Part 1 PC Software Introduction

1. PC Software Introduction

The PC computer corresponds to PLC computer, and is used to send instructions to PLC computer (robot) and receive feedback data from PLC computer. In general, we control PLC computer through running software on PC computer.

Only when PC software realizes serial port communication, it can send instructions to and receive feedback data from the robot. Serial port can be considered as USB interface. PC connects to robot through USB interface, and PC software communicate with robot also through USB interface.

The introduction to the PC software functions is given below.

2. Open PC Software

2.1 Open through Robotic Icon

Click JetAuto_Arm icon to open PC software.

2.2 Open through Command

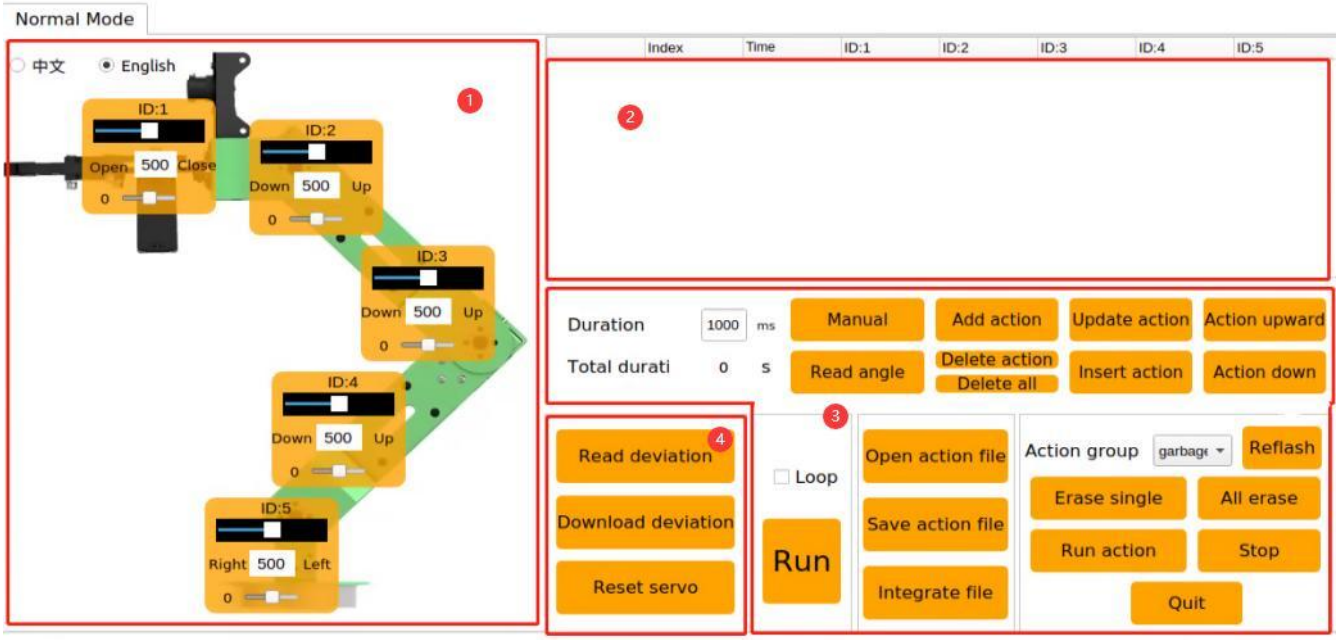
1) Open terminal.

2) Input command "**cd jetauto_software/jetauto_arm_pc/**" and enter PC software directory.

3) Input command "**python3 main.py**" to open PC software.

3. PC Software Interface Layout

The interface under "**normal mode**" is as follow.



①：Servo control area

Icon	Function
	ID number of servo
	Adjust servo position from 0 to 1000. Note: do not make ID4 servo rotate too much, otherwise it will crash on and damage the depth camera
	Adjust servo deviation from -125 to 125.

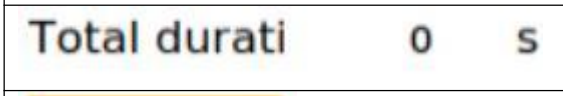
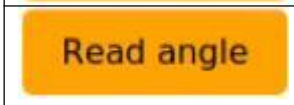
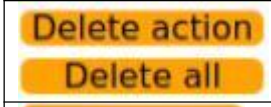
②：Action list

The running time and servo data of the current action are displayed on the action list.

	编号	时间	ID:1	ID:2	ID:3	ID:4	ID:5	ID:6
	1	1000	500	1000	500	500	500	500
	2	1000	500	500	500	500	500	500
▸	3	1000	500	500	500	500	500	500

Icon	Function
Index	Action group number
Time	Running time of the action that is time taken to complete this action
ID:1	Servo value. Double click the figure below 500 to revise.

③：Action group setting

Icon	**Function**
	Action running duration time. Directly click 1000 to modify.
	Total running time taking for all the actions in an action group
	If you click this button, joints of robot become loose, and you can drag servos to design any posture
	Read the servo angle you have designed before. This button should be used with 
	Add the servo value as a action to the last line of the action list
	Delete action: delete the action selected in the action list Delete all: delete all the action in action list
	Replace the angle value of the action selected in the action list with the servo value in the servo control area. And update the running time as the time set in “**Time**”
	Insert a new action above the selected action. The running time of this new action is the time set in “**Time**” and angle value is the current value in servo control area.
	Move the selected action up one line
	Move the selected action down one line

Loop Run	Click to run all the actions on the action list once (If "**Loop**" is ticked, JetAuto Pro will repeat the action.)
Open action file	Load the data of the saved action group to the action list (Save path for action group file：“ArmPi_PC_Software->ActionGroups”)
Save action file	Save the current actions in the action list into the designated path. (ArmPi_PC_Software->ActionGroups)
Integrate file	Firstly, open one action group, then click this button, and then open other action group. And these two action groups will be integrated into one.
Action group garbage	Display the saved action groups. You can select the action to run
Reflash	Refresh action group drop-down menu
Erase single	Delete all action group files
All erase	(⚠)Deleted all the action group files.
Run action	Run the selected action group once.
Stop	Stop running the action group.
Quit	Exit PC software interface

④：Servo deviation setting area

Icon	Function
Read deviation	Click to read the saved servo deviation
Download deviation	Click to download the adjusted deviation to the robot.
Reset servo	Click to return all the servos to the mid point(500).

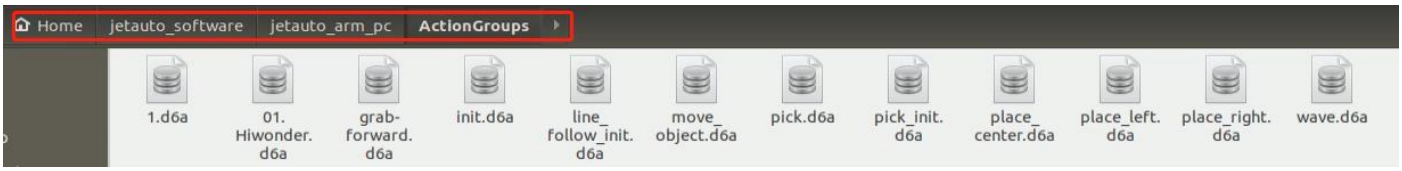
Part 2 Action Calling

1. What is “Action Calling”

Action calling is to directly call the edited action group via PC software to let robot perform this action.

JetAuto has built-in action groups, and its action group files are stored in “**home/jetauto_software/jetauto_arm_pc/ActionGroups/**”. You can check and call built-in actions via PC software or command.

(Only if action files are saved in “**home/jetauto_software/jetauto_arm_pc/ActionGroups/**”, can the files be called)



2. Operation Steps

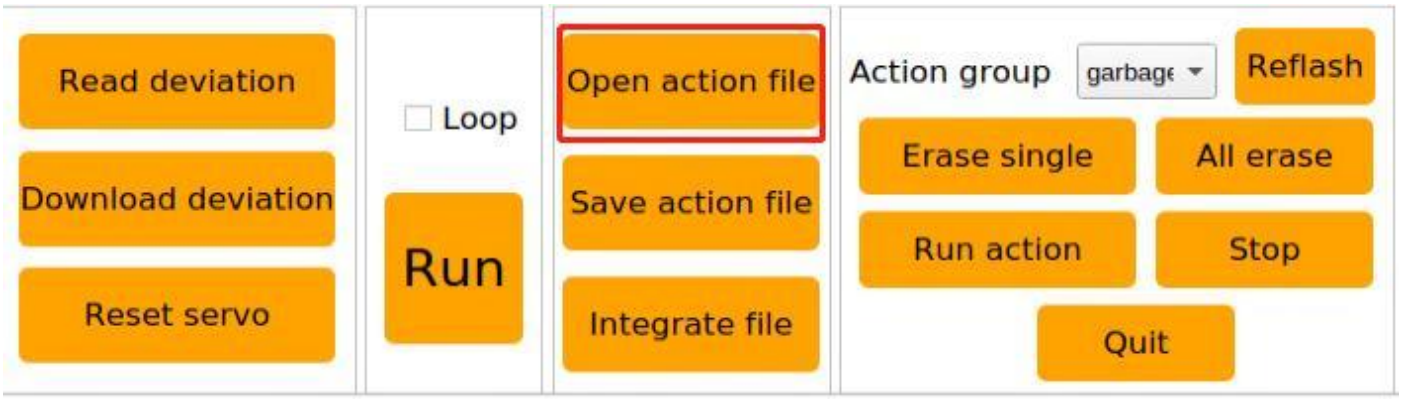
Call built-in action group files via PC software

1) Put down antenna before operation to avoid robot arm of hitting antenna when it is moving.

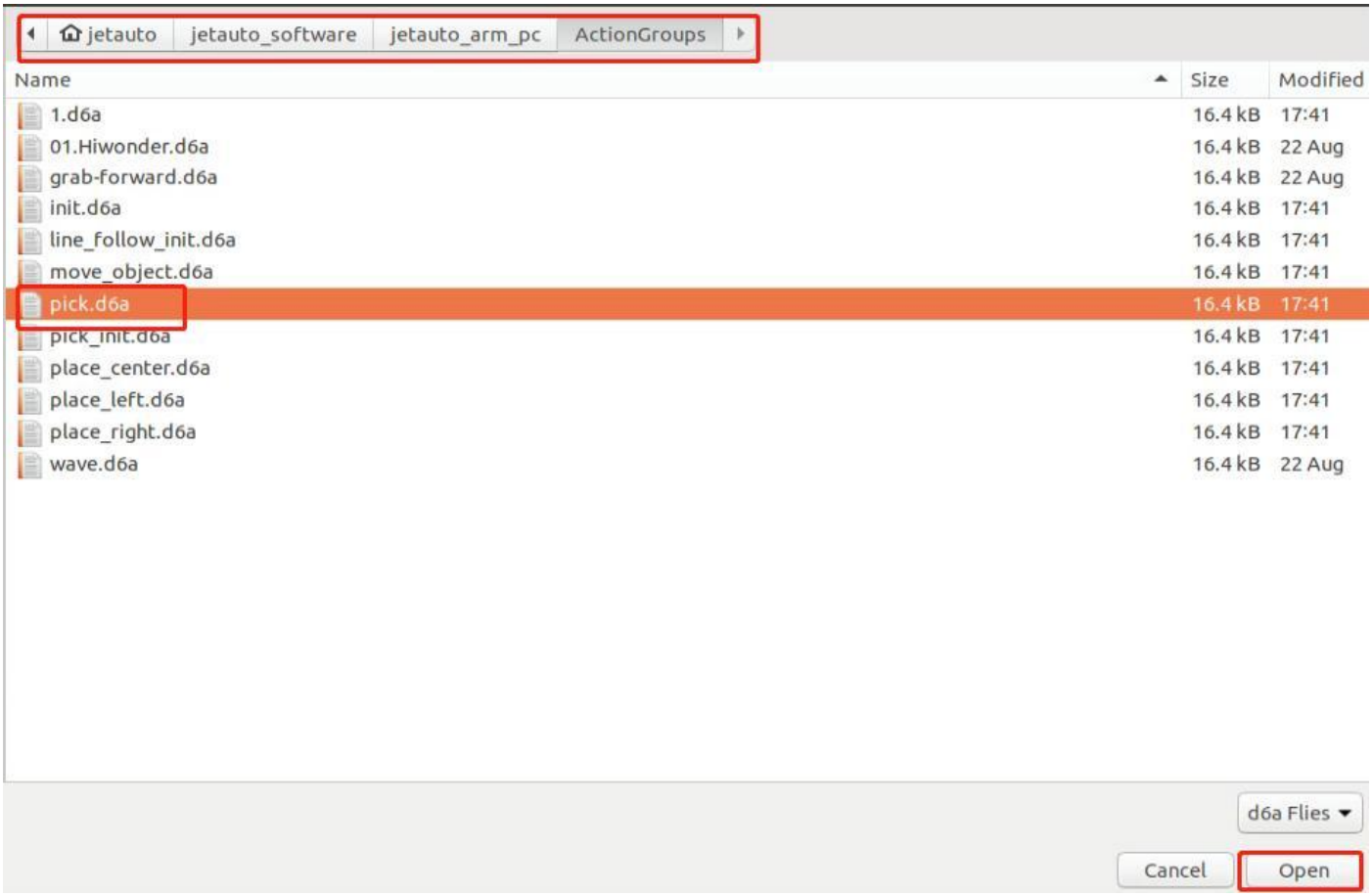
2) Double click 

to enter PC software interface

3) Click “**Open action file**” button



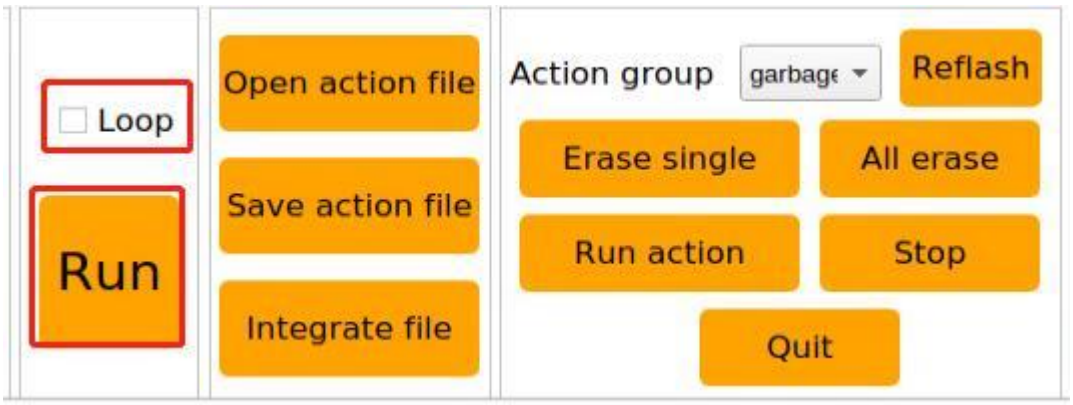
4) Select action group you want, then click “**Open**”.



5) Running time of each action and servo values are displayed on the action list

	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5
	1	1000	200	215	15	650	875
	2	2000	200	230	375	175	875
	3	200	200	230	375	175	875
	4	500	560	230	375	175	875
	5	200	560	230	375	175	875
▶	6	2000	560	215	15	650	875

6) Click “**Run**” button to run all actions in action list. If you want to make robot repeat this action group, you can tick “**Loop**”.



Part 3 Action Editing

1. Final Goal

Edit several actions to form a action group so as to make robotic arm pick the block at left.

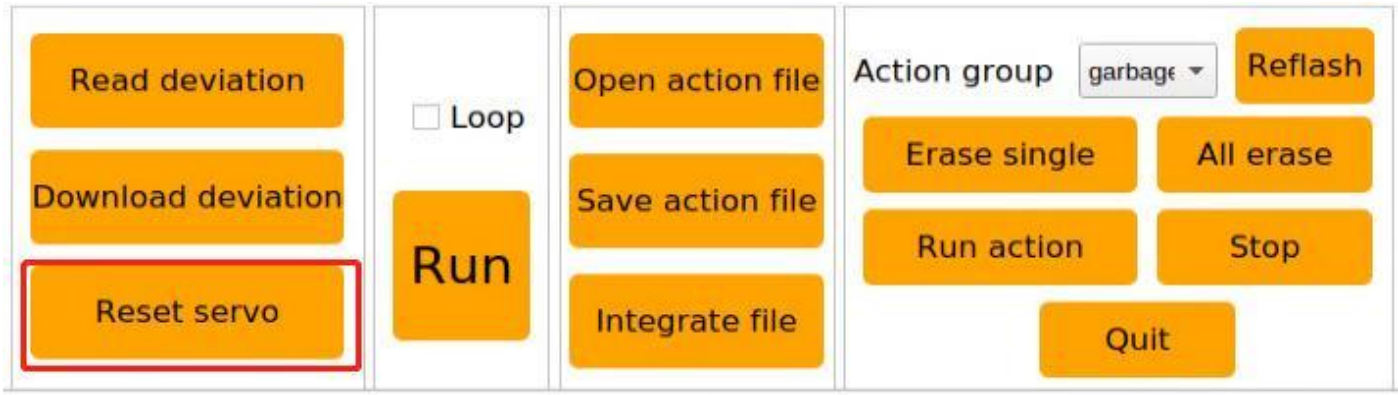
2. Design Action

1) Put down antenna before operation to avoid robot arm of hitting antenna when it is moving.

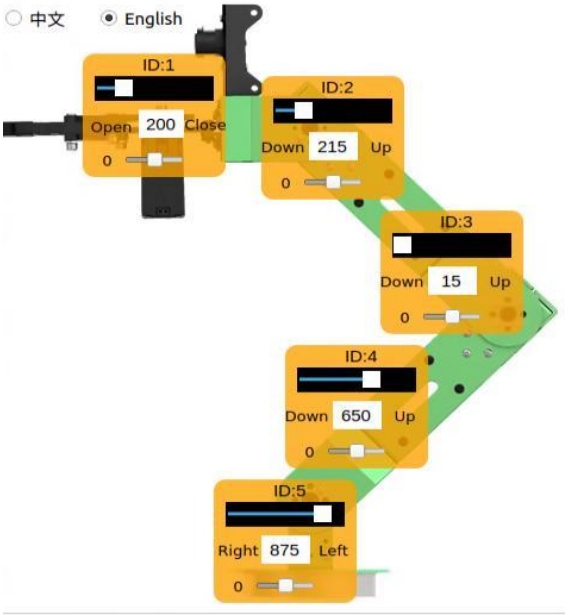
2) Double click 

to enter PC software interface

3) Click “**Reset servo**” to make servo return back to mid-point.



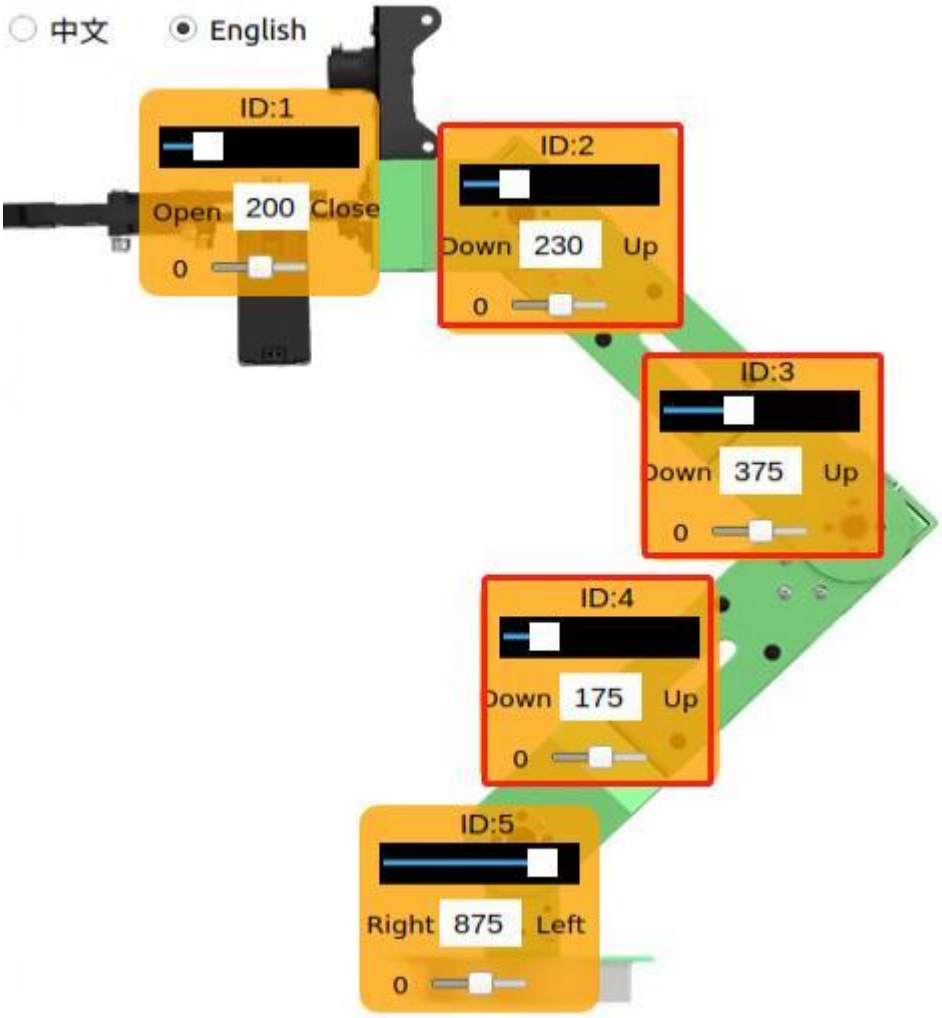
4) Drag the slider to set servo values as pictured to make robot arm bend to left



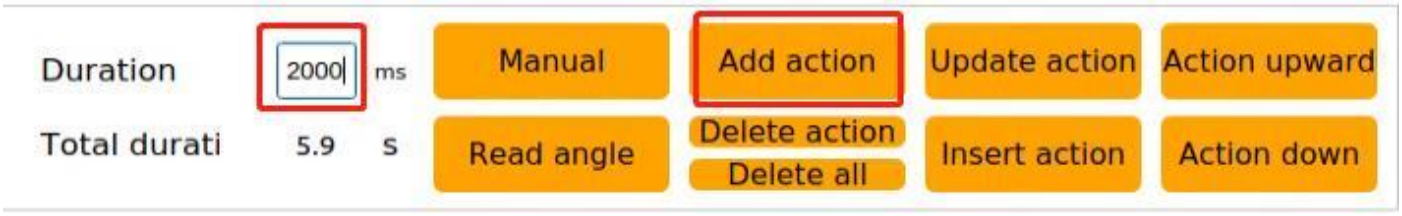
5) Click “**Add Action**” to add current action to action list

	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5
▶	1	1000	200	215	15	650	875

6) Align robot arm with the block. Adjust value of corresponding servos as follow.



7) Set the time as “2000ms”. Click “**Add Action**” to update NO.2 action.

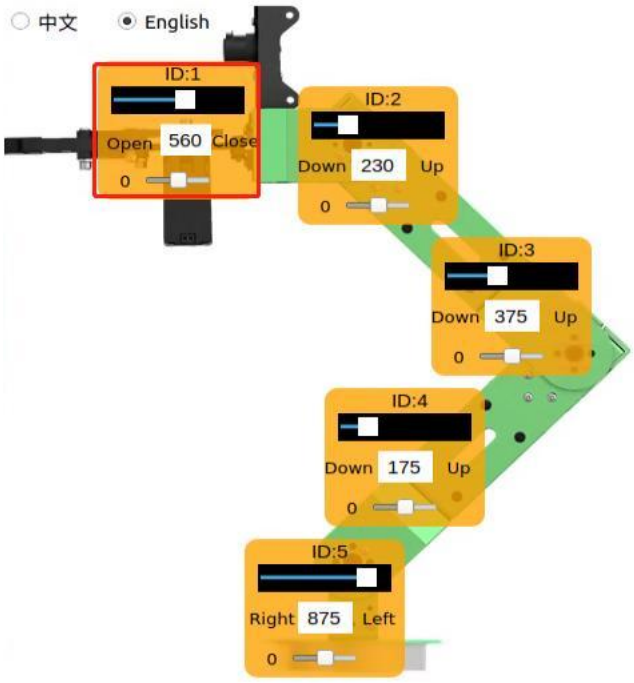


	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5
	1	1000	200	215	15	650	875
▸	2	2000	200	230	375	175	875

8) Add another transitional action. Set the time as 200ms and click “**Add Action**”.

	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5
	1	1000	200	215	15	650	875
	2	2000	200	230	375	175	875
▸	3	200	200	230	375	175	875

9) Adjust NO.1 servo to let robot arm pick the block.



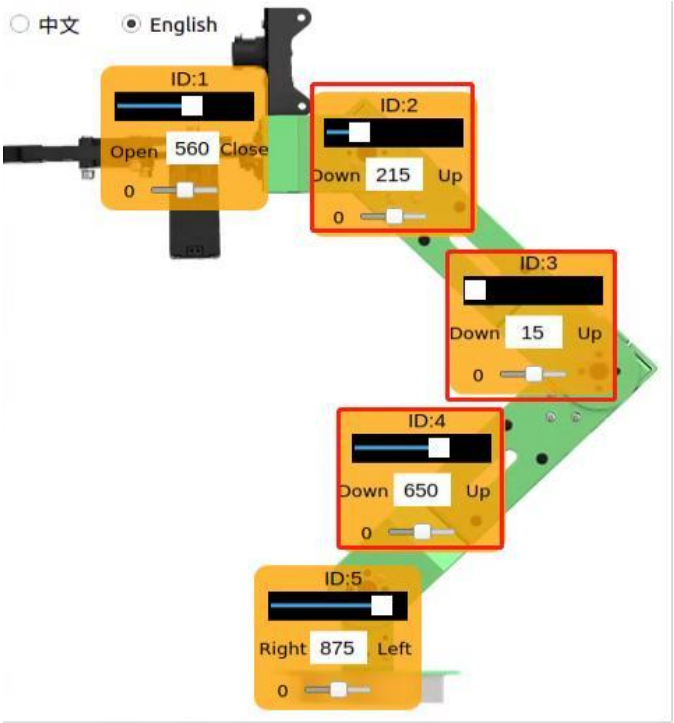
10) Set times as 600ms, then click “**Add Action**”

	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5
	1	1000	200	215	15	650	875
	2	2000	200	230	375	175	875
	3	200	200	230	375	175	875
▶	4	500	560	230	375	175	875

11)Add a transitional action again. Set the time as “200ms”, and click “**Add action**” to form NO.5 action.

	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5
	1	1000	200	215	15	650	875
	2	2000	200	230	375	175	875
	3	200	200	230	375	175	875
	4	500	560	230	375	175	875
▶	5	200	560	230	375	175	875

12)Adjust servo value to make robot arm pick the block to specific height



13)Set the time as 2000 ms, and click “Add action”

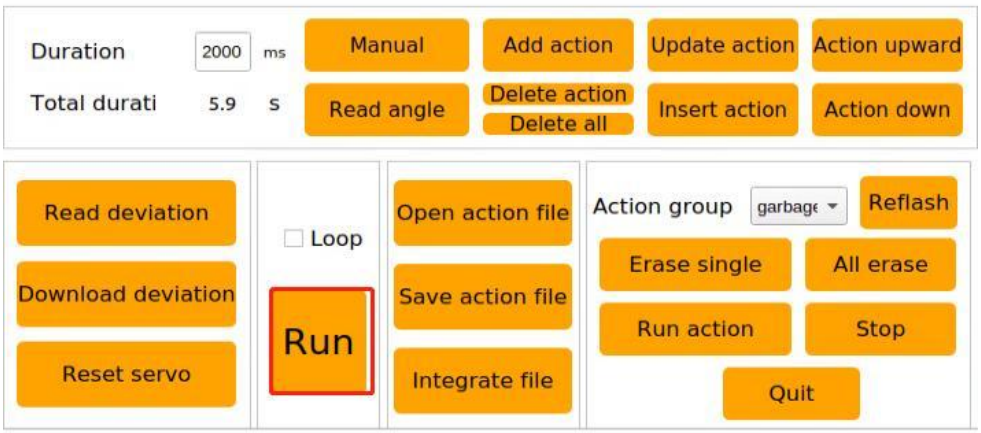
	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5
	1	1000	200	215	15	650	875
	2	2000	200	230	375	175	875
	3	200	200	230	375	175	875
	4	500	560	230	375	175	875
	5	200	560	230	375	175	875
▸	6	2000	560	215	15	650	875

After NO.6 action is edited, action group of "**picking block at left**" is complete

	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5
	1	1000	200	215	15	650	875
	2	2000	200	230	375	175	875
	3	200	200	230	375	175	875
	4	500	560	230	375	175	875
	5	200	560	230	375	175	875
▸	6	2000	560	215	15	650	875

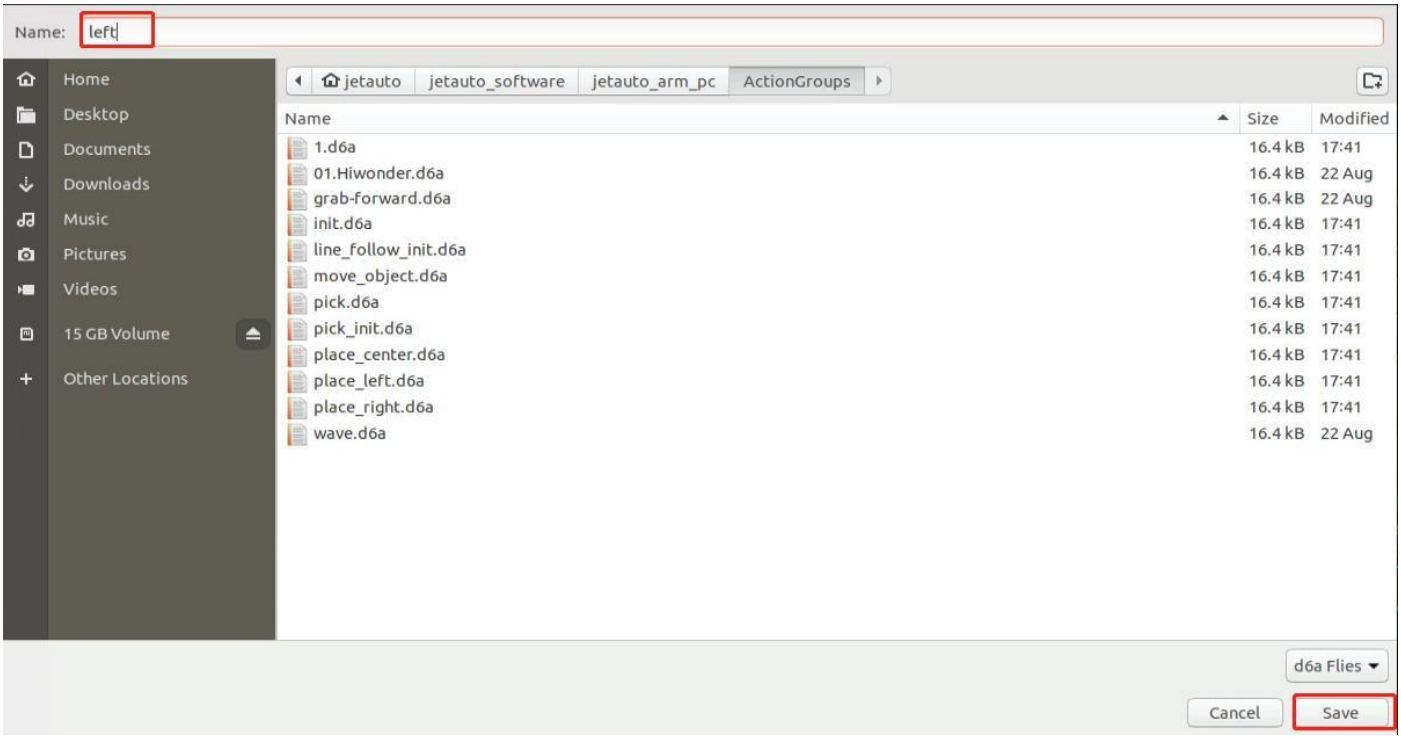
14)Next, let robot arm run the whole action group. Select NO.1 action, then click "**Run**". If you want to repeat this action, tick "**Loop**" box.

	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5
▸	1	1000	200	215	15	650	875
	2	2000	200	230	375	175	875
	3	200	200	230	375	175	875
	4	500	560	230	375	175	875
	5	200	560	230	375	175	875
	6	2000	560	215	15	650	875



3. Save Action

In case of future debugging and management, save the edited action group. Click “Save action file” and select this path, **home/jetauto_software/jetauto_arm_pc/ActionGroups/.**



Part 4 Integrate Action Files

1. Project Goal

Integrating action files is to integrate two action groups to form a new action group.

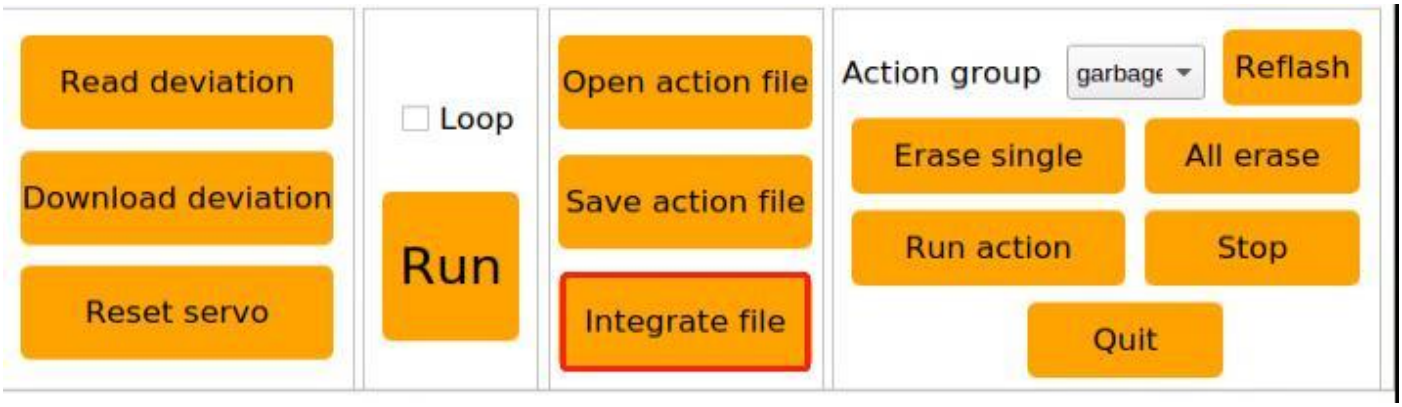
2. Operation Steps

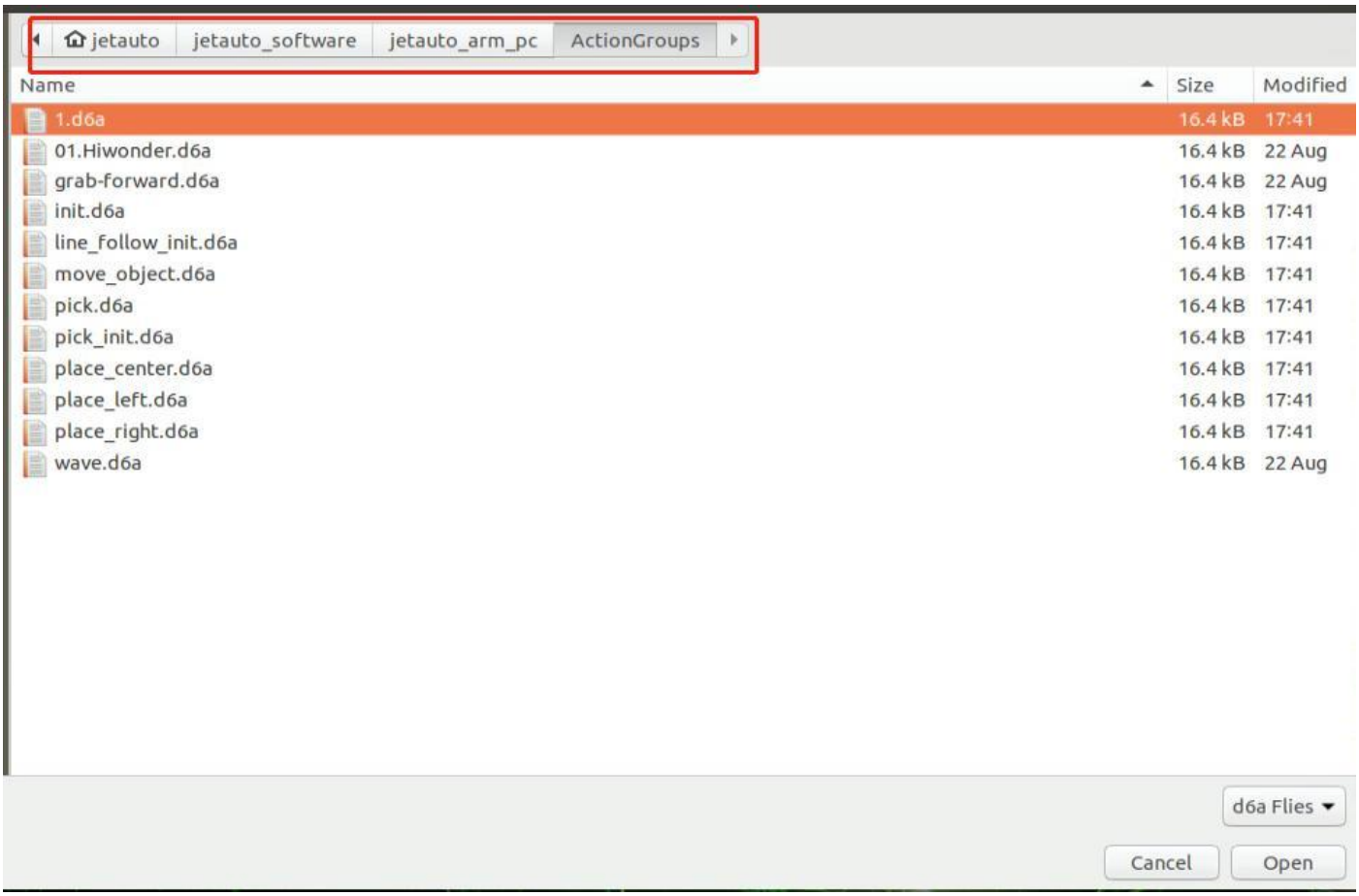
1) Put down antenna before operation to avoid robot arm of hitting antenna when it is moving.

2) Double click 

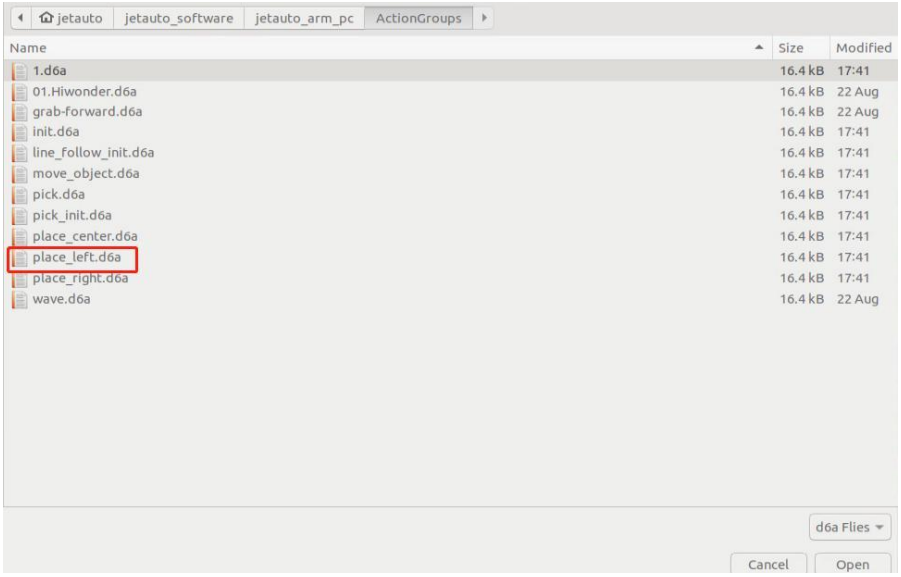
to enter PC software interface.

3) Click “**Integrate files**” button, and select the following path.





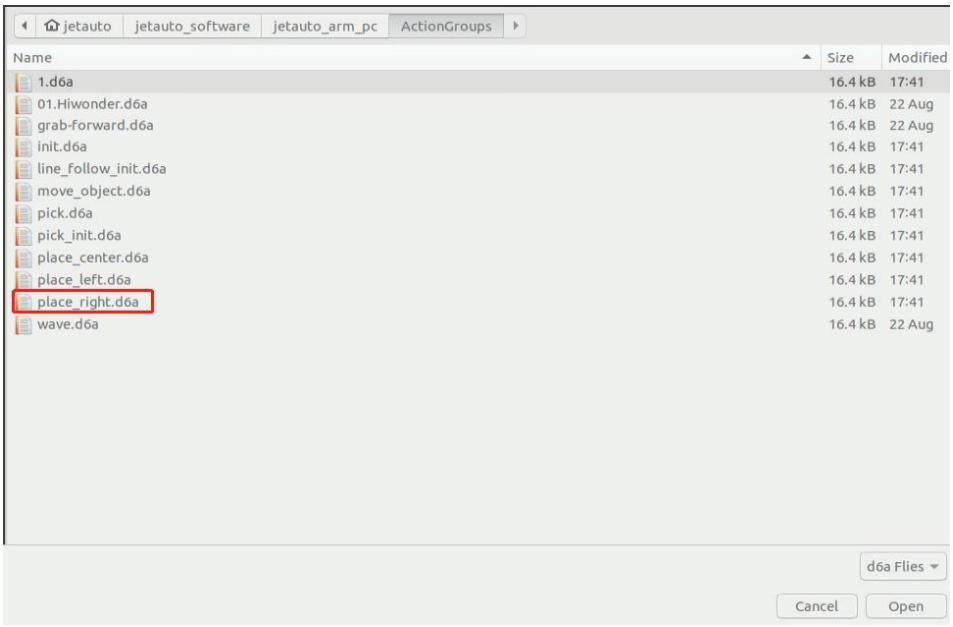
4) Select and open “**place_left.d6a**” on the pop-up window



5) This action group is added to the action list.

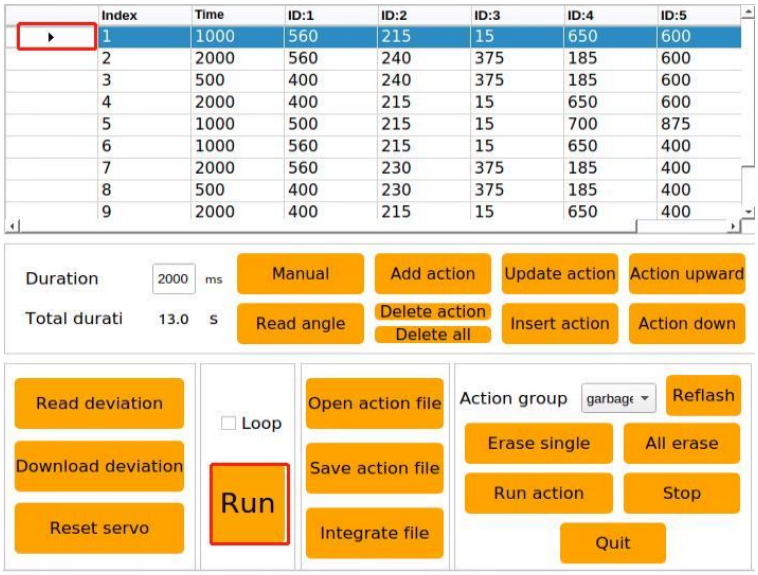
	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5
	1	1000	560	215	15	650	600
	2	2000	560	240	375	185	600
	3	500	400	240	375	185	600
	4	2000	400	215	15	650	600
▸	5	1000	500	215	15	700	875

6) Click “**Integrate action files**” button again. Select and open “**place_right.d6a**”. After that, this action group is added to the end of the first action group.

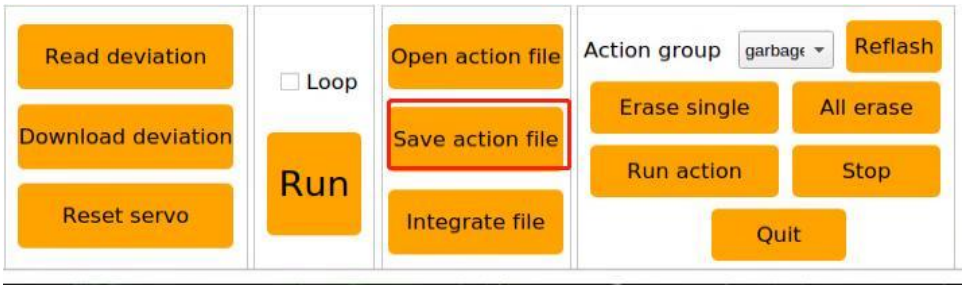


	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5
	2	2000	560	240	375	185	600
	3	500	400	240	375	185	600
	4	2000	400	215	15	650	600
	5	1000	500	215	15	700	875
	6	1000	560	215	15	650	400
	7	2000	560	230	375	185	400
	8	500	400	230	375	185	400
	9	2000	400	215	15	650	400
▸	10	1000	500	215	15	700	875

7) Click NO.1 action, then click “**Run**” to let robot arm perform this integrated action.

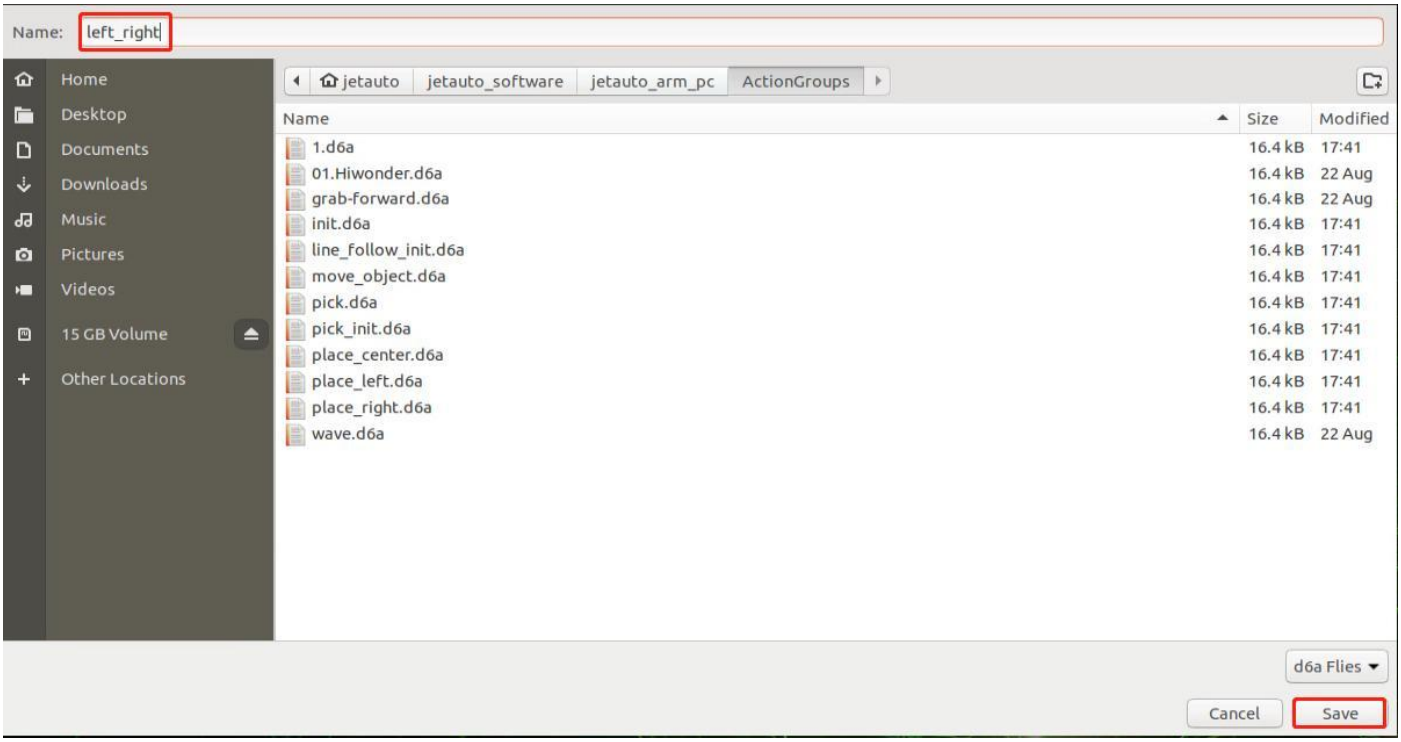


8) Click “**Save action files**” button to save this new action group in case of future debugging.



9) Name this new action group, for example “**left_right**”.

Note: action group name cannot contain “Space”.



Part 5 Export and Import Action Files

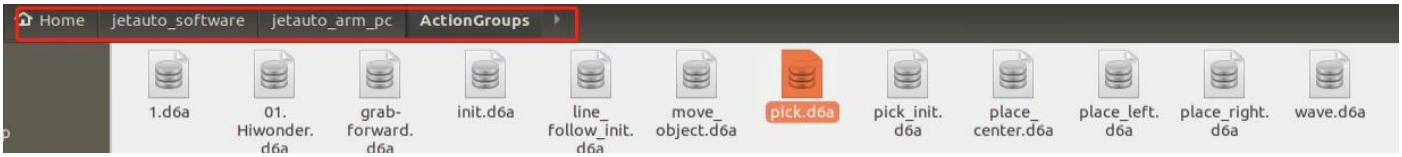
1. Project Goal

Export the action group files edited on PC software, and import them to other devices of the same type.

2. Export Action

1) Click 

2) Find “**pick.d6a**” file.

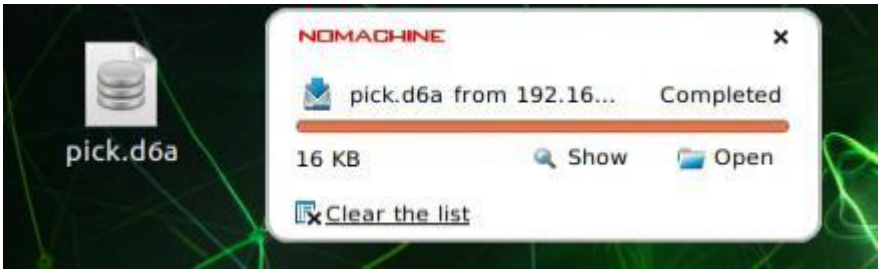


3) Directly drag the action file to the computer desktop to export this file.

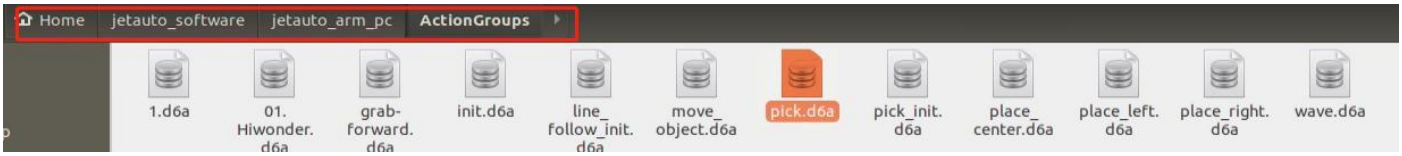
3. Import Action

1) Put down antenna before operation to avoid robot arm of hitting antenna when it is moving.

2) Directly drag “**pick.d6a**” action file to robot system desktop.

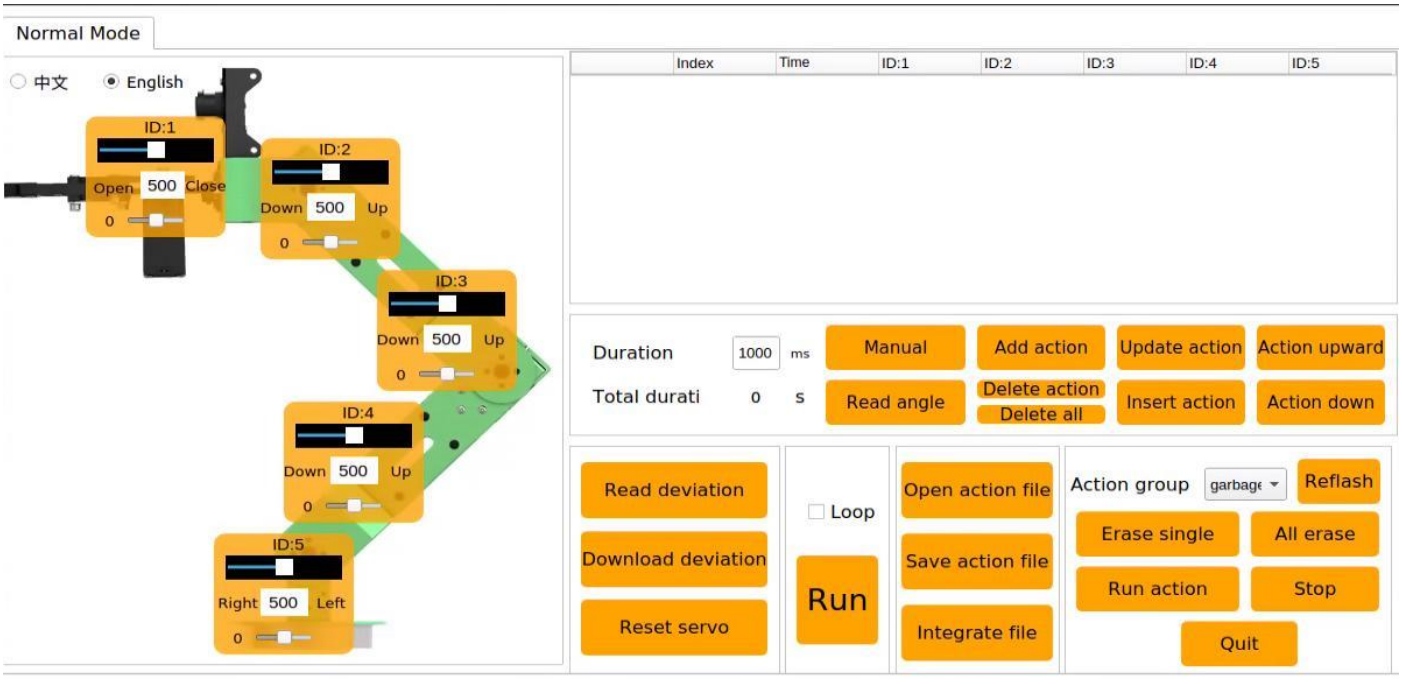


3) Then directly drag or copy “**pick.d6a**” file to following path.

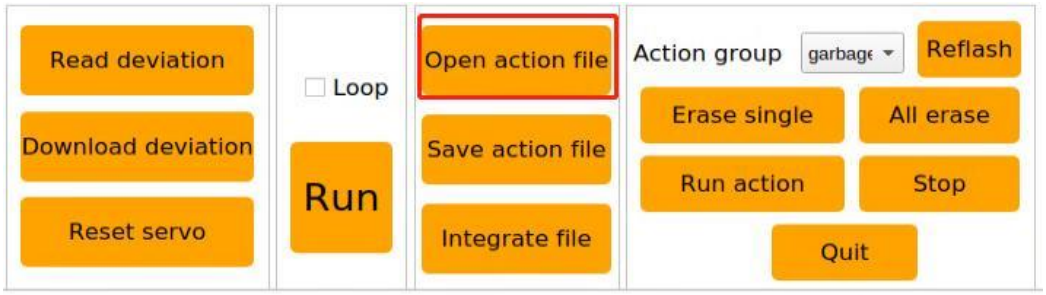


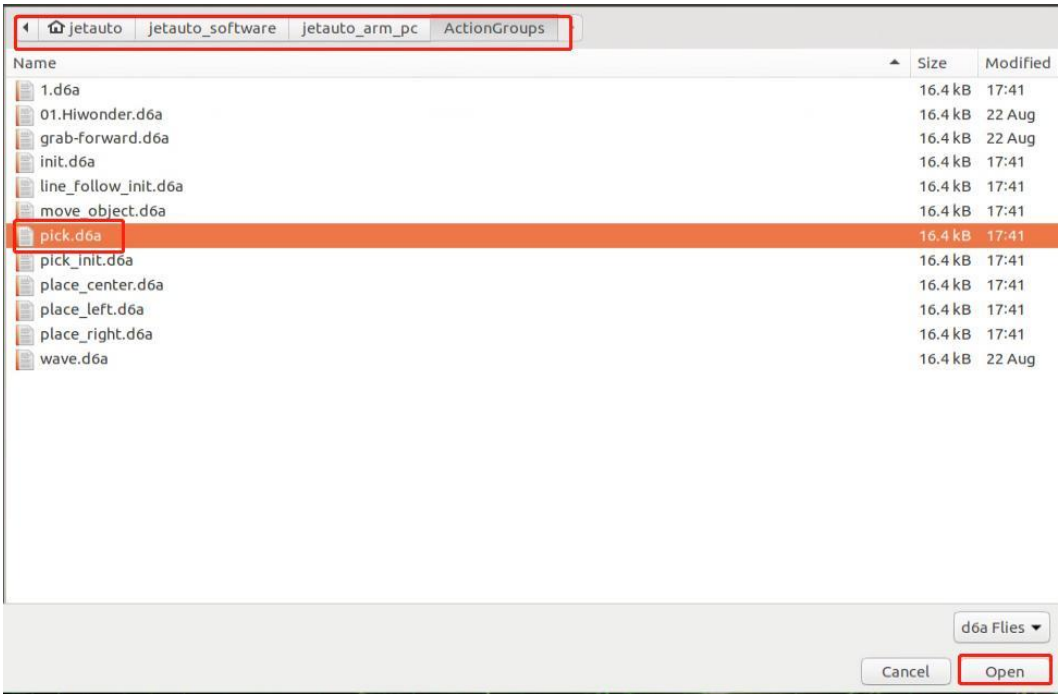
4) Double click 

to enter PC software interface.

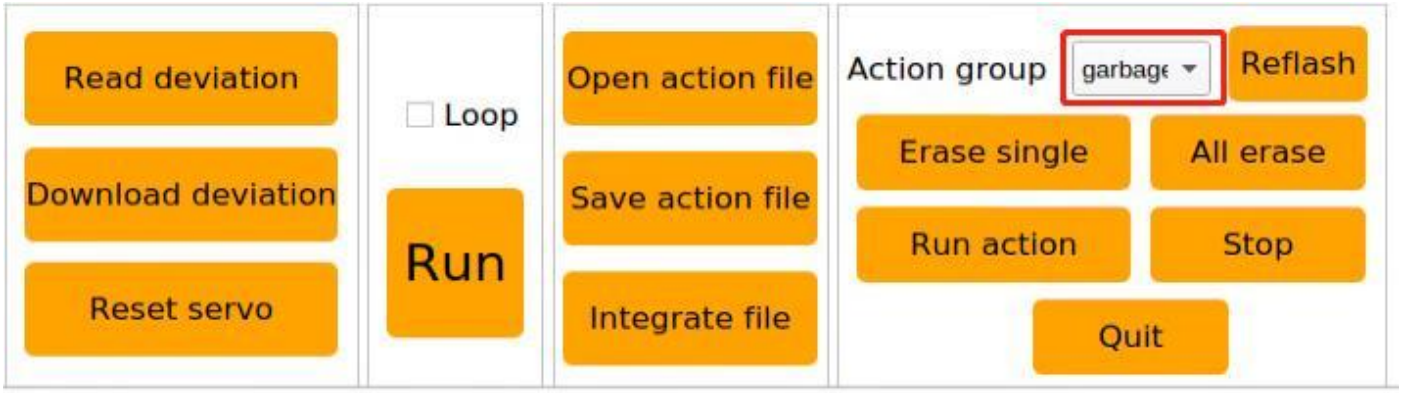


5) Click “**Open action files**” button. Find the file you just import, and open it.





Or directly select the imported action group in this drop-down menu.



6) Click “**Run**” button to let robot arm execute this action group.