

## Lesson 9 WEB Controller Control Robot Arm

### 9.1 Running WebServer.py Program

- Raspberry Pi will automatically run the program of the robot every time it reboots. Specifically, it will run [Adeept\\_Robotic\\_Arm\\_for\\_RPi/Server/WebServer.py](#), but if the driver board Arm HAT is not connected, *WebServer.py* will not run. It's normal because the program of the robot needs to use PCA9685 chip. The Adeept Arm HAT controls servo via PCA9685, while the Raspberry Pi communicates with PCA9685 through I2C. If Arm HAT is not installed on the Raspberry Pi, when instantiating the dependent library of PCA9685, a communication failure will occur with a program error.
- You can power off the Raspberry, install the Arm HAT, and reboot. Then *WebServer.py* can run successfully.
- Under normal circumstances, you don't need to manually run *WebServer.py* since the Raspberry Pi will automatically run the program when booting.
- If you failed to open the page, you can remotely log into the Raspberry Pi via SSH and type in the command as shown below to disable all auto-run programs to release resource. Otherwise, there may be issues like camera initialization failure or occupied port.

```
sudo killall python3
```

```
adeept@raspberrypi:~ $ sudo killall python3  
adeept@raspberrypi:~ $
```

- Type in the following code to run *WebServer.py*:

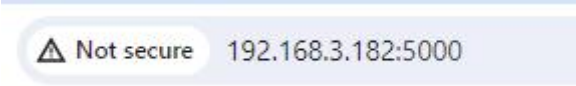
```
sudo python3 Adeept_Robotic_Arm_for_RPi/Server/WebServer.py
```

```
adeept@raspberrypi:~$ sudo python3 Adeept_Robotic_Arm_for_RPi/Server/WebServer.py
//home/adeept/Adeept_Robotic_Arm_for_RPi/Server/plan.json
//home/adeept/Adeept_Robotic_Arm_for_RPi/Server/plan.json
/home/adeept/Adeept_Robotic_Arm_for_RPi/Server/WebServer.py:274: DeprecationWarning: setDaemon() is deprecated, set the daemon attribute instead
  joystickControlThreading.setDaemon(True)
* Serving Flask app 'app'
* Debug mode: off
home
waiting for connection...
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on all addresses (0.0.0.0)
* Running on http://127.0.0.1:5000
* Running on http://192.168.3.182:5000
Press CTRL+C to quit
check_permit
recv_msg
```

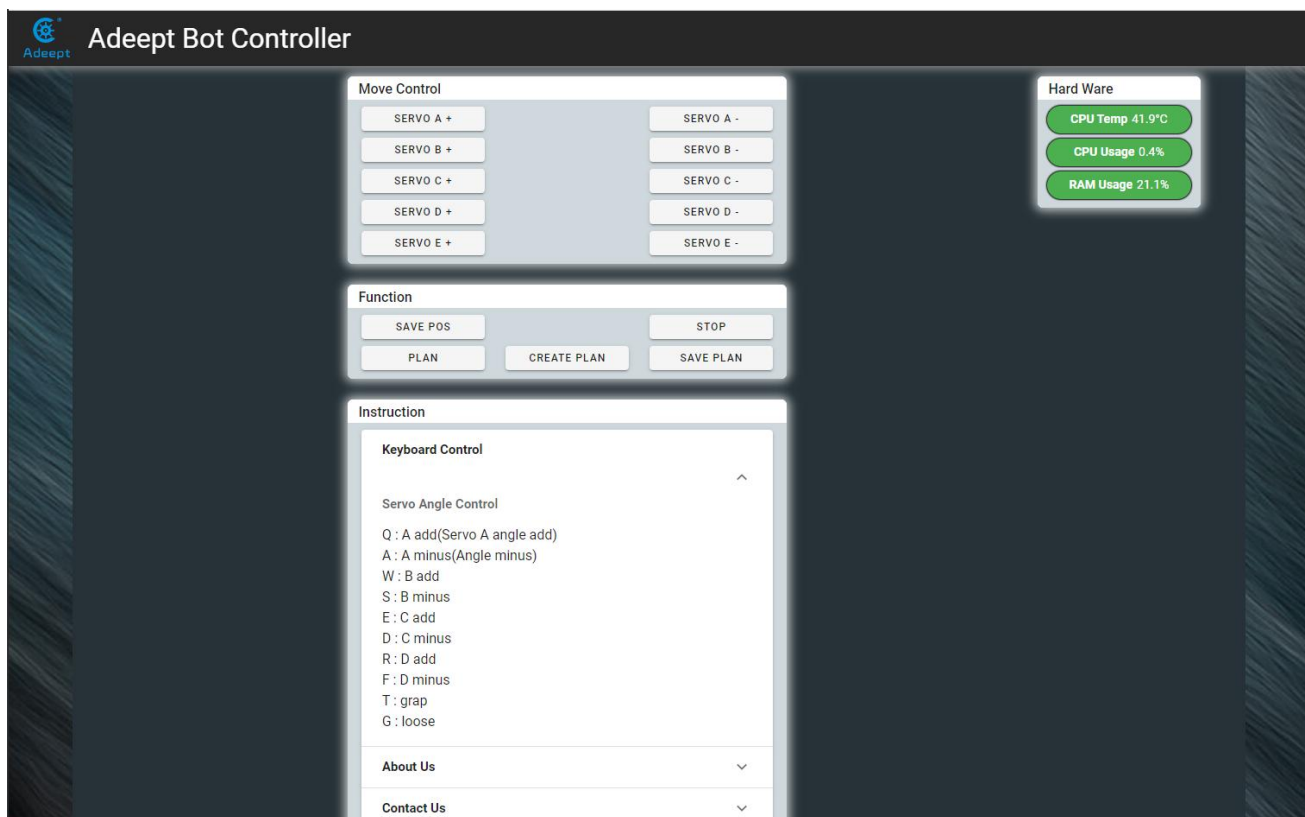
- You can access the Raspberry Pi by IP address through a web browser only when it can successfully run *WebServer.py*.

## 9.2 Getting Access to WEB Controller

- A WEB controller is a WEB interface to control the robot product to perform various actions and it can be applied on any device that is able to run a browser, including PC, mobile phones, tablets, etc.
- If you've completed all installations based on the instructional document, it will be quite easy to open a WEB controller.
  1. Check that your device is under the same LAN with the Raspberry Pi.
  2. Obtain the Raspberry Pi's IP address (refer to the Software Installation section).
  3. Open a WEB browser (recommended to use Chrome in case of any possible incompatibility with other browsers), enter the Raspberry Pi's IP address with the port :5000, for instance: 192.168.3.182:5000

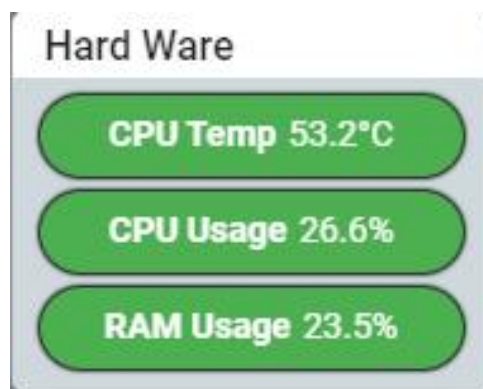


Then the WEB controller will be loaded into the browser.



## 9.3 Function Overview of WEB Controller

### 1. Hard Ware Module

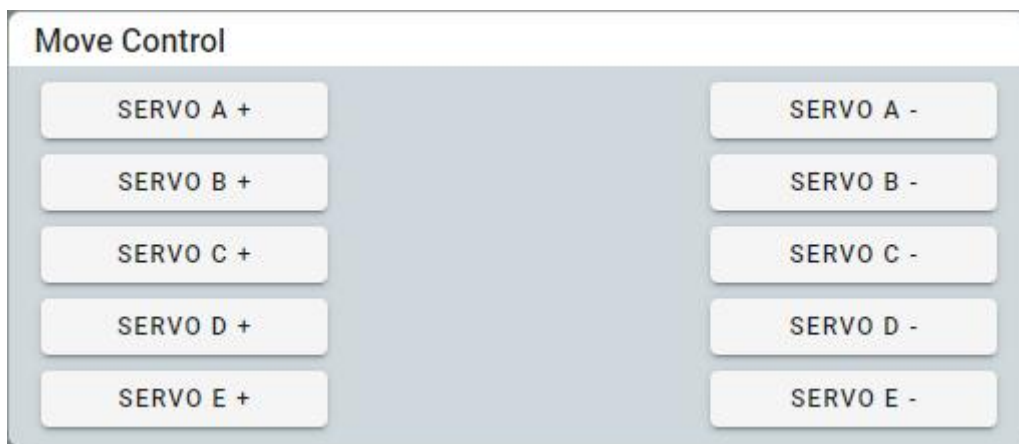


- CPU Temp: Shows the temperature of the Raspberry Pi CPU.

- CPU Usage: Shows the usage of the Raspberry Pi CPU.
- RAM Usage: Shows the usage of the Raspberry Pi memory.

## 2. Move Control Module

Control the rotation of a single servo. The button with "+" on the left increases the corresponding servo angle, and the button with "-" on the right decreases the angle of the servo. (The rotation angle range of the steering gear is 0-180°, and the initial angle is 90°)



- **SERVO A +**: Robot arm servo A turns **left**.
- **SERVO A -**: Robot arm servo A turns right.
- **SERVO B +**: Robot arm servo B rotates upwards.
- **SERVO B -**: Robot arm servo B rotates downwards.
- **SERVO C +**: Robot arm servo C rotates upwards.
- **SERVO C -**: Robot arm servo C rotates downwards.
- **SERVO D +**: The mechanical claw servo D rotates clockwise.
- **SERVO D -**: The mechanical claw servo D rotates counterclockwise.
- **SERVO E +**: The gripper of the robotic arm begins to grasp.

- **SERVO E -**: The gripper of the robotic arm begins to loosen.

**The keys of the keyboard also have corresponding functions. E.g:**

Pressing "**Q**" on the keyboard is equivalent to clicking "**SERVO A+**"

Pressing "**A**" on the keyboard is equivalent to clicking "**SERVO A-**"

Pressing "**W**" on the keyboard is equivalent to clicking "**SERVO B+**"

Pressing "**S**" on the keyboard is equivalent to clicking "**SERVO B-**"

Pressing "**E**" on the keyboard is equivalent to clicking "**SERVO C+**"

Pressing "**D**" on the keyboard is equivalent to clicking "**SERVO C-**"

Pressing "**R**" on the keyboard is equivalent to clicking "**SERVO D+**"

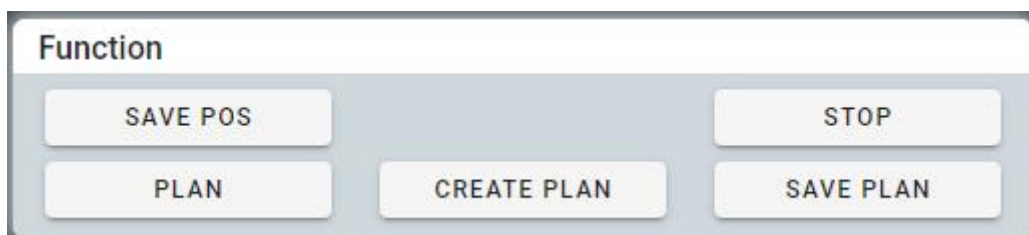
Pressing "**F**" on the keyboard is equivalent to clicking "**SERVO D-**"

Pressing "**T**" on the keyboard is equivalent to clicking "**SERVO E+**"

Pressing "**G**" on the keyboard is equivalent to clicking "**SERVO E-**"

### 3. Function Module

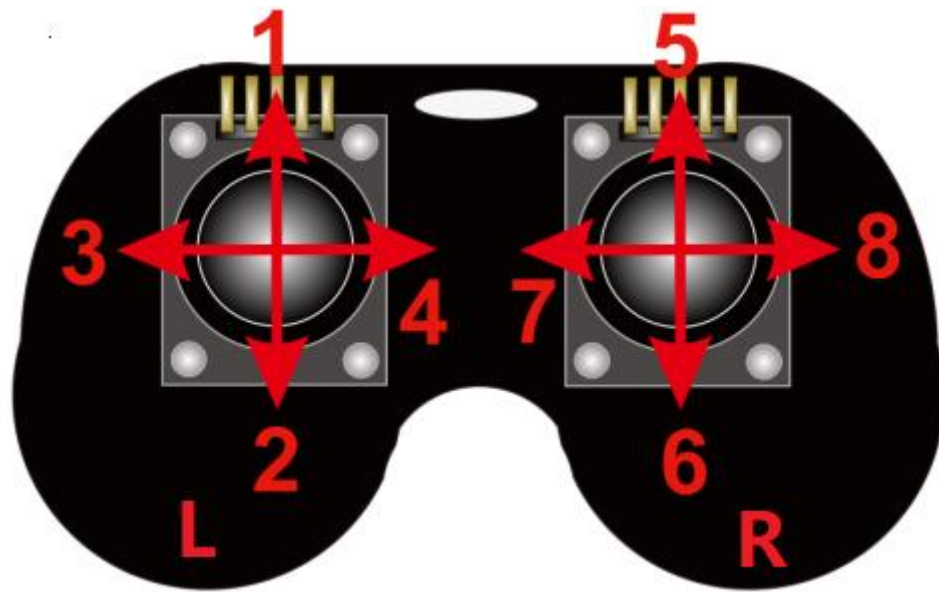
memory function. The robotic arm is able to record the position of each action and can automatically execute the saved actions.



- **CREATE PLAN:** Clear the previous actions and create a new series of actions you want the robot to perform.
- **SAVE POS:** Record the current position of the robotic arm once. Can be recorded multiple times. The position of the arm is saved after the last action, and if "CREATE PLAN" is pressed, this position is the initial position of the arm.
- **SAVE PLAN:** Save the positions of all robotic arms to a local file, and the Raspberry Pi can also execute the saved actions after restarting.
- **PLAN:** The robotic arm begins to perform the saved sequence of actions. Only execute it once, if you need to execute it again, you need to press the button again.
- **STOP:** Aborts the execution of the "PLAN" action. If it has been executed, nothing happens.

## 9.3 Joystick control

After running the *WebSever.py* program, you can also control the robotic arm through the joystick, but due to the limited number of joysticks, only limited functions can be realized.



### control method:

- 1, 2: Control servo A forward and reverse rotation.
- 3, 4: Control servo B to rotate forward and backward.
- 5, 6: Control servo C to rotate forward and backward.
- 7, 8: Control servo E forward and reverse rotation.
- After pressing the left joystick button (L), the robotic arm starts to execute the saved action, which is equivalent to clicking "PLAN" of the WEB controller.
- After pressing the right rocker button (R), the robotic arm stops, which is equivalent to clicking "STOP" on the WEB controller.