

Lesson 3 Action Programming

The values set in this lesson just for reference, you can adjust them according to the actual situation.

1. Purpose

Create an action group to allow robotic arm to transport the block to the left side.

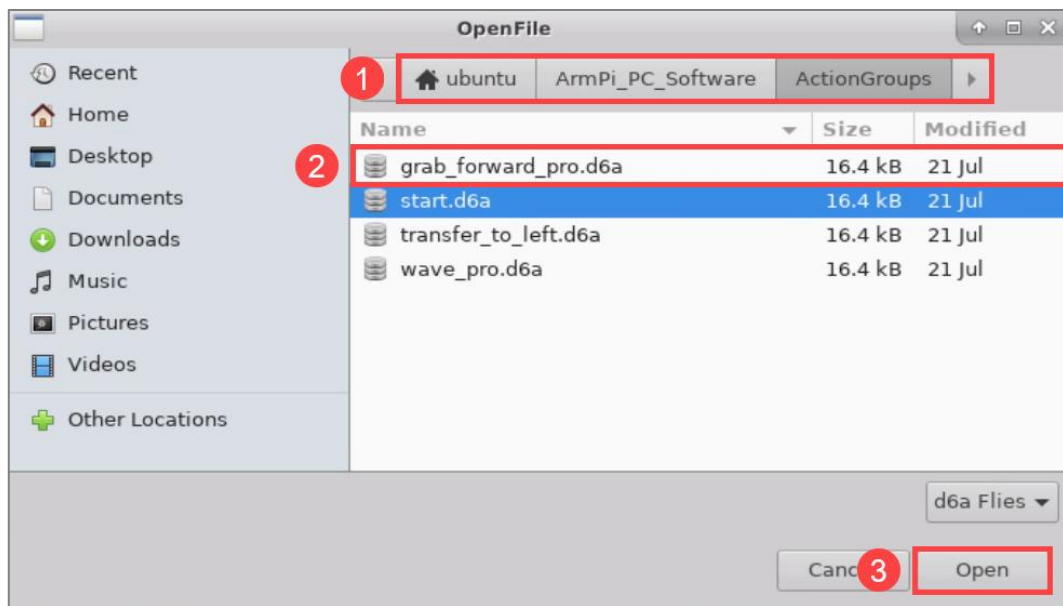
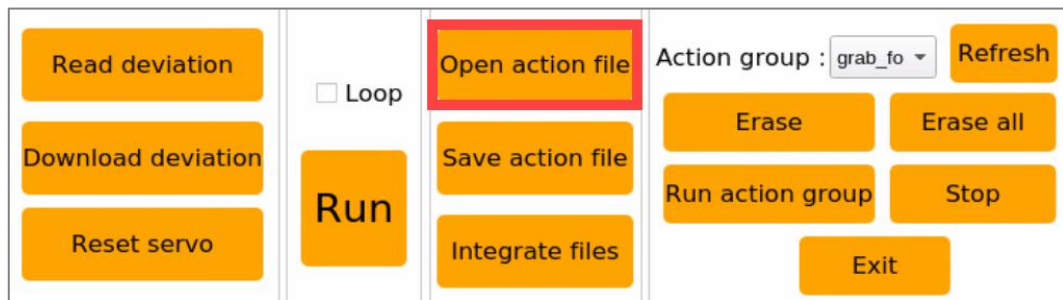
2. How to realize it?

2.1 Action Design

- 1) Double-click  to open PC software (normal mode).



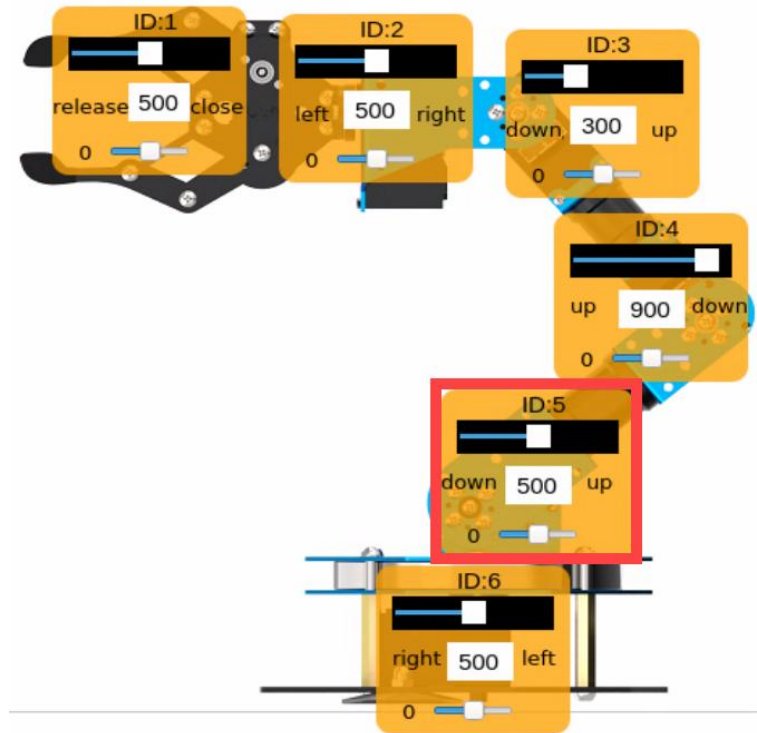
- 2) Click “Open action file” and select “start” action group file in “ubuntu/ArmPi_PC_Software/ActionGroups”. Then click “Open” to import this action group into action date list to set an initial posture for ArmPi Pro.



- 3) Click ► in front of No.1 action to update the servo angel information in servo control area.

	编号	时间	ID:1	ID:2	ID:3	ID:4	ID:5	ID:6
►	1	800	500	500	300	900	700	500

- 4) Drag the bar slider of No.5 servo to allow robotic arm to move down to the block.



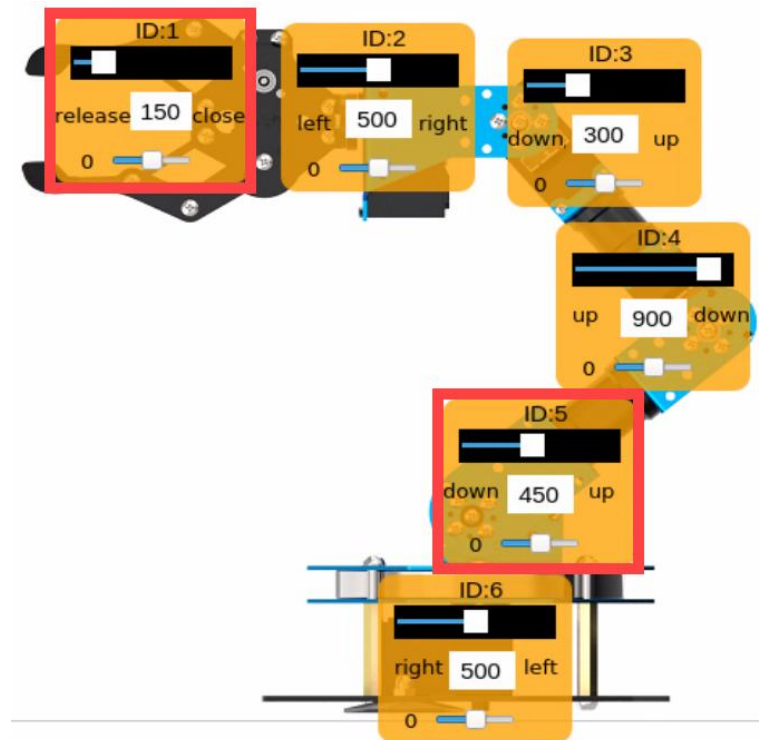
- 5) Set the running time as 800ms and click “Add action” to get the second action.

Running time	<input type="text" value="800"/> ms	Manual coding	Add action	Update action	Move up
Total time	1.6 s	Read angle	Delete action	Insert action	Move down
			Delete all		

- 6) To make action group smoother, add a transition action after setting an action and set the running time as 100ms. Then click “Add action” to get No.3 action.

Running time	<input type="text" value="100"/> ms	Manual coding	Add action	Update action	Move up
Total time	1.7 s	Read angle	Delete action	Insert action	Move down
			Delete all		

- 7) Then drag the sliders of No.1 and No.5 servos to allow the gripper open and move to the block.



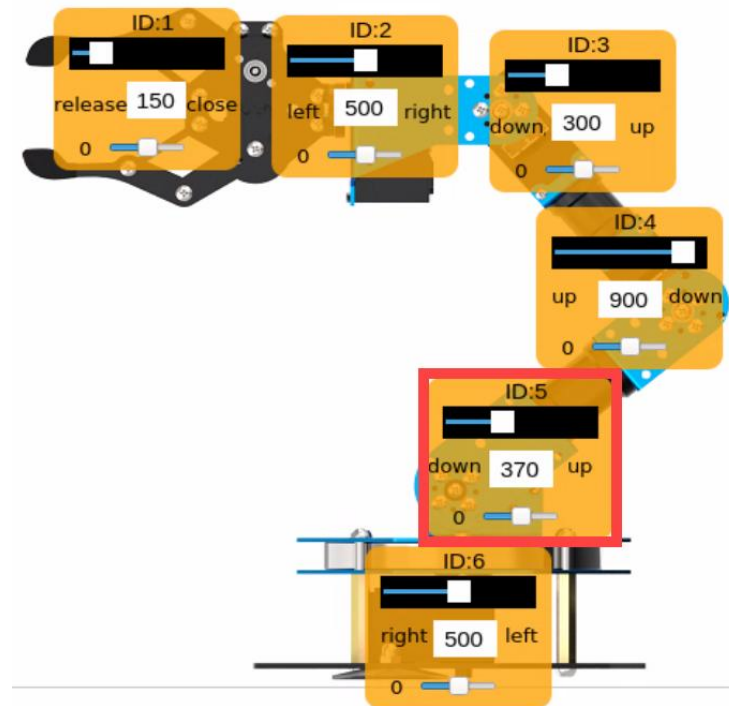
8) Set the running time as 500ms and click “Add action” to get No.4 action.

Running time	500 ms	Manual coding	Add action	Update action	Move up
Total time	2.2 s	Read angle	Delete action	Insert action	Move down
			Delete all		

9) Add a transition action. Set the running time as 500ms and click “Add action” to get No.5 action.

Running time	200 ms	Manual coding	Add action	Update action	Move up
Total time	2.4 s	Read angle	Delete action	Insert action	Move down
			Delete all		

10) Then drag the slider of No.5 servo to point the gripper at the block.



11) The running time is set as 600ms and click “Add action” to get No.6 action.

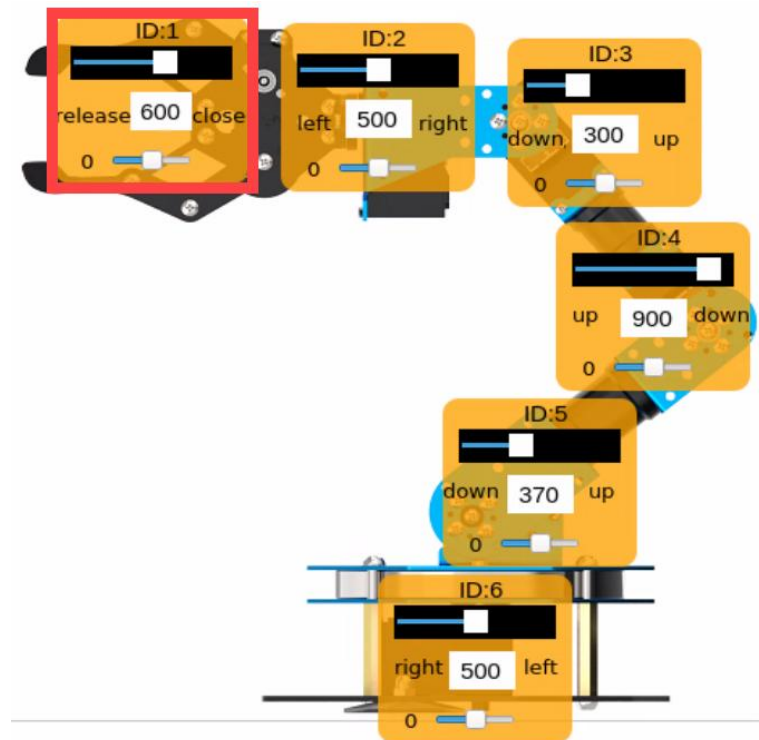
Running time	<input type="text" value="600"/> ms	Manual coding	<input type="button" value="Add action"/>	Update action	Move up
Total time	3.0 s	Read angle	<input type="button" value="Delete action"/>	Insert action	Move down
			<input type="button" value="Delete all"/>		

12) Then add a transition action. Set the running time as 200ms and click “Add action” to get No.7 action.

	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5	ID:6
	1	800	500	500	300	900	700	500
	2	800	500	500	300	900	500	500
	3	100	500	500	300	900	500	500
	4	500	150	500	300	900	450	500
	5	200	150	500	300	900	450	500
	6	600	150	500	300	900	370	500
	7	200	150	500	300	900	370	500

Running time	<input type="text" value="200"/> ms	Manual coding	<input type="button" value="Add action"/>	Update action	Move up
Total time	3.2 s	Read angle	<input type="button" value="Delete action"/>	Insert action	Move down
			<input type="button" value="Delete all"/>		

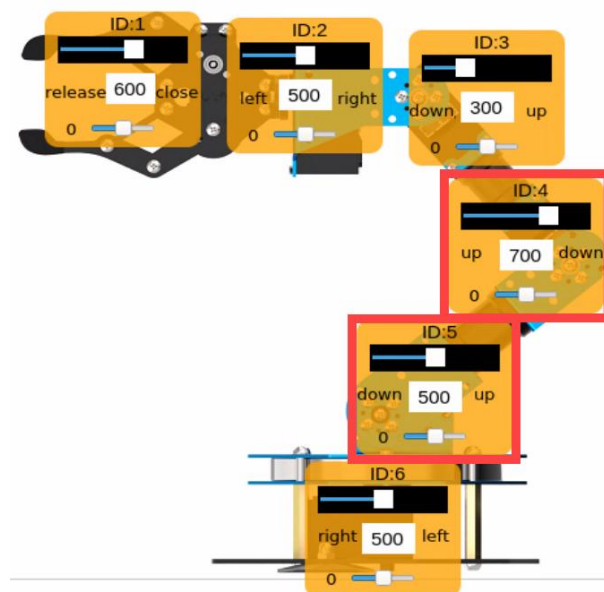
13) Drag the slider under ID1 servo to grip the block.



14) The running time is set as 600ms and then click “Add action” to get No.8 action.



15) Then adjust the value of No.4 and No.5 servos to raise the robotic arm.



16) The running time is set as 700ms and then click “Add action” to get No.9 action.

编号	时间	ID:1	ID:2	ID:3	ID:4	ID:5	ID:6
1	800	500	500	300	900	700	500
2	800	500	500	300	900	450	500
3	100	500	500	300	900	450	500
4	400	150	500	300	900	400	500
5	100	150	500	300	900	400	500
6	500	150	500	300	900	350	500
7	100	150	500	300	900	350	500
8	400	500	500	300	900	350	500
9	700	500	500	300	700	500	500

1

2

动作时间 ms
 总时长 3.9 s

马达掉电
 添加动作
 更新动作
 上移动作
 角度回读
 删除动作
 删除全部
 插入动作
 下移动作

17) Add a transition action and set the running time as 200ms.

编号	时间	ID:1	ID:2	ID:3	ID:4	ID:5	ID:6
2	800	500	500	300	900	450	500
3	100	500	500	300	900	450	500
4	400	150	500	300	900	400	500
5	100	150	500	300	900	400	500
6	500	150	500	300	900	350	500
7	100	150	500	300	900	350	500
8	400	500	500	300	900	350	500
9	700	500	500	300	700	500	500
10	100	500	500	300	700	500	500

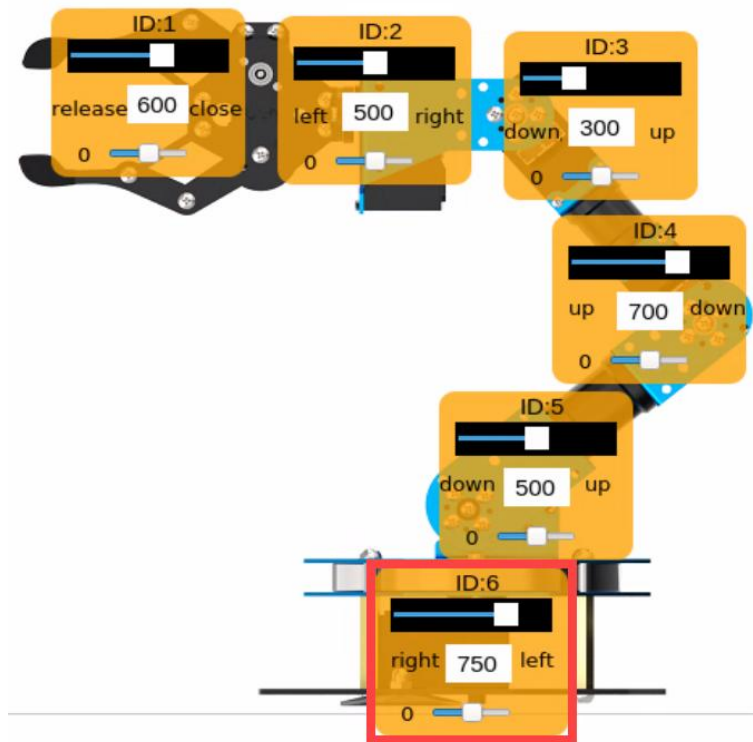
1

2

动作时间 ms
 总时长 4.0 s

马达掉电
 添加动作
 更新动作
 上移动作
 角度回读
 删除动作
 删除全部
 插入动作
 下移动作

18) Then adjust the value of No.6 servo to allow the robotic arm to move the block to the left side.



19) The running time is set as 800ms and then click “Add action” to get No.11 action.



20) Add a transition action and set the running time as 200ms.



21) After moving the block to the specific position, put it down. This step need to adjust the value of No.3, No.4 and No.5 servos.



22) Then set the running time as 600ms and click “Add action” to get No.13 action.

Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5	ID:6
5	200	150	500	300	900	450	500
6	600	150	500	300	900	370	500
7	200	150	500	300	900	370	500
8	600	600	500	300	900	370	500
9	700	600	500	300	700	500	500
10	200	600	500	300	700	500	500
11	800	600	500	300	700	500	750
12	200	600	500	300	700	500	750
13	800	600	500	400	850	350	750

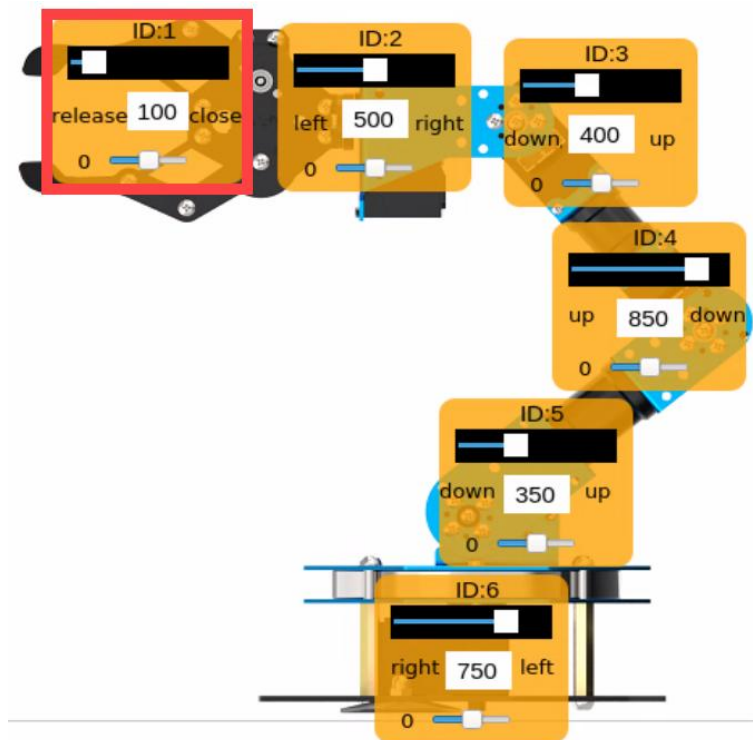
Running time ms
Manual coding
Add action
Update action
Move up

Total time 6.5 s
Read angle
Delete action
Delete all
Insert action
Move down

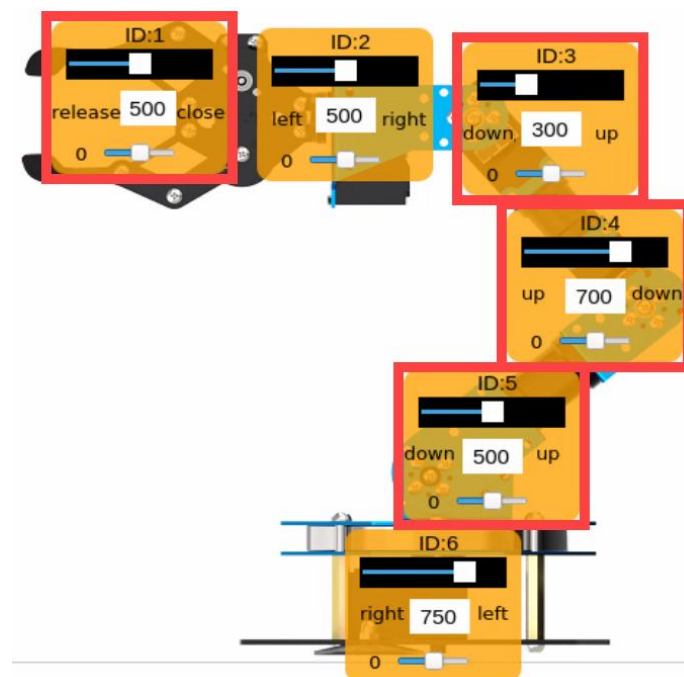
23) Add an transition action and its running time is set to 100ms.

Running time	<input type="text" value="100"/>	ms	Manual coding	Add action	Update action	Move up
Total time	6.6	s	Read angle	Delete action	Insert action	Move down
				Delete all		

24) The drag the slider of ID1 servo to loose the block.



25) After completing this action, let robotic arm back to the initial posture.
Adjust the value of ID1, ID3, ID4 and ID5 servos to close the gripper and lift the robotic arm.



26) Set the time to 00ms, and then click “Add action” to get No.16 action.

	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5	ID:6
	8	600	600	500	300	900	370	500
	9	700	600	500	300	700	500	500
	10	200	600	500	300	700	500	500
	11	800	600	500	300	700	500	750
	12	200	600	500	300	700	500	750
	13	800	600	500	400	850	350	750
	14	100	600	500	400	850	350	750
	15	400	100	500	400	850	350	750
	16	700	500	500	300	700	500	750

Running time ms
Manual coding
Add action
Update action
Move up

Total time 7.7 s
Read angle
Delete action
Delete all
Insert action
Move down


27) Add an transition action and set its running time to 100ms.

Running time ms
Manual coding
Add action
Update action
Move up

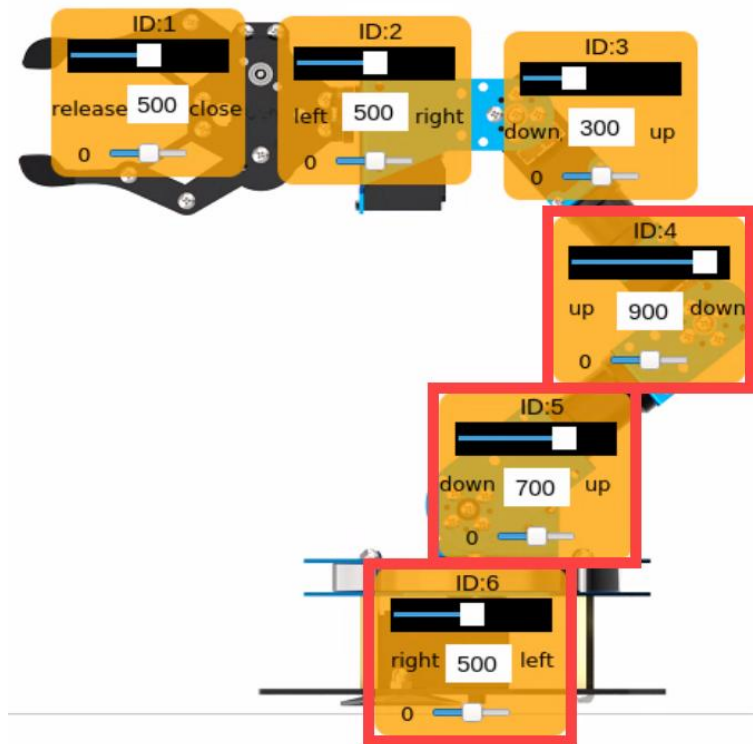
Total time 7.8 s
Read angle
Delete action
Delete all
Insert action
Move down

28) Finally, return the robotic arm to initial posture. No need to adjust the servo

value. Find No.1 action and click .

	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5	ID:6
	1	800	500	500	300	900	700	500
	2	800	500	500	300	900	500	500
	3	100	500	500	300	900	500	500
	4	500	150	500	300	900	450	500
	5	200	150	500	300	900	450	500
	6	600	150	500	300	900	370	500
	7	200	150	500	300	900	370	500
	8	600	600	500	300	900	370	500
	9	700	600	500	300	700	500	500

29) In meantime, the servo control area at left side will update the value of No.1 action, as the figure shown below:



30) Finally, set the running time as 800 and click “Add action” to get No.18 action.

	Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5	ID:6
▶	1	800	500	500	300	900	700	500
	2	800	500	500	300	900	500	500
	3	100	500	500	300	900	500	500
	4	500	150	500	300	900	450	500
	5	200	150	500	300	900	450	500
	6	600	150	500	300	900	370	500
	7	200	150	500	300	900	370	500
	8	600	600	500	300	900	370	500
	9	700	600	500	300	700	500	500

Ok, the entire of this action has been programmed completely, as the figure shown below.

Index	Time	ID:1	ID:2	ID:3	ID:4	ID:5	ID:6
1	800	500	500	300	900	700	500
2	800	500	500	300	900	500	500
3	100	500	500	300	900	500	500
4	500	150	500	300	900	450	500
5	200	150	500	300	900	450	500
6	600	150	500	300	900	370	500
7	200	150	500	300	900	370	500
8	600	600	500	300	900	370	500
9	700	600	500	300	700	500	500
10	200	600	500	300	700	500	500
11	800	600	500	300	700	500	750
12	200	600	500	300	700	500	750
13	800	600	500	400	850	350	750
14	100	600	500	400	850	350	750
15	400	100	500	400	850	350	750
16	700	500	500	300	700	500	750
17	100	500	500	300	700	500	750
18	1000	500	500	300	900	700	500

31) Next, let's look at the performance. Select No.1 action and click "Run". If you want to execute this action cyclically, you can check "Loop".

The screenshot shows the Hiwonder software interface. At the top is a table with 9 columns: 编号 (No.), 时间 (Time), ID:1, ID:2, ID:3, ID:4, ID:5, and ID:6. The first row is highlighted in blue and has a red circle with the number 1 next to it. Below the table is a control panel with various buttons and settings. A red circle with the number 2 highlights the '运行' (Run) button. The control panel includes buttons for '读取偏差' (Read deviation), '下载偏差' (Download deviation), '复位舵机' (Reset servo), '打开动作文件' (Open action file), '保存动作文件' (Save action file), '串联动作文件' (Serial action file), '马达掉电' (Motor power off), '添加动作' (Add action), '更新动作' (Update action), '上移动作' (Move up), '角度回读' (Angle read back), '删除动作' (Delete action), '删除全部' (Delete all), '插入动作' (Insert action), '下移动作' (Move down), '动作组' (Action group) with a dropdown menu set to 'grab-for', '刷新' (Refresh), '单个擦除' (Erase single), '全部擦除' (Erase all), '动作组运行' (Action group run), '停止' (Stop), and '退出' (Exit). There is also a checkbox for '循环' (Loop) which is currently unchecked.

2.2 Save Action

Note: The action name can not contain space key. It is recommended to use “_” instead of space key.

For facilitate debugging sometime, save the completed action group. Click “Save action file” and save to the path “ubuntu\ArmPi_PC_Software\ActionGroups” .

Here name the action group as “transfer_to_left” and click “Save” to save action.

