2、HD camera color tracking

2.1、Introduction

The Transbot robot HD camera color tracking is capable of recognizing multiple colors at any time, automatically storing the currently recognized colors.

When controlling the car to follow the detected colors, we need to keep a certain distance from the object.

The color tracking of the Transbot robot can also realize the function of real-time HSV regulation. By adjusting the high and low thresholds of HSV, the interfering colors can be filtered out, so that the square can be identified ideally in a complex environment. If the color picking effect is not ideal At this time, we need to move the car to a different environment to calibrate it, so that we can recognize the color we need in a complex environment.

- **HSV**

H: 0 — 180

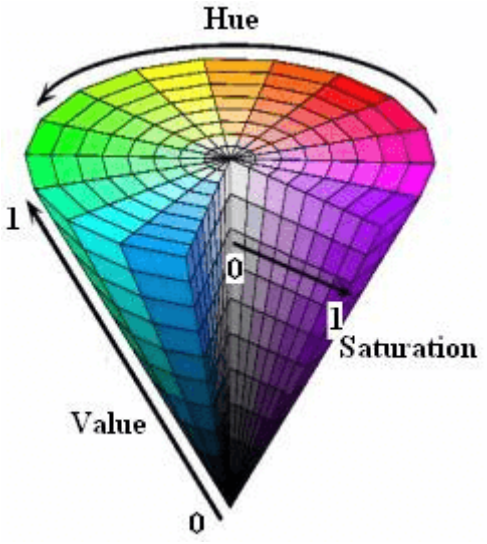
S: 0 — 255

V: 0 — 255

Part of the red is classified as the purple range here:

	black	gray	white	red		orange	yellow	green	verdant	blue	purple
hmin	0	0	0	0	156	11	26	35	78	100	125
hmax	180	180	180	10	180	25	34	77	99	124	155
smin	0	0	0	43		43	43	43	43	43	43
smax	255	43	30	255		255	255	255	255	255	255
vmin	0	46	221	46		46	46	46	46	46	46
vmax	46	220	255	255		255	255	255	255	255	255

- **HSV**
- **Lightness V**
    - **Saturation S**
- **Hue H**



2.2、Steps

Note: The [R2] of the handle remote controller can [Pause/Open] for all functions of robot car

2.2.1、Start up

Start the bottom driver control. (Jetson nano side)

```
roslaunch transbot_bringup bringup.launch
```

Method 1

Start HD camera (Jetson nano side)

```
roslaunch usb_cam usb_cam-test.launch
```

Start HD camera color tracking control (virtual machine)

```
roslaunch transbot_mono mono_tracker.launch VideoSwitch:=false
tracker_type:=color
```

Method 2

Note: press【q】key to exit.

```
roslaunch transbot_mono mono_tracker.launch VideoSwitch:=true
tracker_type:=color
```

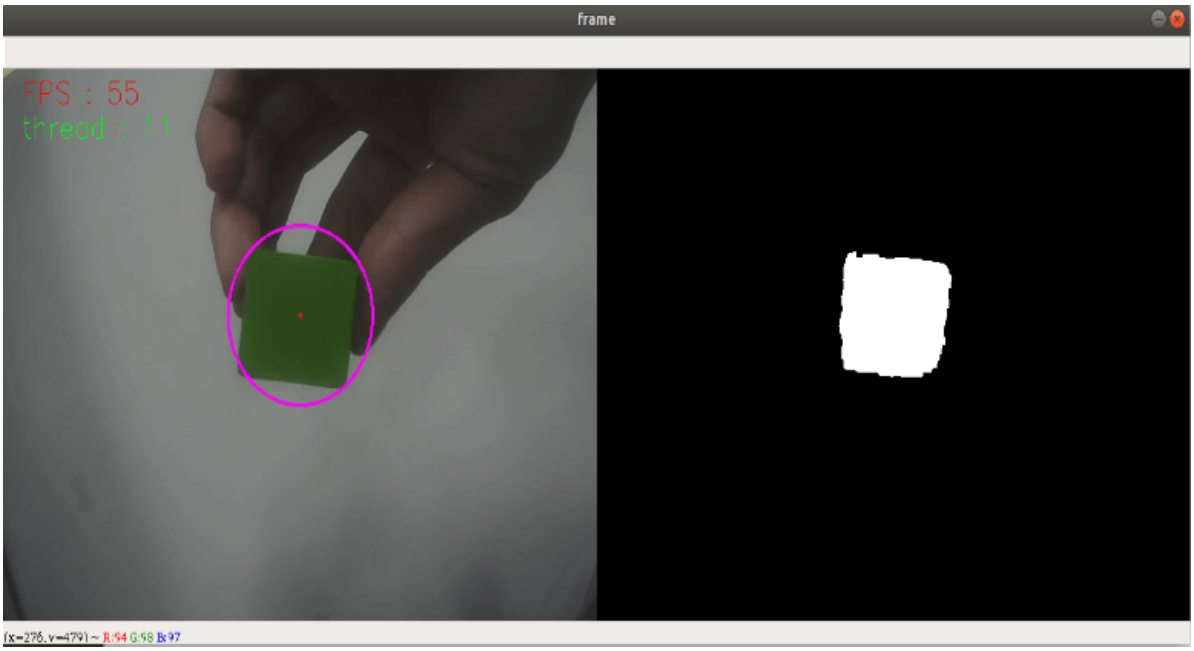
This method can only be activated in the master controller that the camera is connected.

- VideoSwitch parameter: whether to use the camera function package to start; for example: start usb_cam-test.launch, this parameter must be set to true; otherwise, it is false.
- tracker_type parameter: function gameplay, select color tracking.

Set the parameters according to your needs, and you can also modify the launch file directly, so you don't need to attach parameters when you start.

2.2.2、Identify

After startup, the system defaults to [Target Detection Mode], as shown below.



Keyboard key control:

【r】： Color selection mode, the mouse can be used to select the area of the color to be recognized (cannot exceed the area range).

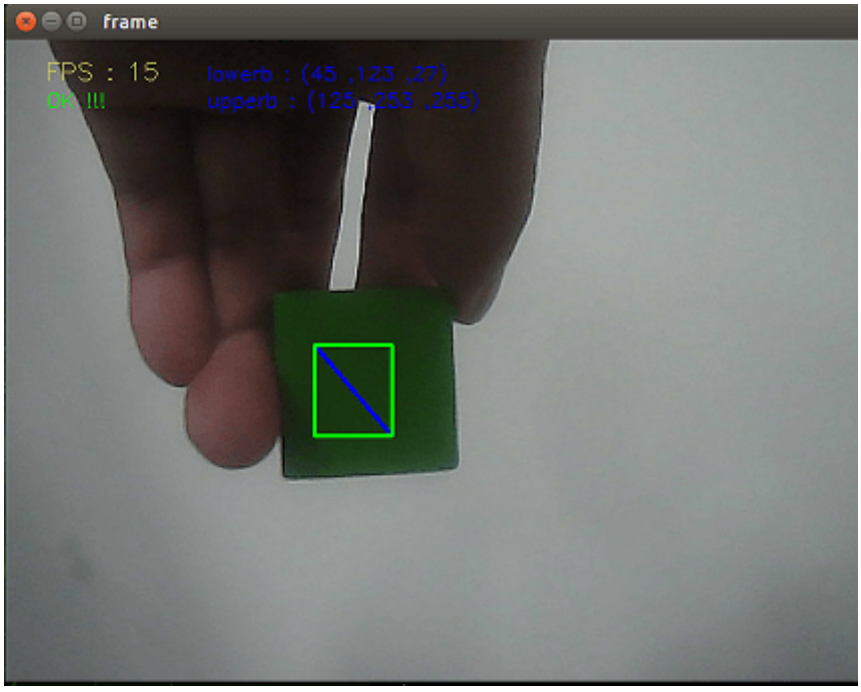
【i】: Target detection mode. Color map on the left (Color), binary map on the right (Binary).

【f】: Switching algorithm: ['BOOSTING','MIL','KCF','TLD','MEDIANFLOW','MOSSE','CSRT','color'].

【q】: Exit the program.

【Space key】: Color follow.

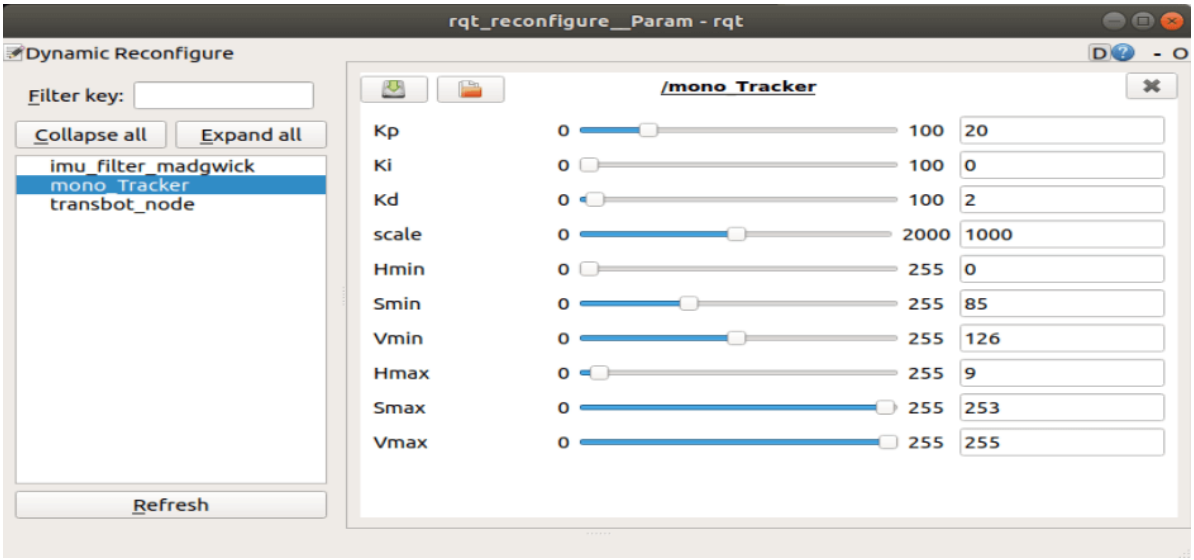
In the color selection mode, use the mouse to select the location of the colored object, as shown below, release it to start recognition.



2.2.3、Color calibration

Dynamic parameter

```
rosrun rqt_reconfigure rqt_reconfigure
```



Select [astra_Tracker] node and [depth_srv] node, generally only need to adjust [Hmin], [Smin], [Vmin], [Hmax], these four parameters can be well identified.

The slider is always in the dragging state, and no data will be transferred to the system. The data will actually be transferred to the system when you release it; you can also select a row and then slide the mouse wheel.

Parameter analysis:

[Kp], [Ki], [Kd]: PID control during the movement of the robot car.

[Scale]: PID scaling.

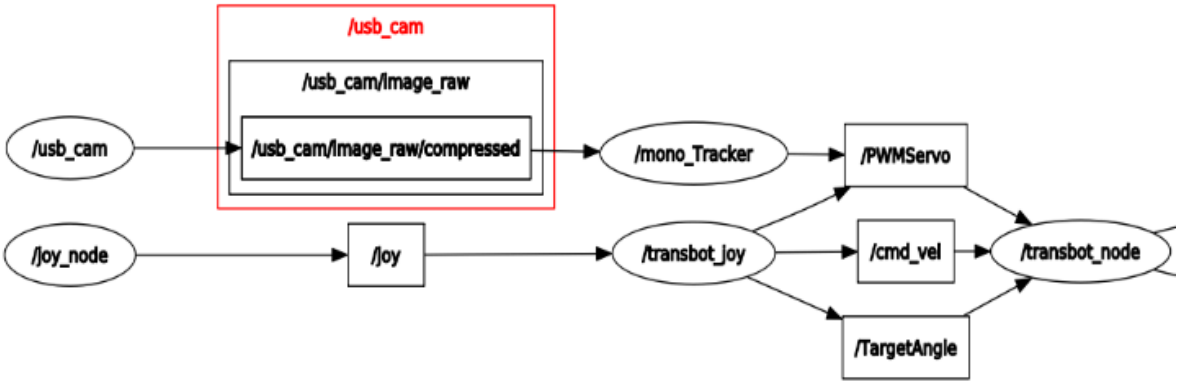
2.2.4、Color follow

After identifying is ok, click [Space key] on the keyboard to execute the color following program.

- View node

```
rqt_graph
```

- Method1--start up，node【mono_Tracker】



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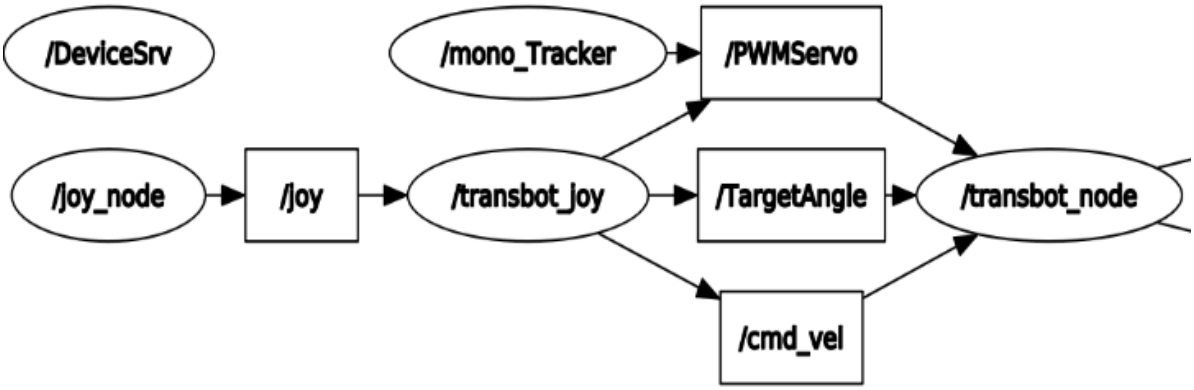
- Method2--start up，node【mono_Tracker】



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