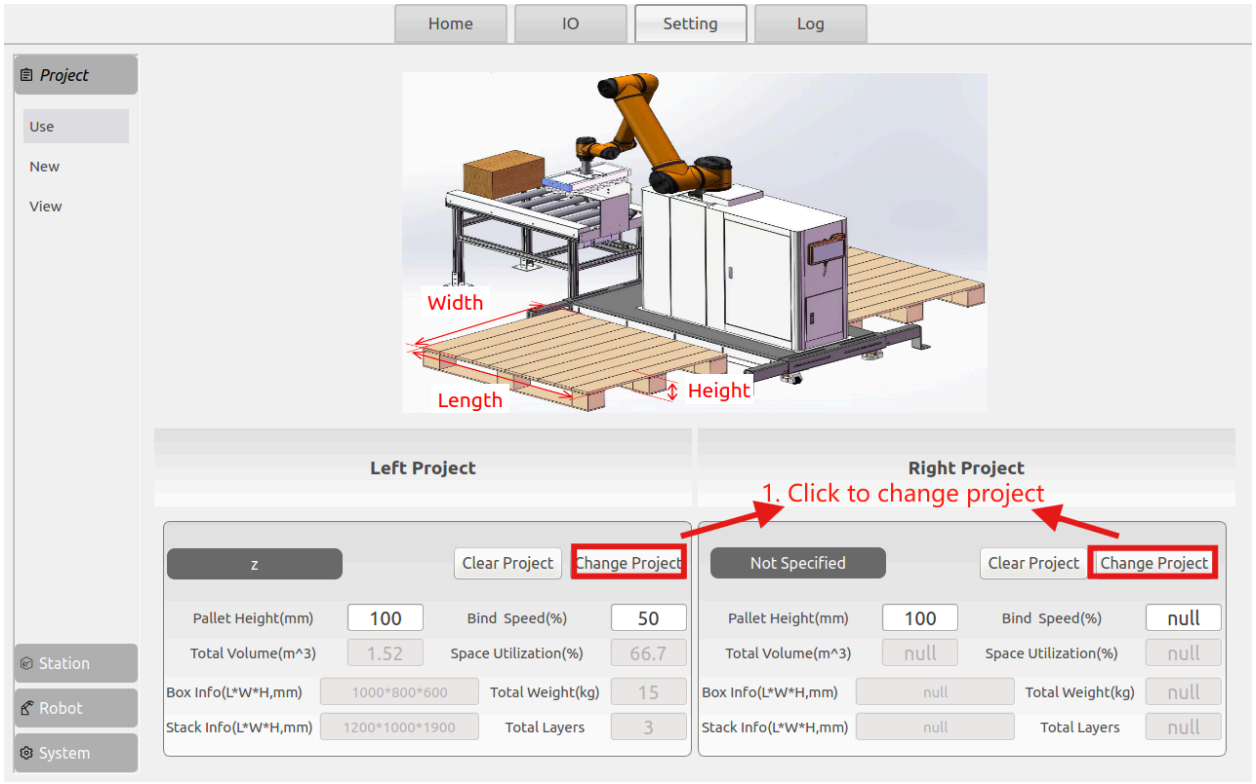


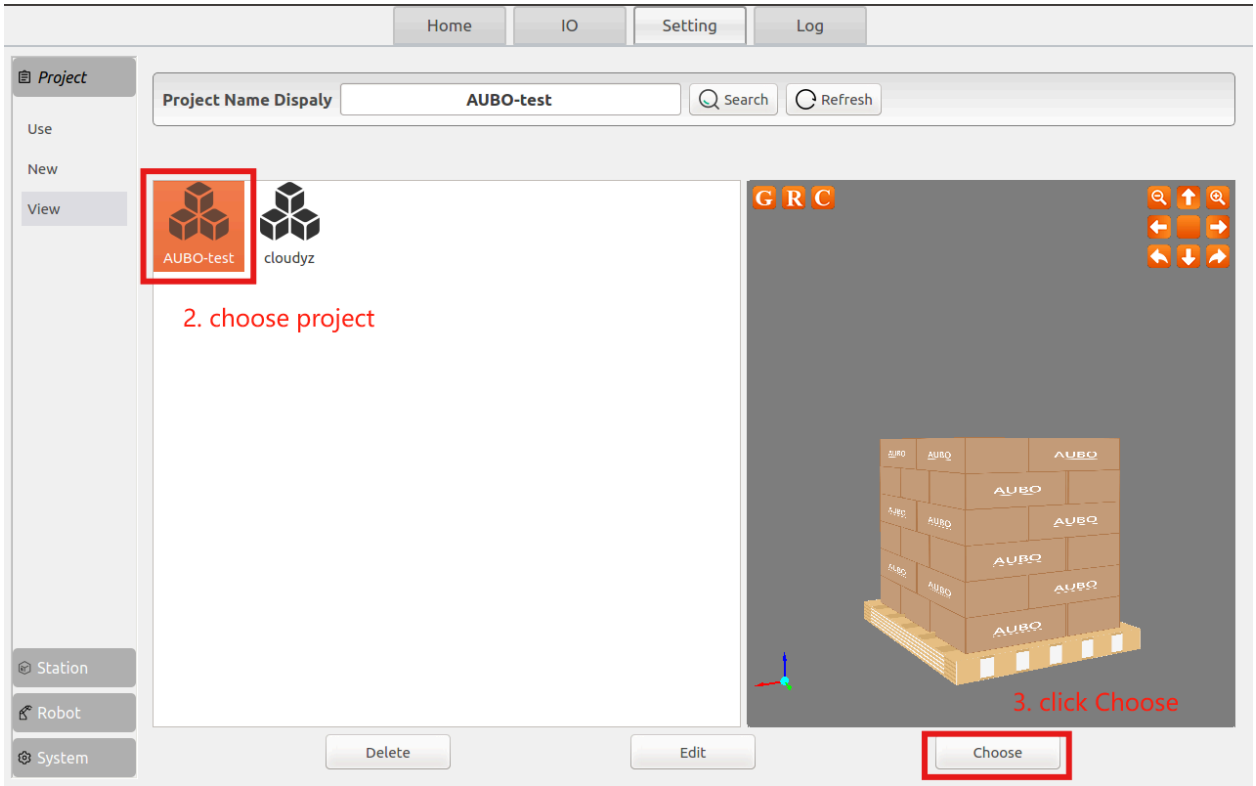
Settings include four functional options: Project, Workstation, AUBO Robotics, and System.

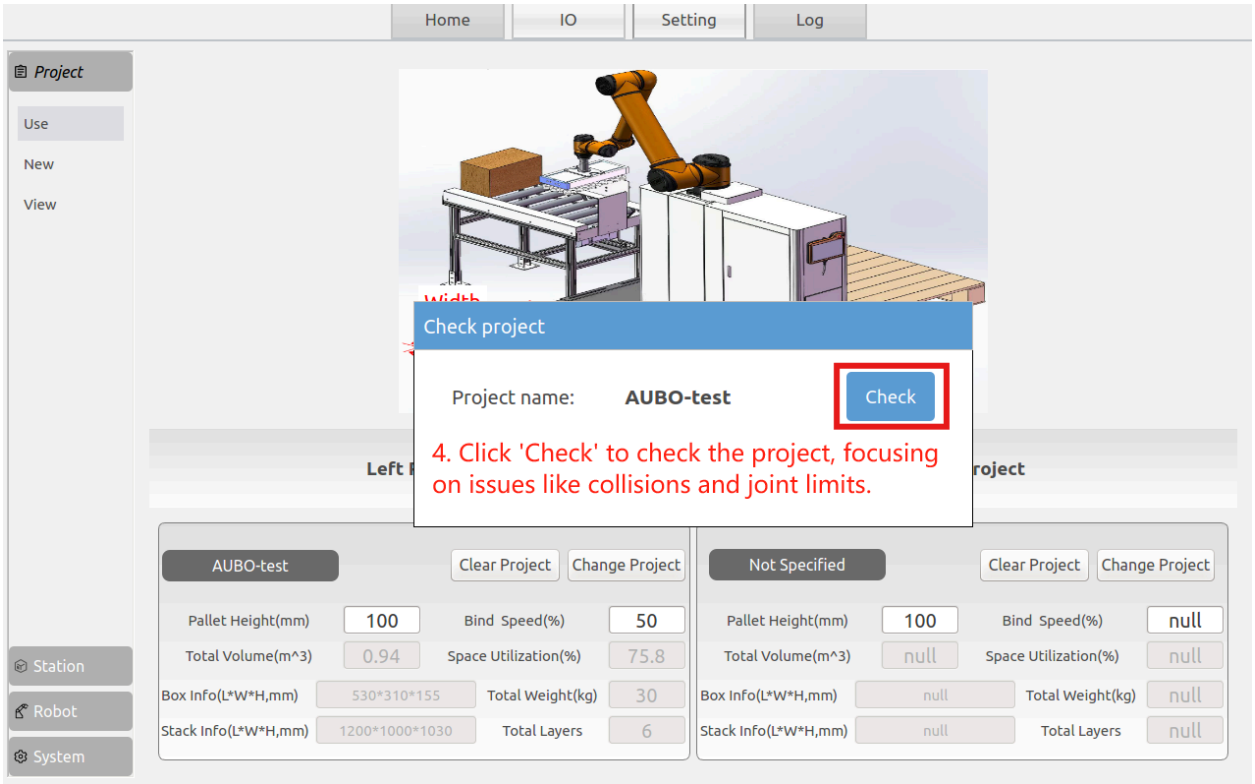
2.3.1 Project

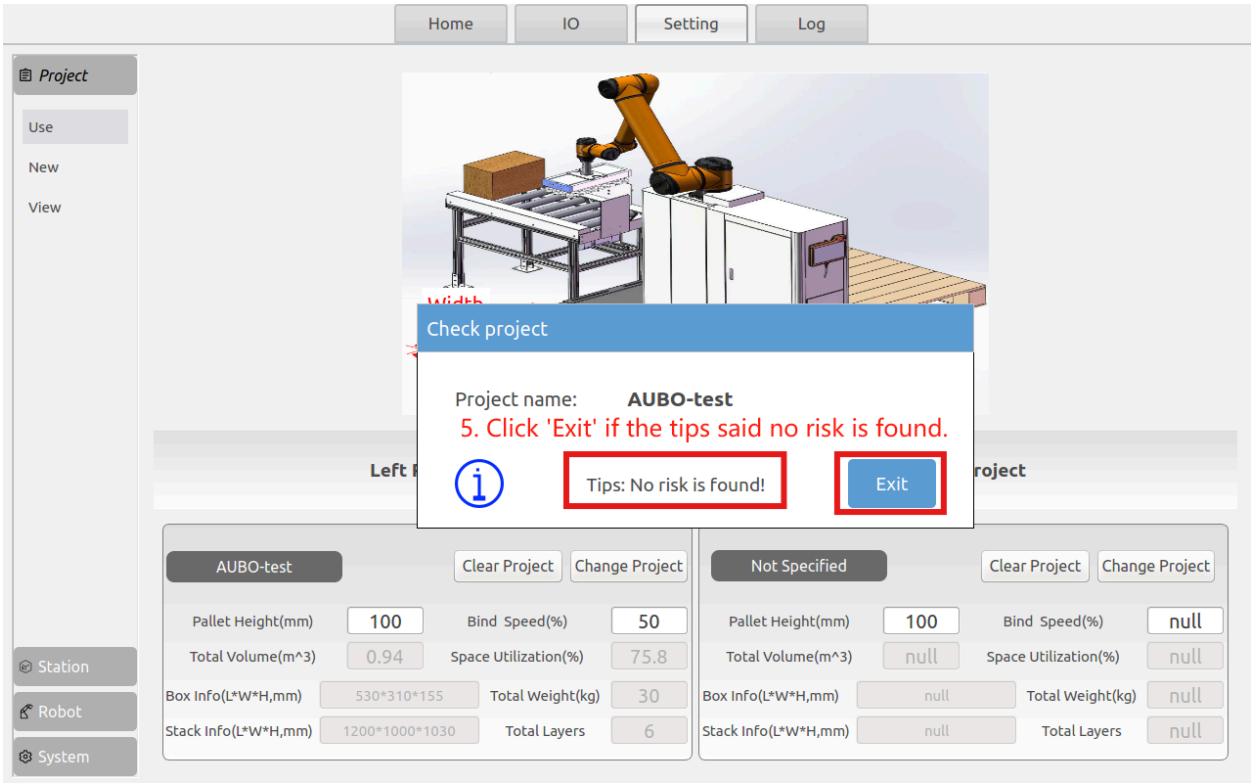
Utilizing Project




Home
IO
Setting
Log
Project
Use
New
View
Width
Length
Height
Left Project
Right Project
1. Click to change project
z
Clear Project
Change Project
Not Specified
Clear Project
Change Project
Pallet Height(mm)
100
Bind Speed(%)
50
Pallet Height(mm)
100
Bind Speed(%)
null
Total Volume(m^3)
1.52
Space Utilization(%)
66.7
Total Volume(m^3)
null
Space Utilization(%)
null
Box Info(L*W*H,mm)
1000*800*600
Total Weight(kg)
15
Box Info(L*W*H,mm)
null
Total Weight(kg)
null
Stack Info(L*W*H,mm)
1200*1000*1900
Total Layers
3
Stack Info(L*W*H,mm)
null
Total Layers
null
Station
Robot
System

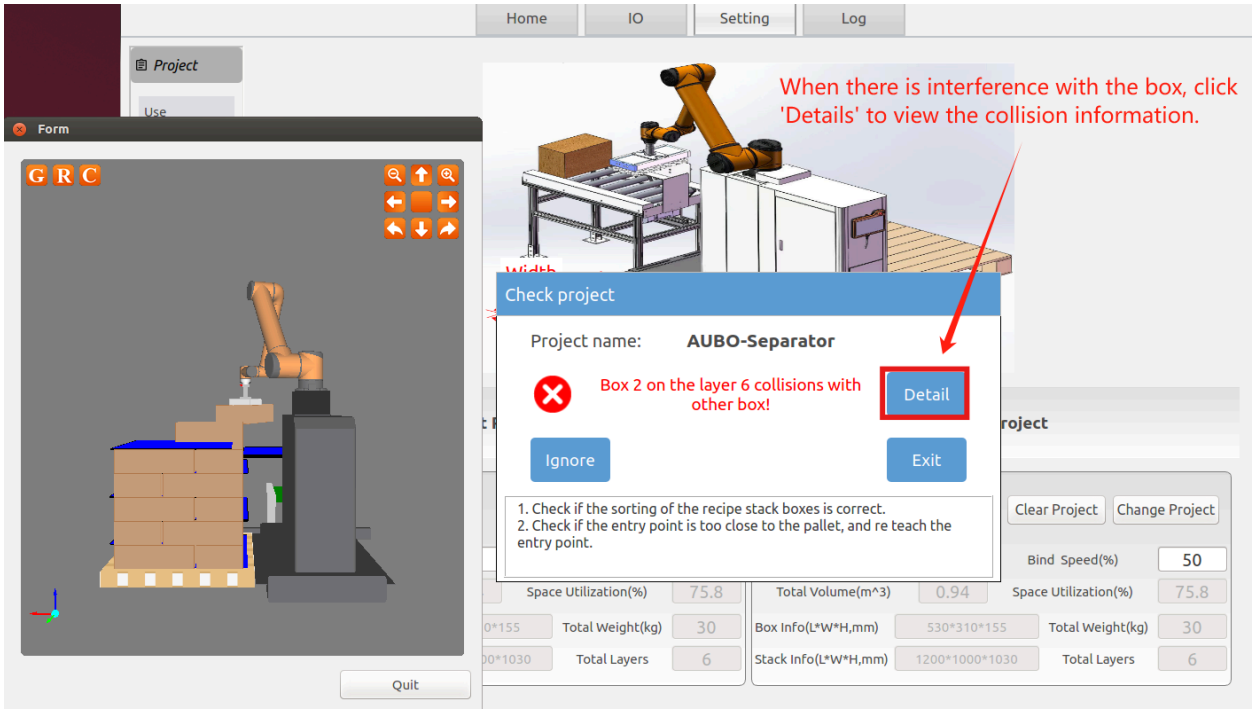

Home
IO
Setting
Log
Project
Use
New
View
Project Name Dispaly
AUBO-test
Search
Refresh
AUBO-test
cloudyz
2. choose project
3. click Choose
Station
Robot
System
Delete
Edit
Choose


Home
IO
Setting
Log
Project
Use
New
View
Check project
Project name:
AUBO-test
Check
4. Click 'Check' to check the project, focusing on issues like collisions and joint limits.
AUBO-test
Clear Project
Change Project
Not Specified
Clear Project
Change Project
Pallet Height(mm)
100
Bind Speed(%)
50
Pallet Height(mm)
100
Bind Speed(%)
null
Total Volume(m^3)
0.94
Space Utilization(%)
75.8
Total Volume(m^3)
null
Space Utilization(%)
null
Box Info(L*W*H,mm)
530*310*155
Total Weight(kg)
30
Box Info(L*W*H,mm)
null
Total Weight(kg)
null
Stack Info(L*W*H,mm)
1200*1000*1030
Total Layers
6
Stack Info(L*W*H,mm)
null
Total Layers
null
Station
Robot
System

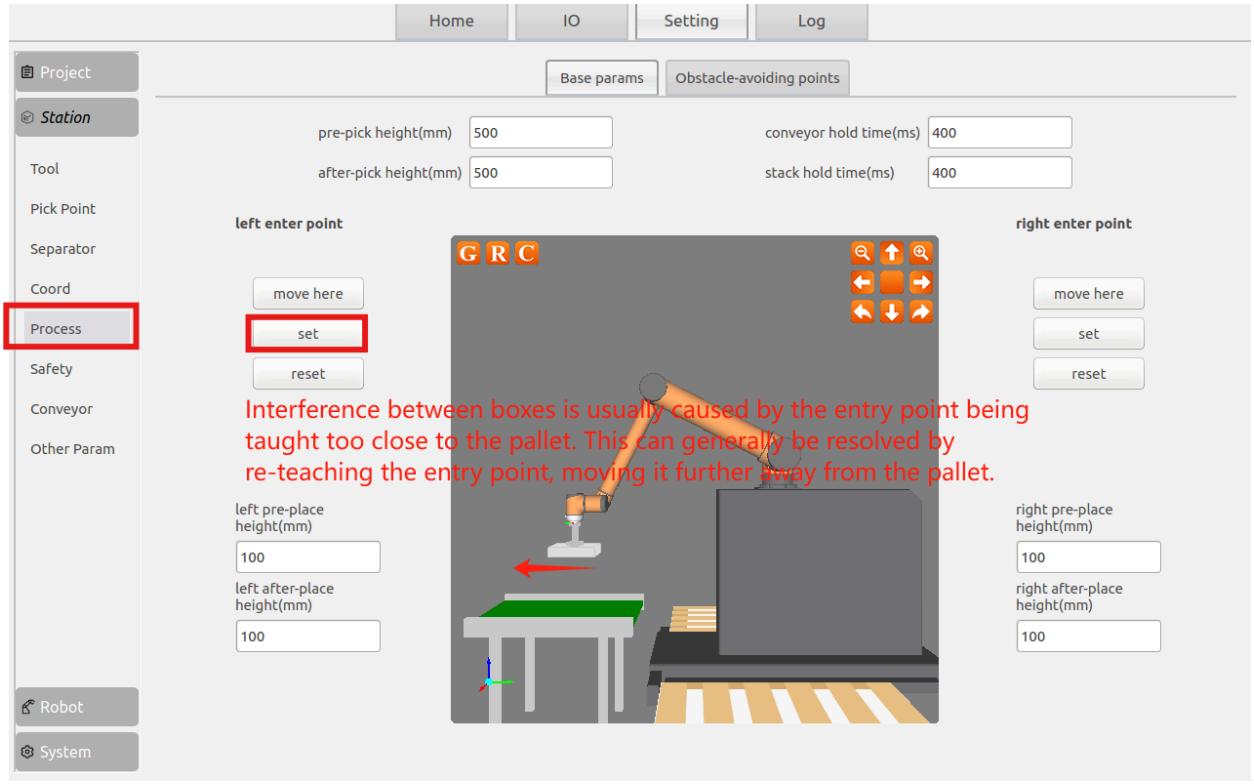

Home
IO
Setting
Log
Project
Use
New
View
Check project
Project name:
AUBO-test
5. Click 'Exit' if the tips said no risk is found.
Tips: No risk is found!
Exit
AUBO-test
Clear Project
Change Project
Not Specified
Clear Project
Change Project
Pallet Height(mm)
100
Bind Speed(%)
50
Pallet Height(mm)
100
Bind Speed(%)
null
Total Volume(m^3)
0.94
Space Utilization(%)
75.8
Total Volume(m^3)
null
Space Utilization(%)
null
Box Info(L*W*H,mm)
530*310*155
Total Weight(kg)
30
Box Info(L*W*H,mm)
null
Total Weight(kg)
null
Stack Info(L*W*H,mm)
1200*1000*1030
Total Layers
6
Stack Info(L*W*H,mm)
null
Total Layers
null
Station
Robot
System

Error Handling

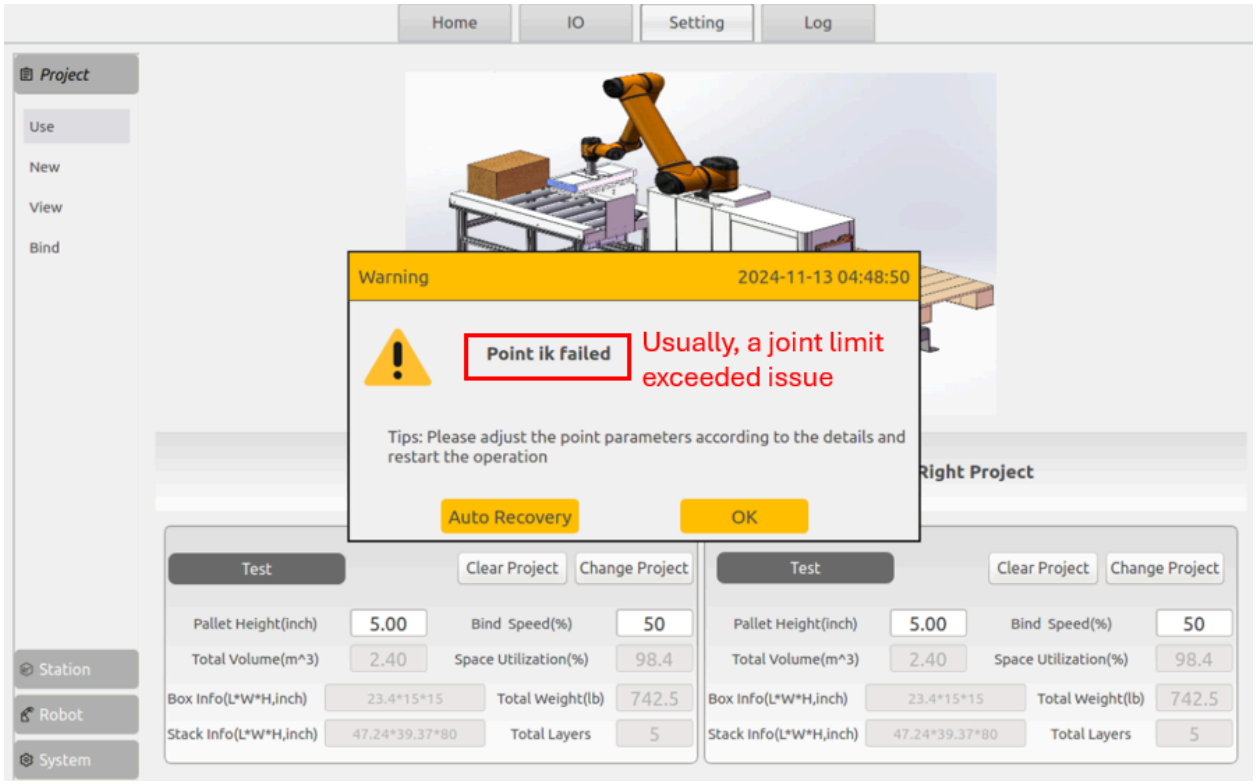
Issue 1: Box Interference Issue



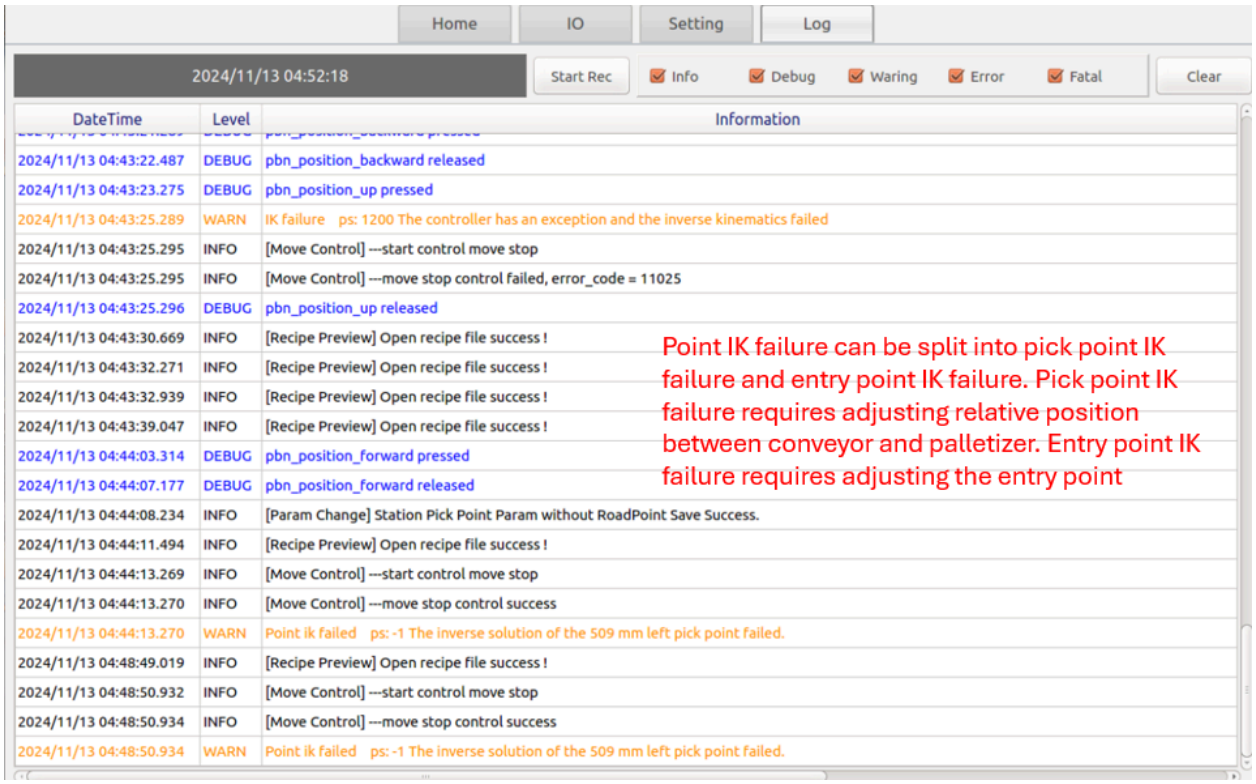
Solution: Adjust the entry point direction and position away from the pallet while avoiding conveyor interference by clicking the ‘set’ button.



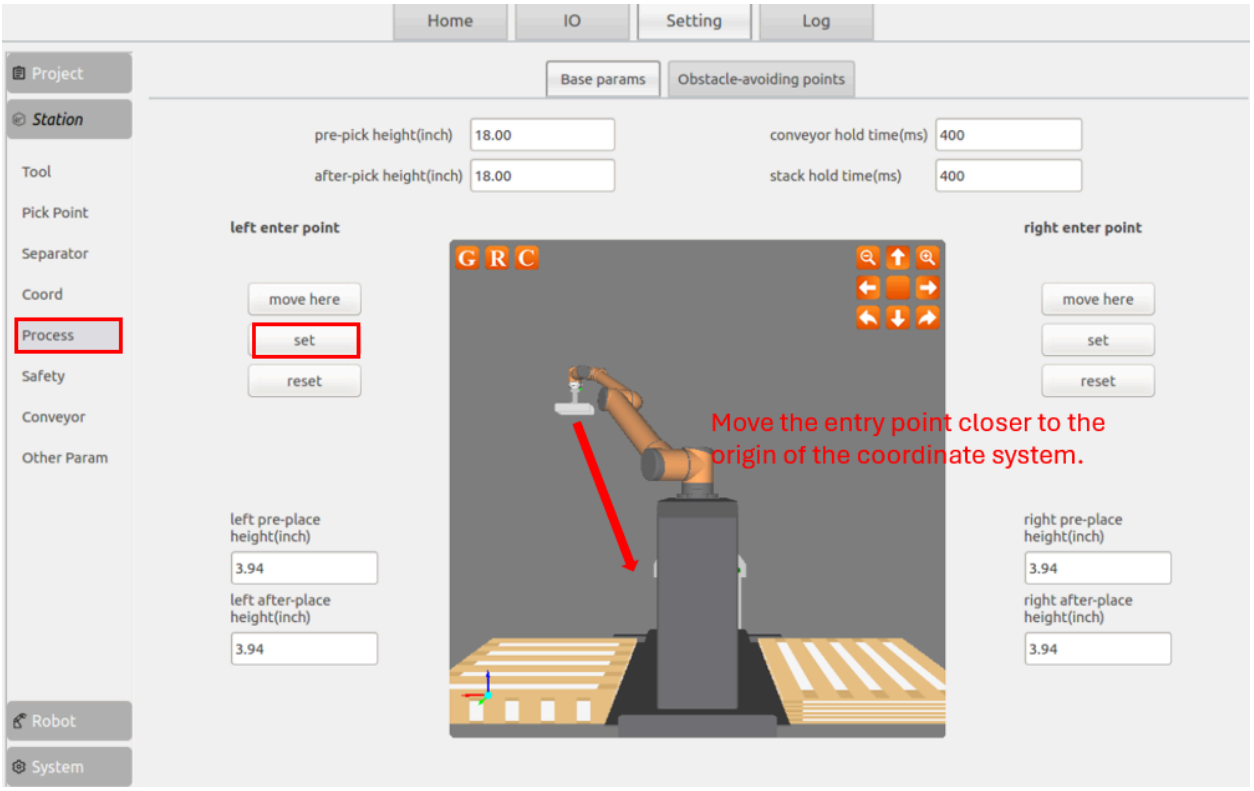
Issue 2: Waypoint Inverse solution Failure



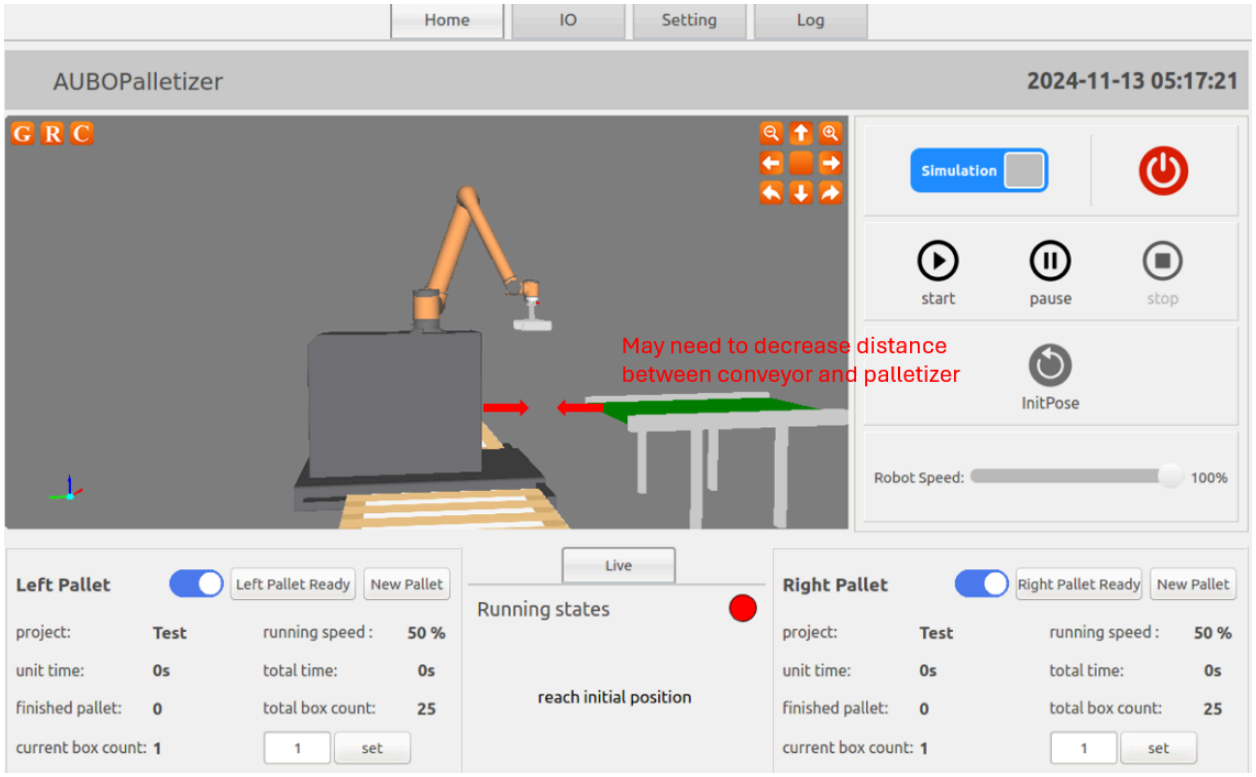
Check the information from the Log page.



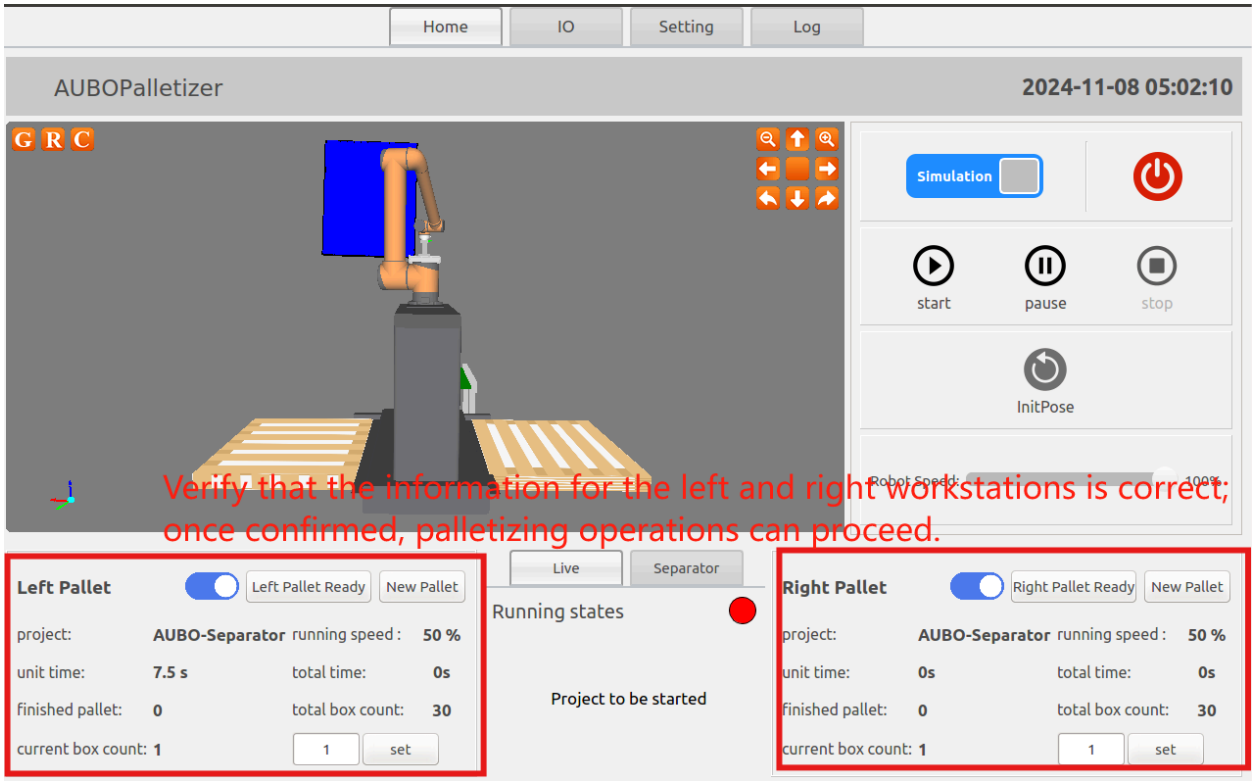
Solution: If the entry point encounters inverse kinematics failure, adjust the entry point downward toward the origin of the pallet coordinate system, avoiding interference.



For pick-up point inverse kinematics failure, adjust the spacing between the conveyor and workstation.

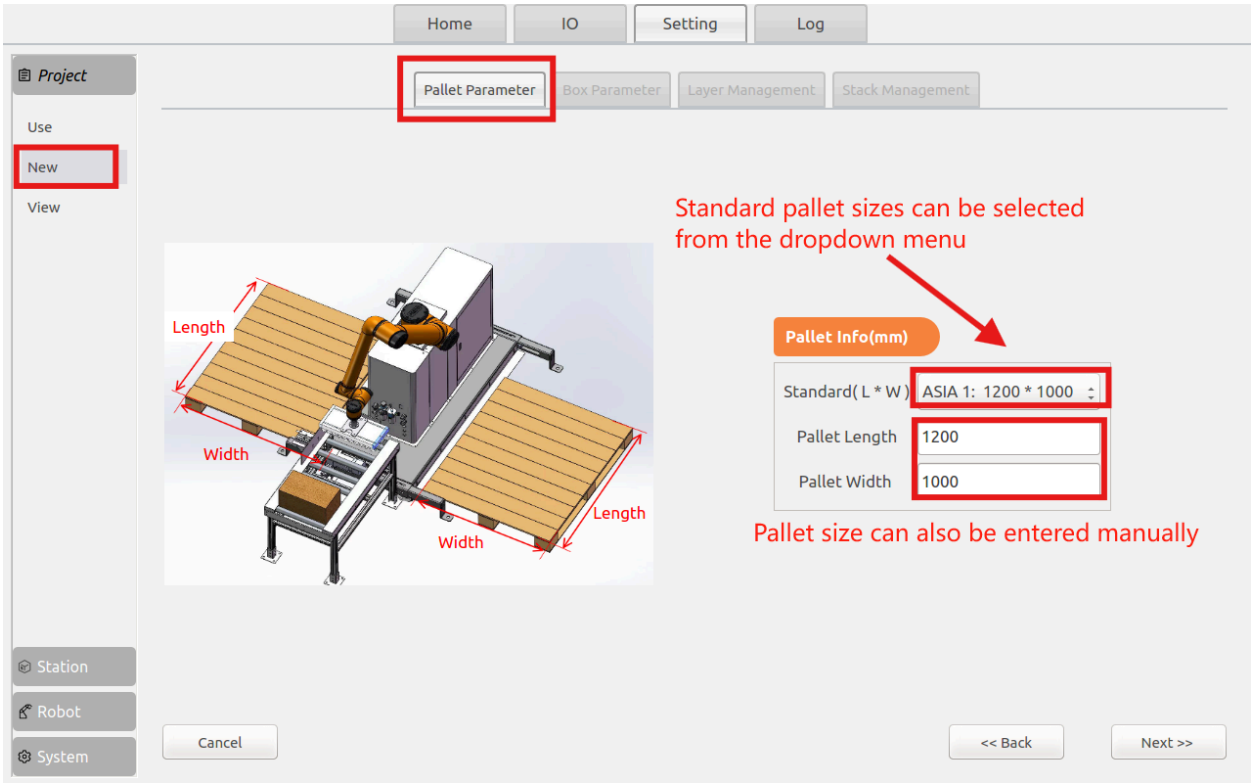


Once the project has been validated and switched, palletizing operations can be performed in simulation or real mode in the main interface.



Creating a New Project

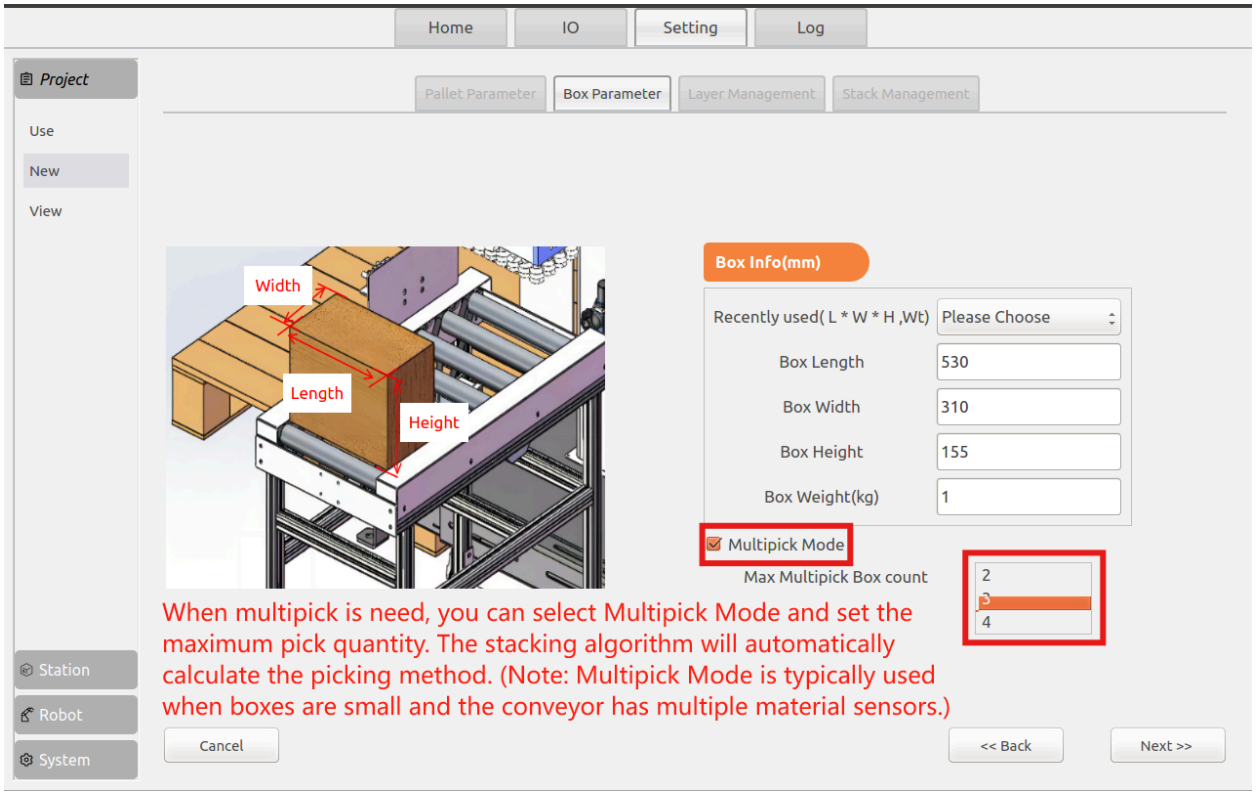
1. **Enter Pallet Dimensions**



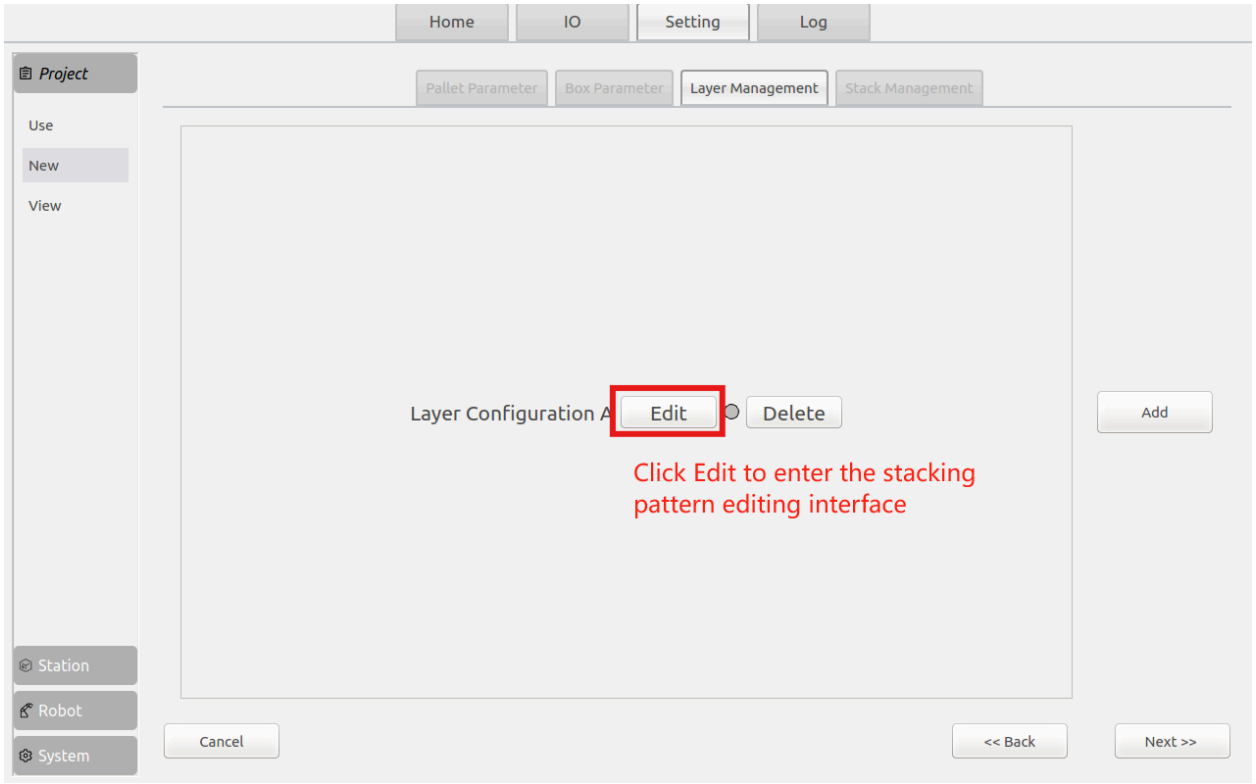
Once the pallet dimensions are set, click **Next**.

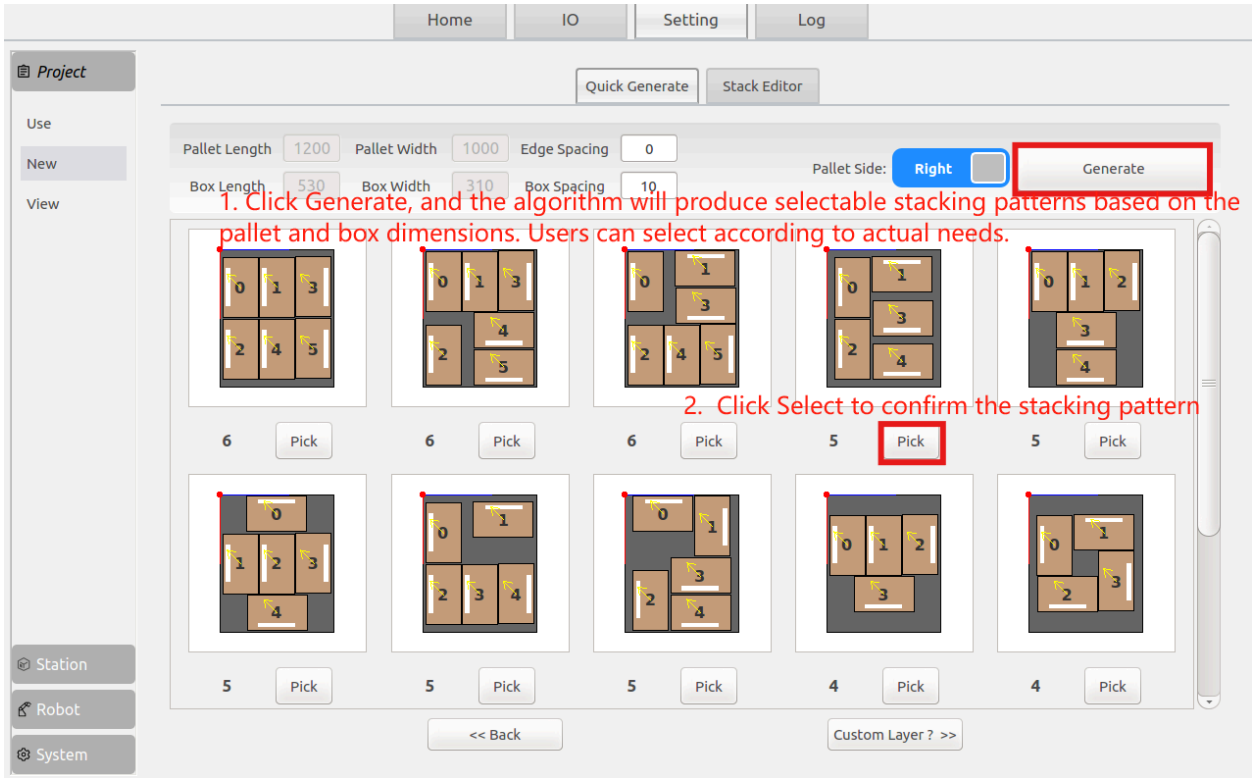
2. Enter Box Dimensions

After entering the box dimensions, click **Next**.

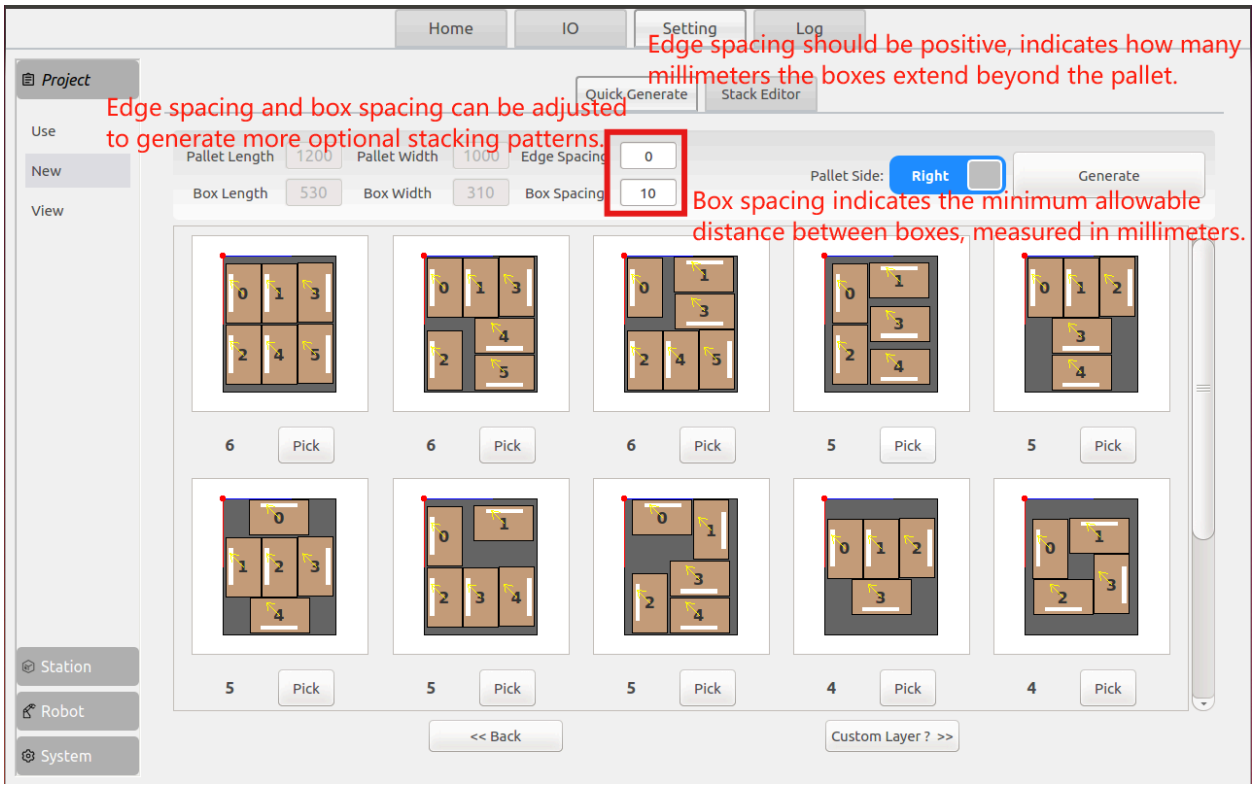


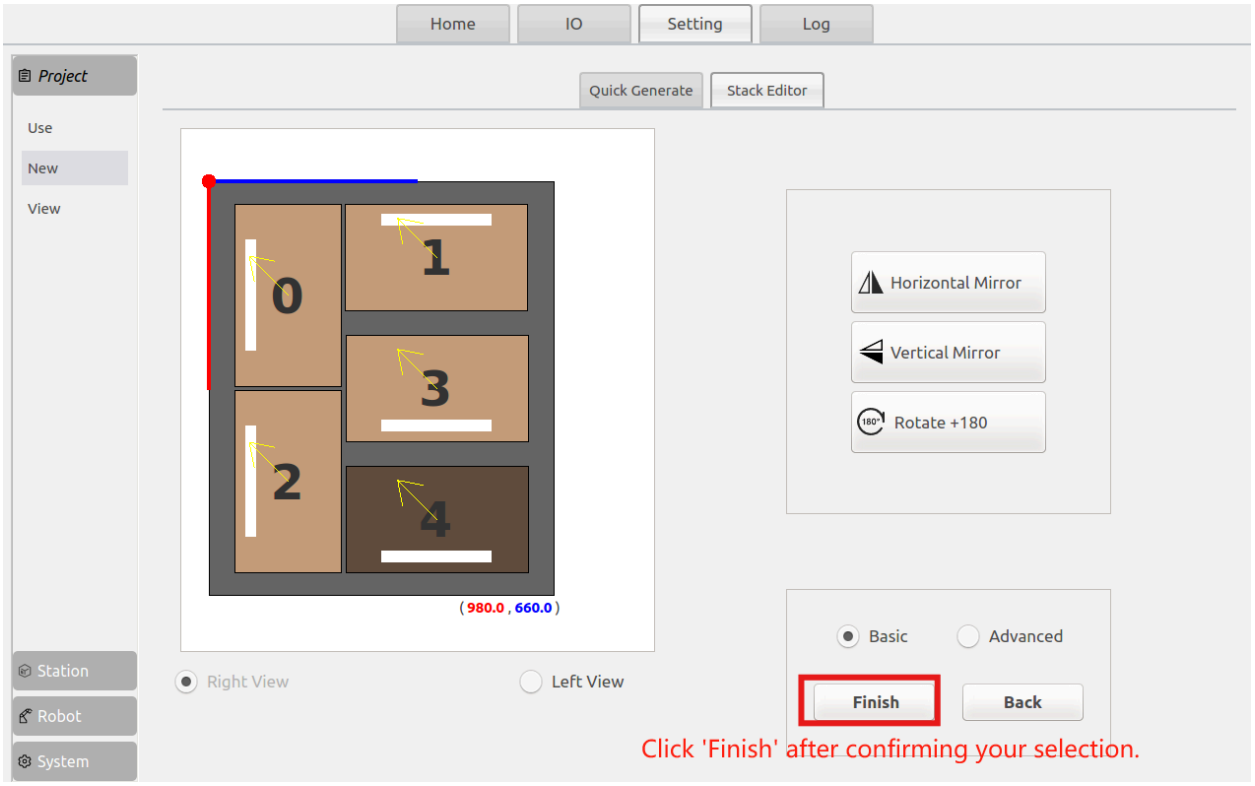
3. Edit Stacking Pattern

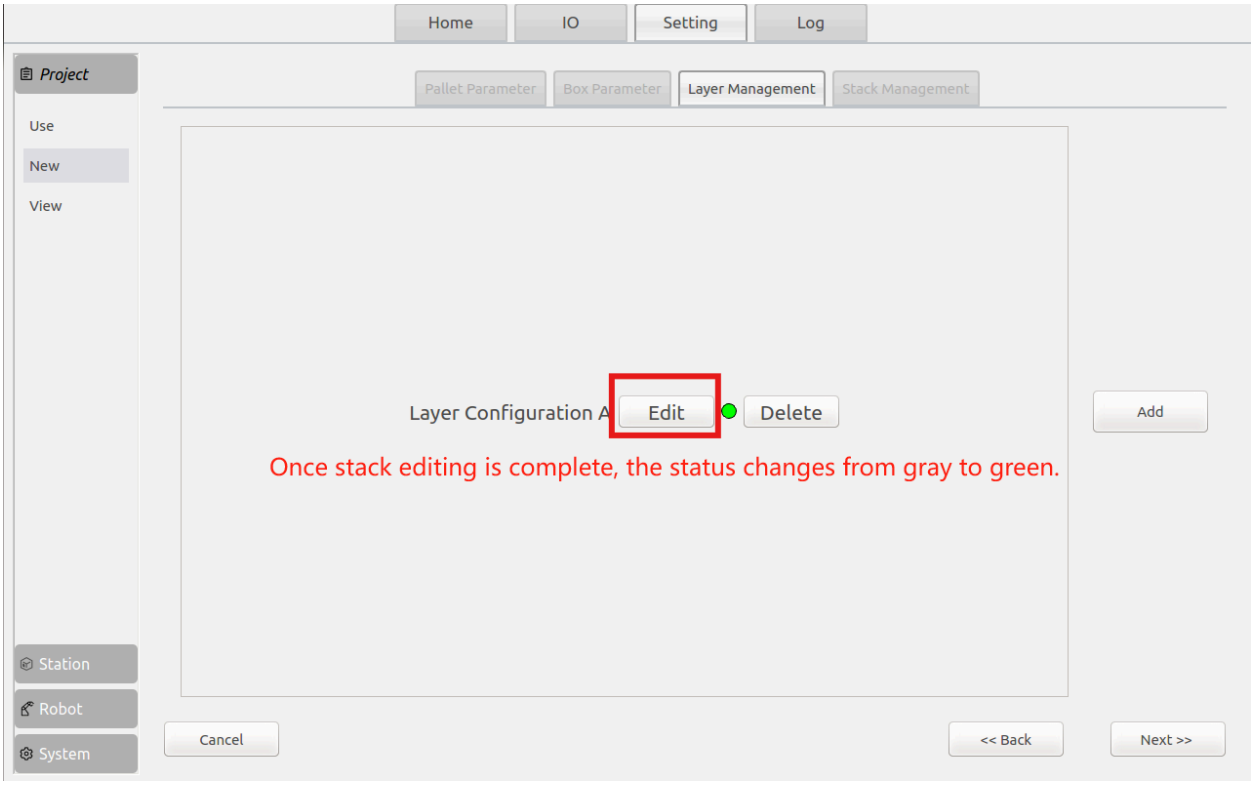




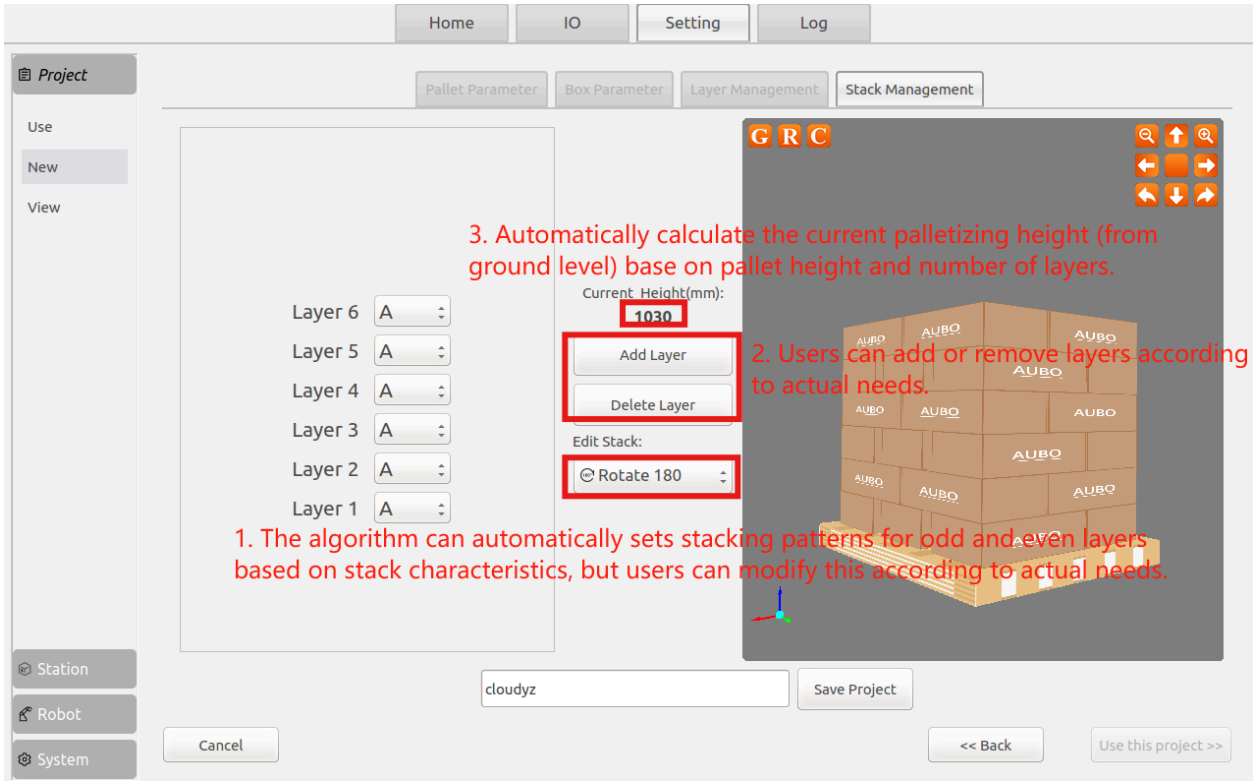
If the required stacking pattern cannot be generated based on pallet and box dimensions, adjust the edge and box spacing and click **Generate** to create additional stacking pattern options.

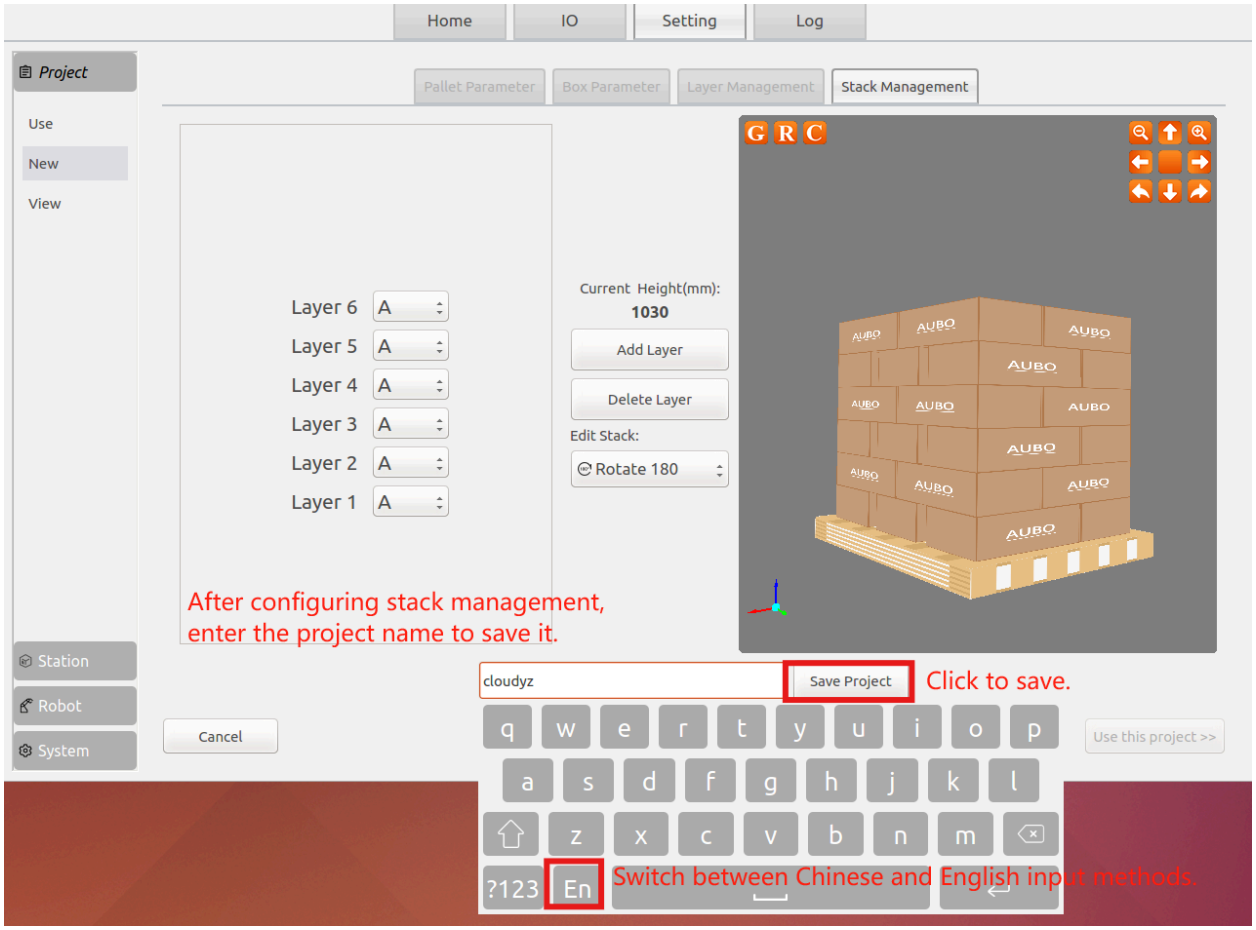



Home
IO
Setting
Log
Project
Use
New
View
Quick Generate
Stack Editor
0
1
2
3
4
(980.0 , 660.0)
Horizontal Mirror
Vertical Mirror
Rotate +180
Basic
Advanced
Finish
Back
Right View
Left View
Station
Robot
System
Click 'Finish' after confirming your selection.

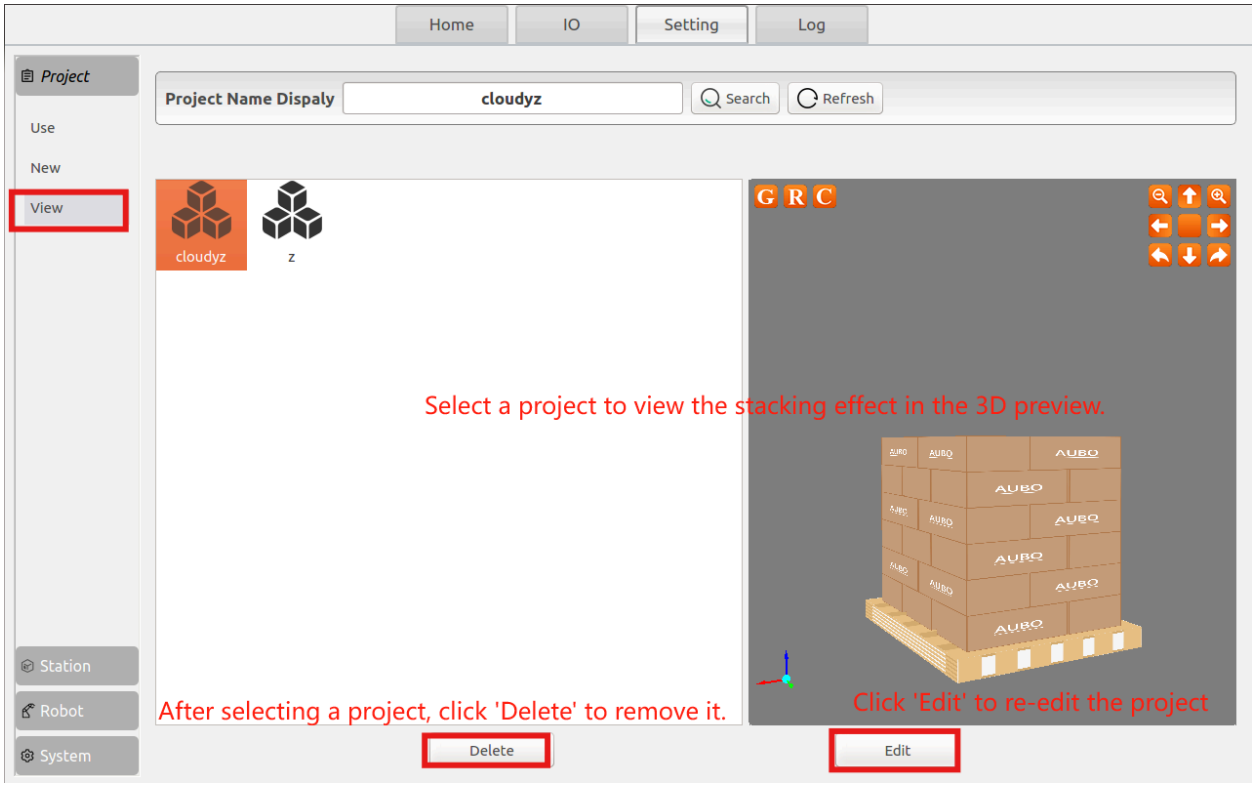

Home
IO
Setting
Log
Project
Use
New
View
Pallet Parameter
Box Parameter
Layer Management
Stack Management
Layer Configuration A
Edit
Delete
Add
Once stack editing is complete, the status changes from gray to green.
Station
Robot
System
Cancel
<< Back
Next >>

4.Layer Configuration



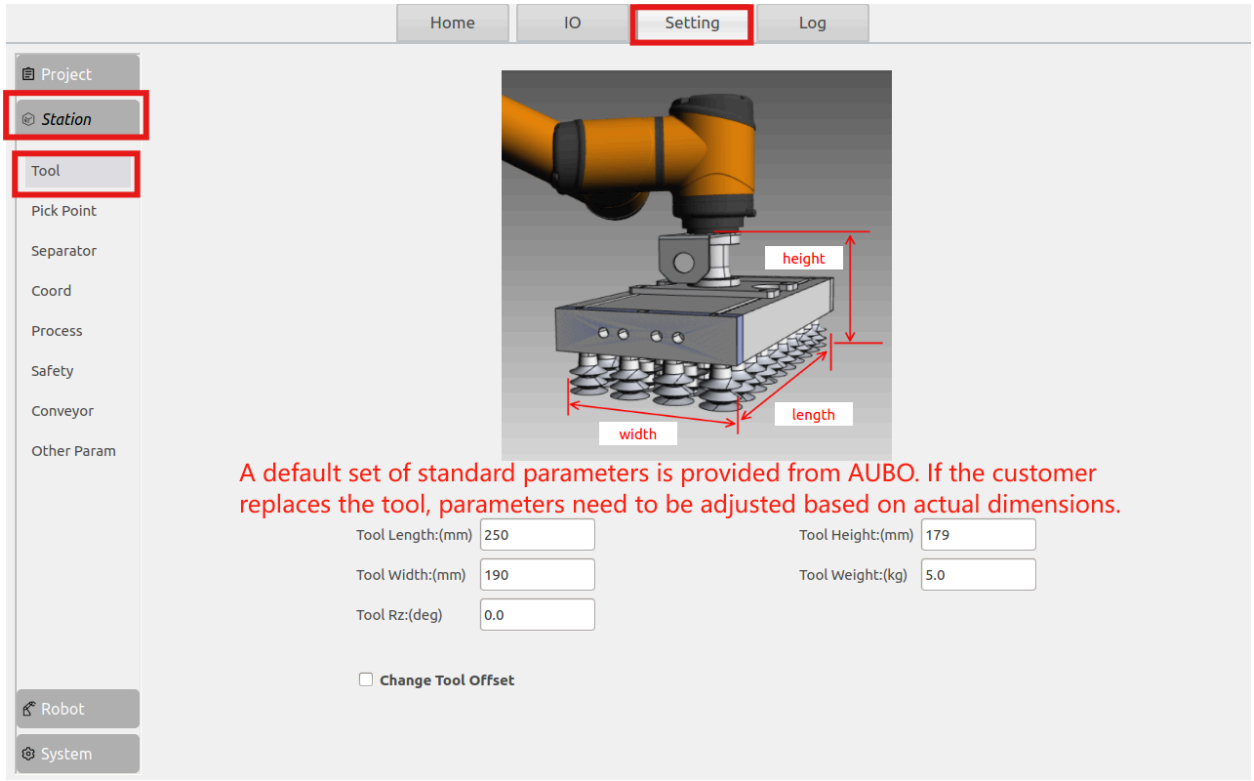

Home
IO
Setting
Log
Project
Use
New
View
Station
Robot
System
Pallet Parameter
Box Parameter
Layer Management
Stack Management
Layer 6 A
Layer 5 A
Layer 4 A
Layer 3 A
Layer 2 A
Layer 1 A
Current Height(mm):
1030
Add Layer
Delete Layer
Edit Stack:
Rotate 180
After configuring stack management, enter the project name to save it.
cloudyz
Save Project
Click to save.
Cancel
Use this project >>
Switch between Chinese and English input methods.

View the project.



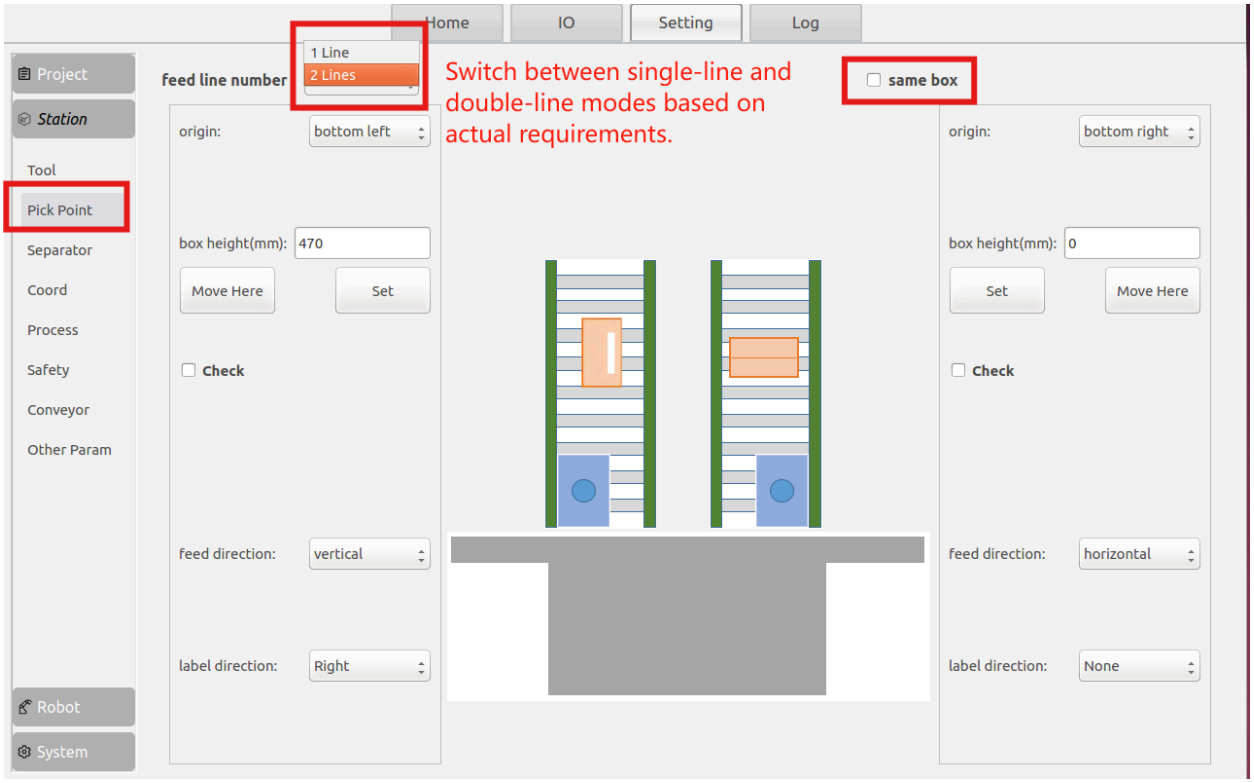
2.3.2 Workstation

2.3.2.1 End Tooling

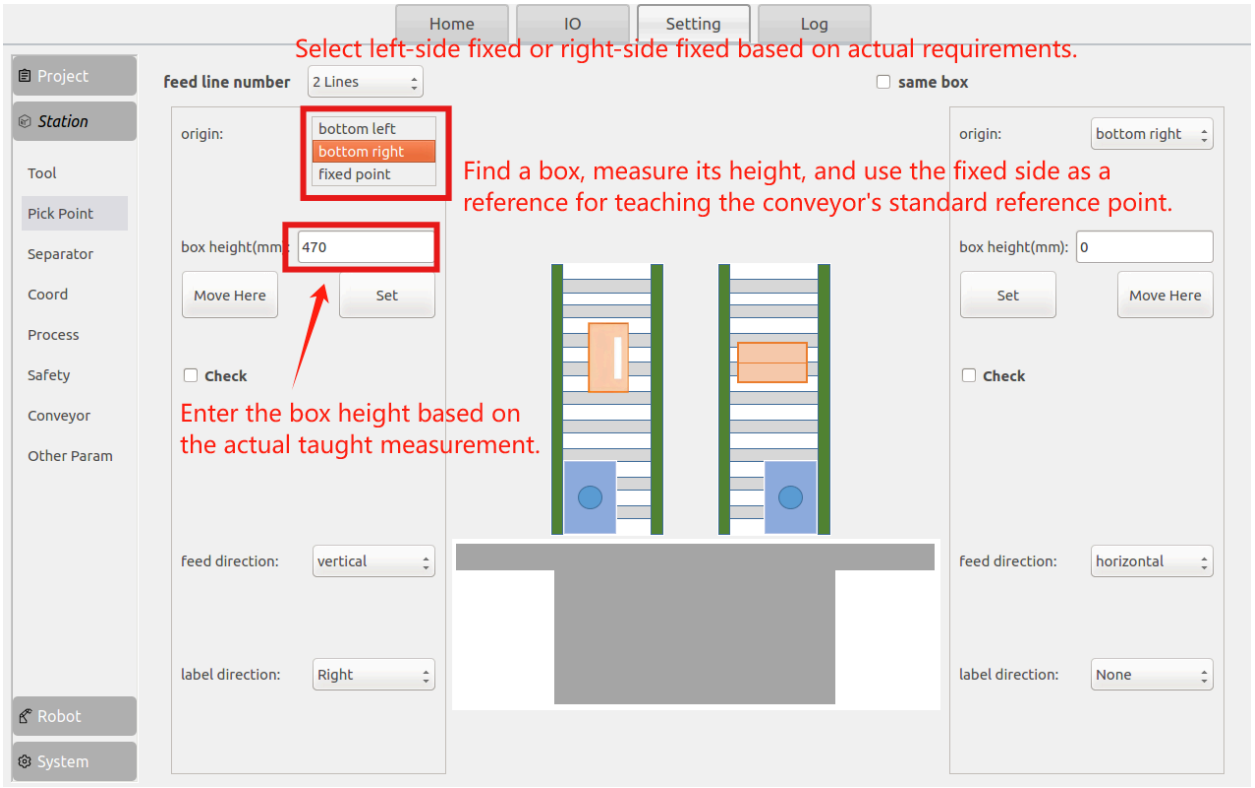


2.3.2.2 Pick-up Point

Select single or double conveyor line feed based on on-site conditions.

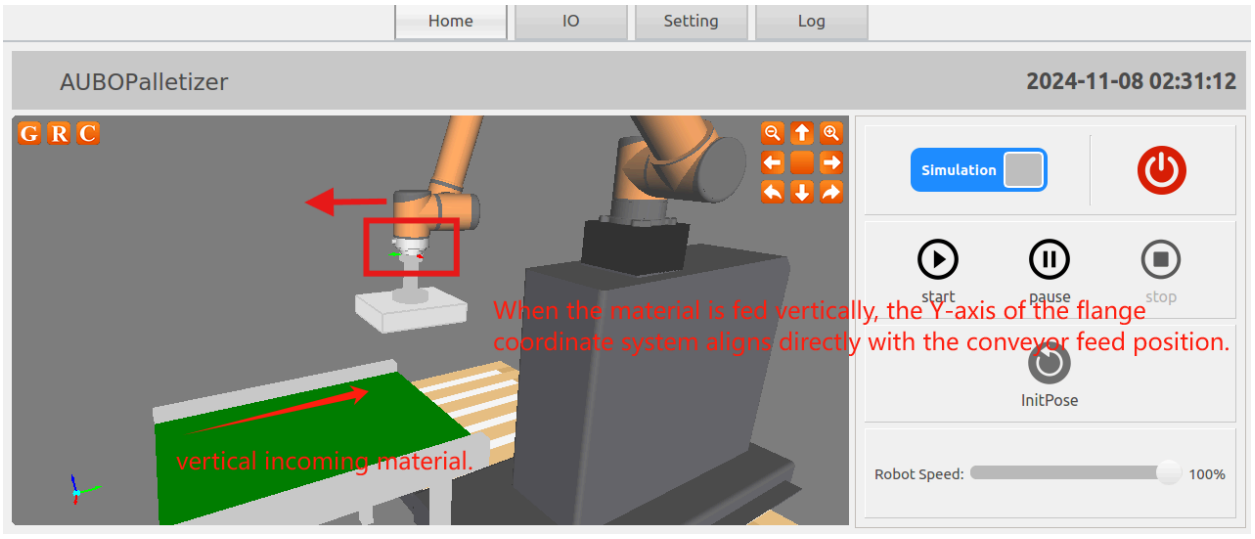


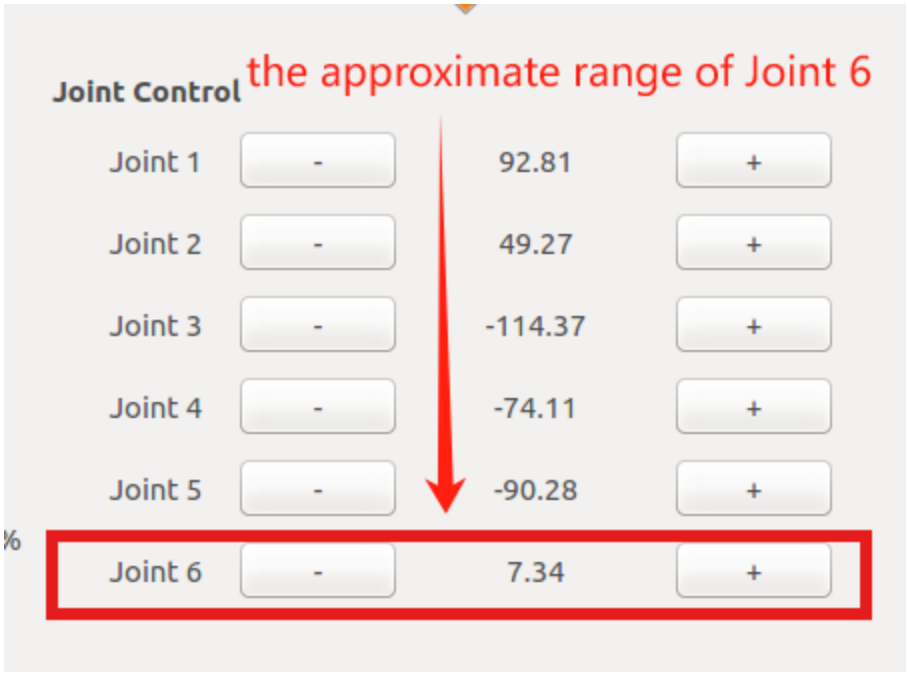
Set the standard position of the pick-up point,



Set the standard position of the pick-up point, with the flange's Y-axis end facing the conveyor (view green arrow direction in simulation).

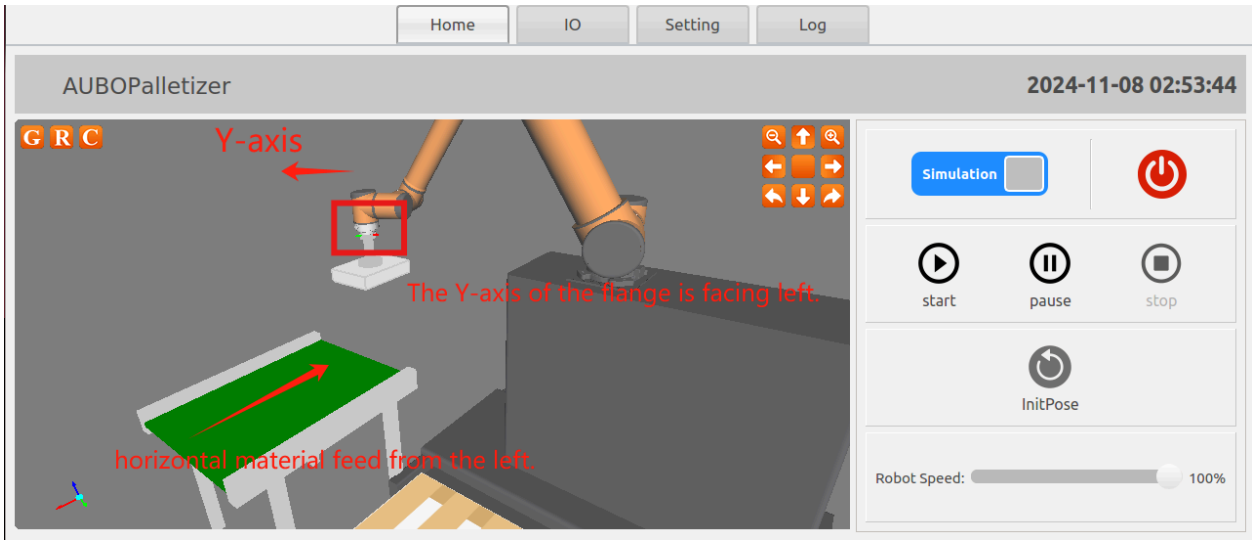
For Vertical Feed:

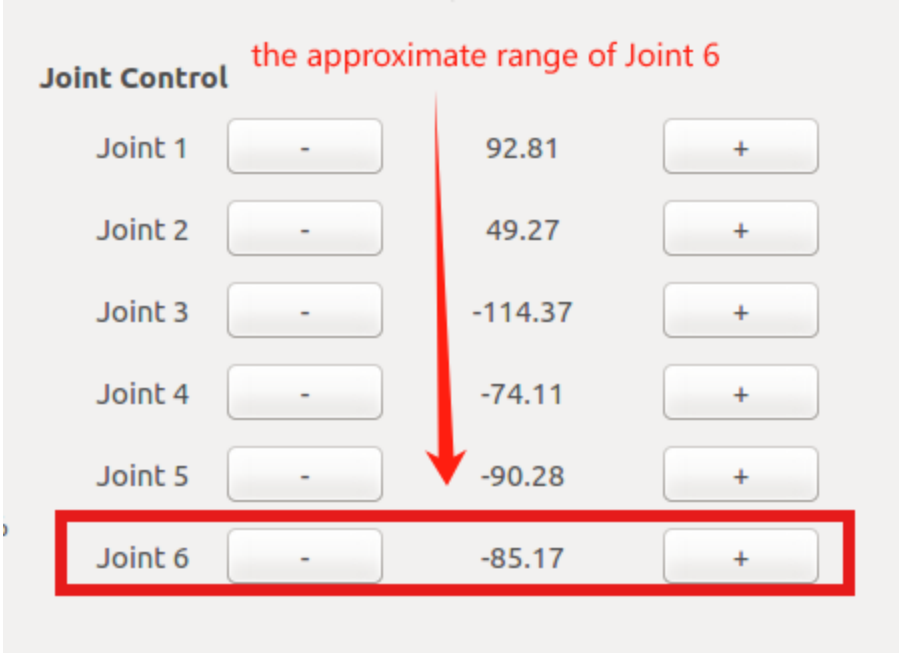




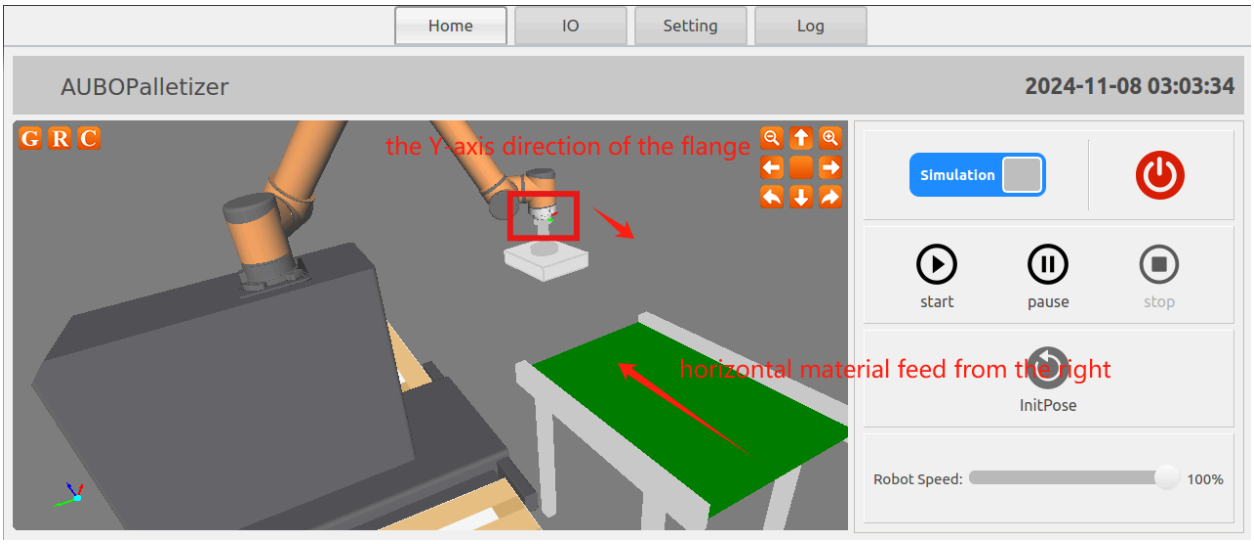
For Horizontal Feed:

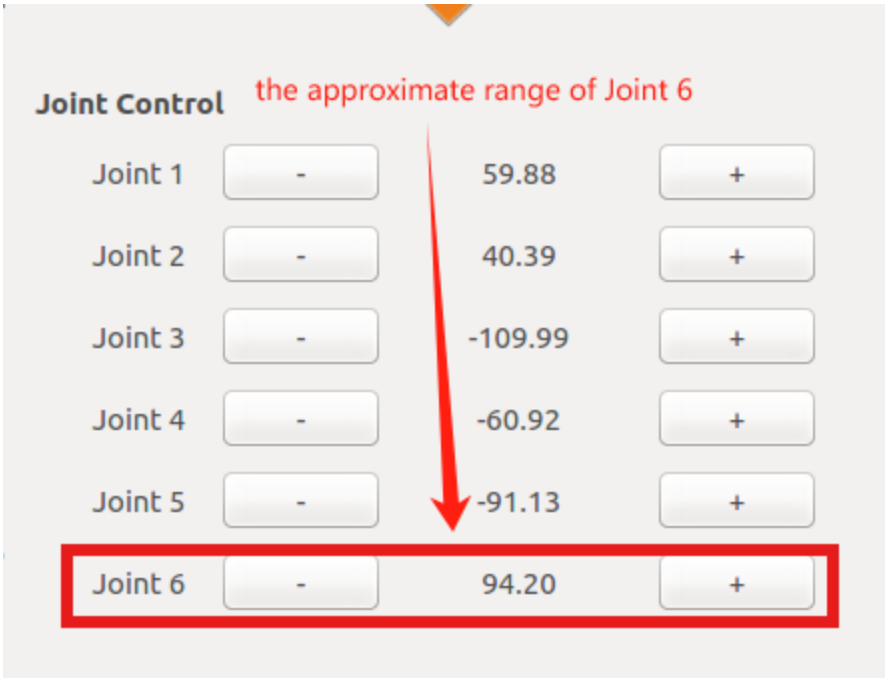
Case 1: Left-side Feed



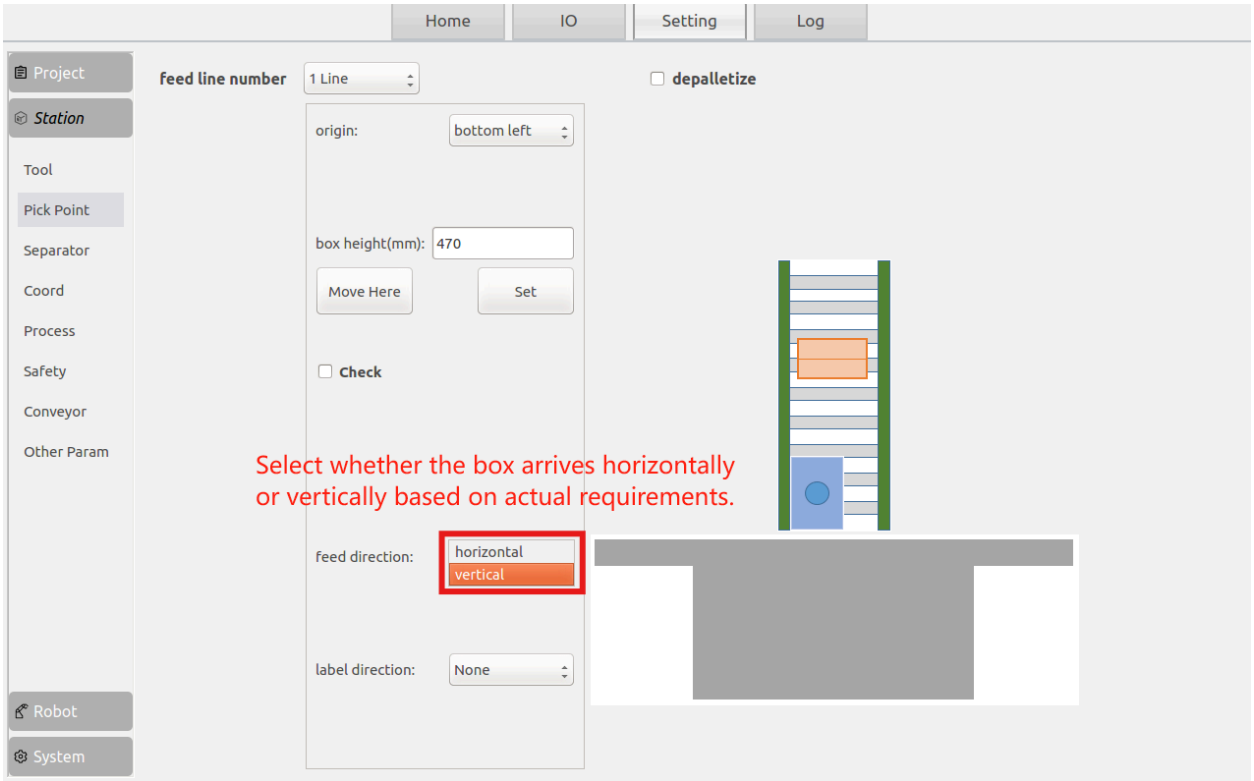


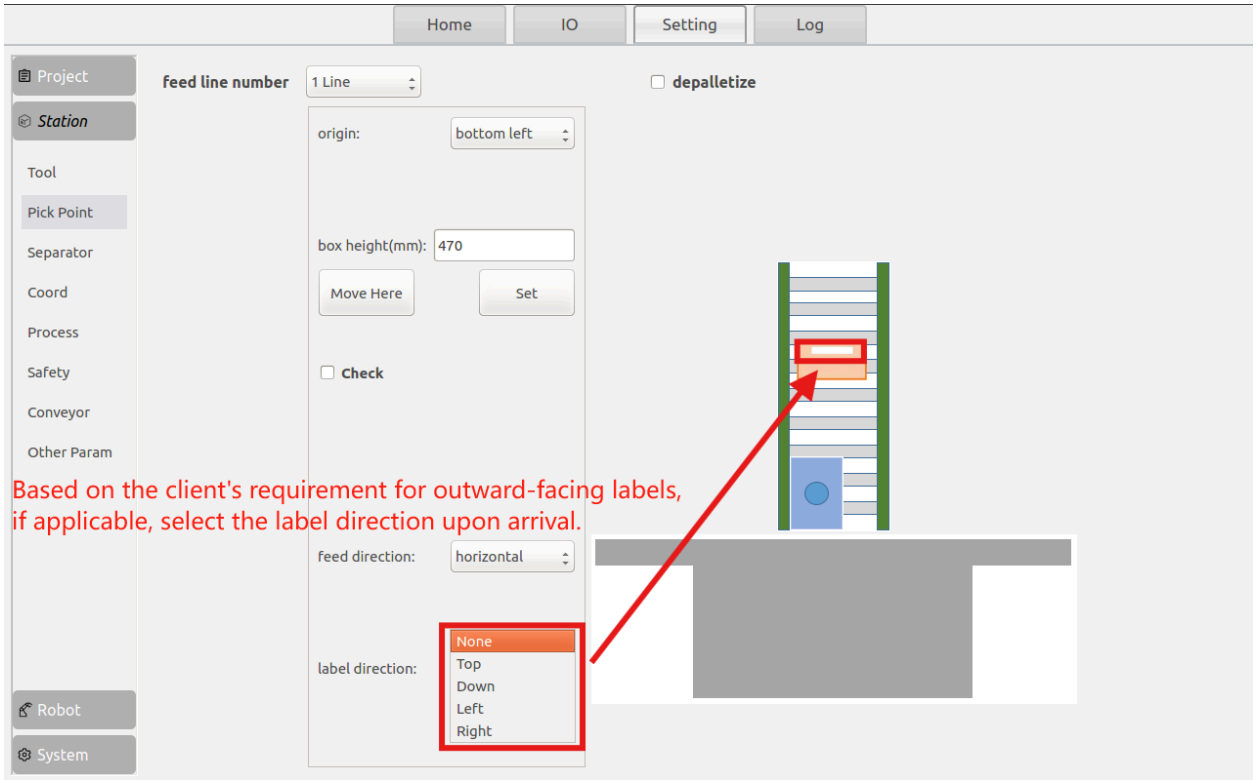
Case 2: Right-side Feed



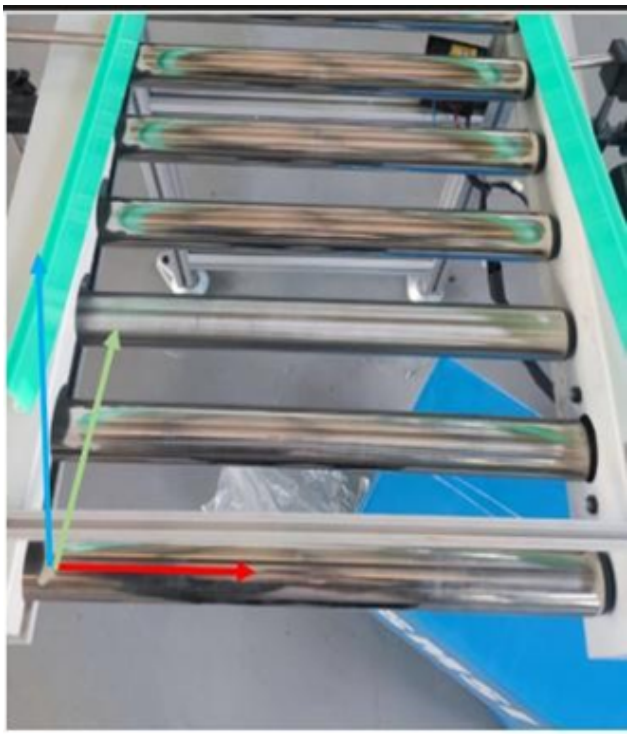


Set the feed method for boxes; choose between horizontal or vertical feed and, if needed, enable label positioning (with consistent outward-facing labels). Adjust the label direction based on actual conditions.



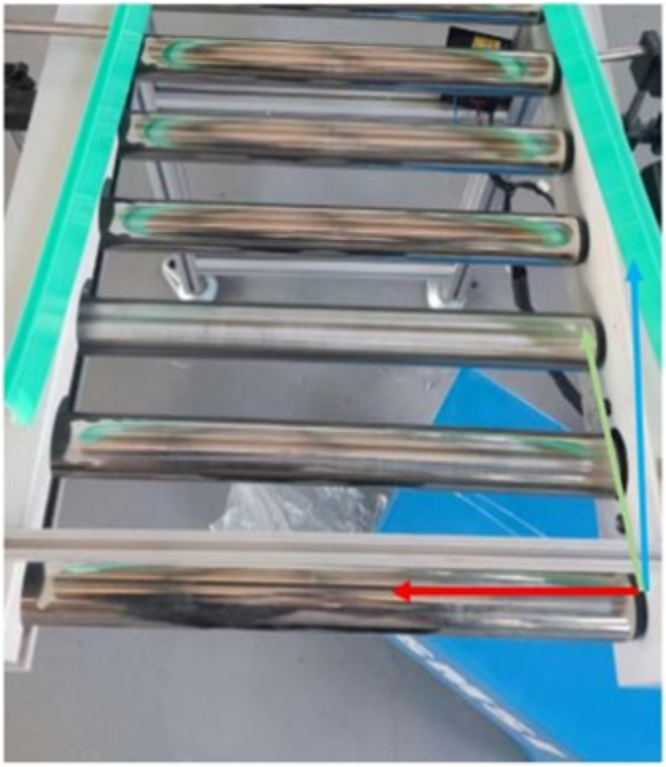

Home
IO
Setting
Log
Project
Station
Tool
Pick Point
Separator
Coord
Process
Safety
Conveyor
Other Param
Robot
System
feed line number
1 Line
depalletize
origin:
bottom left
box height(mm):
470
Move Here
Set
Check
feed direction:
horizontal
label direction:
None
Top
Down
Left
Right
Based on the client's requirement for outward-facing labels,
if applicable, select the label direction upon arrival.

Depalletizing Function: Currently supports single-line depalletizing. The teaching method is consistent with palletizing, requiring the Depalletize option to be selected and input of horizontal, vertical, and height offset values.



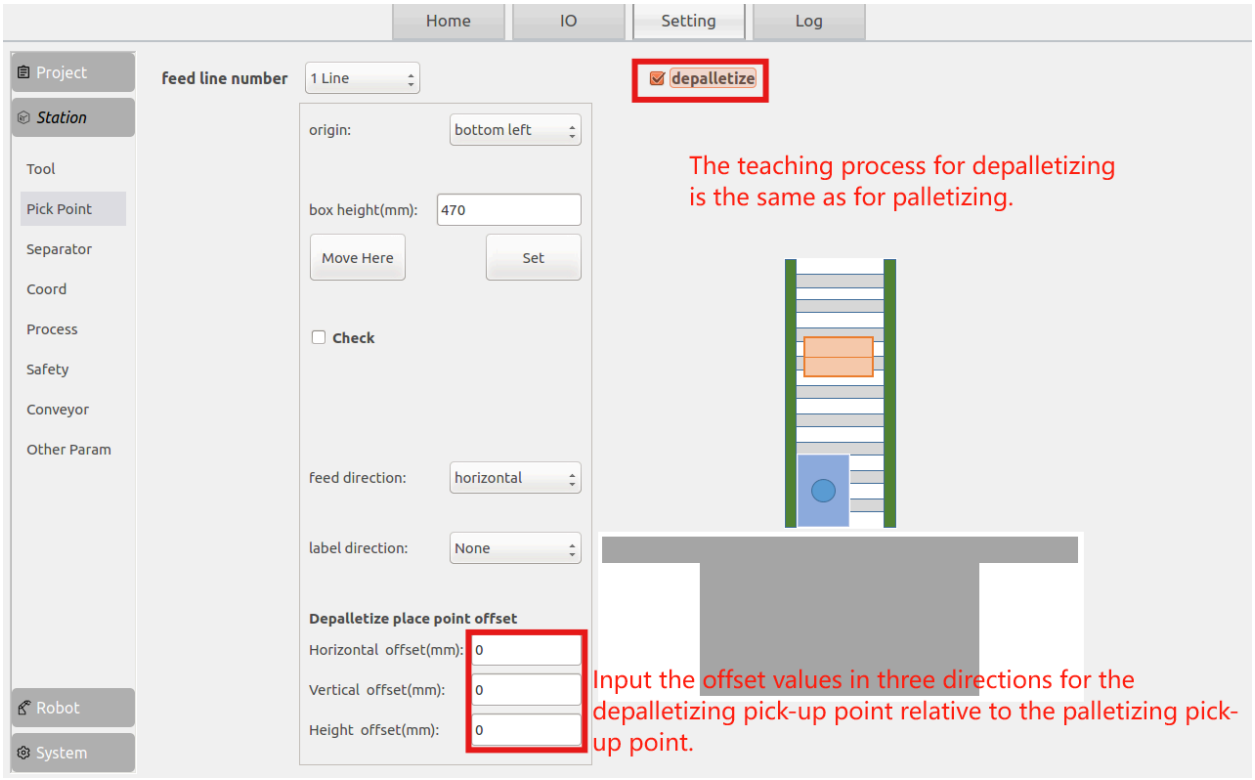
According to the above Example: When the origin point is set to the lower-left corner:

- **Horizontal direction:** Positive values correspond to the red arrow direction; negative values are the opposite.
- **Vertical direction:** Positive values correspond to the green arrow direction; negative values are the opposite.
- **Height direction:** Positive values correspond to the blue arrow direction; negative values are the opposite.



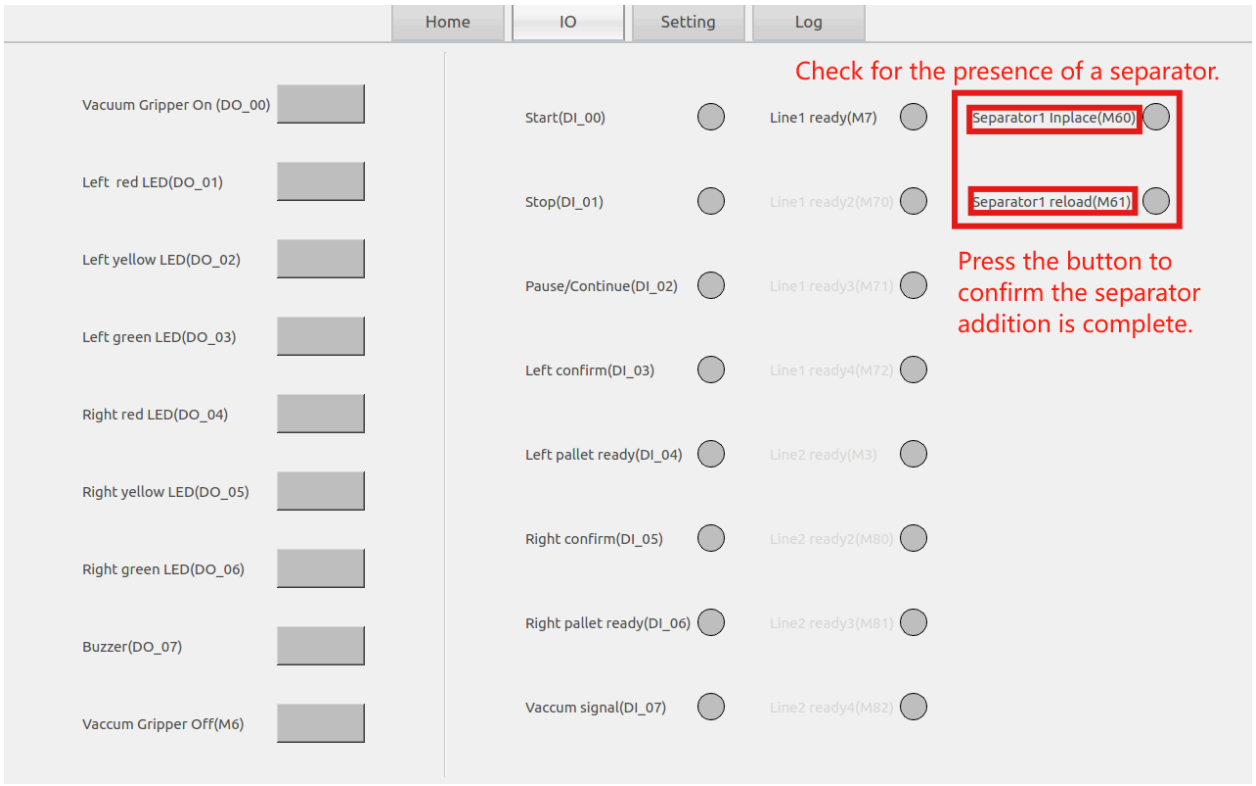
According to the above Example: When the origin point is set to the lower-right corner:

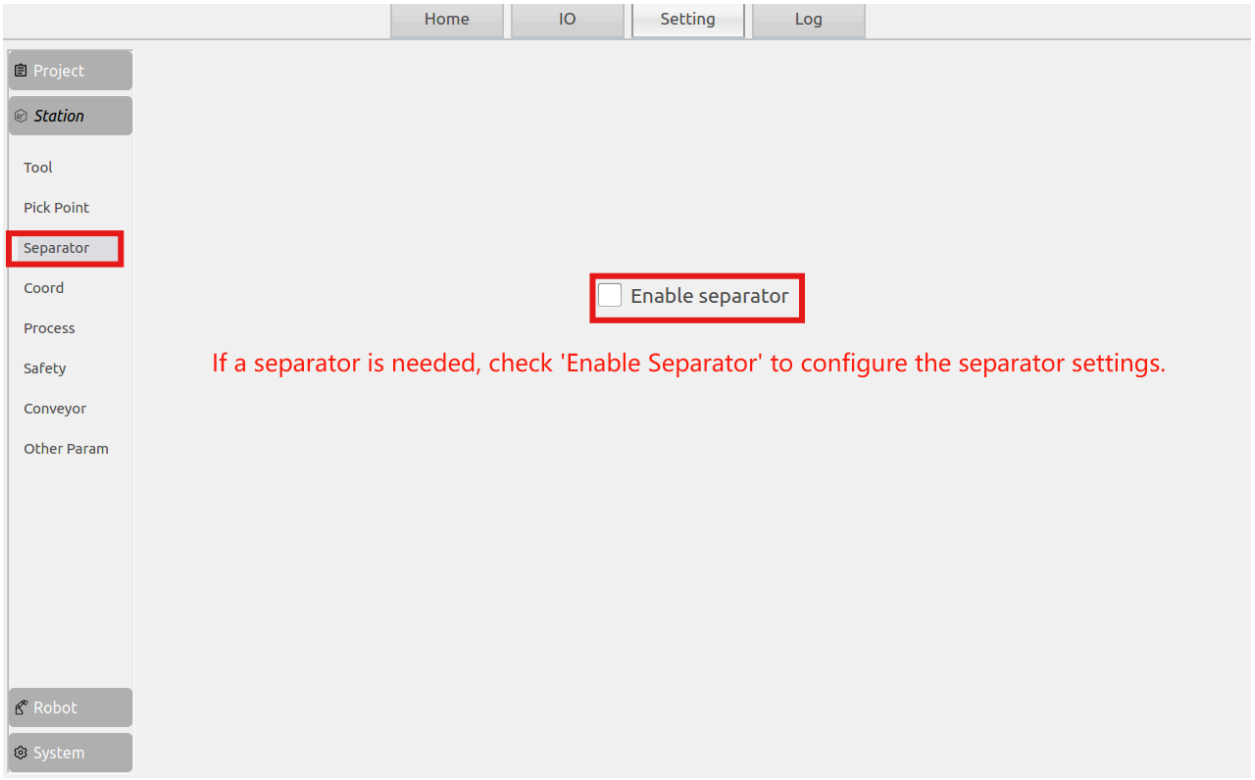
- **Horizontal direction:** Positive values correspond to the red arrow direction; negative values are the opposite.
- **Vertical direction:** Positive values correspond to the green arrow direction; negative values are the opposite.
- **Height direction:** Positive values correspond to the blue arrow direction; negative values are the opposite.

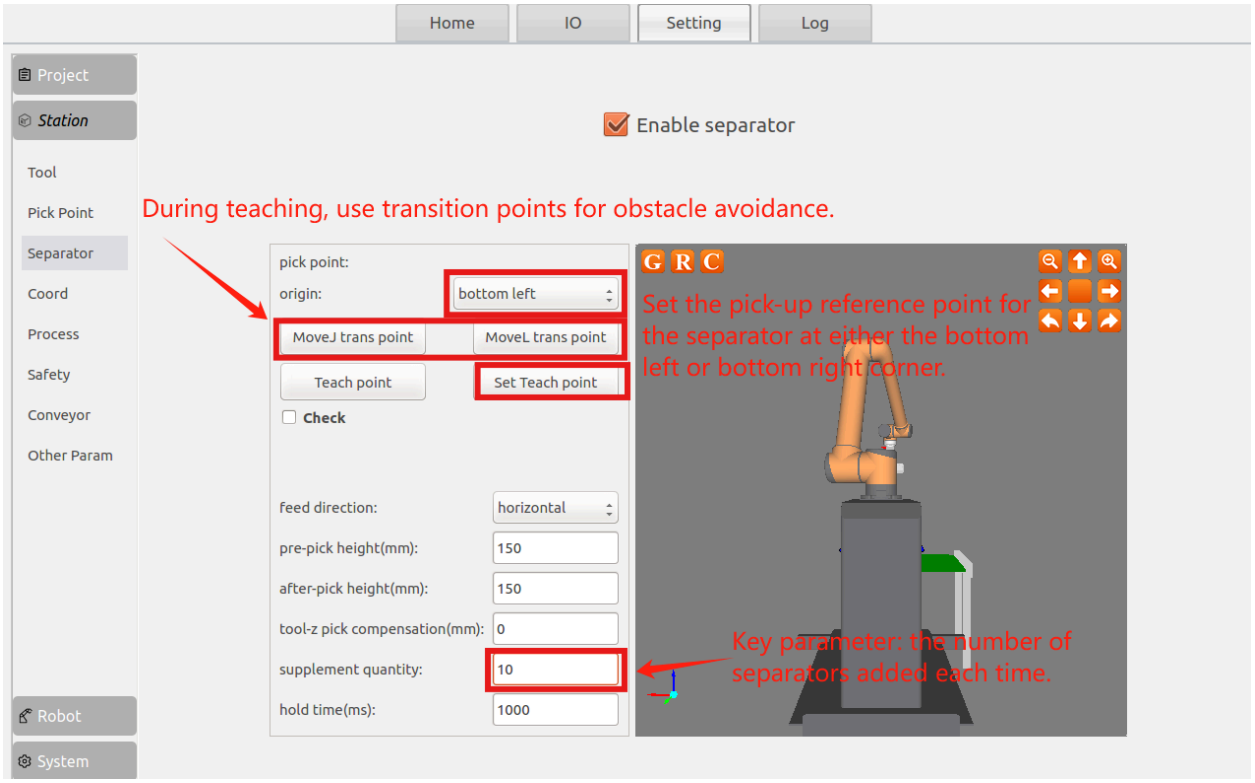

Home
IO
Setting
Log
Project
Station
Tool
Pick Point
Separator
Coord
Process
Safety
Conveyor
Other Param
Robot
System
feed line number
1 Line
depalletize
origin:
bottom left
box height(mm):
470
Move Here
Set
Check
feed direction:
horizontal
label direction:
None
Depalletize place point offset
Horizontal offset(mm):
0
Vertical offset(mm):
0
Height offset(mm):
0
The teaching process for depalletizing is the same as for palletizing.
Input the offset values in three directions for the depalletizing pick-up point relative to the palletizing pick-up point.

2.3.2.3 Separator

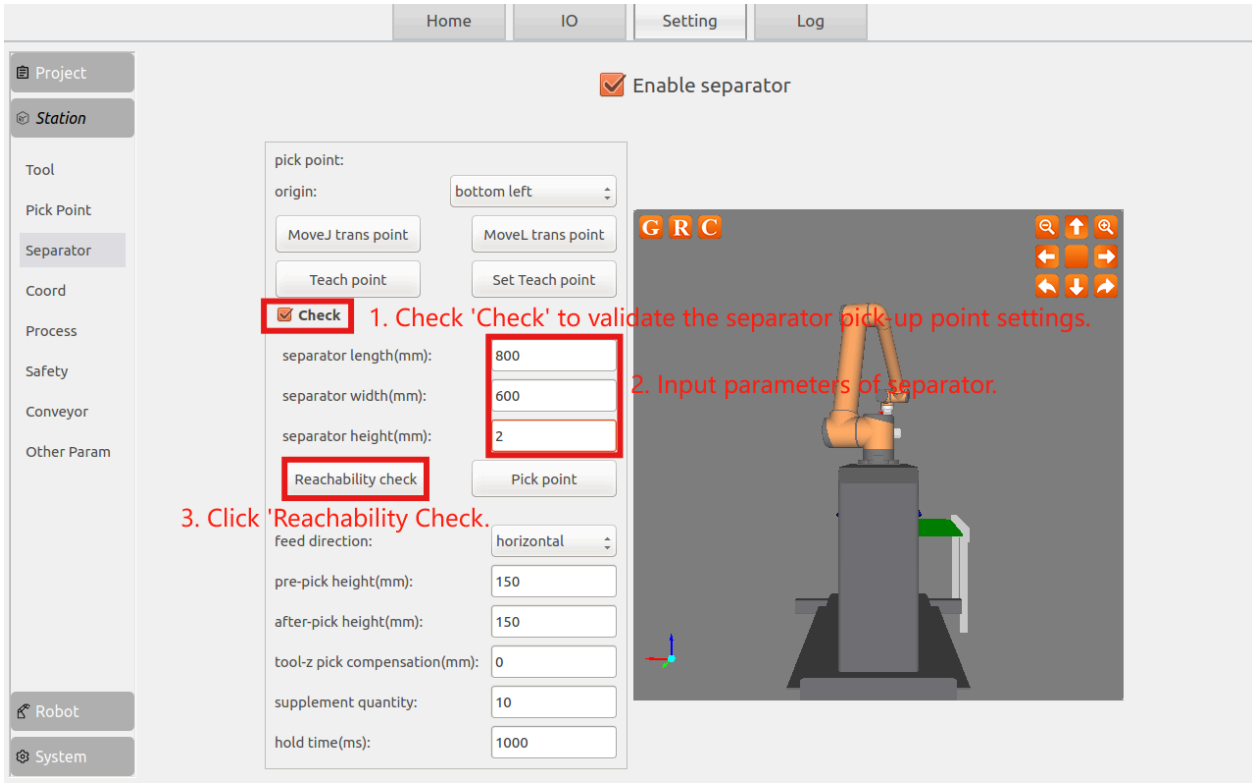
The separator tooling requires connection to the designated reserved interface(IO).

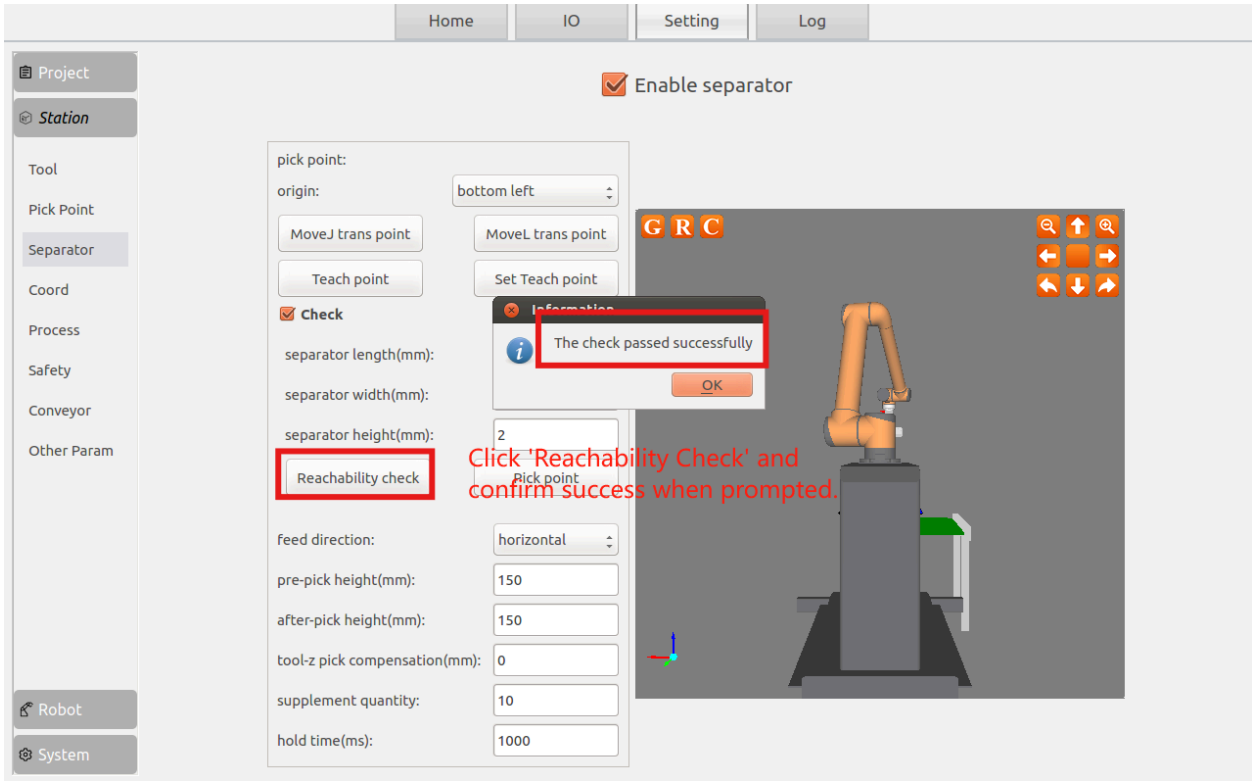



Home
IO
Setting
Log
Project
Station
Tool
Pick Point
Separator
Coord
Process
Safety
Conveyor
Other Param
Robot
System
Enable separator
If a separator is needed, check 'Enable Separator' to configure the separator settings.

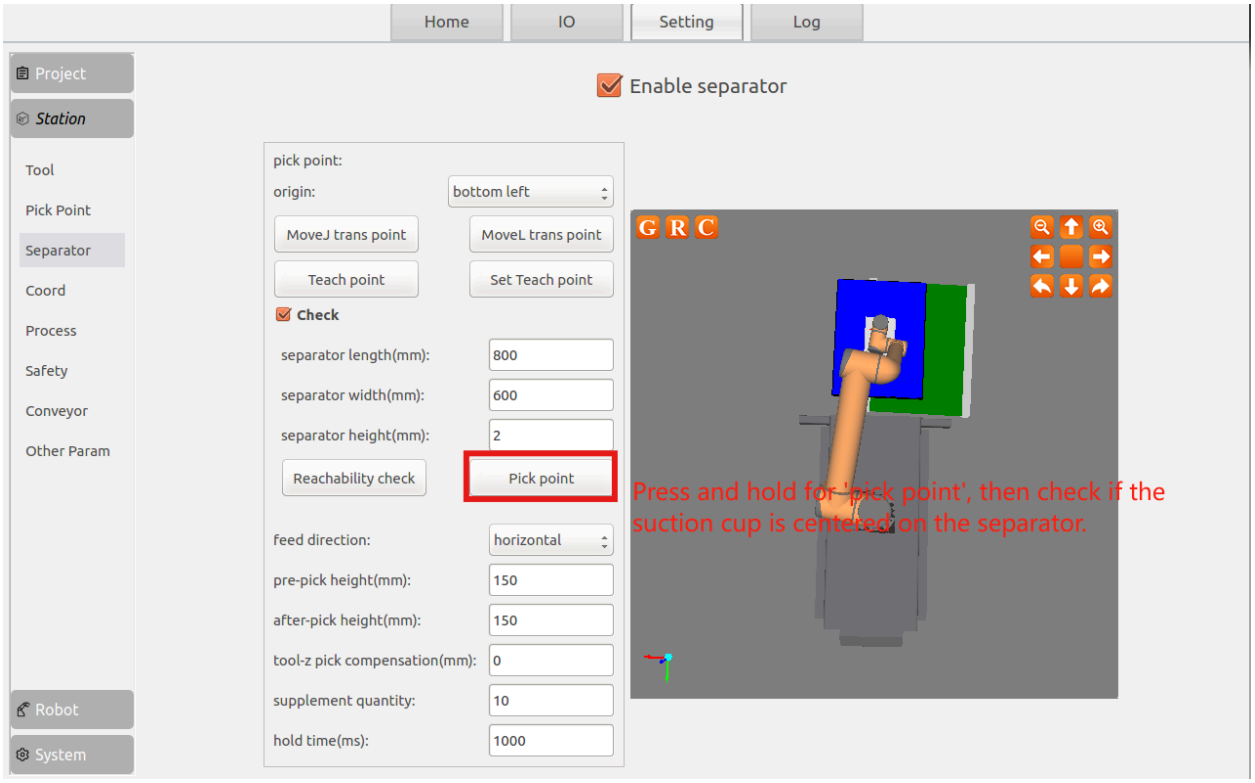

Home
IO
Setting
Log
Project
Station
Tool
Pick Point
Separator
Coord
Process
Safety
Conveyor
Other Param
Robot
System
Enable separator
During teaching, use transition points for obstacle avoidance.
pick point:
origin:
bottom left
MoveJ trans point
MoveL trans point
Teach point
Set Teach point
Check
feed direction:
horizontal
pre-pick height(mm):
150
after-pick height(mm):
150
tool-z pick compensation(mm):
0
supplement quantity:
10
hold time(ms):
1000
Set the pick-up reference point for the separator at either the bottom left or bottom right corner.
Key parameter: the number of separators added each time.

Pick-up Point Setting Verification

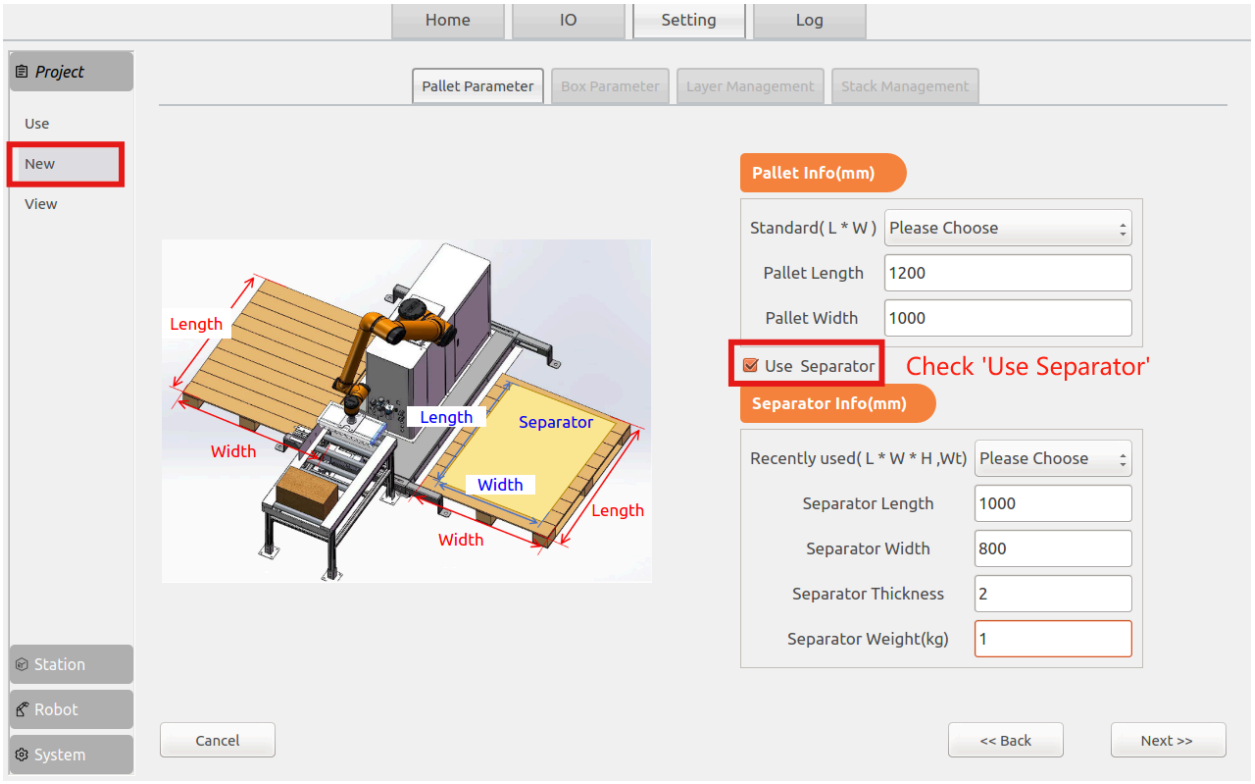


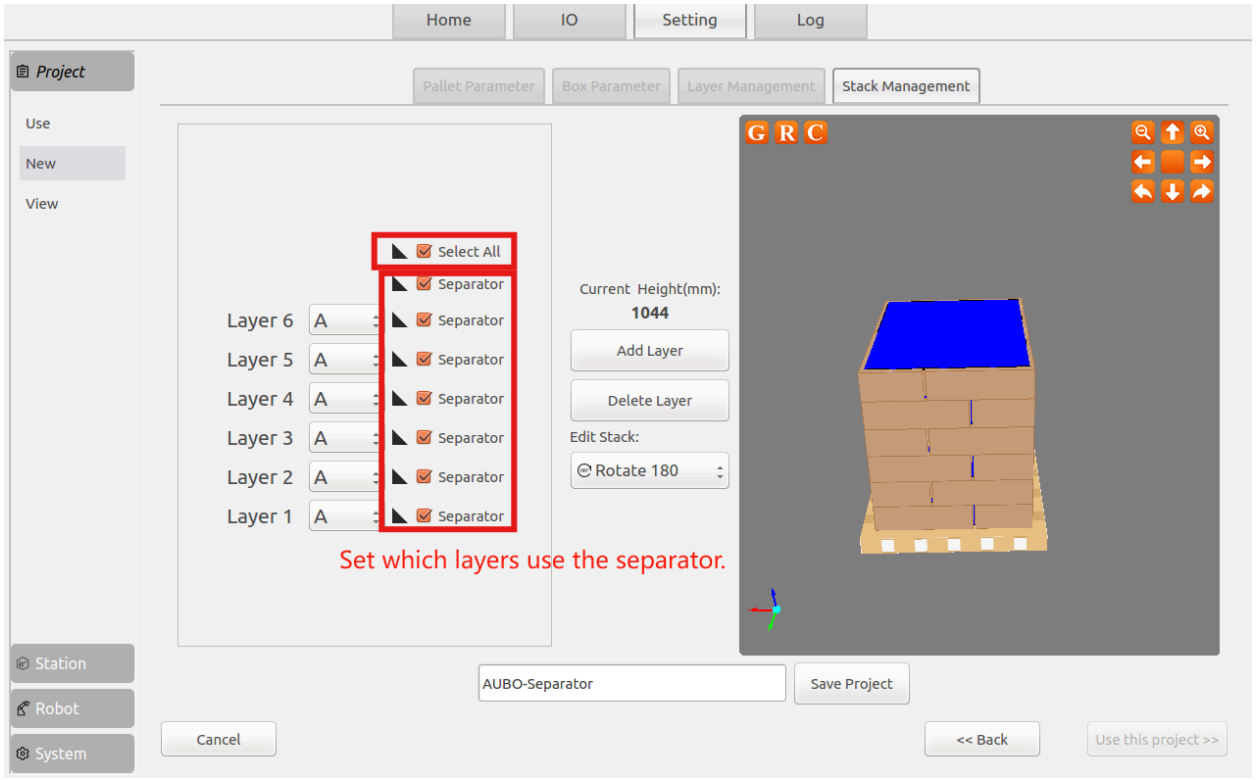


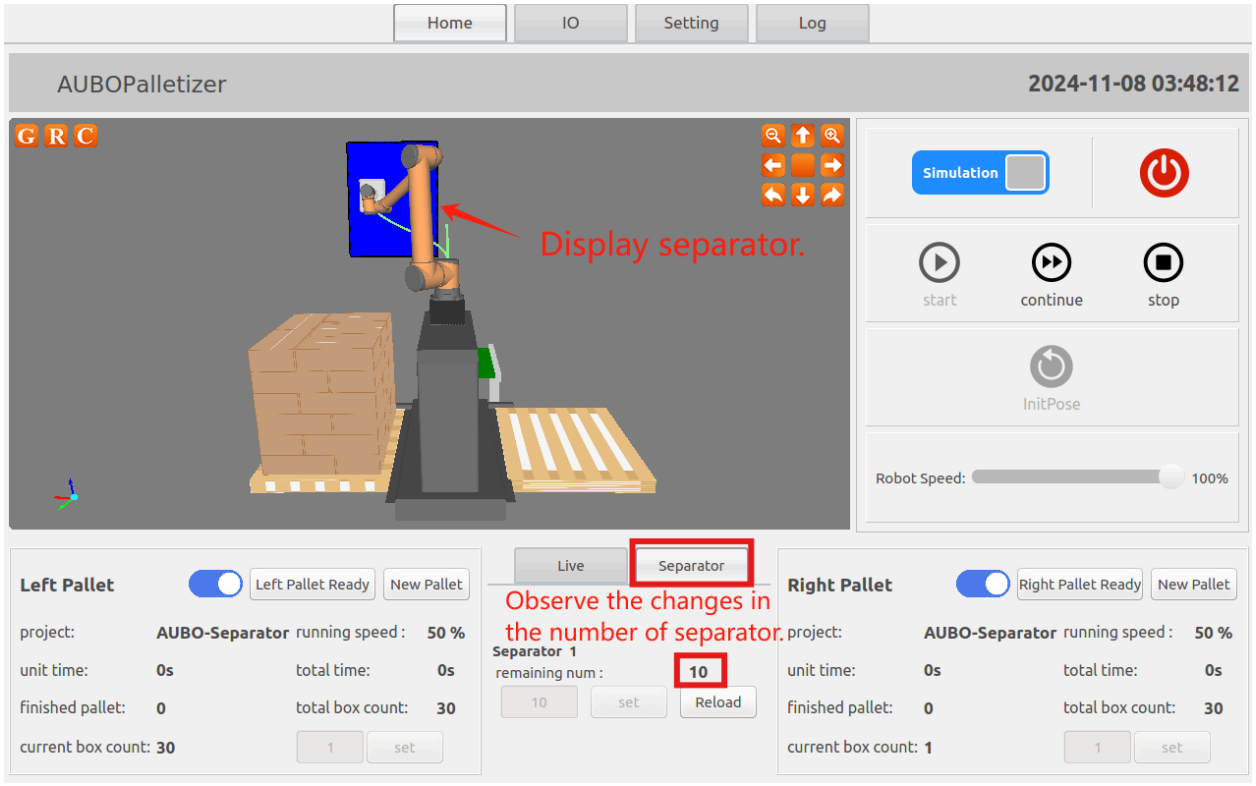
Press and hold 'Pick Point' to verify that the suction cup is centered over the separator.



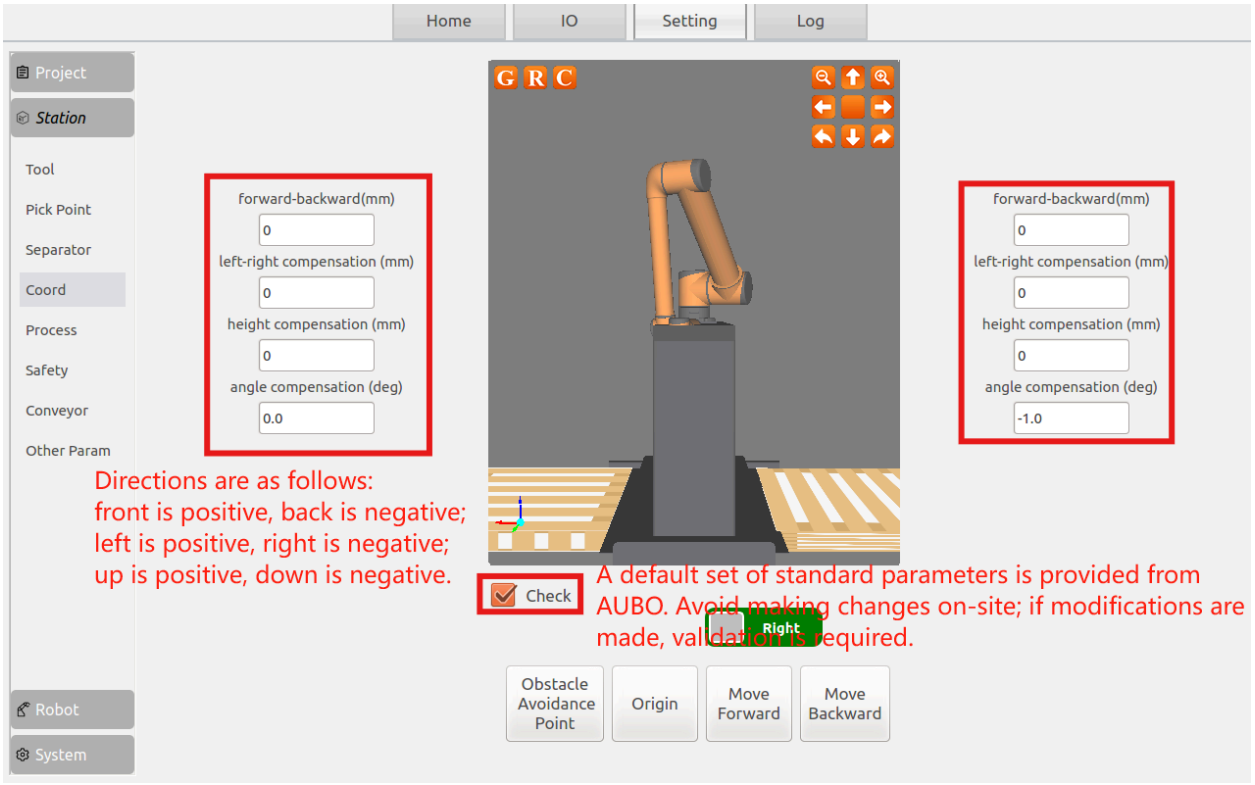
To use a separator in the project, fill in separator-related parameters in the pallet dimensions and stacking pattern management.



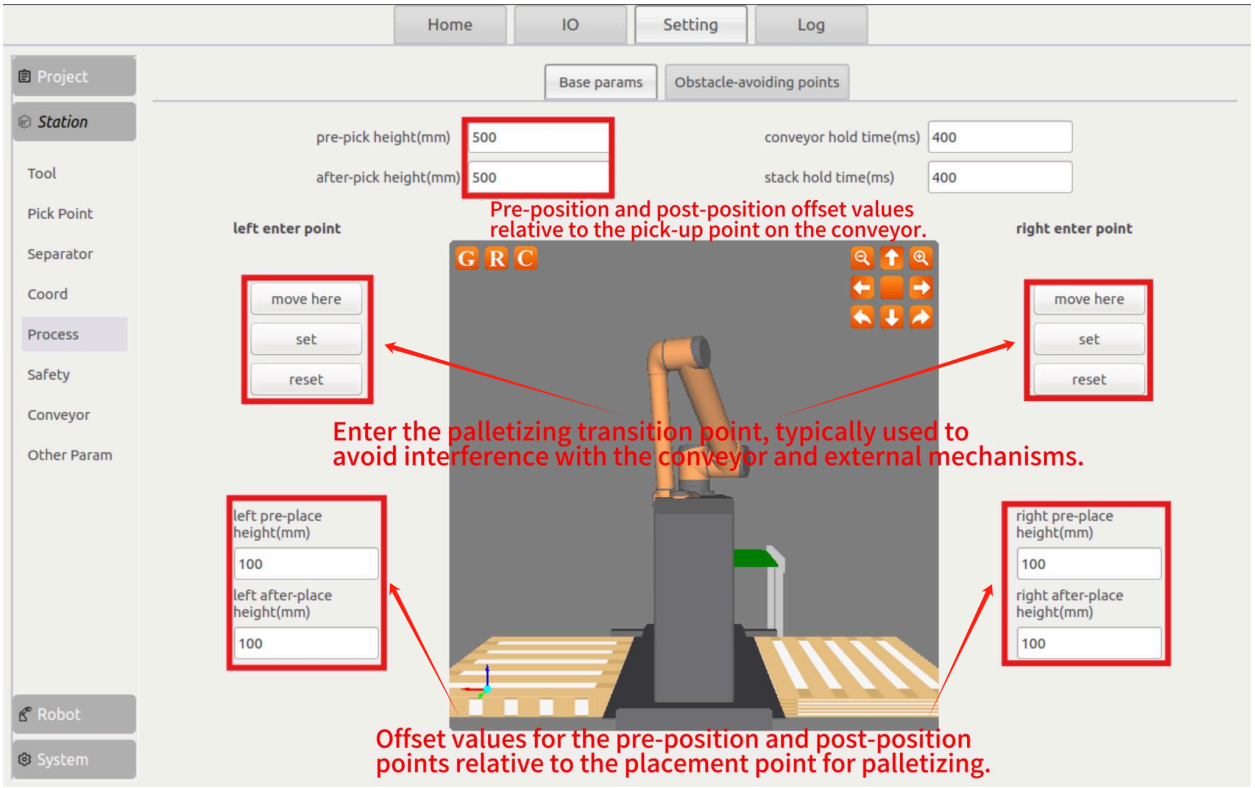

Home
IO
Setting
Log
Project
Use
New
View
Pallet Parameter
Box Parameter
Layer Management
Stack Management
Select All
Separator
Layer 6
Layer 5
Layer 4
Layer 3
Layer 2
Layer 1
A
Current Height(mm):
1044
Add Layer
Delete Layer
Edit Stack:
Rotate 180
Set which layers use the separator.
Station
Robot
System
AUBO-Separator
Save Project
Cancel
<< Back
Use this project >>


Home
IO
Setting
Log
AUBOPalletizer
2024-11-08 03:48:12
Display separator.
Simulation
start
continue
stop
InitPose
Robot Speed:
100%
Left Pallet
Left Pallet Ready
New Pallet
project:
AUBO-Separator
running speed :
50 %
unit time:
0s
total time:
0s
finished pallet:
0
total box count:
30
current box count:
30
set
Live
Separator
Observe the changes in the number of separator.
Separator 1
remaining num :
10
Reload
Right Pallet
Right Pallet Ready
New Pallet
project:
AUBO-Separator
running speed :
50 %
unit time:
0s
total time:
0s
finished pallet:
0
total box count:
30
current box count:
1
set

2.3.2.4 Pallet Coordinate System

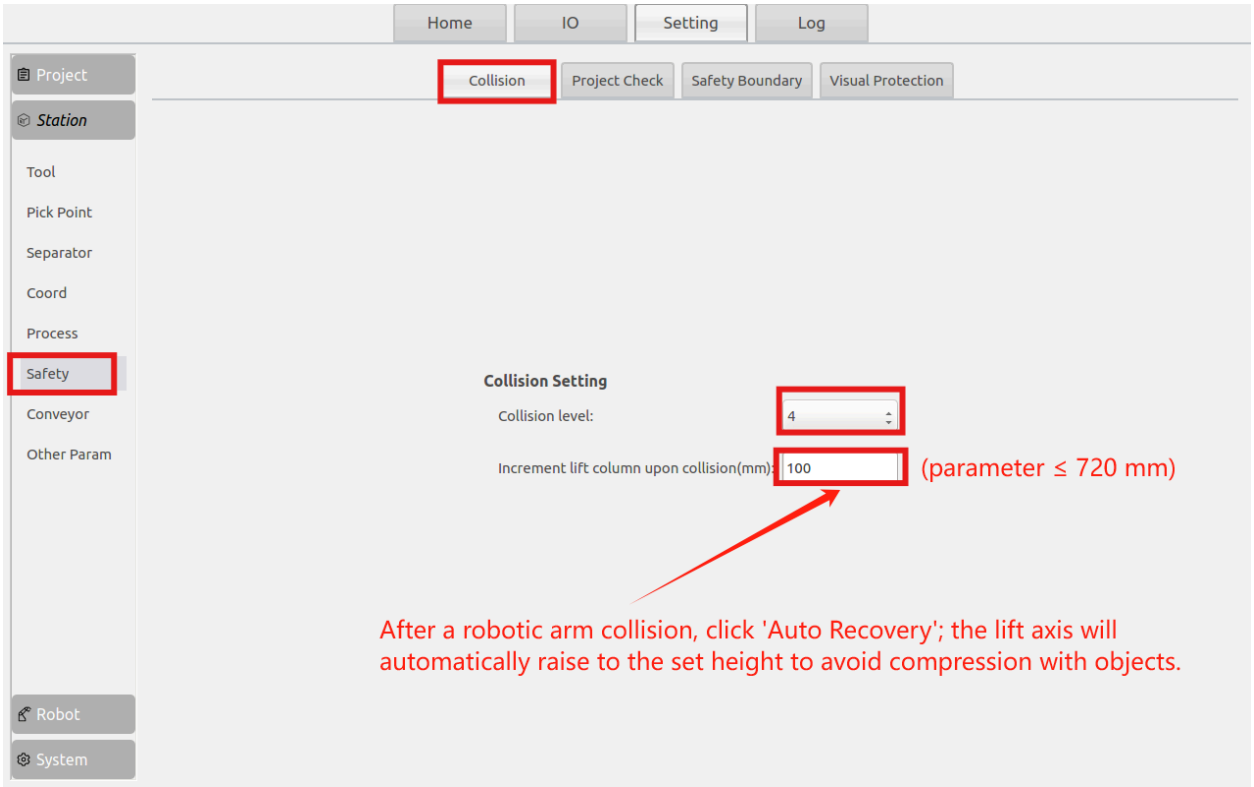


2.3.2.5 **Process Parameters** (a set of standard parameters is provided by default)

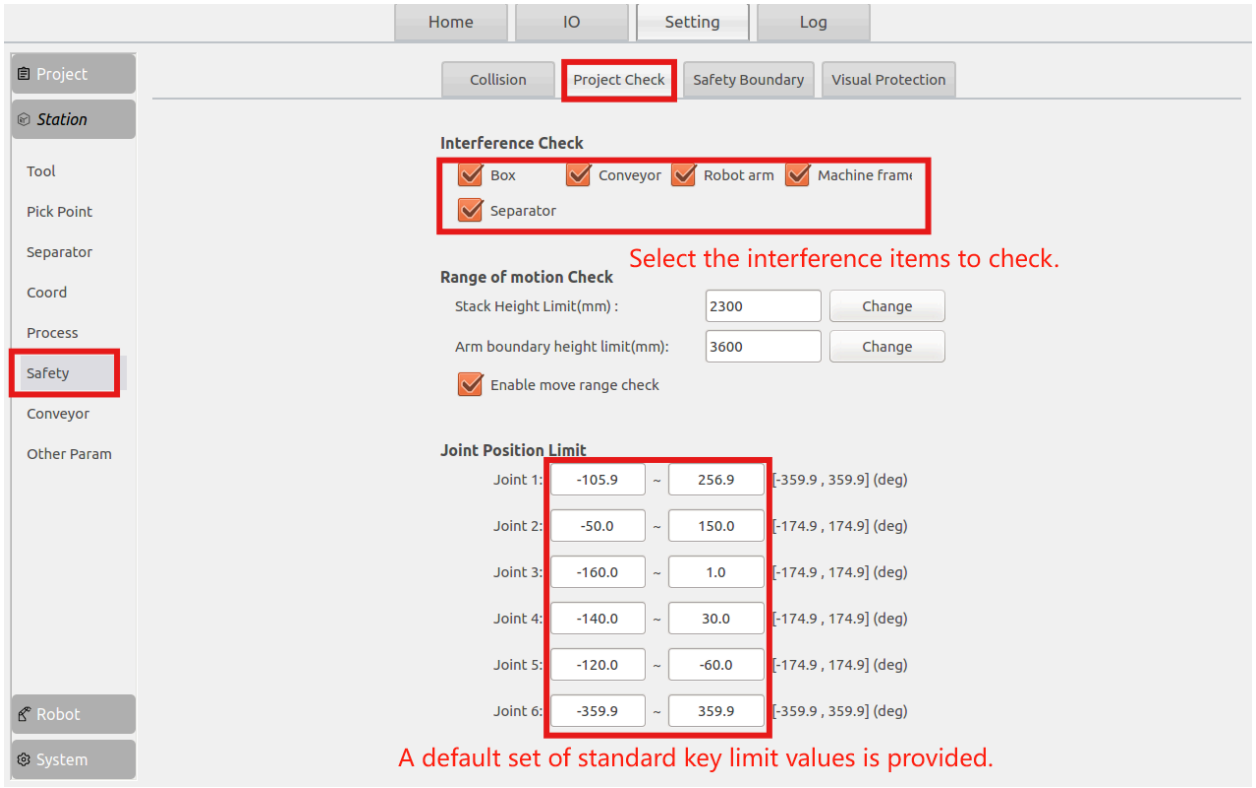


2.3.2.6 Safety Parameters

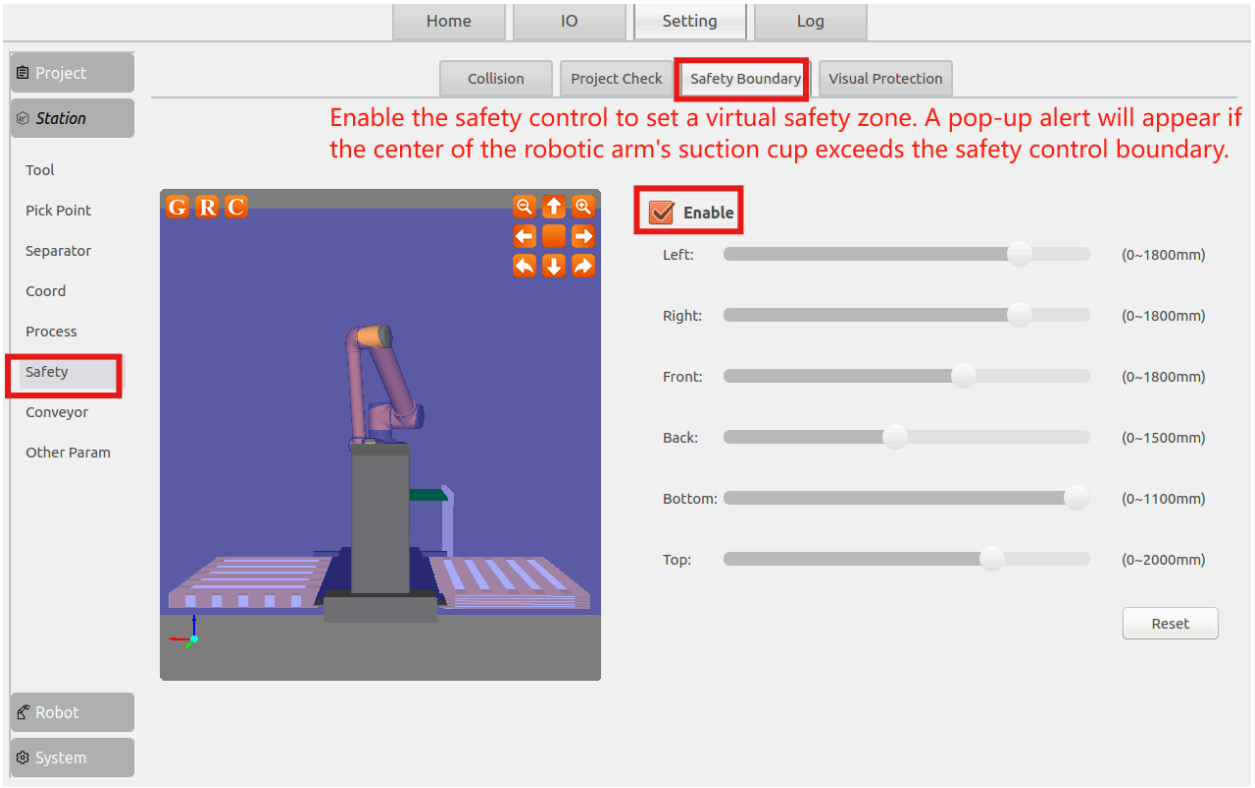
Collision Parameters



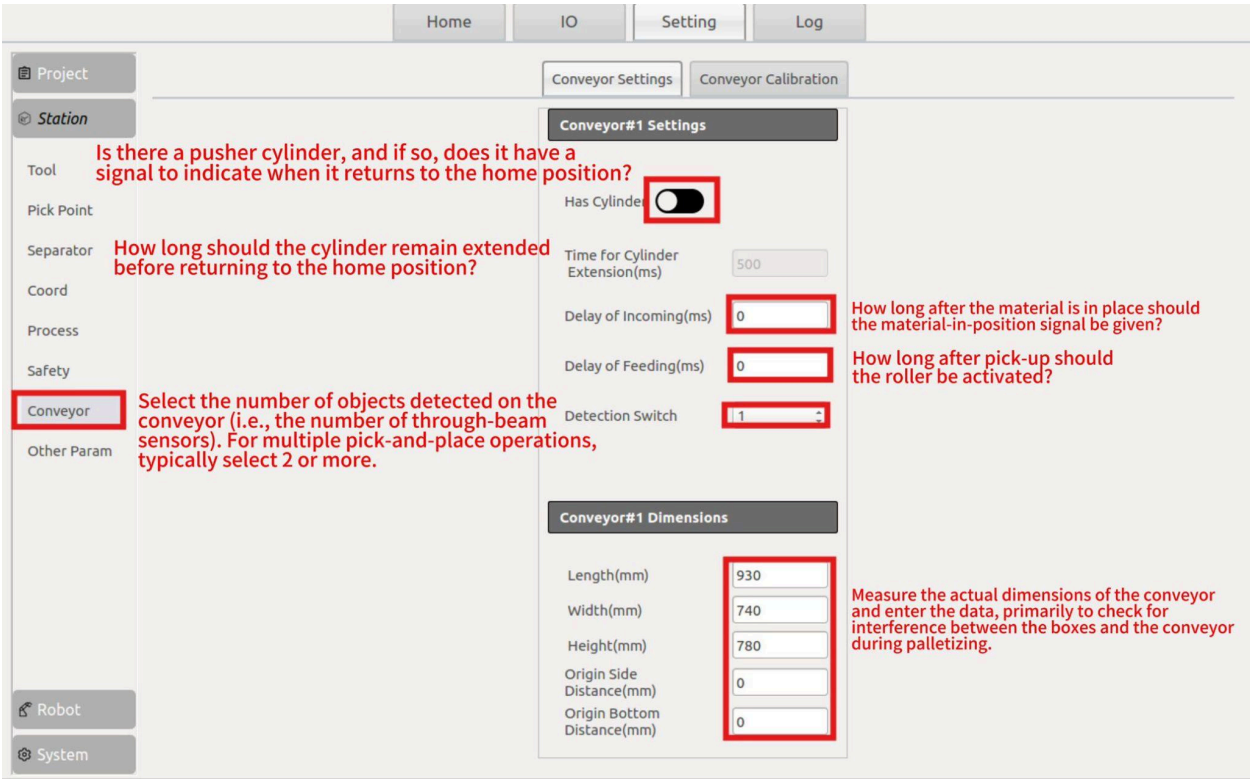
Project Checklist



Safety Boundary

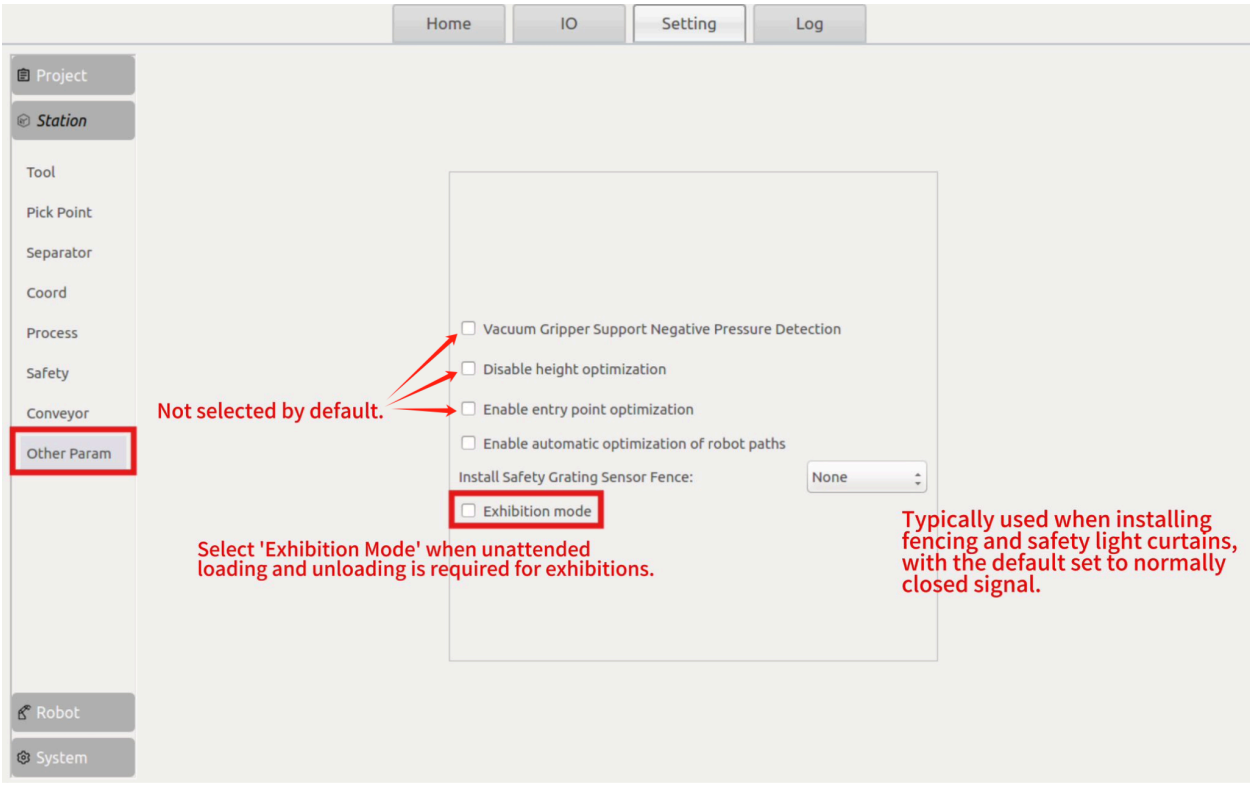


2.3.2.7 Conveyor



2.3.2.8 Other

This section covers settings related to external material sensors, conveyor control, and external safety light curtains.



Palletizing Height Limit: Default is 2300; can be modified based on actual conditions.

Robot Arm Boundary Height Limit: Default is 3000; can be adjusted as needed.

Vacuum Gripper Support Negative Pressure Detection: Primarily used to verify the succession of pick-up through a vacuum gauge. Regular palletizing does not require this setting, but it should be enabled for depalletizing.

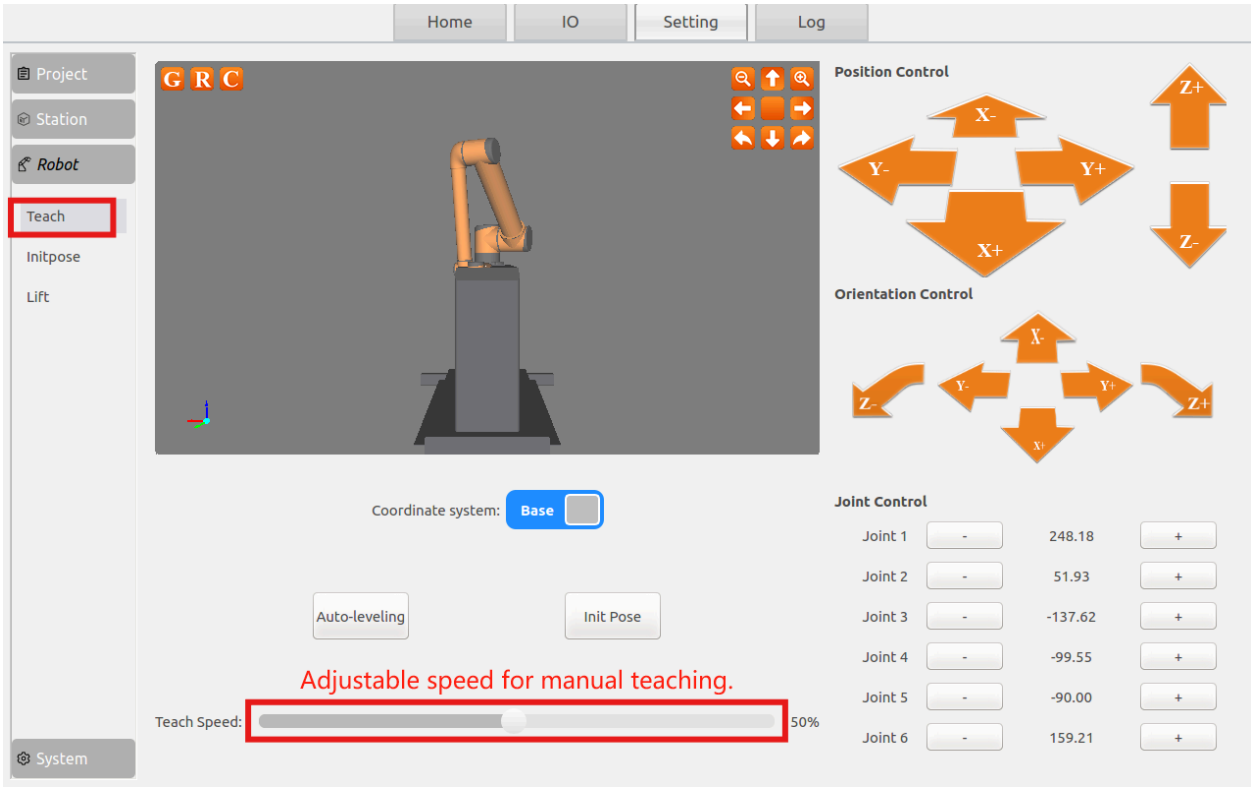
Disable Height Optimization: If unchecked, the underlying algorithm will choose between 45° forward-sequence stacking or -135° reverse-sequence stacking to achieve greater stack heights. However, if custom stacking order is needed, check this option to ensure stacking follows the defined sequence.

Enable Entry Point Optimization: Default is unchecked.

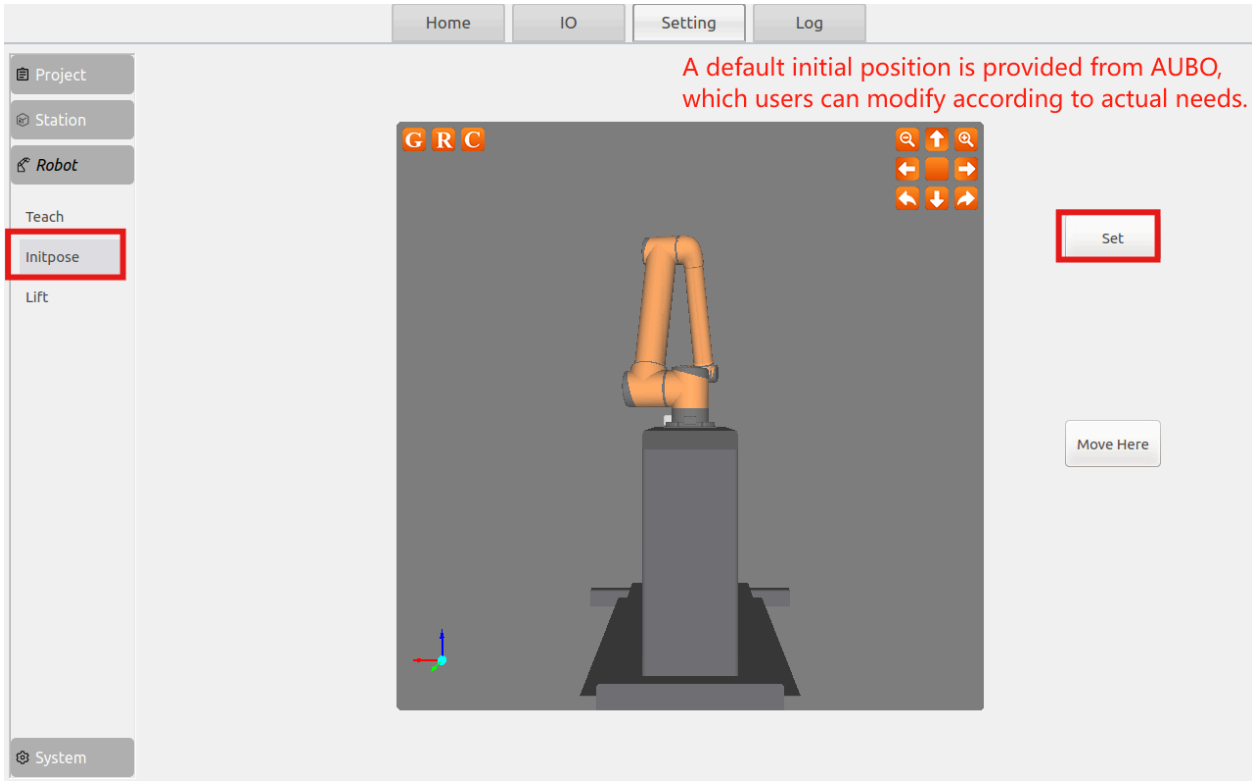
Exhibition Mode: Typically used for expo show displays. Set the depalletizing offset value and manually configure palletizing for the left station. When enabled, the system will continuously alternate between depalletizing and palletizing.

2.3.3 AUBO Cobot Arm

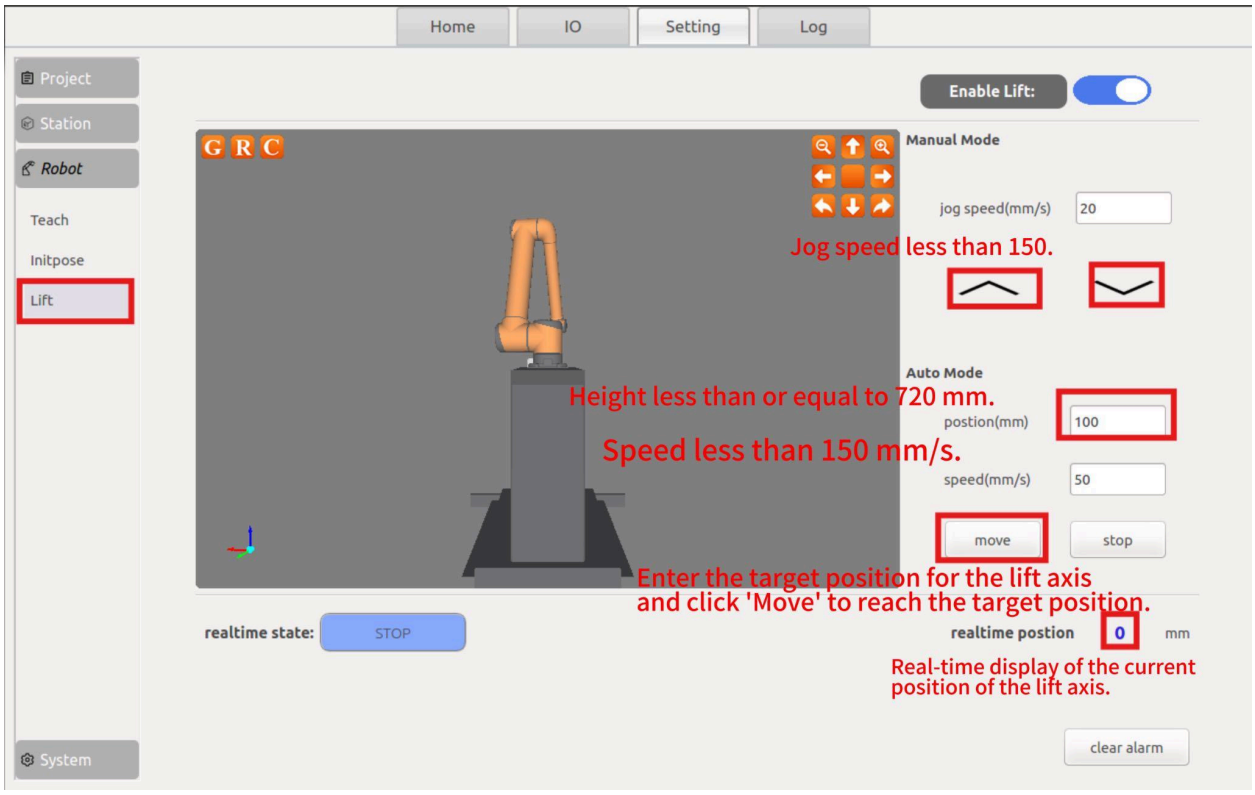
AUBO Robotics Teaching



Initial Position Setting (Safety Position)



Lift Axis Control



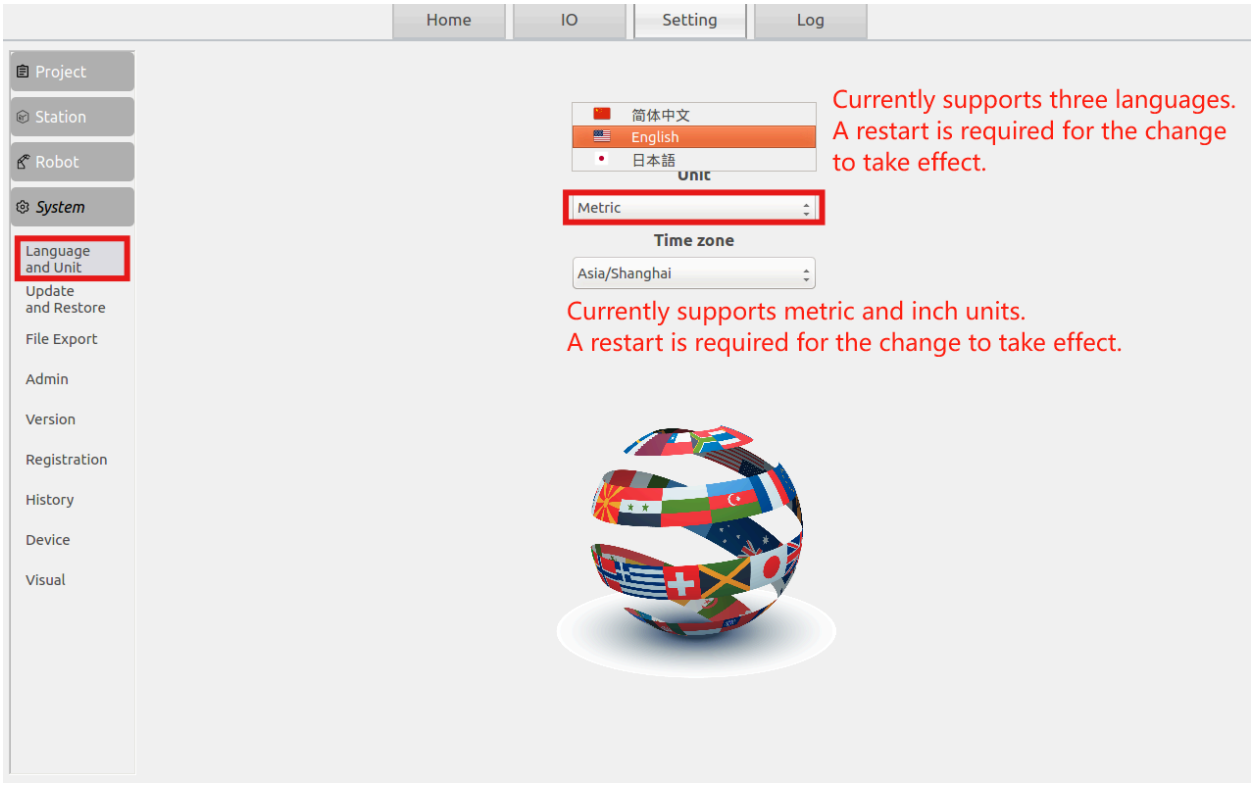
Switch to enabled state using the enable toggle button.

Manual Operation: First, set the jog speed (0-150 mm/s), then hold the up or down icon to move the lift axis.

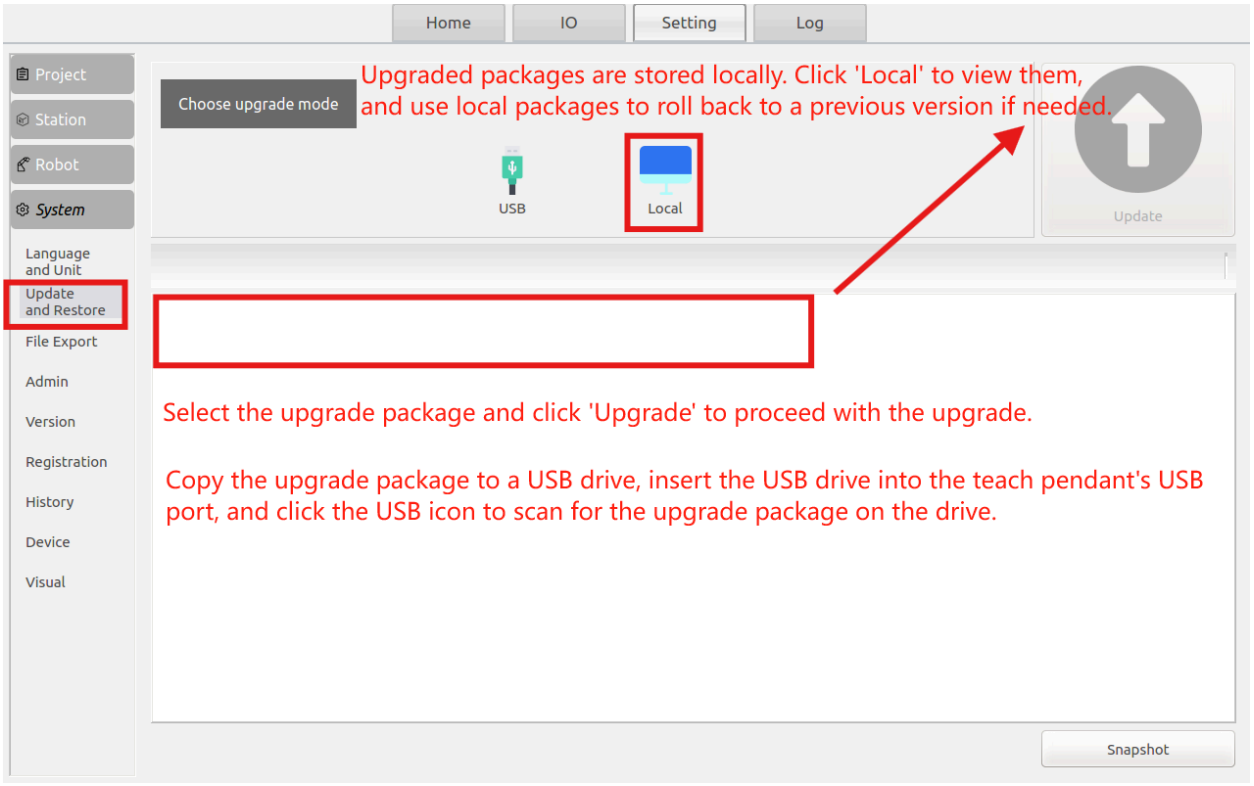
Automatic Operation: Enter the target position (range: 0-720mm) and movement speed (0-150 mm/s), then click **Move**.

2.3.4 System

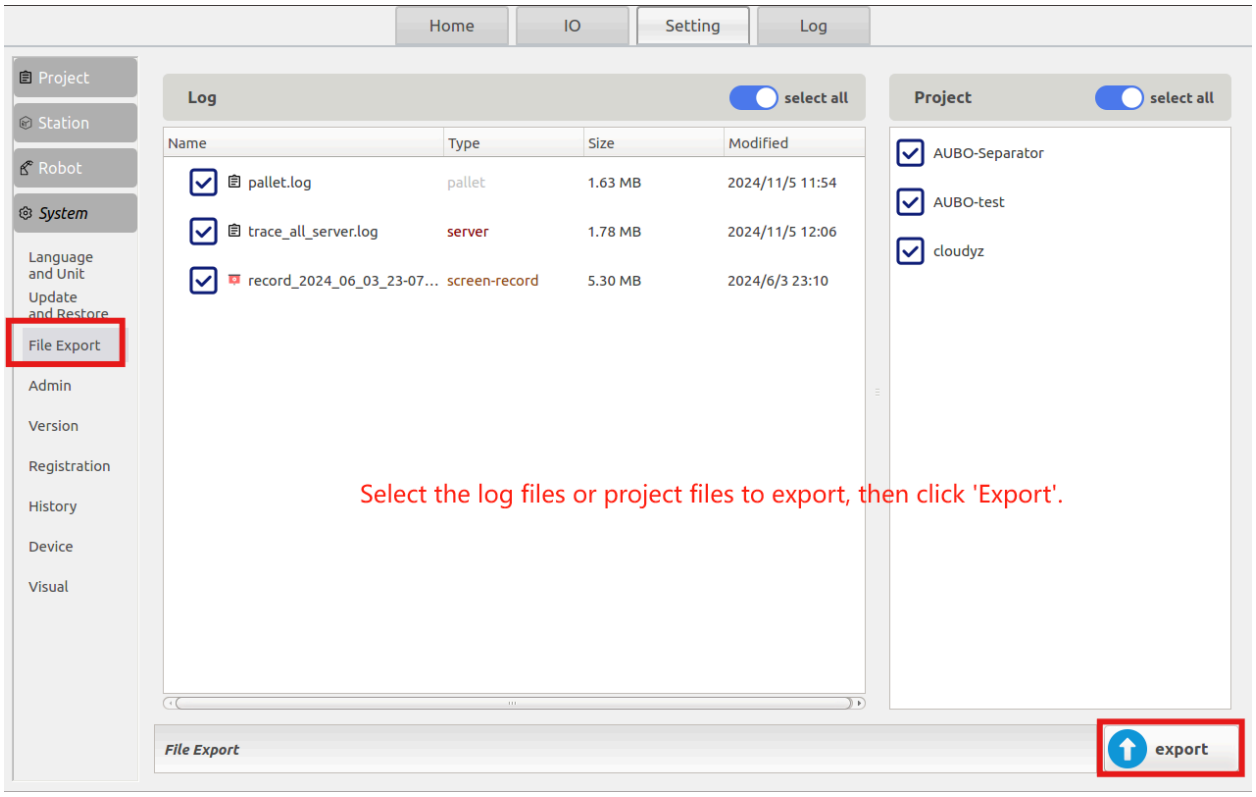
Language and Unit

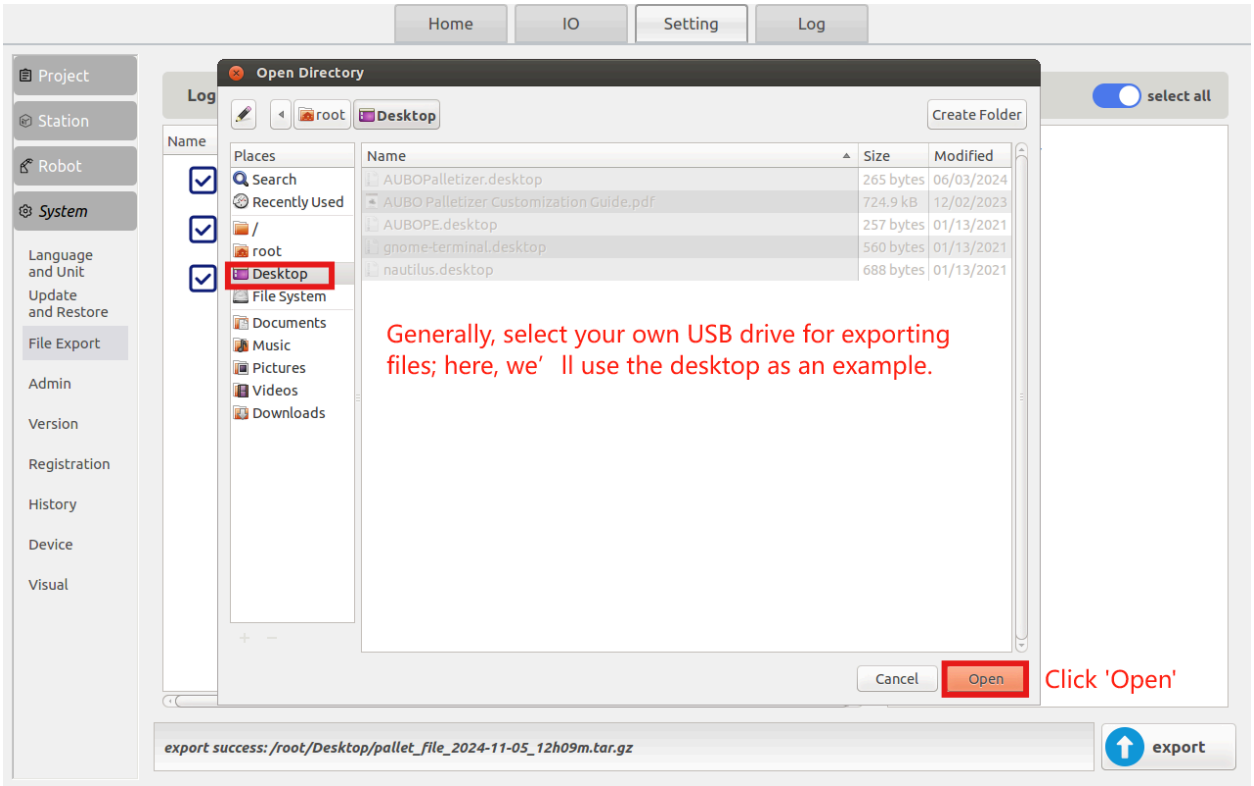


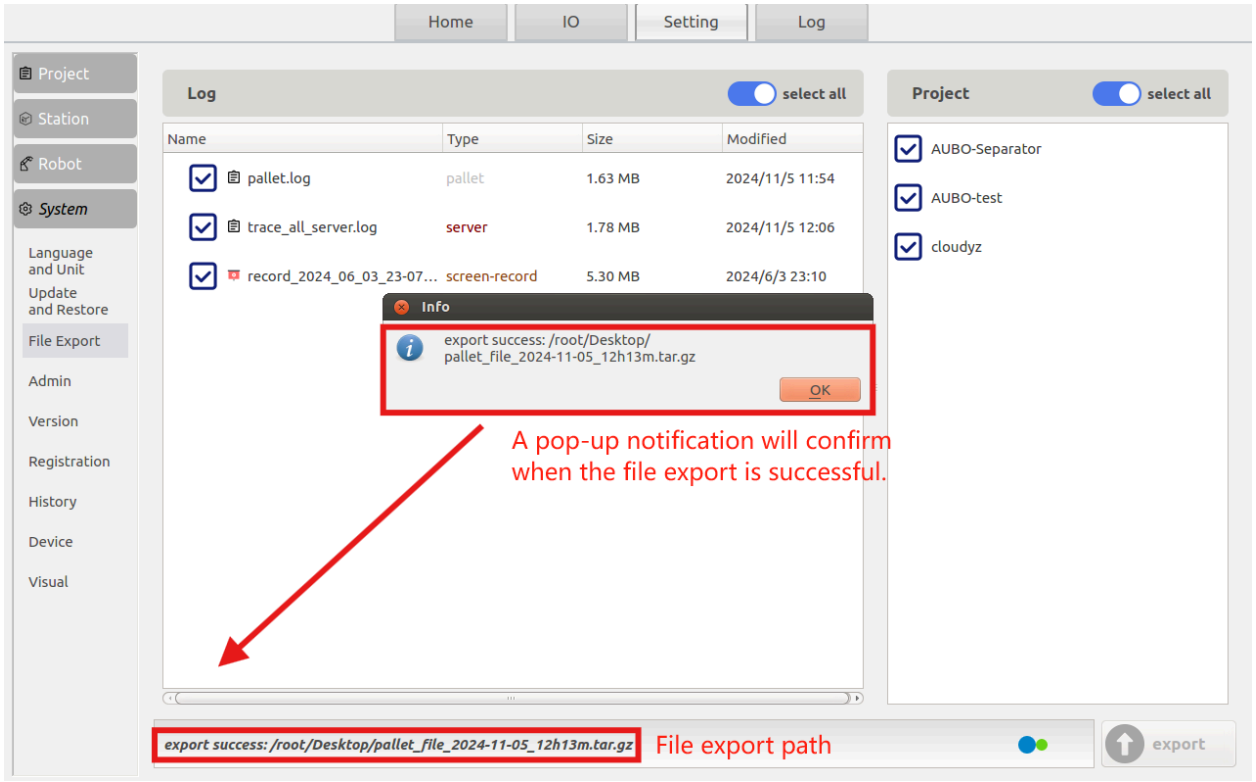
Update



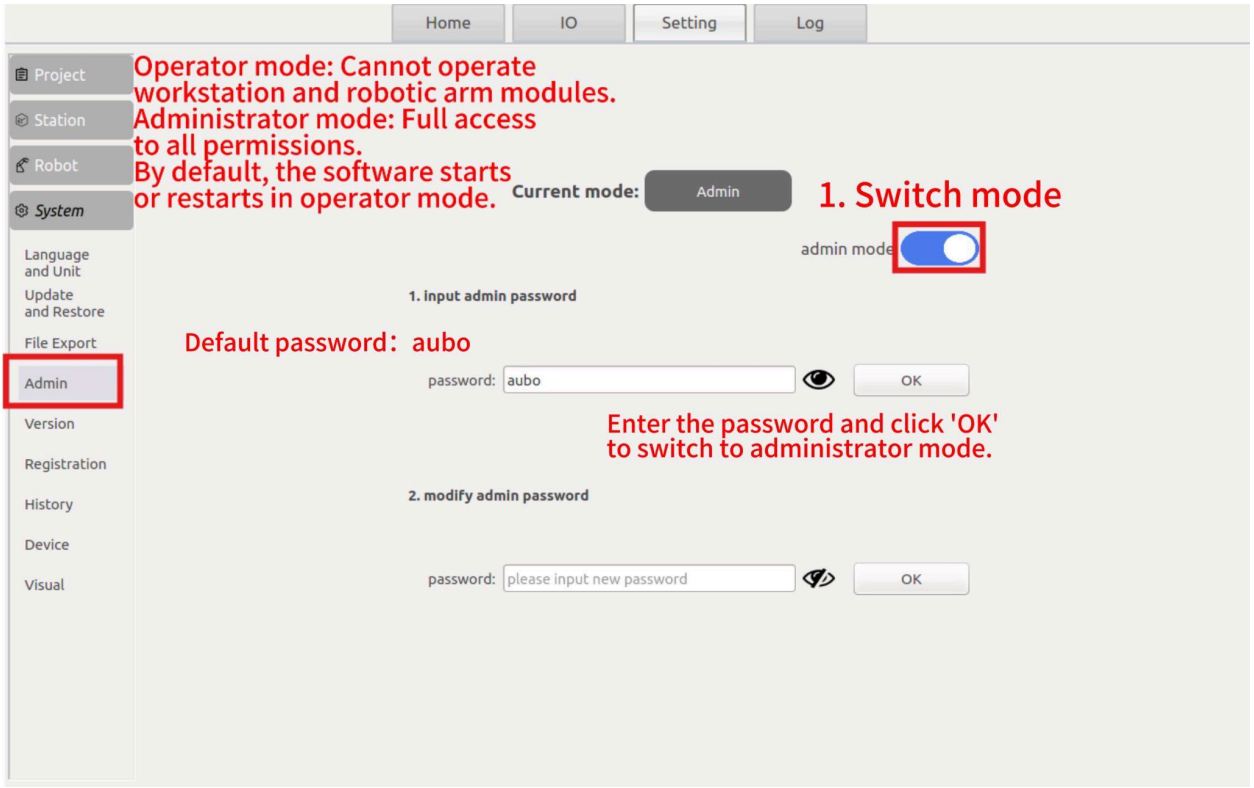
File Export



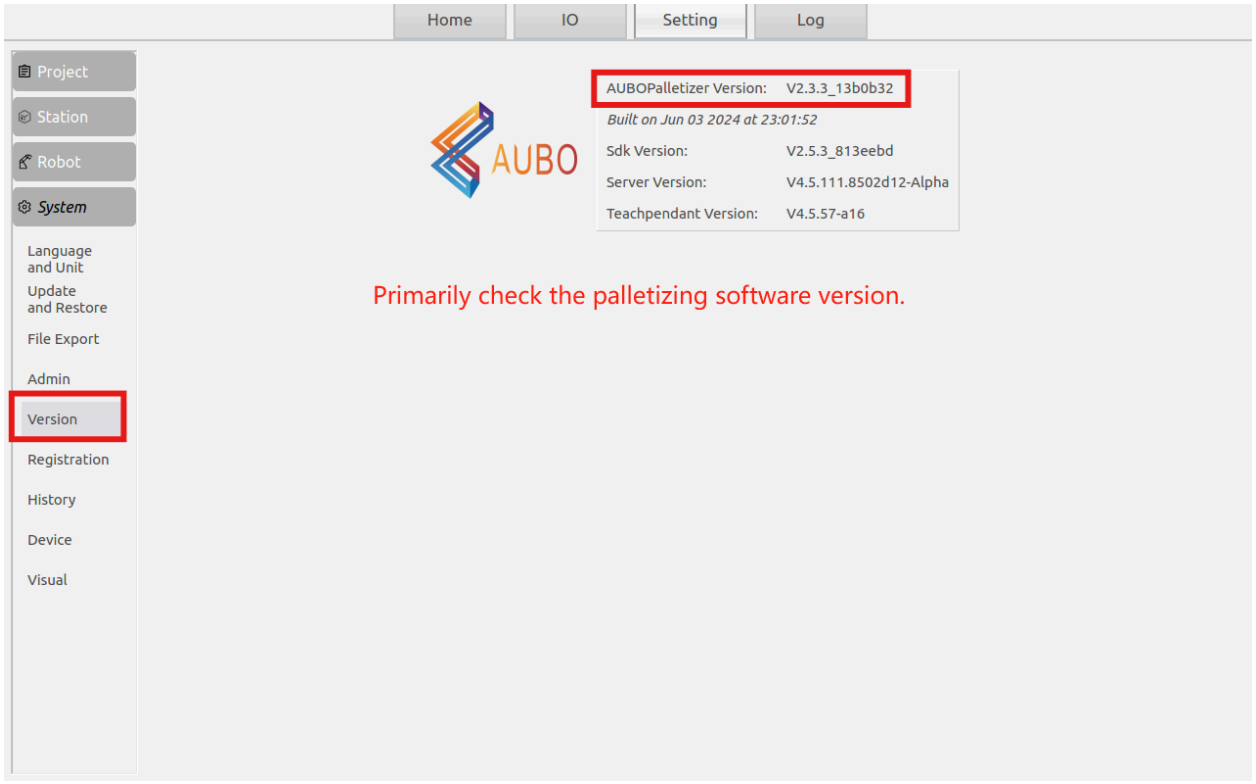

Home
IO
Setting
Log
Project
Station
Robot
System
Language and Unit
Update and Restore
File Export
Admin
Version
Registration
History
Device
Visual
Open Directory
root
Desktop
Create Folder
Places
Search
Recently Used
/
root
Desktop
File System
Documents
Music
Pictures
Videos
Downloads
Name
Size
Modified
AUBOPalletizer.desktop 265 bytes 06/03/2024
AUBO Palletizer Customization Guide.pdf 724.9 kB 12/02/2023
AUBOPE.desktop 257 bytes 01/13/2021
gnome-terminal.desktop 560 bytes 01/13/2021
nautilus.desktop 688 bytes 01/13/2021
Generally, select your own USB drive for exporting files; here, we' ll use the desktop as an example.
Cancel
Open
Click 'Open'
select all
export success: /root/Desktop/pallet_file_2024-11-05_12h09m.tar.gz
export



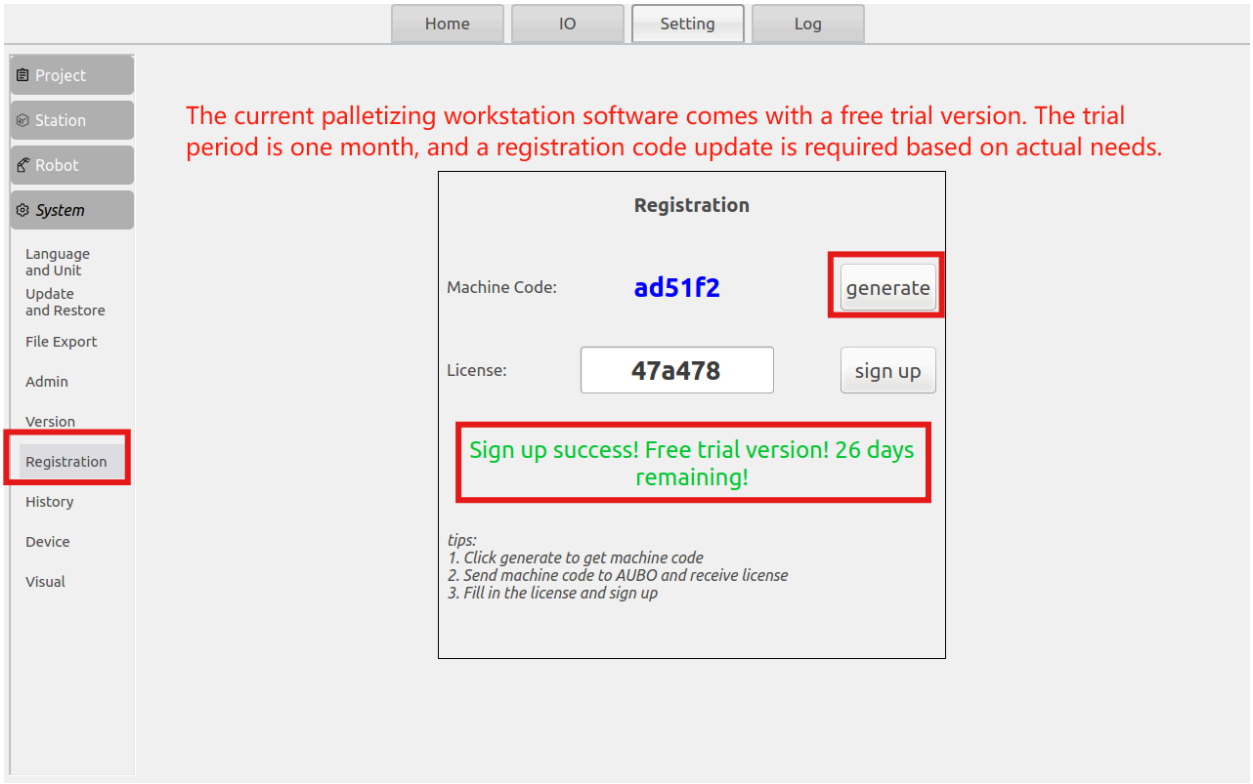
Administrator



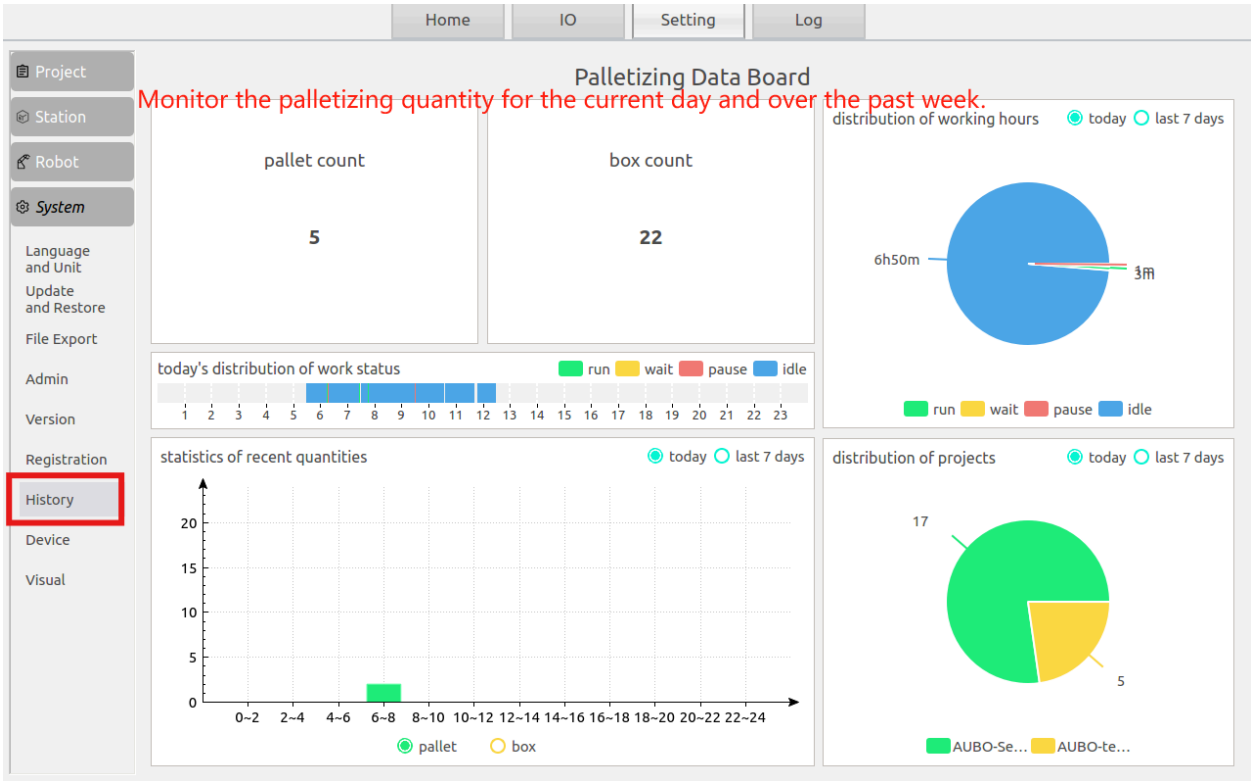
Version Information



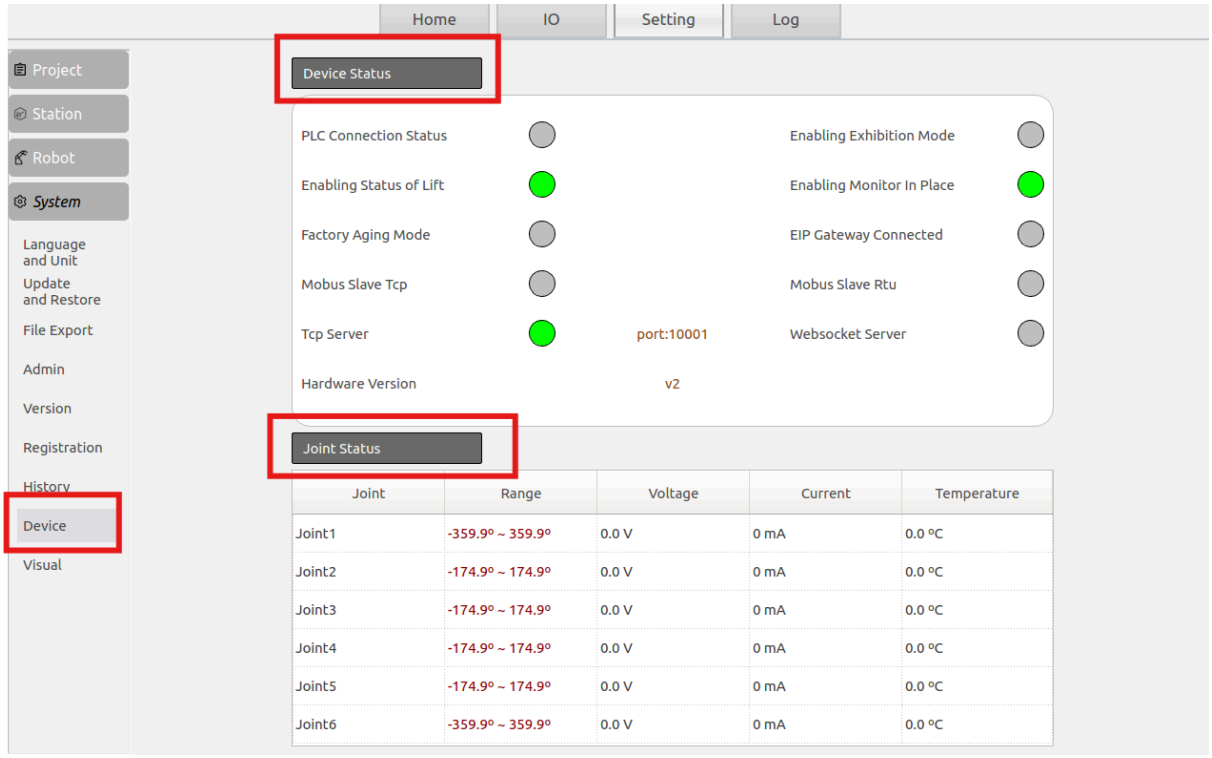
Registration：The AUBO palletizer software in factory-default workstations is in trial mode, and registration is required based on actual needs.



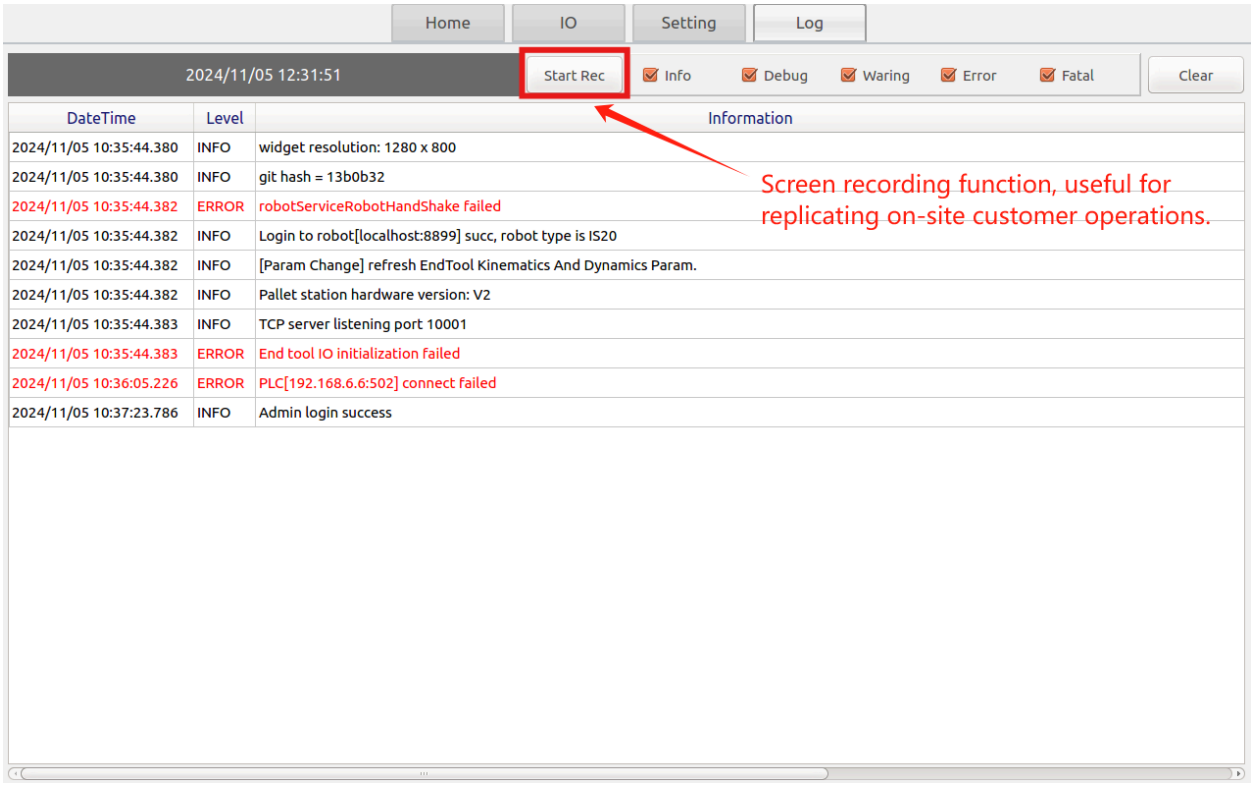
Historical Data: Allows viewing of current or recent palletizing data, such as the number of pallets and boxes.



Device Status: Displays the status of devices such as the PLC, lift axis, and robot arm joints.

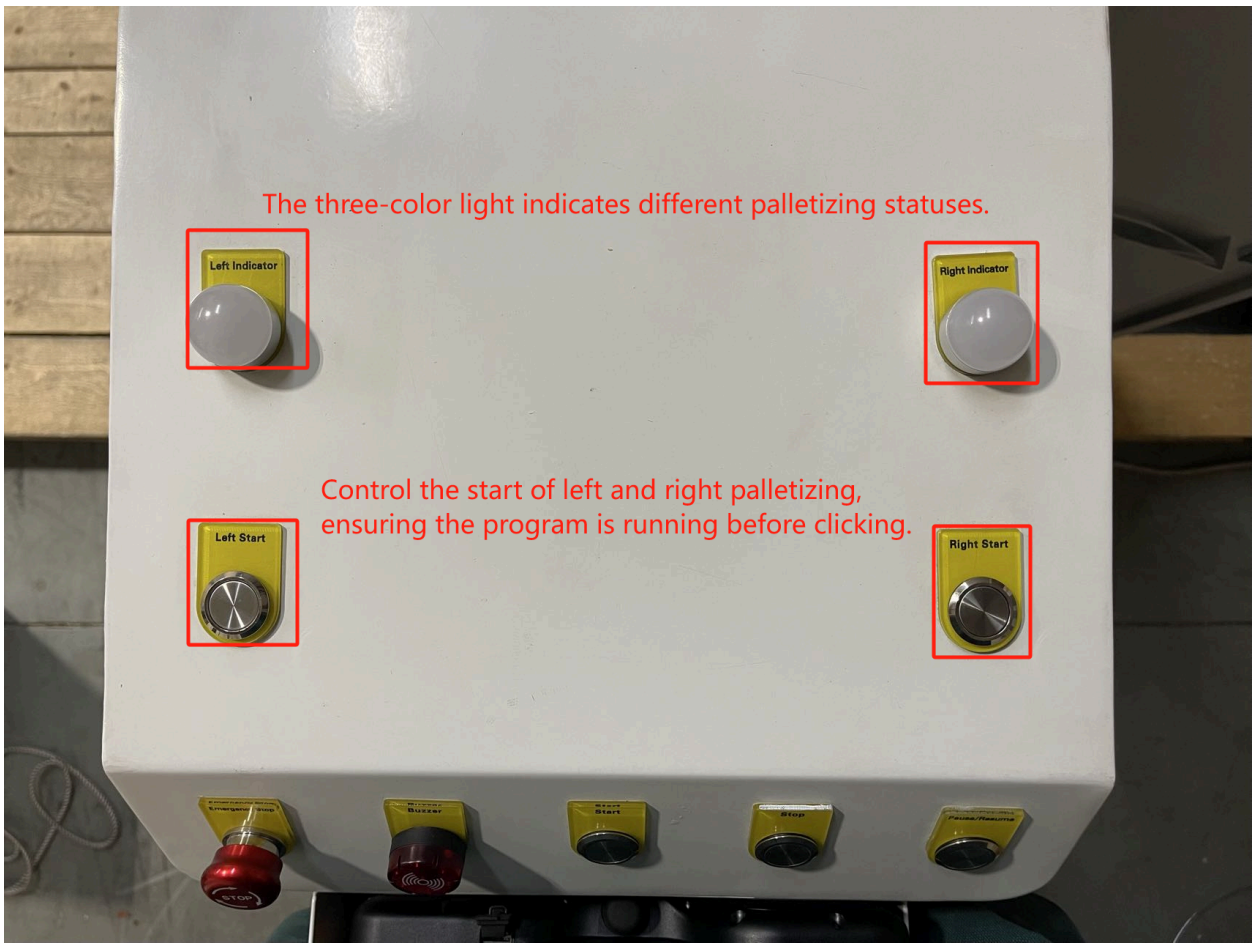


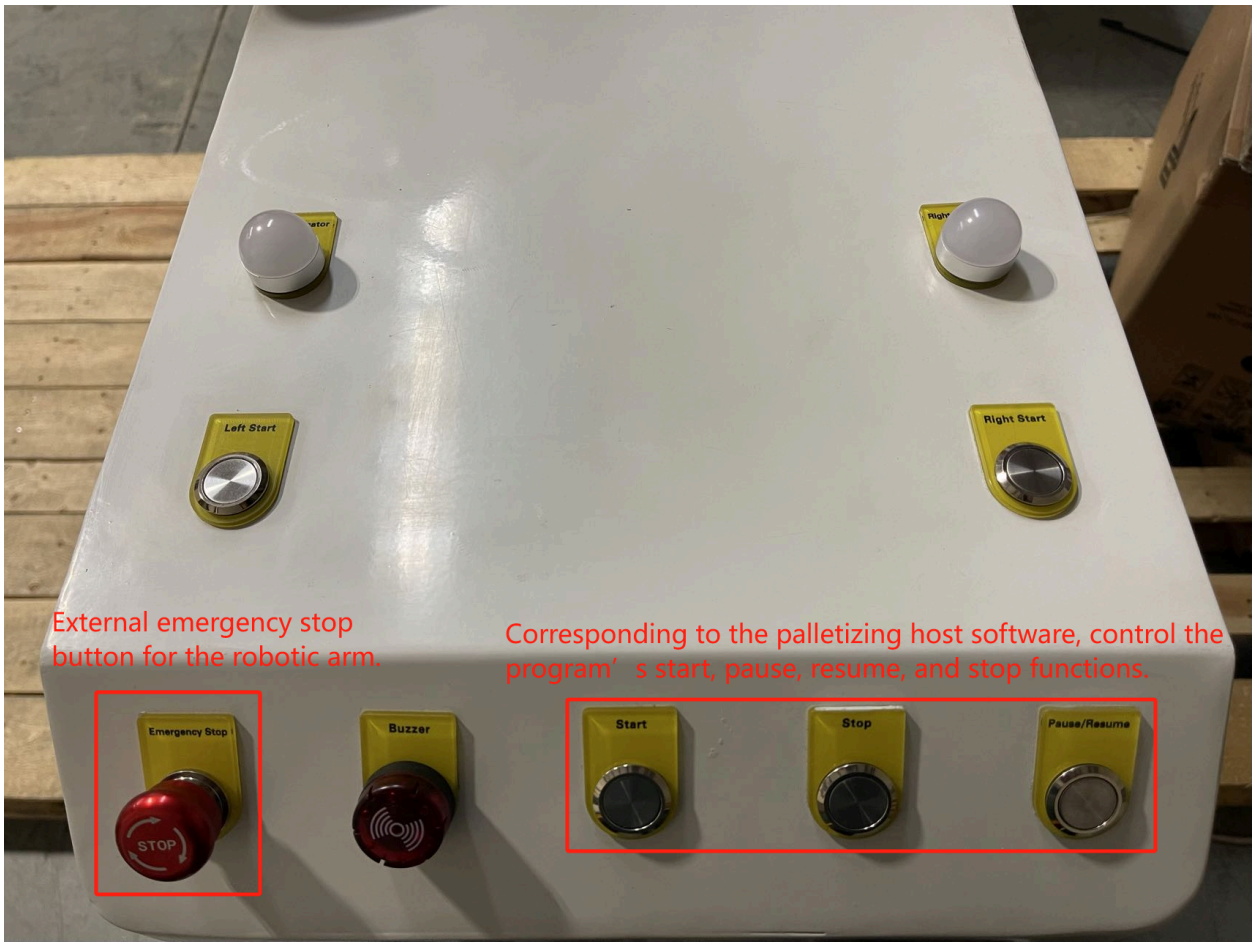
2.4 Logs


Home
IO
Setting
Log
2024/11/05 12:31:51
Start Rec
Info
Debug
Waring
Error
Fatal
Clear
DateTime
Level
Information
2024/11/05 10:35:44.380 INFO widget resolution: 1280 x 800
2024/11/05 10:35:44.380 INFO git hash = 13b0b32
2024/11/05 10:35:44.382 ERROR robotServiceRobotHandShake failed
2024/11/05 10:35:44.382 INFO Login to robot[localhost:8899] succ, robot type is IS20
2024/11/05 10:35:44.382 INFO [Param Change] refresh EndTool Kinematics And Dynamics Param.
2024/11/05 10:35:44.382 INFO Pallet station hardware version: V2
2024/11/05 10:35:44.383 INFO TCP server listening port 10001
2024/11/05 10:35:44.383 ERROR End tool IO initialization failed
2024/11/05 10:36:05.226 ERROR PLC[192.168.6.6:502] connect failed
2024/11/05 10:37:23.786 INFO Admin login success
Screen recording function, useful for replicating on-site customer operations.

3. External Buttons and Indicator Lights for the Palletizing Workstation

3.1 Overview

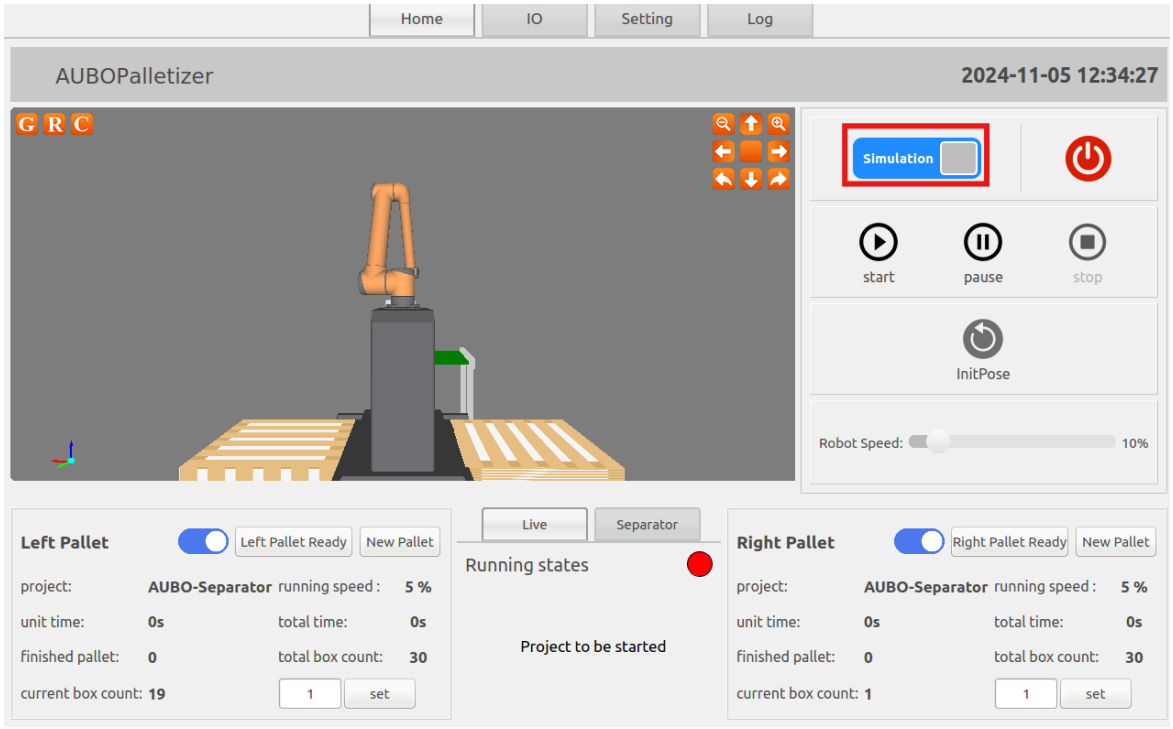



Left Start
Right Start
External emergency stop button for the robotic arm.
Corresponding to the palletizing host software, control the program’ s start, pause, resume, and stop functions.
Emergency Stop
STOP
Buzzer
Start
Stop
Pause/Resume

3.2 Operating Procedure

3.2.1 Normal Startup of the AUBO Palletizer Software

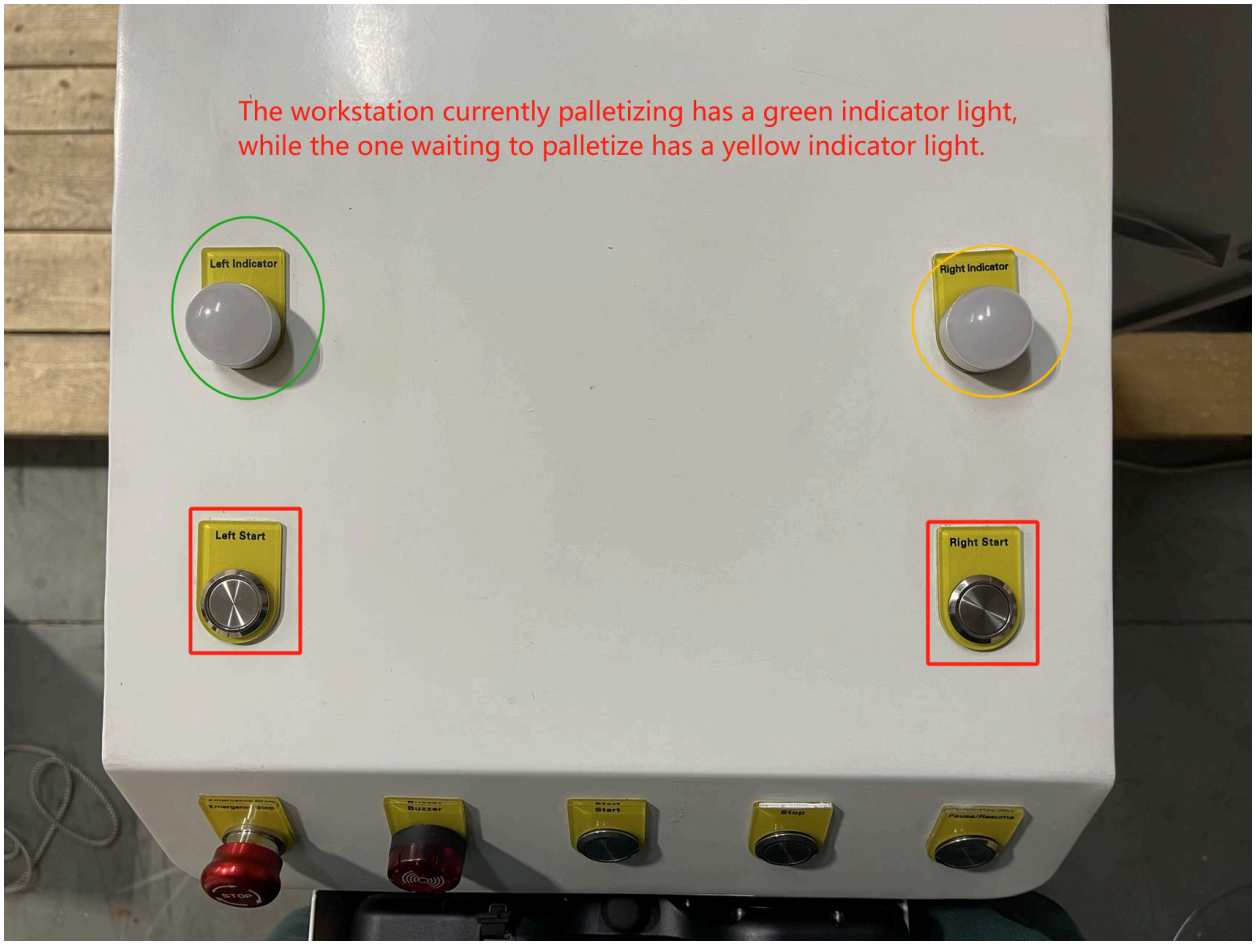
Choose either real mode or simulation mode based on actual requirements.



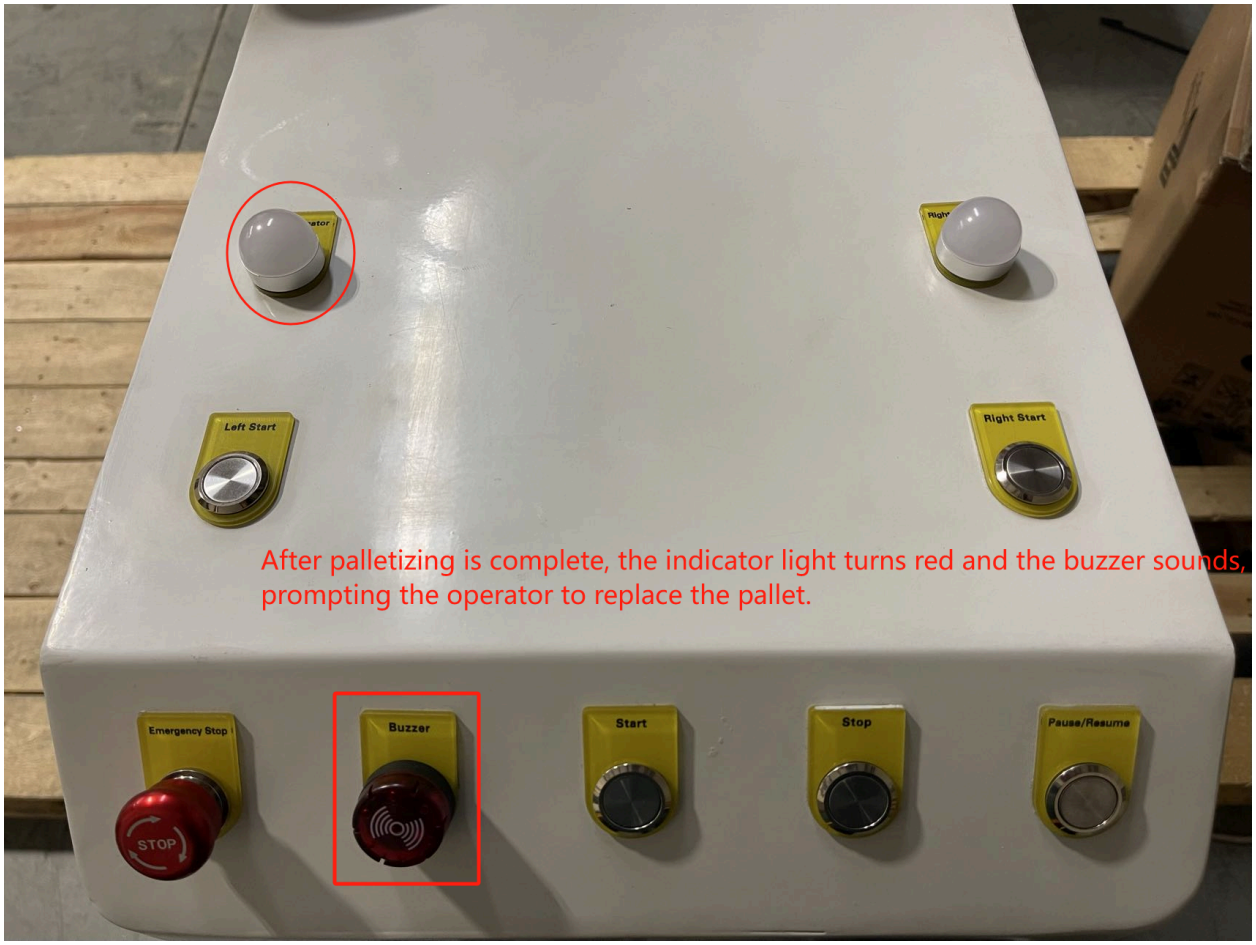
3.2.2 Position the Pallet Properly

3.2.3 Press the Start Button

3.2.4 Press Left or Right Start Button

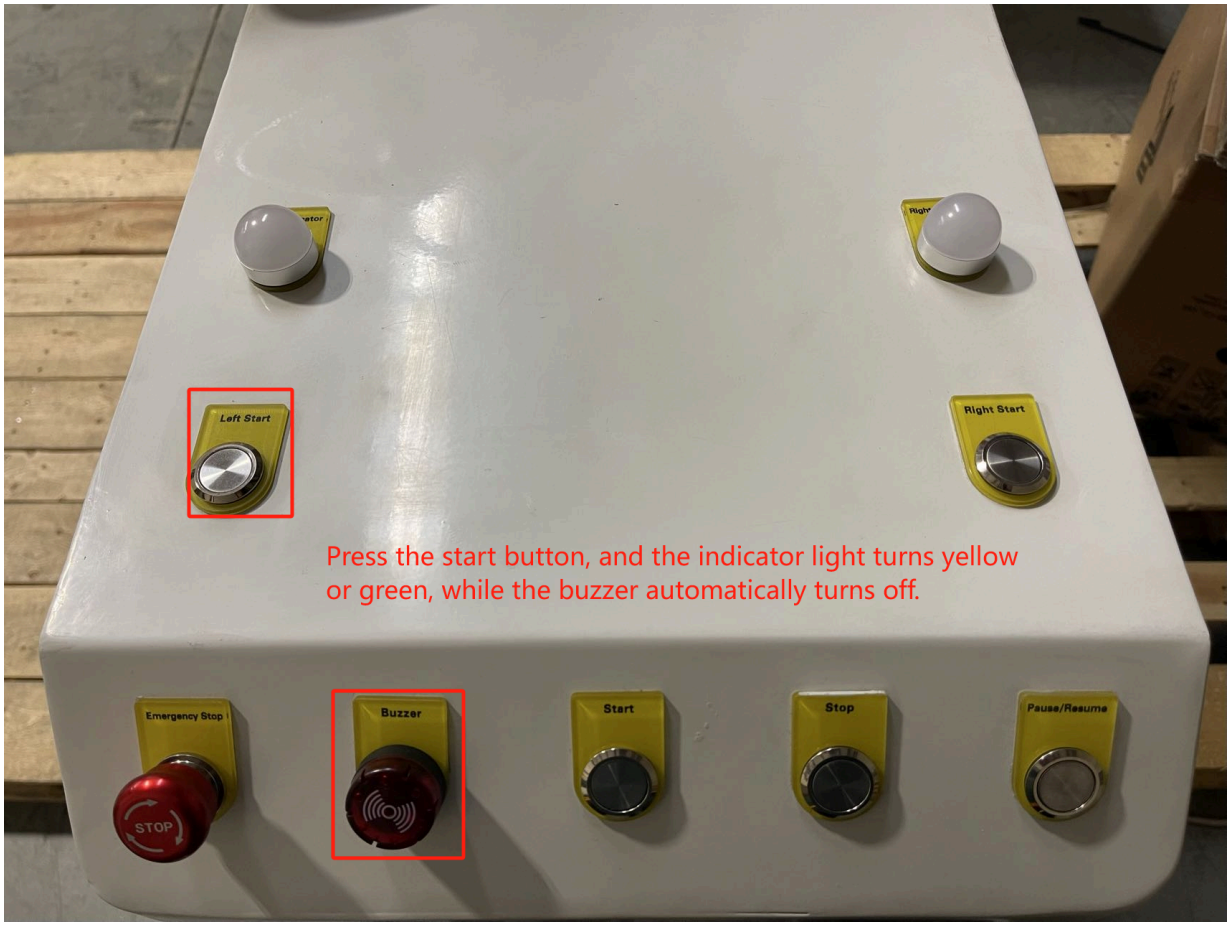


3.2.5 Palletizing Completion



3.4.6 Replacing the Pallet

Remove the completed pallet and replace it with a new one. Press the left or right start button corresponding to the respective end. The buzzer will turn off, and the indicator light will change from red to yellow (waiting for palletizing) or green (starting palletizing).

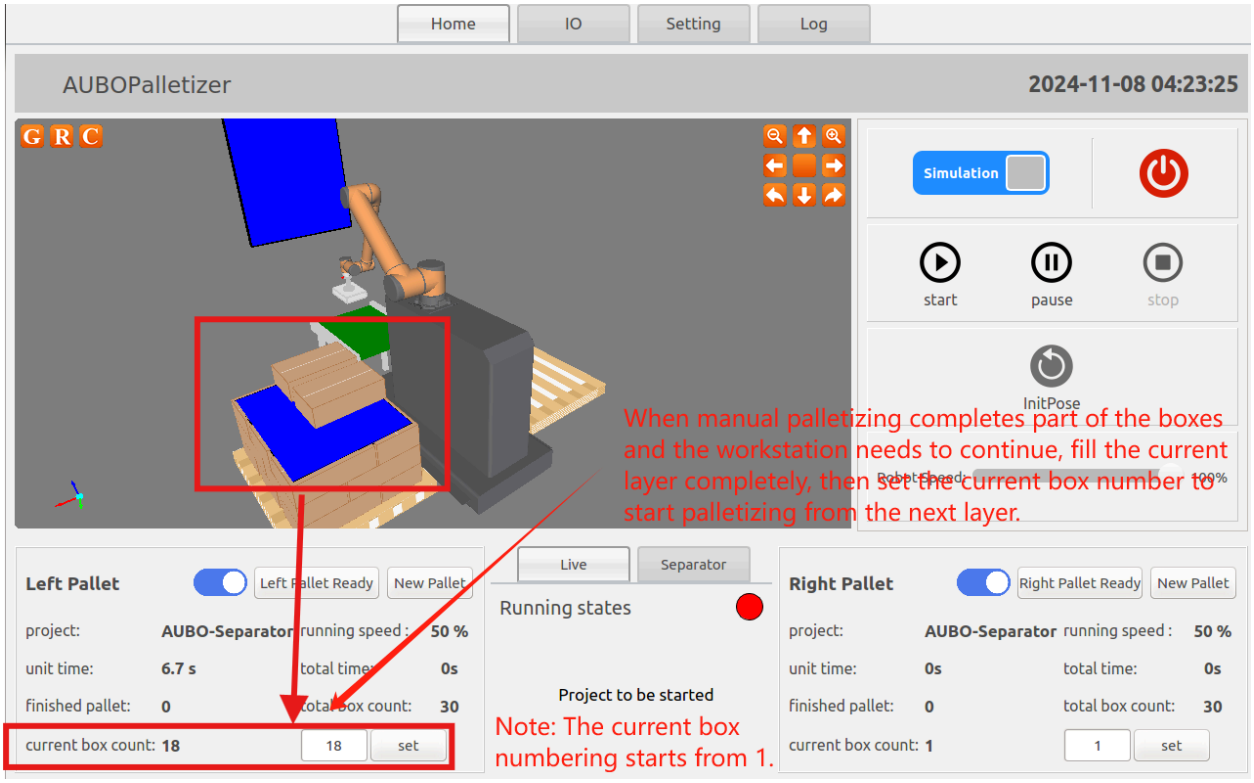


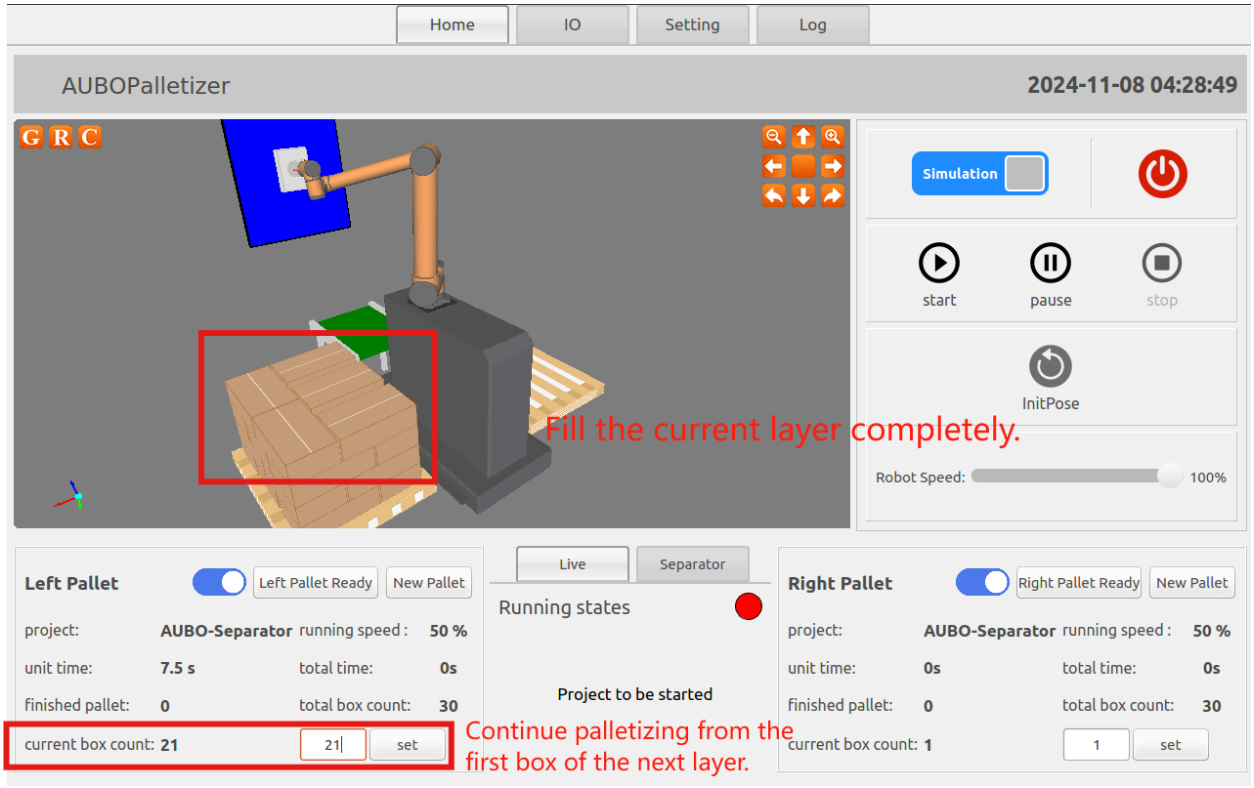
Press the start button, and the indicator light turns yellow or green, while the buzzer automatically turns off.

4. Special Situations and Troubleshooting

4.1 Manually Adjusting the Current Box Number During Palletizing

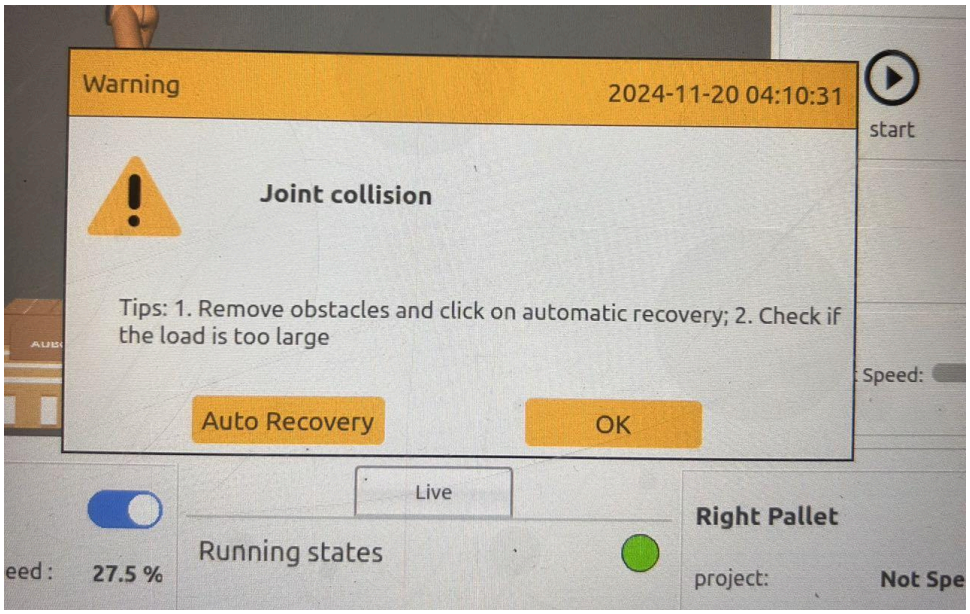
If there is a discrepancy between the manual palletizing sequence and the robotic arm's internal sequence, manually fill the current layer and continue palletizing from the next layer.





4.2 Joint Collision

When a joint collision is detected, a popup will notify the user, and the buzzer will sound an alert. Click "Auto Recovery" in the popup; the lift axis will elevate to a safe height.



Afterward, click "Stop" and check if any material is still on the suction cup. If so, manually remove the material and go to the IO interface to disable the suction. Resume palletizing as usual.

Note: If the collision occurs during material placement due to issues like box deformation from sealing, remove the affected box.

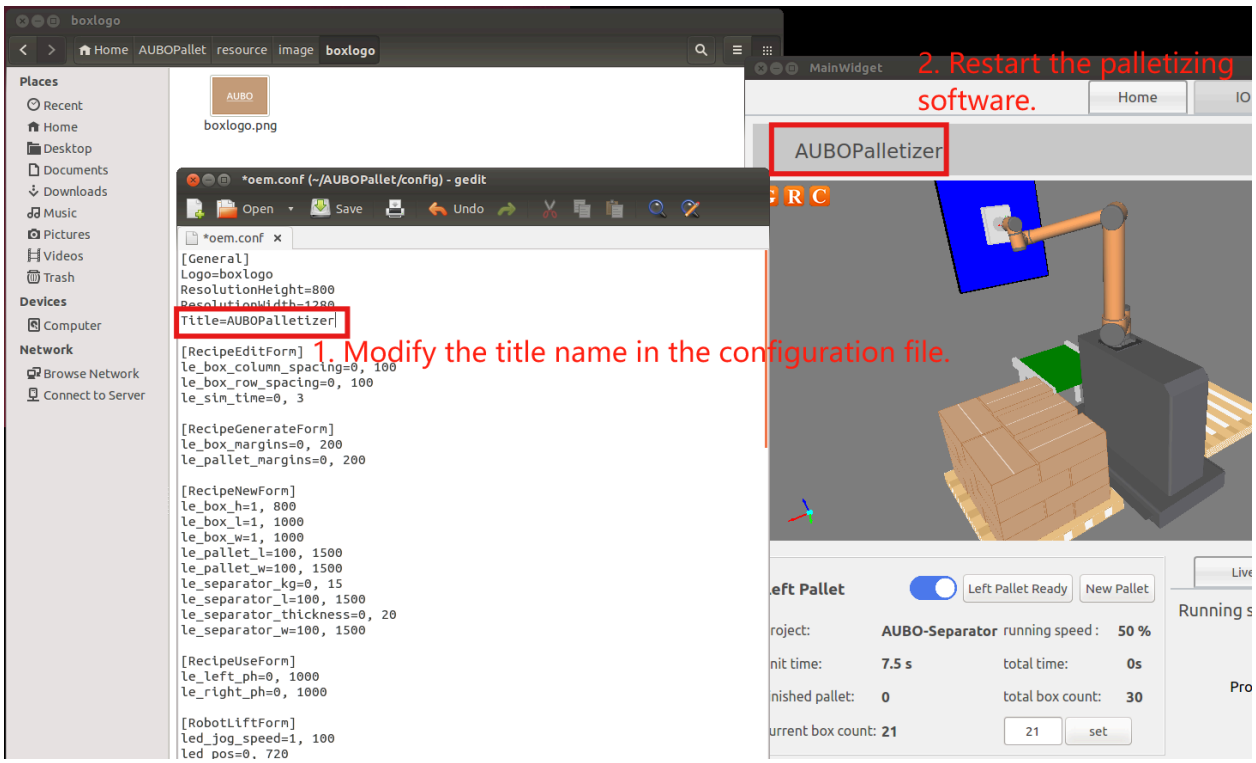
4.3 Suction Cup Status Error

If the suction cup is left on before starting the program, a popup will alert for a suction cup status error when starting. You can either proceed manually by resuming material handling or click **Confirm** and manually disable the suction in the IO interface.

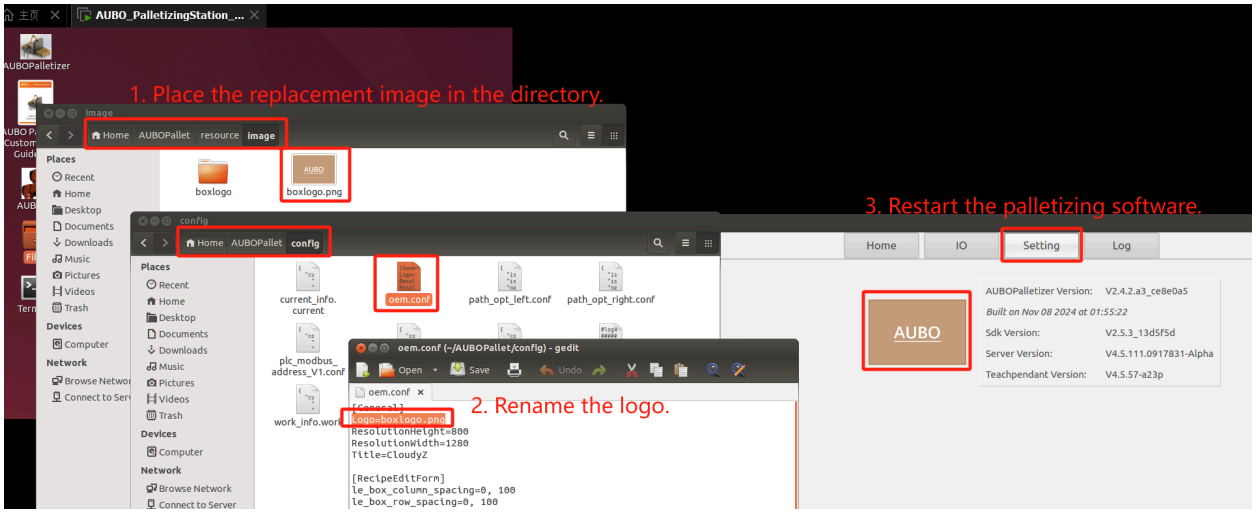
5. OEM Branding Replacement

5.1 AUBO Palletizer Software Title and Logo Replacement

To modify the main interface title, edit the title name in /root/AUBOPallet/config/oem.conf



To update the logo in the version information interface, edit the logo name in /root/AUBOPallet/config/oem.conf

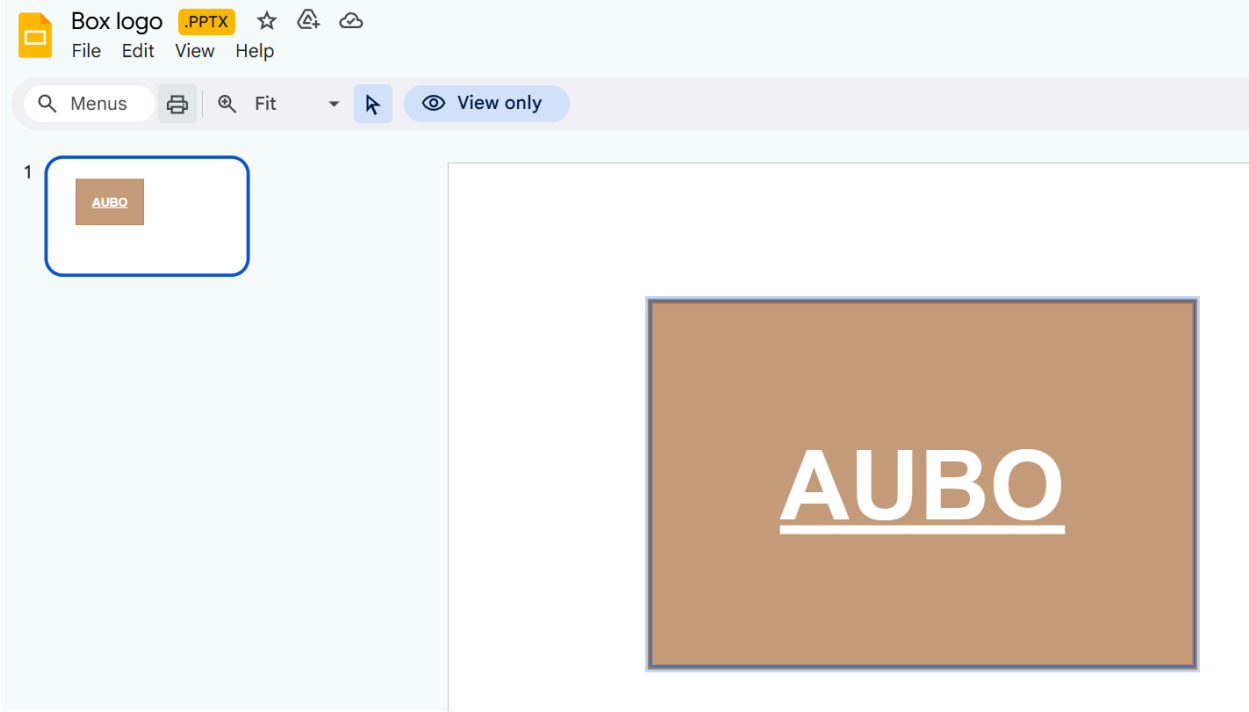


5.2 Replacing the 3D Simulation Box Logo

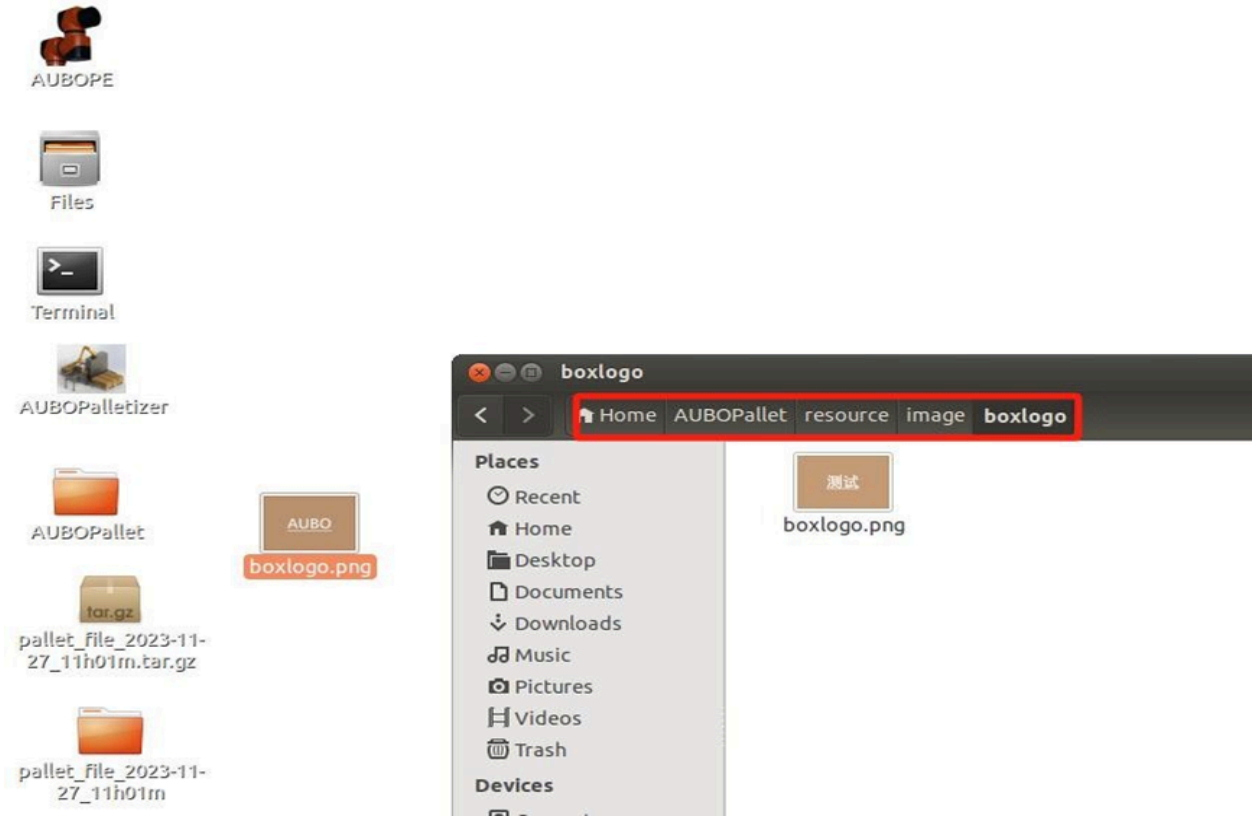
Template PPT download link:

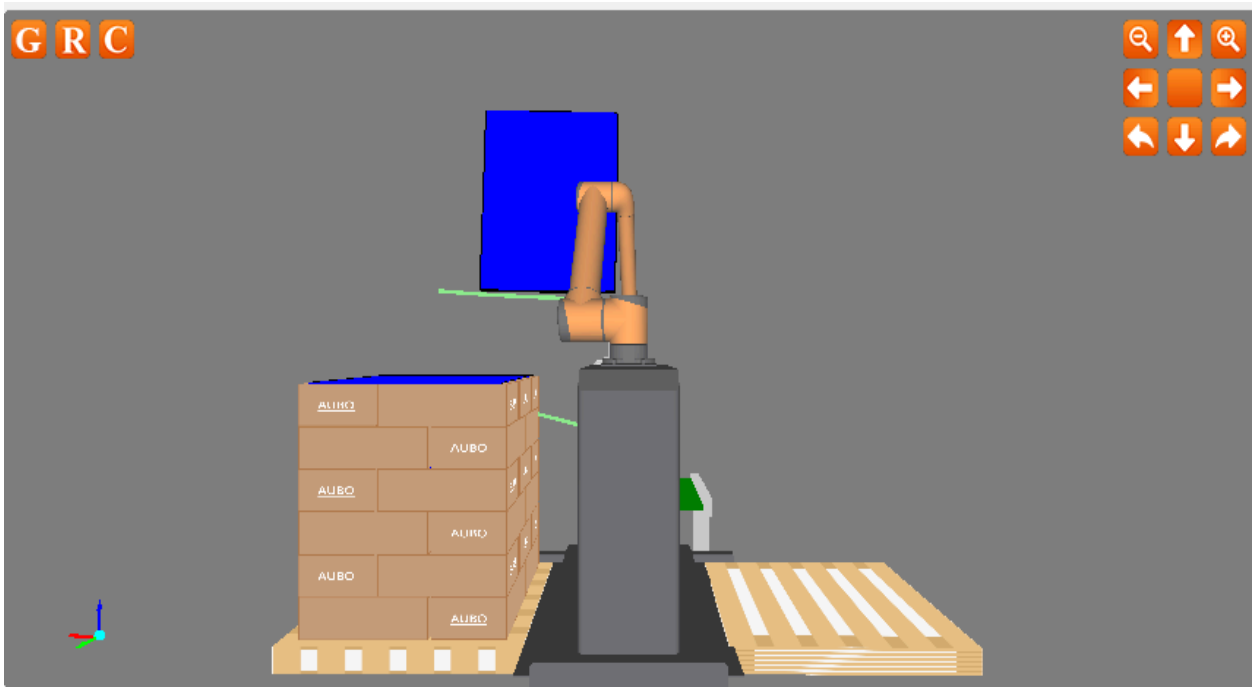
https://drive.google.com/drive/folders/17BQoW7F1x_1n-Yo5SyBjp_3Il9AuQlV3?usp=sharing

Open logo.pptx, update the logo, and save the image as boxlogo (in PNG format).



Replace the logo image in the corresponding folder, then restart the AUBO palletizer software.





If the logo on the box doesn't show up, go to Setting->Station->Pick Point->label direction->choose a direction, and try to restart the software again.

AUBO Robotics USA

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