PC Web Page Programming

I. Web Page Programming Description

Remote control course uses the Jupyter lab platform, calling built-in buttons and sliders and other controls to generate sliders for controlling the six joints and movement speed of the robotic arm. Each time you drag the slider, you can control the corresponding servo of the robotic arm to rotate.

II. Important Code Explanation

Code path:

```
/home/jetson/dofbot_pro/dofbot_ctrl/scripts/PC_Control.ipynb
```

Create three new buttons for controlling robotic arm reset, power on, and power off functions.

```python
def on_button_clicked(b):
    with output:
        print("Button clicked:", b.description)
    if b.description == 'Reset':
        reset_joints()
    elif b.description == 'Power_on':
        Arm.Arm_serial_set_torque(True)
        b.icon = 'check'
        button_power_off.icon = 'uncheck'
    elif b.description == 'Power_off':
        Arm.Arm_serial_set_torque(False)
        b.icon = 'check'
        button_power_on.icon = 'uncheck'
```

Create six new sliders for controlling the six joints of the robotic arm.

```
def on_slider_S1(angle):
    print("J1:", angle)
    mc.send_angle(1, angle, g_speed)
def on_slider_S2(angle):
    print("J2:", angle)
    mc.send_angle(2, angle, g_speed)
def on_slider_S3(angle):
    print("J3:", angle)
    mc.send_angle(3, angle, g_speed)
def on_slider_S4(angle):
    print("J4:", angle)
    mc.send_angle(4, angle, g_speed)
def on_slider_S5(angle):
    print("J5:", angle)
    mc.send_angle(5, angle, g_speed)
def on_slider_S6(angle):
    print("J6:", angle)
    mc.send_angle(6, angle, g_speed)
```

Create a new slider for controlling the movement speed of the servo.

```
slider_speed = widgets.IntSlider(description='Speed:', value=1000, min=0,
max=2000, step=100, orientation='horizontal')

def on_slider_speed(value):
    global g_speed
    g_speed = value
    print("speed:", value)

widget_speed = widgets.interactive(on_slider_speed, value=slider_speed)
```

Reset the joint angles of the robotic arm.

```
def reset_joints():
    if button_power_off.icon == 'check':
        Arm.Arm_serial_set_torque(True)
        time.sleep(1)
    Arm.Arm_serial_servo_write6_array([90, 164, 18, 0, 90, 30], 1000)
    slider_S1.value = 90
    slider_S2.value = 164
    slider_S3.value = 18
    slider_S4.value = 0
    slider_S5.value = 90
    slider_S6.value = 30
    slider_speed.value = 1000
    button_power_on.icon = 'check'
    button_power_off.icon = 'uncheck'
```

Create a camera display window to read and display camera images in real time.

```
imgbox = widgets.Image(format='jpg', width=640, height=480,
layout=widgets.Layout(align_self='center'))
model = 'Start'
```

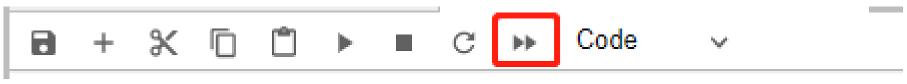
```
def camera():
    global model
    capture = cv.VideoCapture(0)
    capture.set(cv.CAP_PROP_FRAME_WIDTH, 640)
    capture.set(cv.CAP_PROP_FRAME_HEIGHT, 480)
    while capture.isOpened():
        try:
            _, img = capture.read()
            if model == 'Exit':
                break
            imgbox.value = cv.imencode('.jpg', img)[1].tobytes()
        except:
            break
    with output:
        print("capture release")
    capture.release()
```

Create a new close button to end the program and release resource occupation.

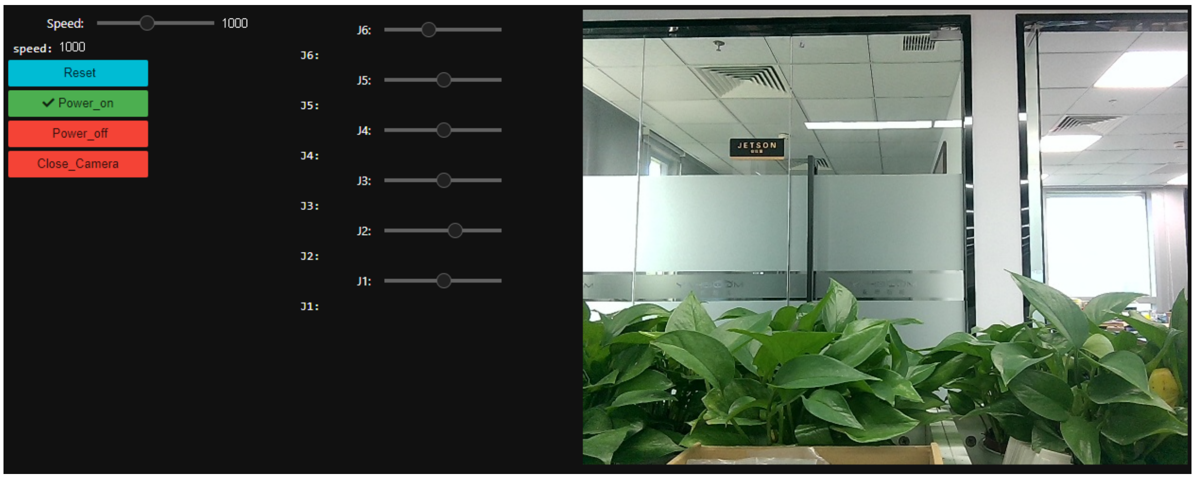
```
button_close = widgets.Button(description='Close_Camera', button_style='danger')
def button_close_Callback(value):
    global model
    model = 'Exit'
    with output: print(model)
button_close.on_click(button_close_Callback)
```

III. Run the Program

Click the run entire program button on the jupyterlab toolbar, then scroll to the bottom.



You can see the relevant control controls on the left and the camera display on the right.



The corresponding positions of the robotic arm joints are shown in the figure below.