6. Voice control color tracking

6.1. Function description

By interacting with the voice recognition module on ROSMASTER, you can turn on or off ROSMASTER's red/blue/green/yellow color tracking function by voice. The R2 key on the handle can cancel/enable this function at any time.

6.2. Start

```
#Raspberry Pi 5 master needs to enter docker first, please perform this step
#If running the script into docker fails, please refer to ROS/07, Docker tutorial
~/run_docker.sh
```

6.2.1. Function package path

```
~/yahboomcar_ws/src/yahboomcar_voice_ctrl/
```

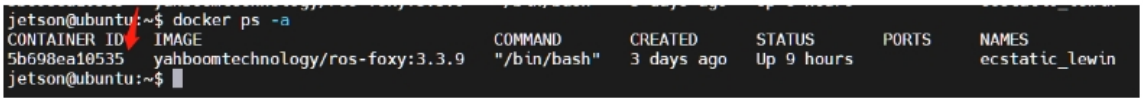
6.2.2. Start

```
roslaunch yahboomcar_voice_ctrl voice_ctrl_colorTracker.launch
```

<PI5 needs to open another terminal to enter the same docker container

1. In the above steps, a docker container has been opened. You can open another terminal on the host (car) to view:

```
docker ps -a
```



2. Now enter the docker container in the newly opened terminal:

```
docker exec -it 5b698ea10535 /bin/bash
```

After successfully entering the container, you can open countless terminals to enter the container.

```
python
~/yahboomcar_ws/src/yahboomcar_voice_ctrl/scripts/voice_Ctrl_color_tracker.py
```

After the program is started, call ROSMASTER "Hello, Xiaoya" to wake up the module. When it broadcasts "on", it means waking up the module. Taking tracking red as an example, you can then say "Start tracking red" to it, and ROSMASTER will broadcast "Okay, start tracking red". Then, we release the controller's control of ROSMASTER by pressing the R2 key of the controller, and

ROSMASTER begins to track red. If there is no remote control, you can also enter the following command through the terminal,

```
rostopic pub /JoyState std_msgs/Bool False
```

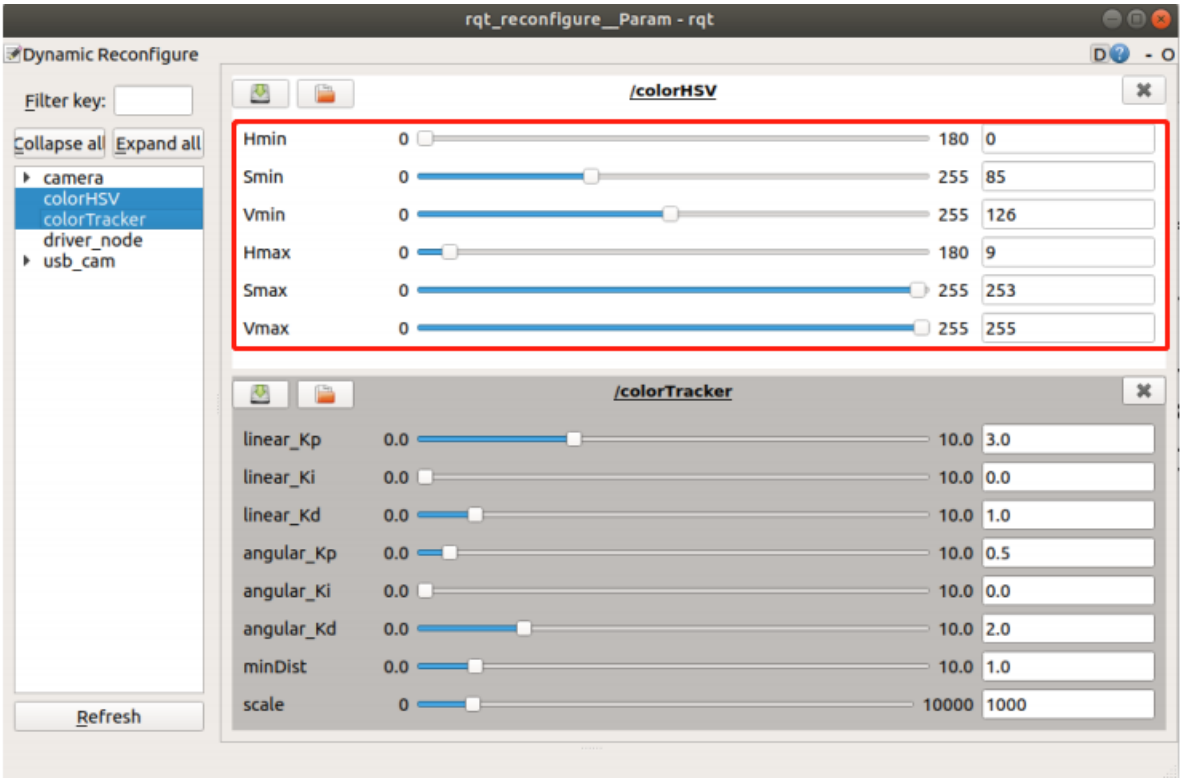
If you want to cancel the color tracking function, say "cancel tracking" to ROSMASTER, ROSMASTER stops, and the voice will broadcast "OK, cancel tracking".

6.2.3. Color calibration

The camera is very sensitive to light, so sometimes the color recognition will be inaccurate. In this case, the red, green, yellow, and blue colors need to be recalibrated. Terminal input,

```
rosrun rqt_reconfigure rqt_reconfigure
```

Find the colorHSV column and drag the slider to modify the HSV value.



Open the voice_Ctrl_color_tracker.py program and find the following sections,

```
if command_result == 73 :
      self.model = "color_follow_line"
      print("tracker red")
      self.hsv_range = [(0, 185, 175), (180, 253, 255)]
elif command_result == 74 :
      self.model = "color_follow_line"
      print("tracker green")
      self.hsv_range = [(54, 92, 75), (125, 255, 255)]
elif command_result == 75 :
      self.model = "color_follow_line"
      print("tracker bule")
      self.hsv_range = [(55, 204, 177), (125, 253, 255)]
elif command_result == 72 :
      self.model = "color_follow_line"
```

```
    print("tracker yellow")
    self.hsv_range = [(18, 128, 168), (125, 253, 255)]
```

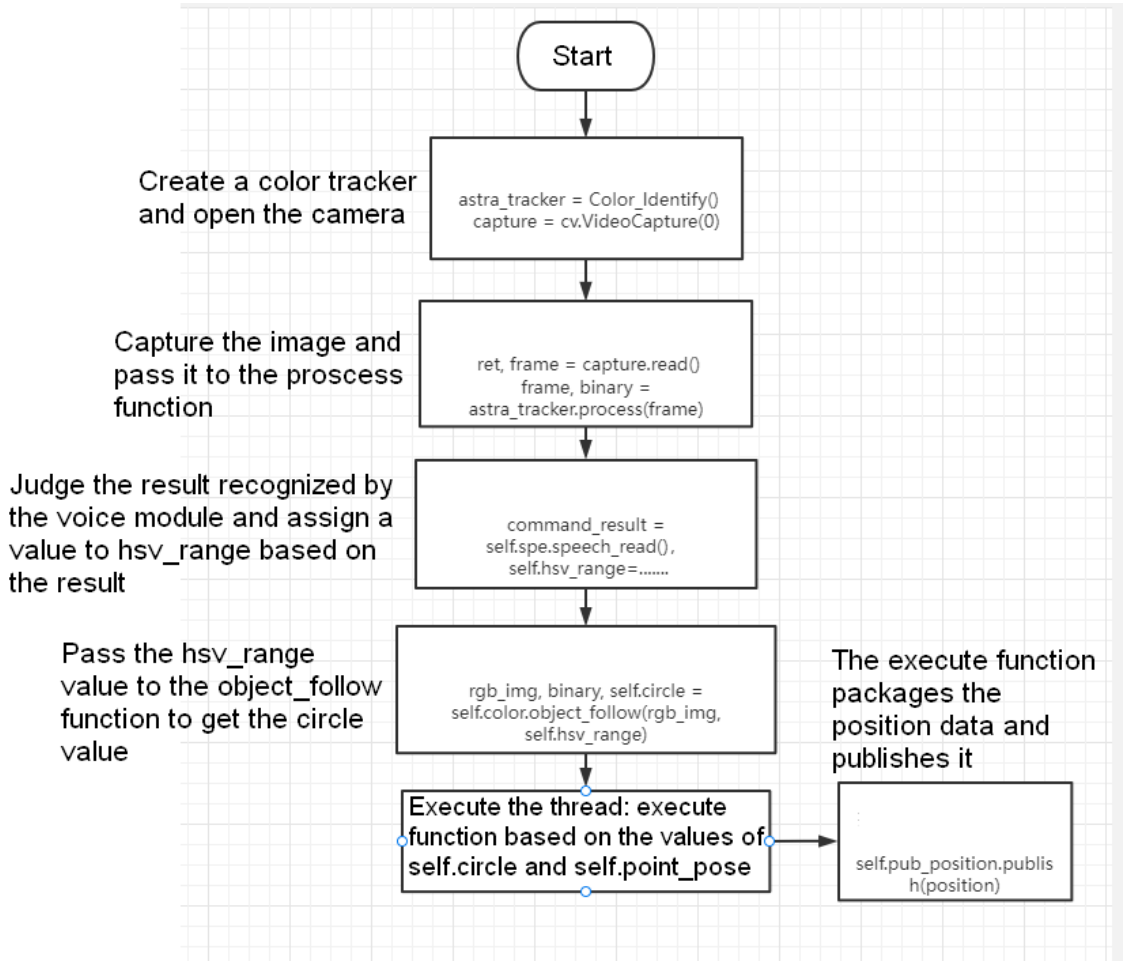
Modify the calibrated HSV value just recorded to the position of the corresponding color, save it, and use the calibrated value the next time you start it.

6.3. Core code analysis voice_Ctrl_color_tracker.py

```
command_result = self.spe.speech_read()
        self.spe.void_write(command_result)
        if command_result == 73 :
            self.model = "color_follow_line"
            print("tracker red")
            self.hsv_range = [(20, 215, 111), (180, 253, 255)]
            self.dyn_update = True
        elif command_result == 74 :
            self.model = "color_follow_line"
            print("tracker green")
            self.hsv_range = [(44, 138, 91), (84, 255, 255)]
            self.dyn_update = True
        elif command_result == 75 :
            self.model = "color_follow_line"
            print("tracker bule")
            self.hsv_range = [(83, 217, 196), (141, 253, 255)]
            self.dyn_update = True
        elif command_result == 72 :
            self.model = "color_follow_line"
            print("tracker yellow")
            self.hsv_range = [(18, 55, 187), (81, 253, 255)]
            self.dyn_update = True
        elif command_result == 76 :
            self.model = "Stop"
            #self.ros_ctrl.Joy_active == False
            #self.ros_ctrl.pub_cmdVel.publish(Twist())
        self.command_result = 999
        if self.dyn_update == True :
            params = {'Hmin': self.hsv_range[0][0], 'Hmax': self.hsv_range[1]
[0],
                      'Smin': self.hsv_range[0][1], 'Smax':
self.hsv_range[1][1],
                      'Vmin': self.hsv_range[0][2], 'Vmax':
self.hsv_range[1][2]}
            self.dyn_client.update_configuration(params)
            self.dyn_update = False
        if self.model == "color_follow_line":
            self.ros_ctrl.Joy_active == False
            #self.model == "General"
            rgb_img, binary, self.circle = self.color.object_follow(rgb_img,
self.hsv_range)
            if self.ros_ctrl.Joy_active == False :
                if self.circle[2] != 0: threading.Thread(
                target=self.execute, args=(self.circle[0], self.circle[1],
self.circle[2])).start()
                if self.point_pose[0] != 0 and self.point_pose[1] != 0:
threading.Thread(
```

```
                target=self.execute, args=(self.point_pose[0],
self.point_pose[1], self.point_pose[2])).start()
            #threading.Thread(target=self.execute, args=(self.circle[0],
self.circle[2])).start()
        return rgb_img, binary
def execute(self, x, y, z):
position = Position()
position.angleX = x
position.angleY = y
position.distance = z
self.pub_position.publish(position)
```

6.3.1. Program flow chart



For complete code, please refer to:

```
~/yahboomcar_ws/src/yahboomcar_voice_ctrl/scripts/voice_Ctrl_color_tracker.py
```

6.4. Function module communication table

Function words	Speech recognition module results	Voice broadcast content
Start tracking yellow	72	OK, start tracking yellow
Start tracking red	73	OK, start tracking red
Start tracking green	74	OK, start tracking green

Function words	Speech recognition module results	Voice broadcast content
Start tracking blue	75	OK, start tracking blue
Cancel Tracking	76	OK, Cancel Tracking