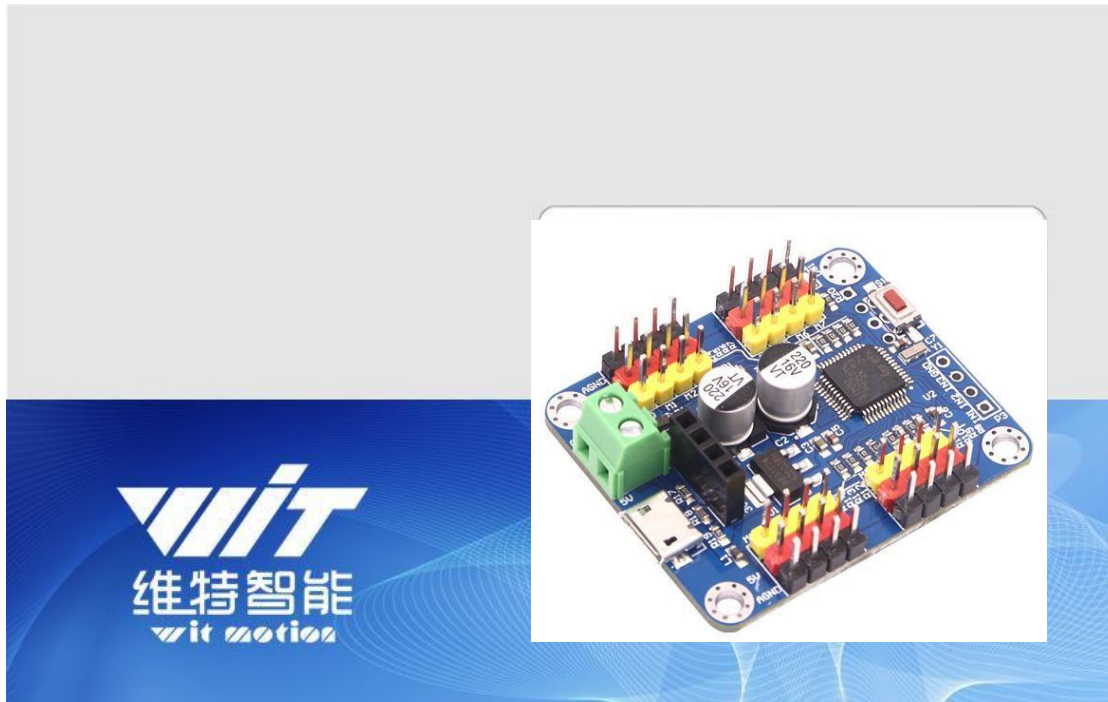


16 Channels Servo Board



Model : WT Servo 16

Description : Servo motor controller driver board 16 channels

Production Standard

Enterprise quality system standard: ISO9001:2016

Catalog

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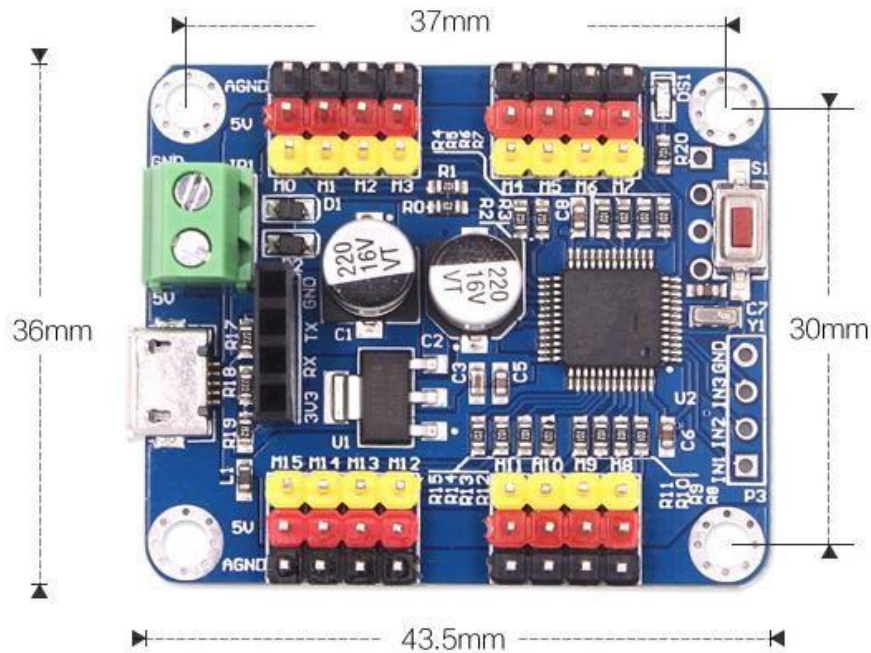
1. Features

- ❖ 16 channels servo motor control.
- ❖ USB/ TTL/ Bluetooth (optional Bluetooth module) connection.
- ❖ Action state setting, Simplify the action process.
- ❖ Online motor program editor, custom action sequences.
- ❖ Excellent PC control software, online control, offline operation.
- ❖ USB power supply (for writing program), direct plug, no need to drive.

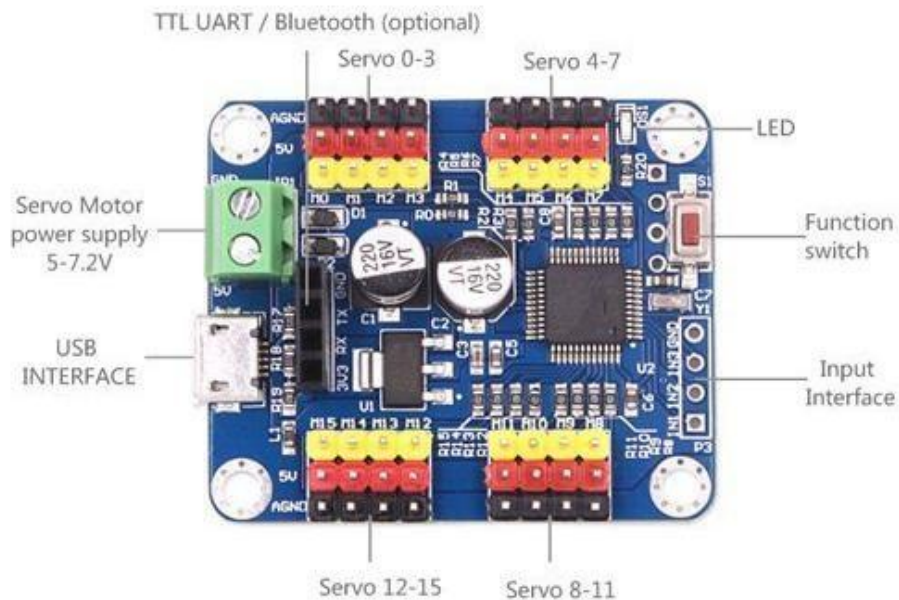
2. Product Parameters

- Master chip: STM32 series.
- Frequency: 48MHZ.
- Size: 3.5mm×36mm×12mm.
- Mounting hole position: 37×30mm, Aperture: 3mm.
- Operating temperature: -40~80℃.
- Operating voltage: USB: 5V
- TTL: 3.3V(two choose one).
- Servo motor supply: 5~7.2V. The JP1 needs to supply the servo motor separately.
- Channels: 16.
- PWM accuracy: 0.1us.
- The minimum step of the servo motor: 1us.
- Communication interface: USB/ TTL UART(optional Bluetooth).
- Baud rate: 9600Kps
- PC software: Yes.
- Number of action groups: Group 16.
- Store the number of action: 8192.

3. Product Display



4. Interface Description



5. Operating Instruction

5.1 Dual Power Supply

1. The USB port/ serial port is supplied to the servo motor control board. it is also used as the interface of PC communication. Voltage is 5V
2. The Servo Motor power port(JP1) supplies to the steering gear, the supplied voltage is 5-7.2V.

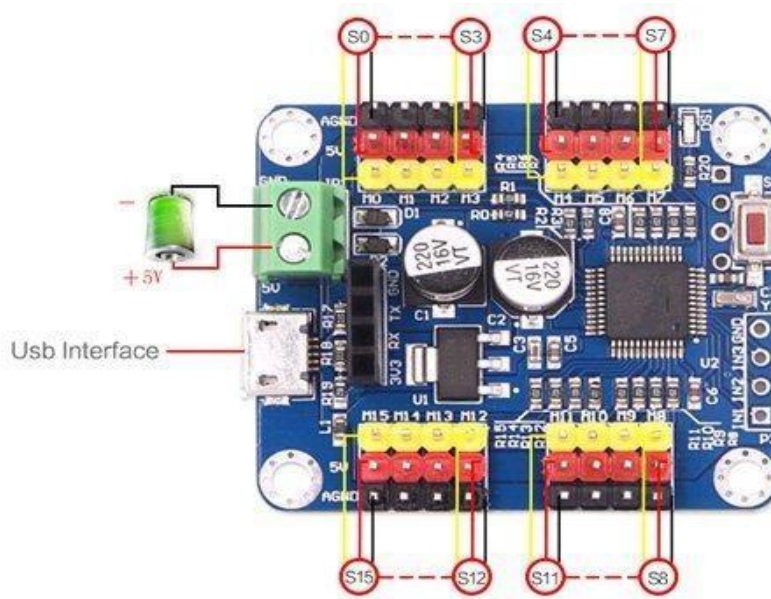
Reminder: The PC software can be programmed directly through the USB port/ serial port. If there is a connection to the steering gear. You must use the JP1 port to power the servo motor, otherwise the servo motor can not be turned. In the case of two-way power supply, the PC software operation is also correct, nor can not control the servo motor. Please measure the voltage of the JP1 port. This phenomenon is generally caused by the instability of power supply.

5.2 USB Connection


Connecting PC requires only one USB cable to control the board, connect to the PC software and test the basic function of the control panel.

5.2.1 Hardware Connection

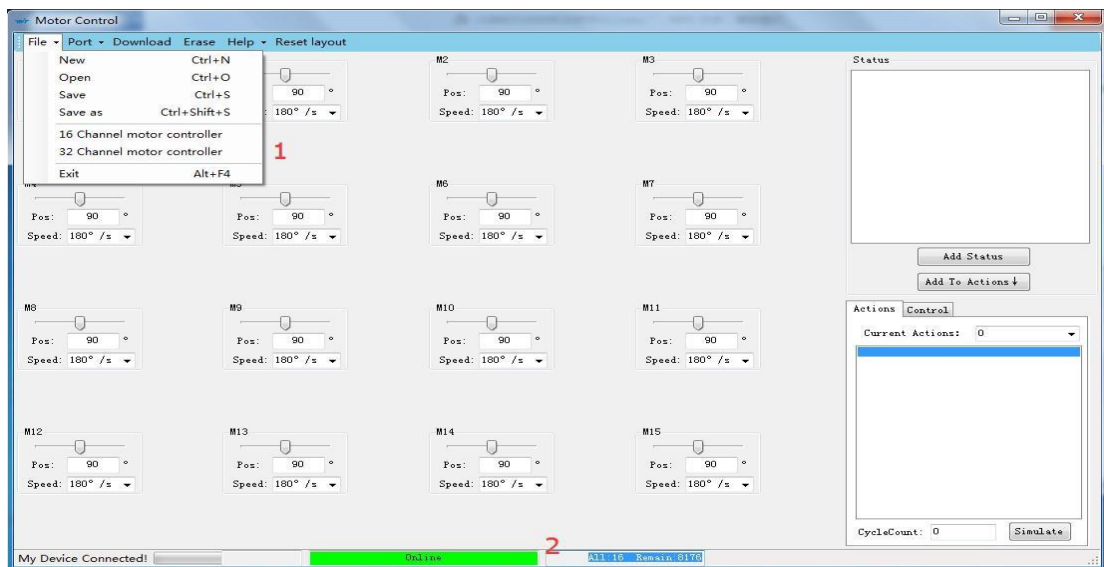
When the USB cable is connected to the servo motor control panel, the light(DS1) of control panel is always on, which means having been connected successfully. Refer to the hardware connection diagram.



5.2.2 Software Connection

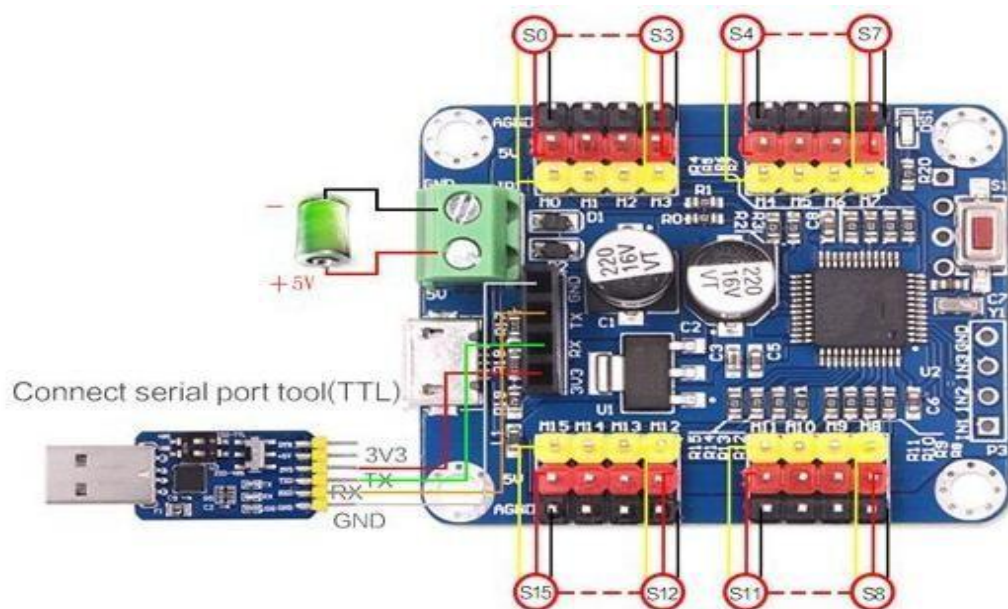
- (1) Double-click on the PC software icon  and open it.
- (2) Click "File" and choose "16 Channels controller".

When the status of the PC software connection is displayed green, that is the online state. At this time, the indicator light(DS1) of the control panel blinks slowly. If not online, the state bar is yellow.



5.3 Instruction

5.3.1 Hardware Connection

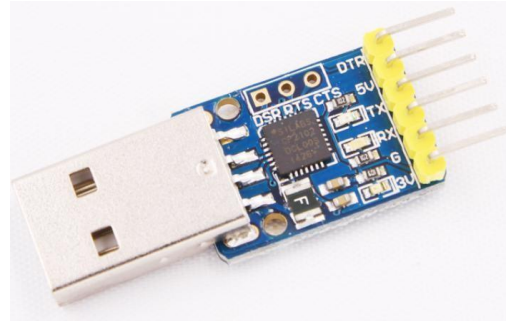
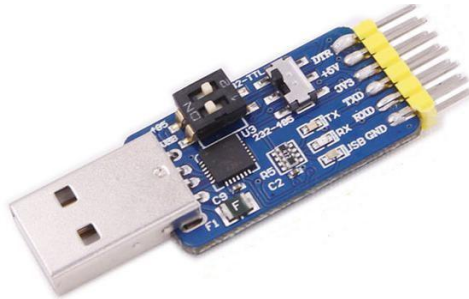


- ① Power the board
The supplied voltage of control panel is 3.3V
- ② Power the Servo Motor

The Servo Motor power port(JP1) supplies to the steering gear, the supplied voltage is 5-7.2V.
Reminder: The voltage of control panel can not exceed 3.3V. Otherwise, the servo motor control panel will be damaged.

③

the following two module.



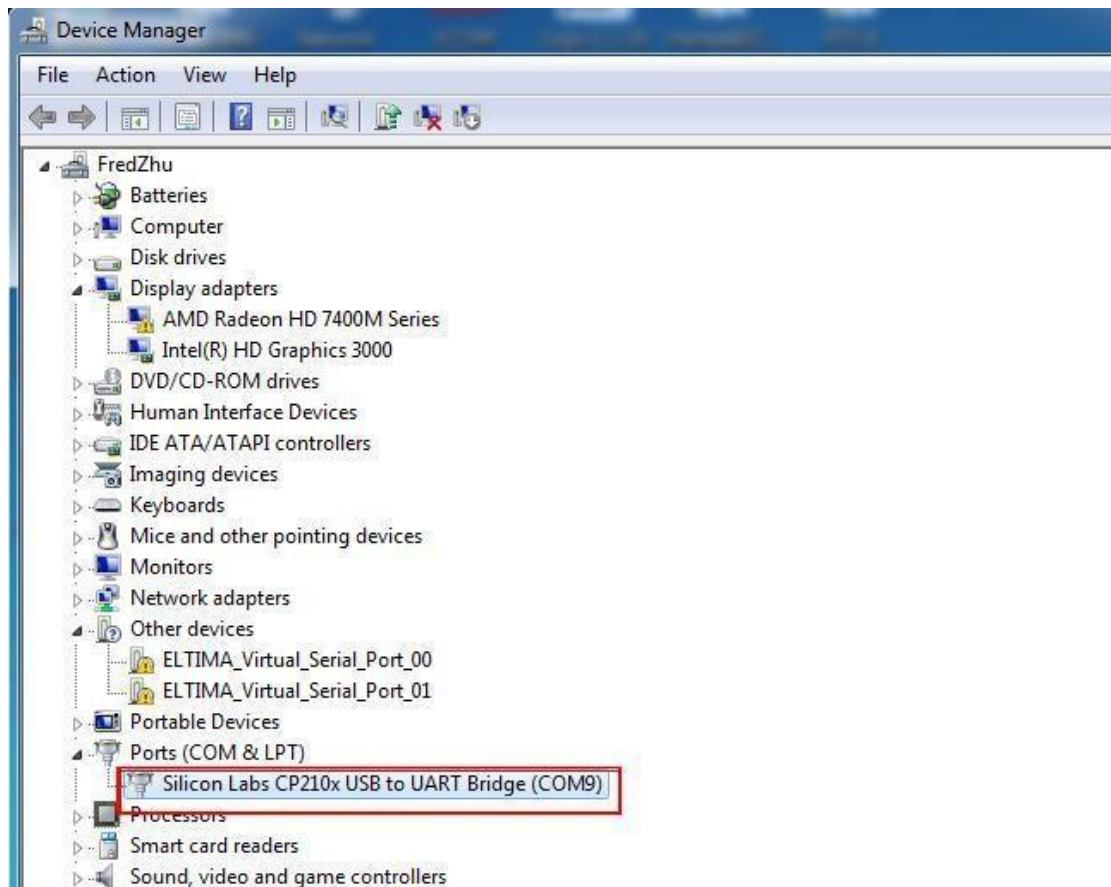
When connected to the PC software, you need a USB

-TTL serial module. Recommend

The ways to connect USB module to the control panel are: 3.3V of the USB, TXD, RXD are connected to 3.3V, RX, TX, GND.

Reminder: Insert the module USB- TTL, and make sure the connection is correct, then you should install the drive first. Drive download address;

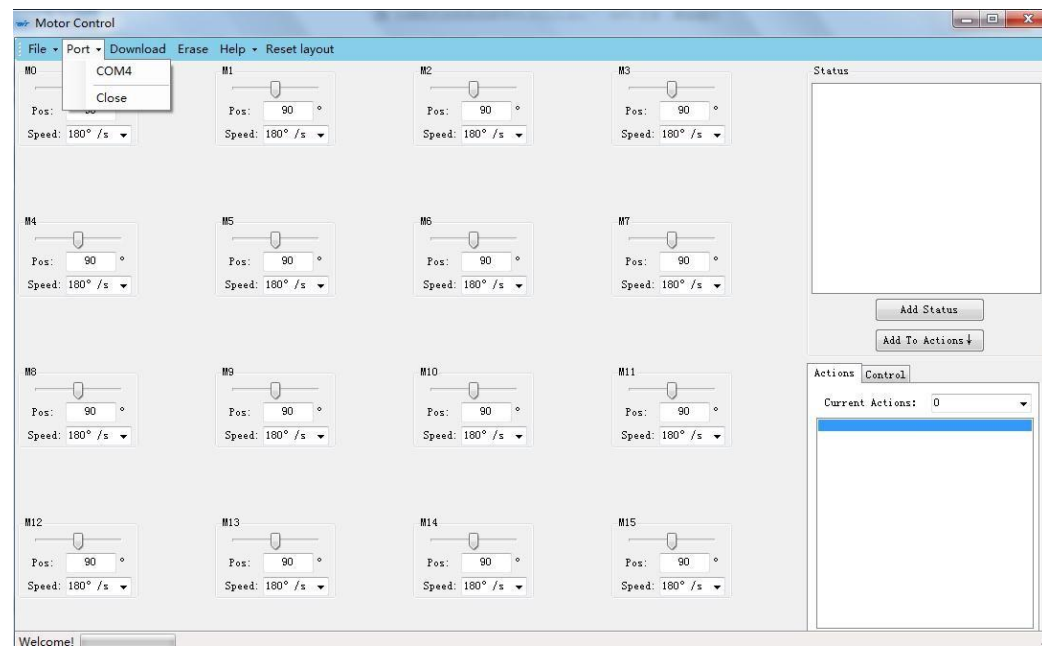
https://wiki.wit-motion.com/english/doku.php?id=communication_module_1



5.3.2 PC Software Connection

1. Click “File” and choose the servo motor control panel.
2. Click “Port” and choose the corresponding port number.

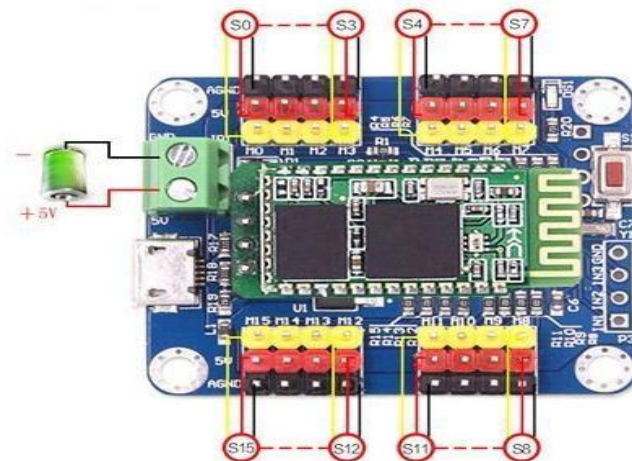
When the status of the PC software connection is displayed green,, that is the online state, at this time, the control pane indicator light(DS1) blinks slowly. If not on line, The state display column is yellow.



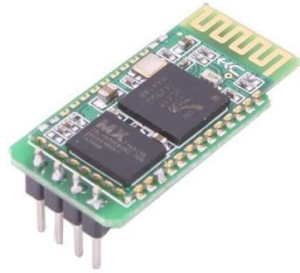
5.4 Bluetooth Connection (just for phone)

5.4.1 Hardware Connection

Bluetooth connection
 Directly connected the Bluetooth module



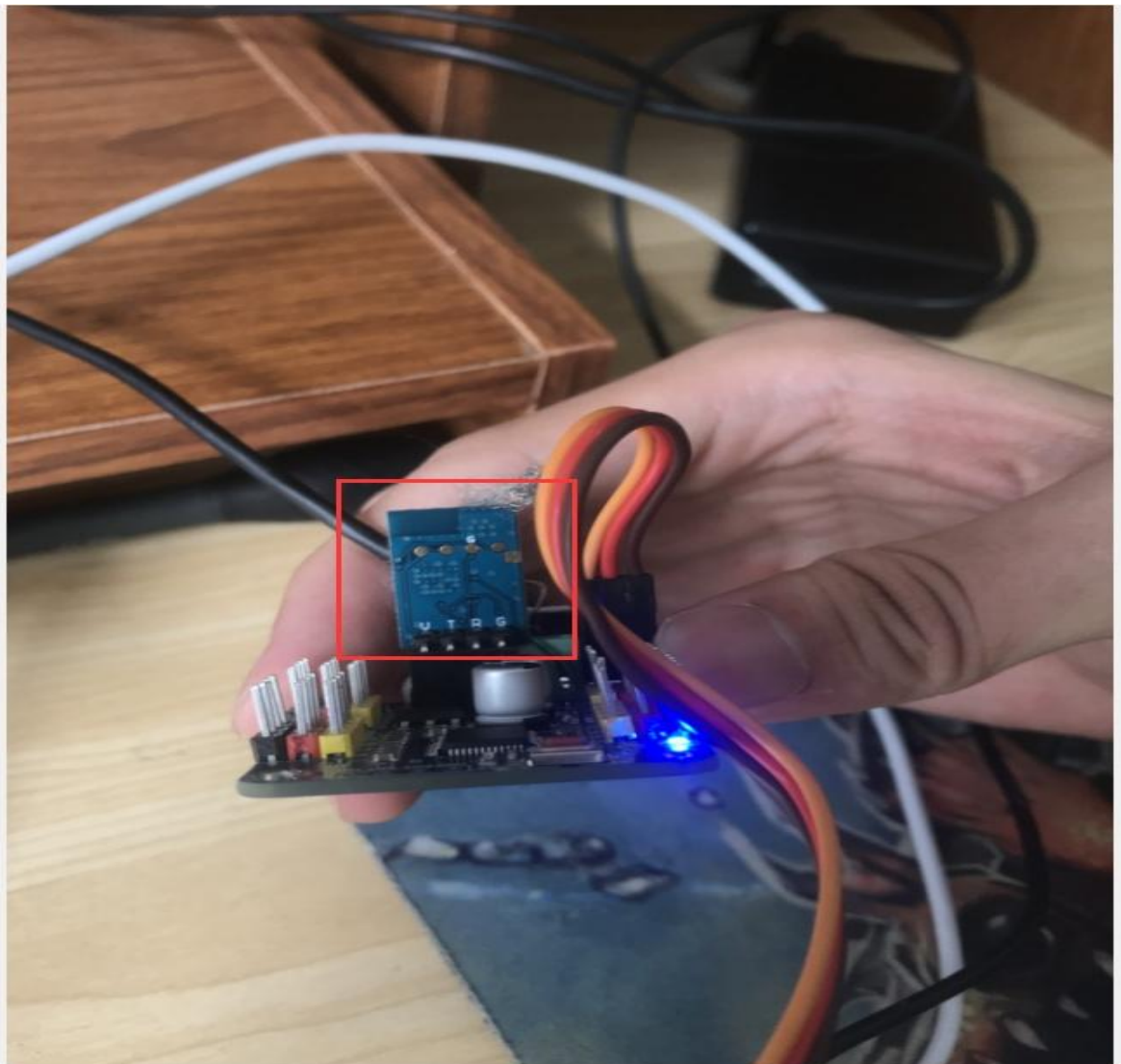
- a. Power supply
The power supply of the servo motor is 5V- 7.2V, refer to the hardware connection diagram .
- b. Recommended Bluetooth module



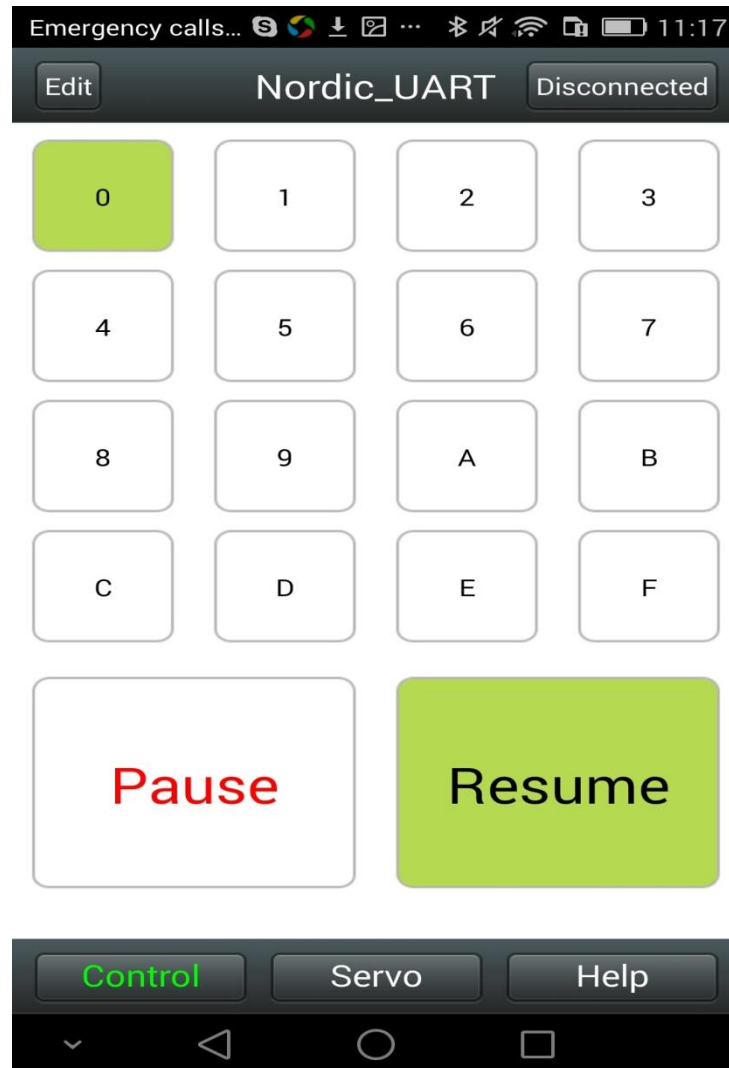
Insert the Bluetooth module into the Bluetooth port, refer to the hardware connection diagram. c.
Search the PC software for Bluetooth device and match it.

Windows system does not support for Bluetooth connection very well sometimes.
Recommended a software Bluesoleil:

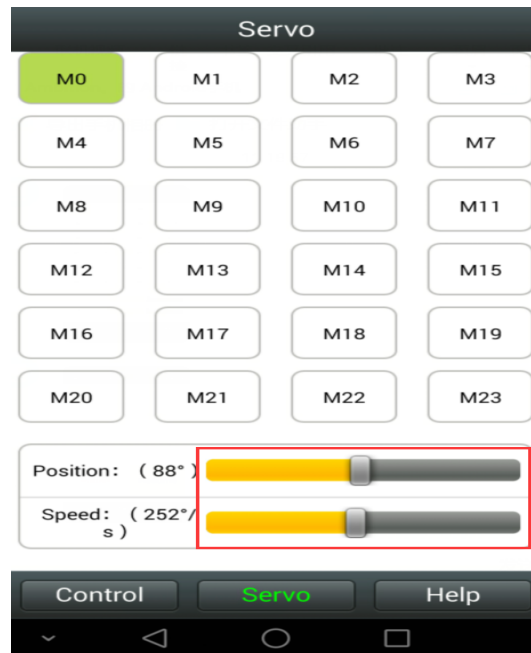
Use like this



- 1) Open Bluetooth on phone
- 2) Then turn on the "mini IMU" APP on the phone , then click connect to find product
- 3) When the blue light on the Bluetooth module is lit, the connection is successful.
- 4) this page shows Action group which you need set on PC software, you can use action group to connect Multiple servos.

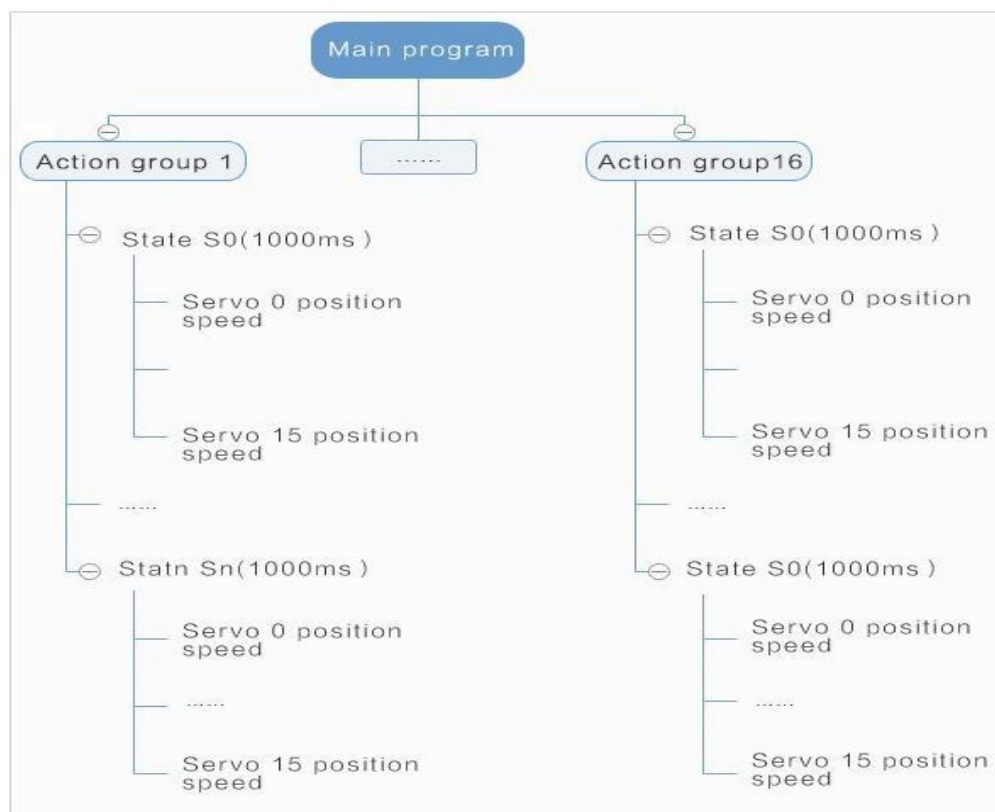


- 5) This page shows the name of the gusset on a single servo connection, you can click it to change the position and speed



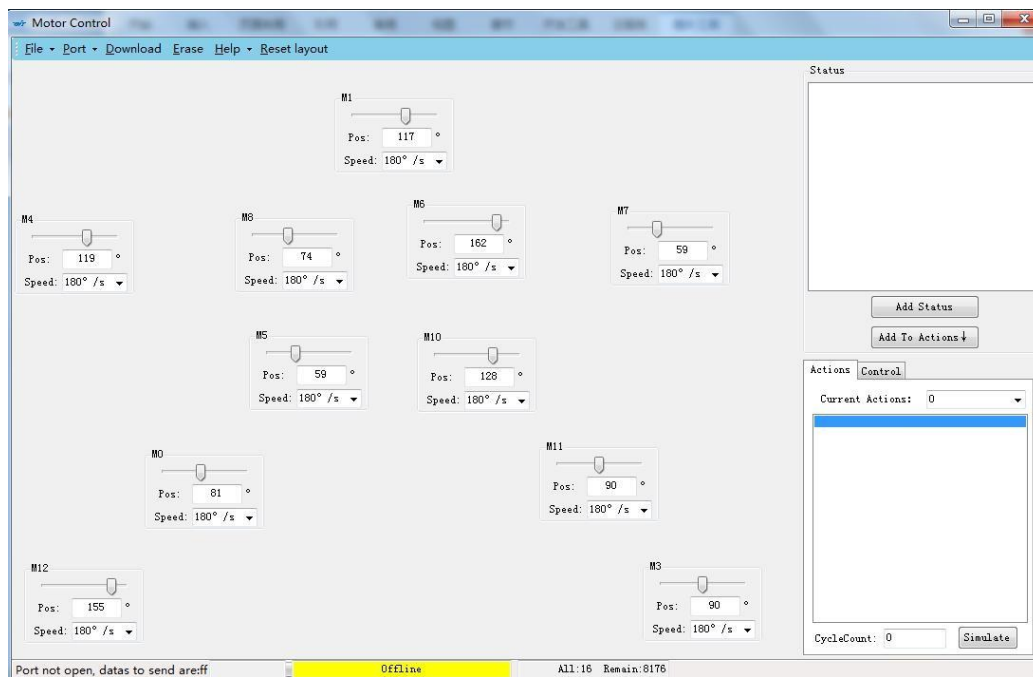
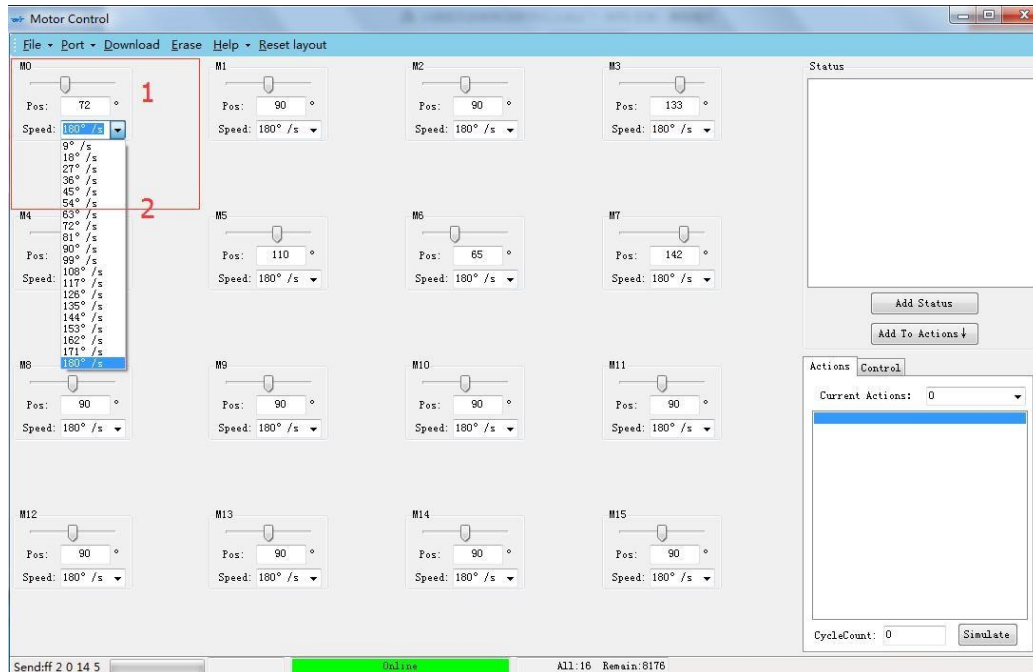
5.5 Software Operation

Highlights: only need to define the final state of the servo motor, without detailed calculation of the details of the servo motor operation, breaking the traditional control of the servo motor control board.



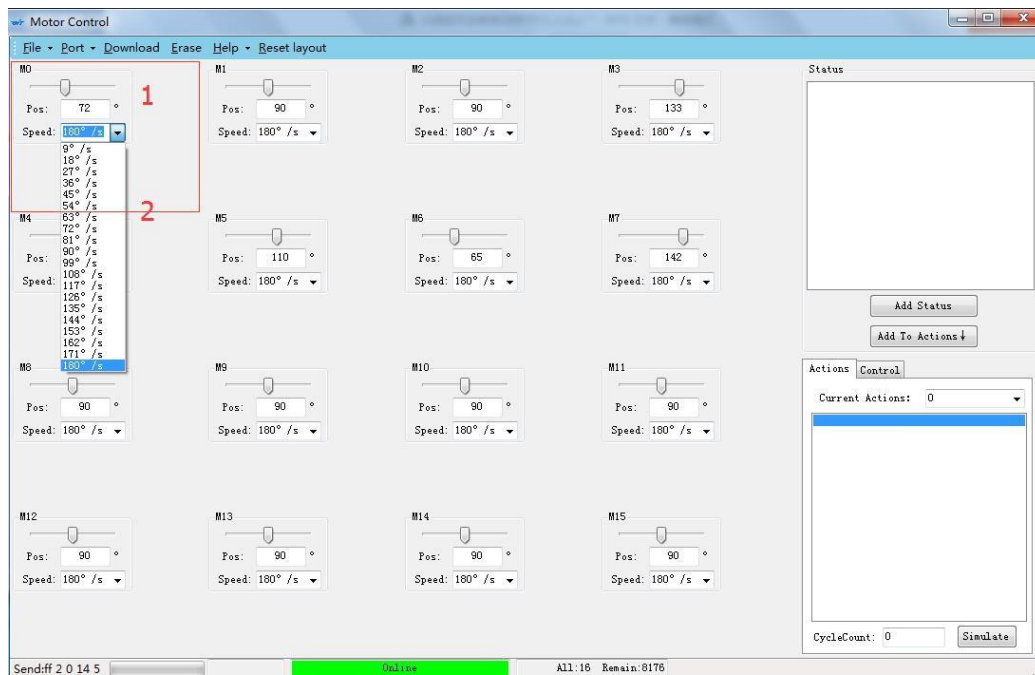
5.5.1 Control the Servo motor

- (1) In the on line state, drag the progress bar of the servo motor and change the speed of the servo motor.
- (2) Click "Speed" change the speed of the servo motor, speed is 9°/S-180°/S optional.

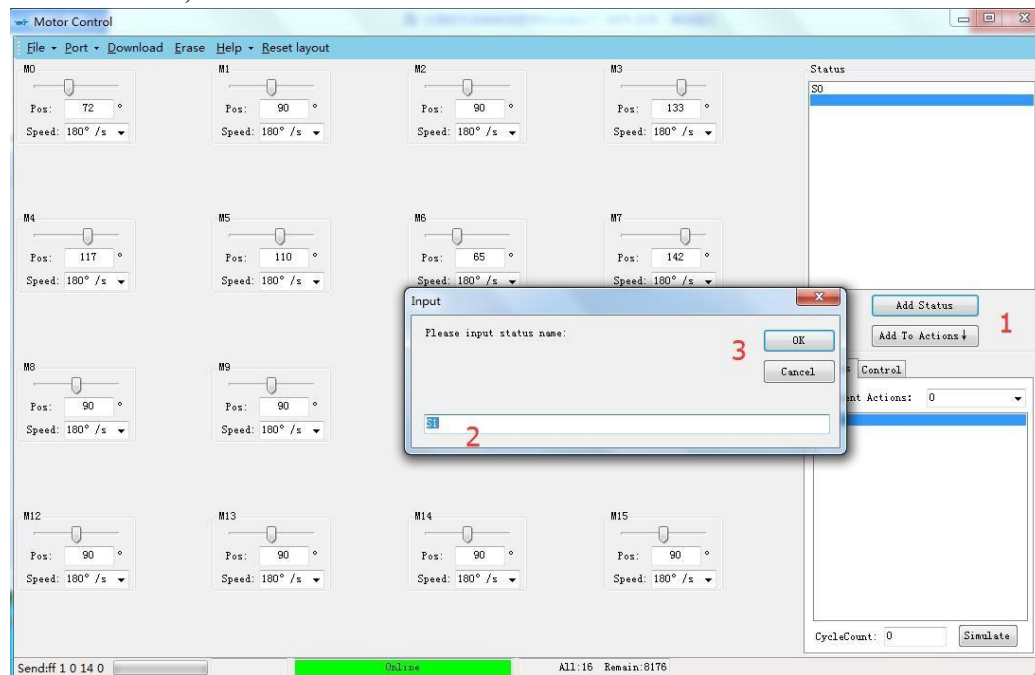


5.5.2 Add State

- (1) Set the parameter of the servo motor(speed/ time)

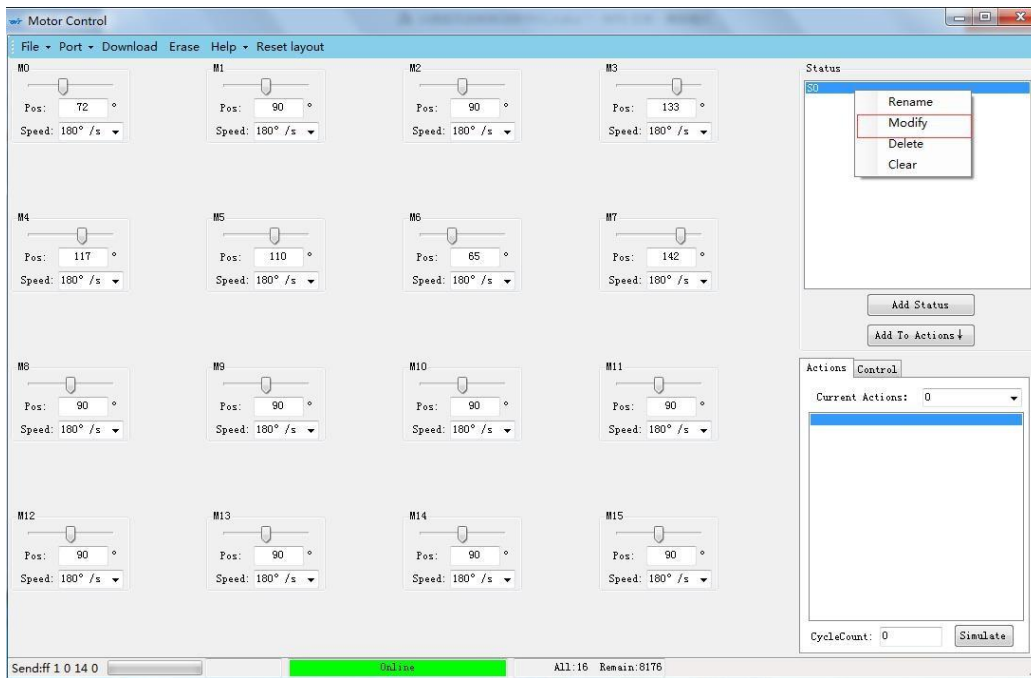


- (2) Add the new state in the status, and input the name of it.
- (3) Click the “OK”, the action will be added to the actions.



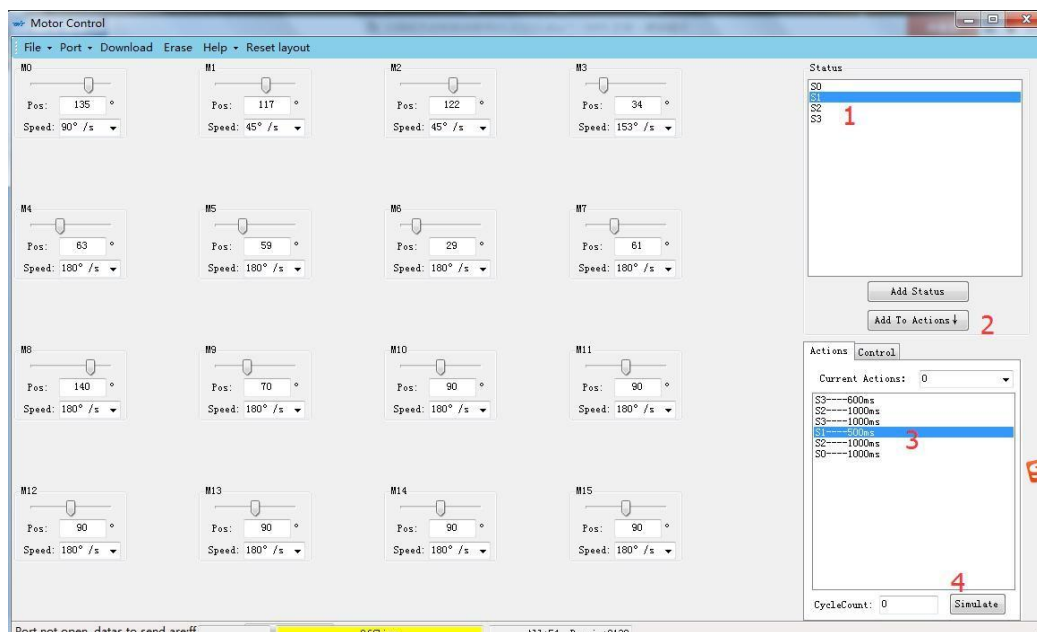
Repeat the steps above and you can add many different state

- (4) Click the name of the action and modify the position and speed of the servo motor.
Click the “Modify ” and finish it.

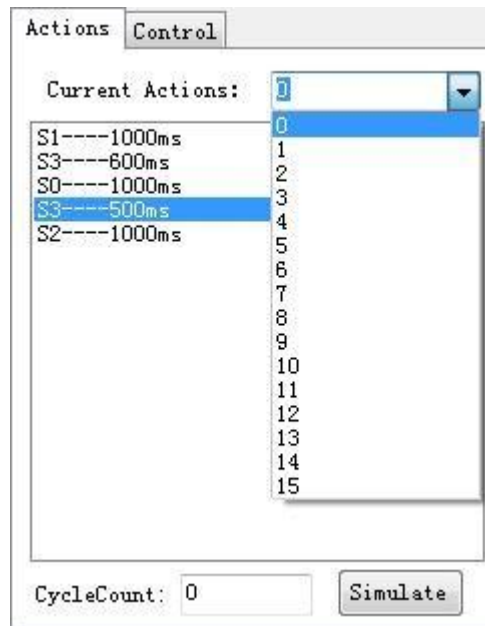


5.5.3 Set the Action Group

- ① Select the status name.
- ② Click the “Add to action”
- ③ You can find the status has been added, and set the time about the action group.
- ④ Add status to the action group in sequence, and click “simulate”, the servo motor will do simulation operation.

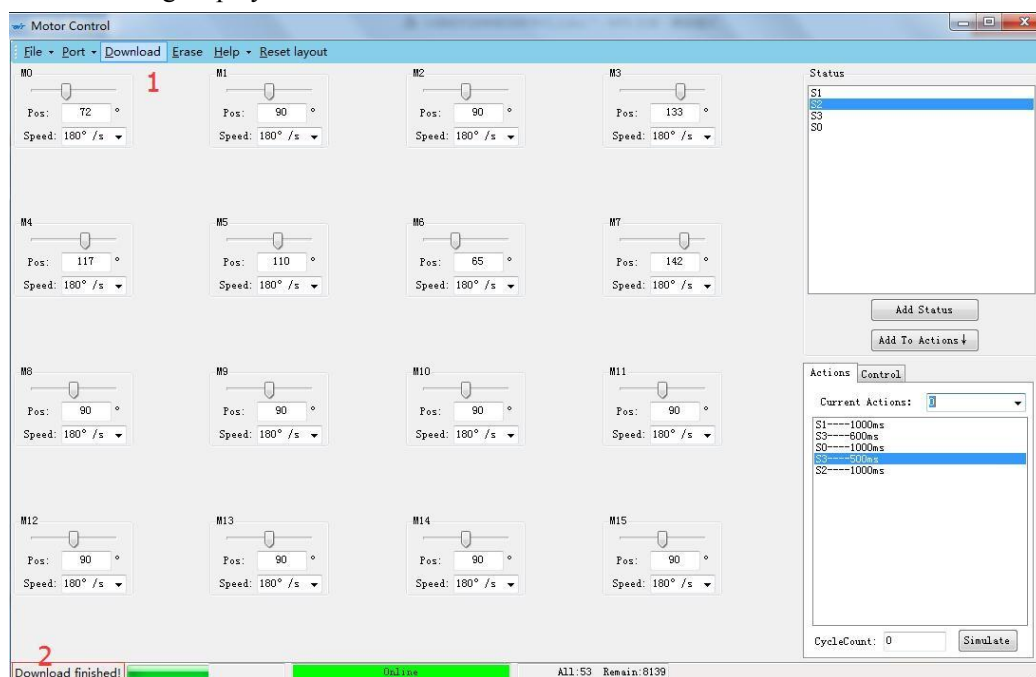


- ⑤ Depending on requirements, you can set up multiple action groups.

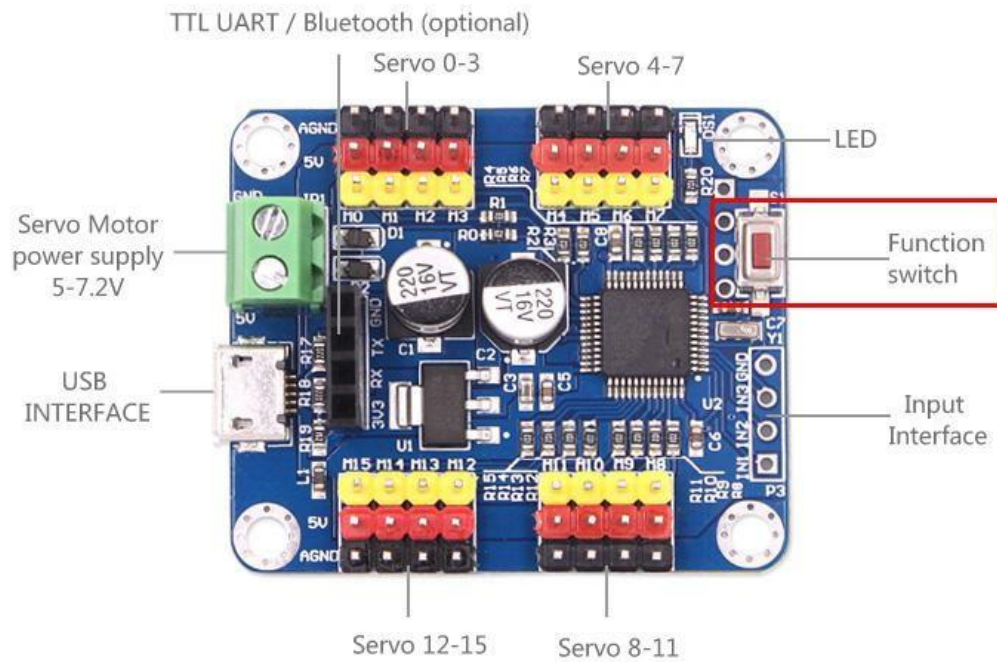


5.5.4 Download

- (1) Click the “Download”, The signal on the control panel is always on. The bar of the downloading displayed”Download finished”.

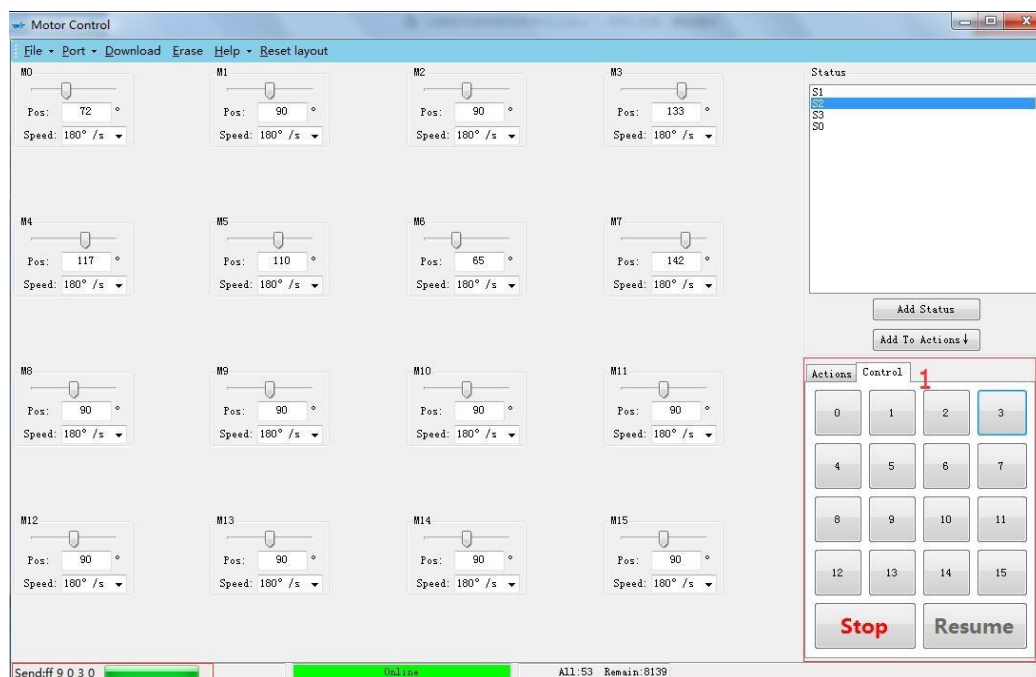


- (2) Press the function switch, you can start action group 0, run the program offline.

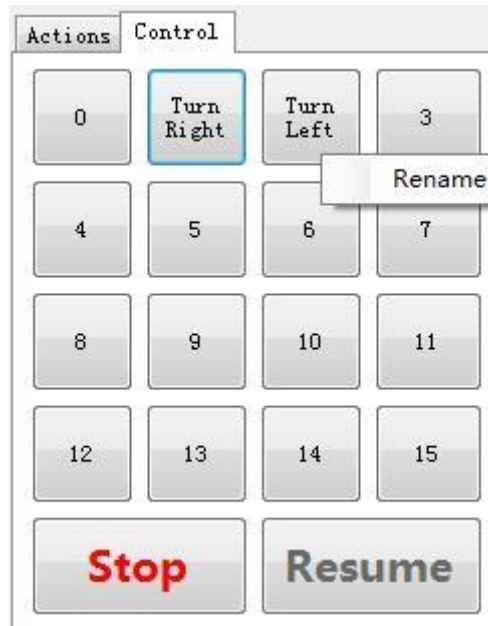


5.5.5 Control State

- When all the action groups are downloaded, you can control arbitrarily action group through the control state.



Reminder: The action groups can be renamed, check the name of the action group and input the new name.



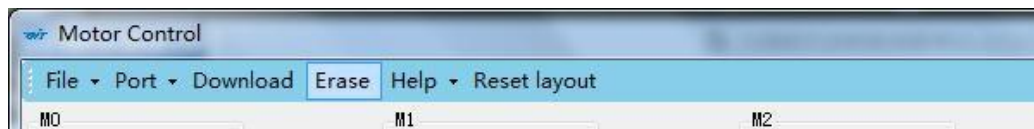
2. Emergency stop and resume

When you need an emergency stop, click on the emergency stop, the servo motor will stop.

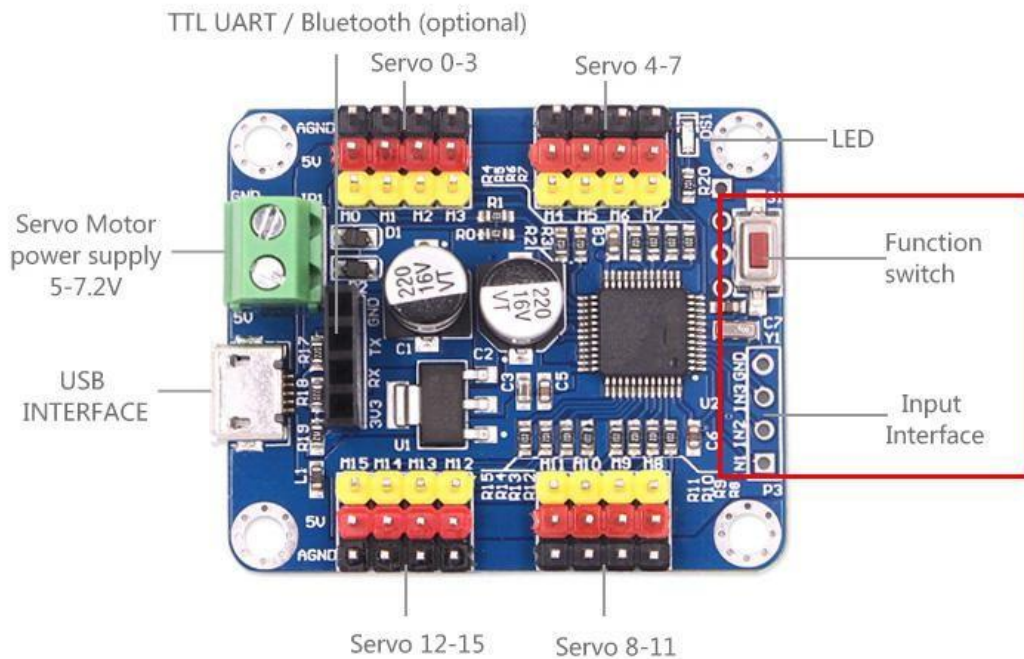
When you need to restore, click Restore, click will resume action group.

5.5.6 Chip Erase

When you need get a chip erase, you should just click “Erase” and all the action group will be deleted.



5.5.7 External Signal Input



Enter	operating	Features
S1	click it once	Start / stop action group 0
IN3	IN3 --- GND shorted	Start / stop action group 0
IN2	IN2---GND shorted	Start / stop action group 1
IN1	IN1---GND shorted	Start / stop action group 2

6.Serial Communication Protocol

Level: The TTL level(if the module is connected to the RS232 level, it may cause damage to module)

Baud rate: 9600 Stop bit: 1 Check bit: 0

6.1 PC Software to Control Panel

Reminder:

1. The factory default setting uses a serial port with a baud rate of 9600. Configuration can be configured through the host computer software, because all configurations are power-down save, so only need to configure once on the line.

2. Data format

0xFF	CMD	CH	DataL	DataH
------	-----	----	-------	-------

Every Packet contains 5 bytes. Note that data is sent in **hexadecimal** not ASCII mode. The first byte is the start code 0xFF, the second byte is CMD, the third byte is channel number, which controls the data of the corresponding channel. The fourth and fifth bits are the low and high bytes of the data, respectively.

CMD instruction table

Instruction	Function
0x01	Speed control
0x02	Position control
0x09	Action group start
0x0b	Emergency stop/ recovery

6.1.1 Speed Control of Servo motor

0xFF	0x01	CH	DataL	DataH
------	------	----	-------	-------

CH: Servo motor channel number, value 0- 15.

DataL, DataH: The low and high bytes of the data, The two are combined into a short type of data with a symbol- Data.

Data indicates the speed of the servo motor, the unit ($9^\circ / s$), the value of 1 to 20.

DataL=Data&0xff; DataH=Data>>8. Example:

1. Servo motor no.1, rotational speed: $10(90^\circ / s)$: Sent instructions: 0xFF 0x01 0x01 0x0a 0x00, where 0x000a is the decimal 10
2. Servo motor no.1, rotational speed: $20(180^\circ / s)$: Sent instructions: 0xFF 0x01 0x01 0x14 0x00, 0x0014 is the decimal 20

6.1.2 Position Control of Servo motor

0xFF	0x02	CH	DataL	DataH
------	------	----	-------	-------

CH: Servo channel number, the value of 0 ~ 15.

DataL, DataH: Data of the low byte and high byte, the two combined into a signed short type of data Data, DataL = Data & 0xff; DataH = Data >> 8. Data indicates the position of the steering gear, unit us (0.09°), the value is 500 ~ 2500, the control pulse width of the steering gear is 500us ~ 2500us, the corresponding angle $0^\circ \sim 180$ degrees.

Example:

- 1) Servo 0, position 1500us (90°): send command 0xFF 0x02 0x00 0xdc 0x05, where 0x05dc is the decimal 1500.

- 2) Servo 1, speed 500us (0): send command 0xFF 0x02 0x01 0xf4 0x01, where 0xf4 is the decimal 500.

6.1.3 Action Group Settings

0xFF	0x09	0x00	DataL	DataH
------	------	------	-------	-------

Data: The number of the action group. Value:1- 15

Execute the action group, you can sent the instructions to the control panel through the serial port.

1. Action group1: sent instruction 0xFF 0x09 0x00 0x00 0x00, 0x0000 represent 0 of 10decimal system.
2. Action group2: sent instruction 0xFF 0x09 0x00 0x01 0x00, 0x0010 represent 0 of 10decimal system.
3. Action group3: sent instruction 0xFF 0x09 0x00 0x02 0x00, 0x0020 represent 0 of 10decimal system.
4. Action group4: sent instruction 0xFF 0x09 0x00 0x03 0x00, 0x0030 represent 0 of 10decimal system.
5. Action group5: sent instruction 0xFF 0x09 0x00 0x04 0x00, 0x0040 represent 0 of 10decimal system.
6. Action group6: sent instruction 0xFF 0x09 0x00 0x05 0x00, 0x0050 represent 0 of 10decimal system.
7. Action group7: sent instruction 0xFF 0x09 0x00 0x06 0x00, 0x0060 represent 0 of 10decimal system.
8. Action group8: sent instruction 0xFF 0x09 0x00 0x07 0x00, 0x0070 represent 0 of 10decimal system.
9. Action group9: sent instruction 0xFF 0x09 0x00 0x08 0x00, 0x0080 represent 0 of 10decimal system.
10. Action group10: sent instruction 0xFF 0x09 0x00 0x09 0x00, 0x0090 represent 0 of 10decimal system.
11. Action group11: sent instruction 0xFF 0x09 0x00 0x0a 0x00, 0x00a0 represent 0 of 10decimal system.
12. Action group12: sent instruction 0xFF 0x09 0x00 0x0b 0x00, 0x00b0 represent 0 of 10decimal system.
13. Action group13: sent instruction 0xFF 0x09 0x00 0x0c 0x00, 0x00c0 represent 0 of 10decimal system.
14. Action group14: sent instruction 0xFF 0x09 0x00 0x0d 0x00, 0x00d0 represent 0 of 10decimal system.
15. Action group15: sent instruction 0xFF 0x09 0x00 0x0e 0x00, 0x000e0 represent 0 of 10decimal system.
16. Action group16: sent instruction 0xFF 0x09 0x00 0x0f 0x00, 0x00f0 represent 0 of 10decimal system.

6.1.4 Emergency Stop and Recovery

0xFF	0x0b	0x00	DataL	DataH
------	------	------	-------	-------

DataL, DataH: low byte and high byte of data, the two are combined into a signed short type of data Data.

$\text{DataL} = \text{Data} \& 0\text{xFF}$; $\text{DataH} = \text{Data} \gg 8$ 。Data That emergency stop or recovery, the value of 0 to

1.

1 for emergency stop, 0 for recovery

Emergency stop: send command 0xFF 0x0b 0x00 0x01 0x00

Recovery: Send command 0xFF 0x0b 0x00 0x00 0x00

7. Appendix

DS1 state:

DS1	Control panel state
Normally on	Off-line
Slow blinking (1S per time)	On line
Fast blinking (0.2S per time)	Action group operation



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