12. Synchronous action

1.Communication Principle

The principle of this experiment is to use one of the robotic arms as a server, open the TCP network service, receive data, and perform operations;The other robotic arm serves as the client, that is, the operator, and reads the angle values of all servos in sequence, and then immediately sends the angles of all servos to the server through the TCP service;At this time, the client has been rapidly reading the angle value of the servos and sending it to the server. The server receives and sets the angles of all servos to be updated immediately. In this way, the function of remote synchronization of the two robotic arms is realized.

2.Preparation before experiment

1. This experiment involves two robotic arms with the same hardware. Except for the different running programs, everything else can be the same. If the robot arm uses the system image that comes with the factory, please end the factory program that starts automatically at boot before performing this experiment.
2. Ensure that both robotic arms are connected to the same LAN, that is, connected to the same router (wired or wireless connection is acceptable), and can communicate within the LAN.
3. Since there are two robotic arms involved here, in order to easily distinguish them, we call the robotic arm that is the server A robotic arm (controlled party).The robotic arm that serves as the controller is called the B robotic arm (free-moving side).Since the movement of robot arm A depends on the movement of robot arm B, in order to avoid that the range of movement of robot arm A is too large when the program is just started,Therefore, before starting the program, please adjust both the A robot arm and the B robot arm to the vertical upward state.

A

B

3.Program code

【Server code: A robotic arm】

Please see the content of the following path for the specific code:

```
/home/dofbot/Dofbot/3.ctrl_Arm/12.sync_movement/A_arm_follow.py
```

【Client code: B robotic arm】

Please see the content of the following path for the specific code:

```
/home/dofbot/Dofbot/3.ctrl_Arm/12.sync_movement/ B_arm_ctrl.py
```

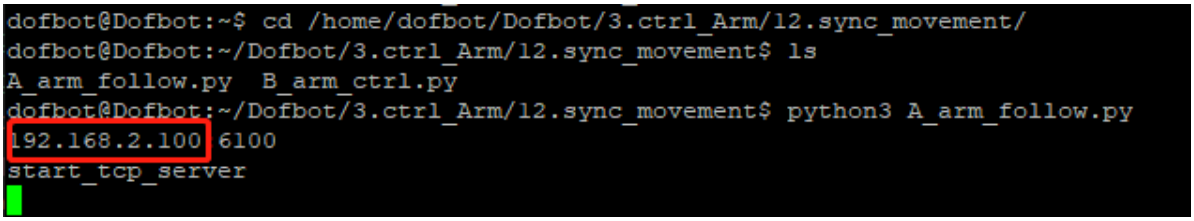
4.Operational experiment and experimental purpose

Experiment purpose: Use B robotic arm to remotely control A robotic arm.

1. Open the terminal of the A robot arm and run the A_arm_follow.py program. Then make a note of the IP address printed out.

cd /home/dofbot/Dofbot/3.ctrl_Arm/12.sync_movement/

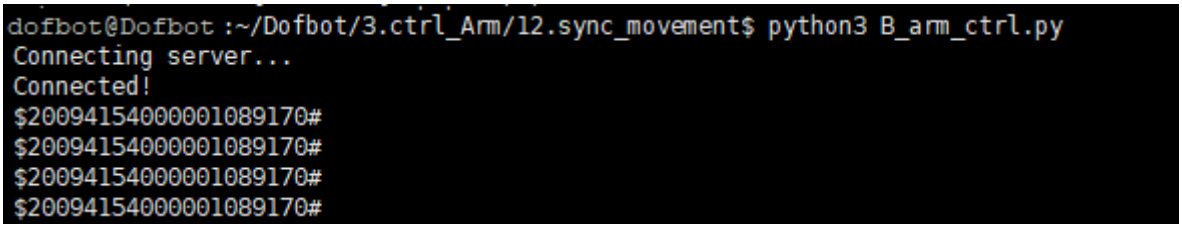
python3 A_arm_follow.py



2. Open the terminal of robotic arm B and replace the IP address noted in the previous step to the ip address location in B_arm_ctrl.py.

3. After the modification is completed, save and exit, and then run the B_arm_ctrl.py program.

python3 B_arm_ctrl.py



Note that you must run the A_arm_follow.py program of robotic arm A first, and then run the B_arm_ctrl.py program of robotic arm B. The B robot arm terminal will print the connection information and the sent data, and the communication between the two robot arms will officially begin.

At this time, you can see that the status of robotic arm A is the same as that of robotic arm B, and you can modify the posture of robotic arm A by moving the posture of robotic arm B. Through such TCP transmission commands, the effect of synchronized movement of two robotic arms can be achieved. Robotic arm A is controlled with an angle limit, while robotic arm B moves automatically without any angle limit. The No. 1 servo added to robotic arm B moves more than 180 degrees. Then A will stay at 180 degrees until the angle of B's robotic arm is adjusted back to a reasonable range before it can continue to move.