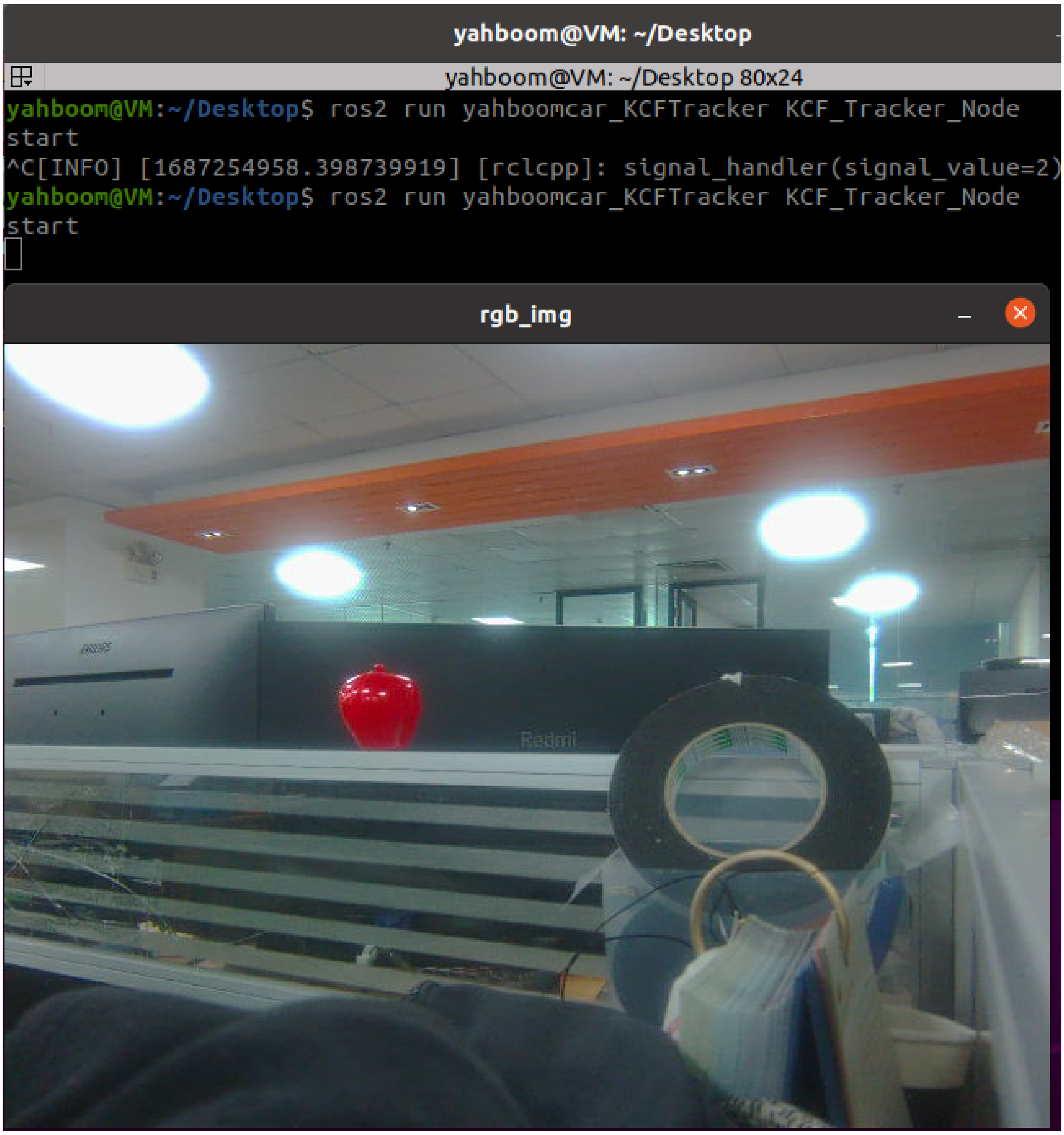
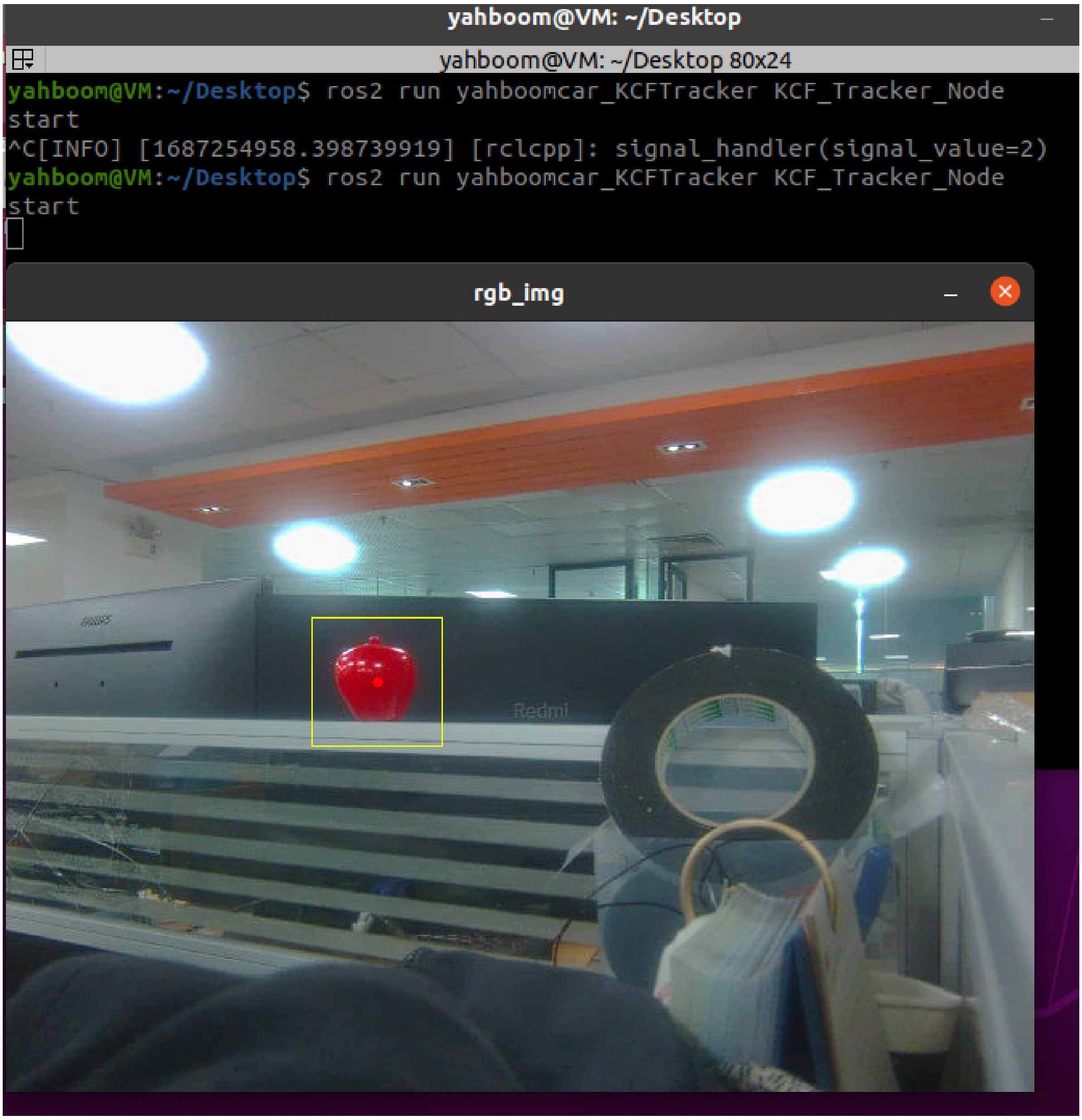
4. KCF object tracking

4.1. Program startup

```
ros2 launch orbbec_camera gemini2.launch.py
ros2 run yahboomcar_KCFTracker KCF_Tracker_Node
```



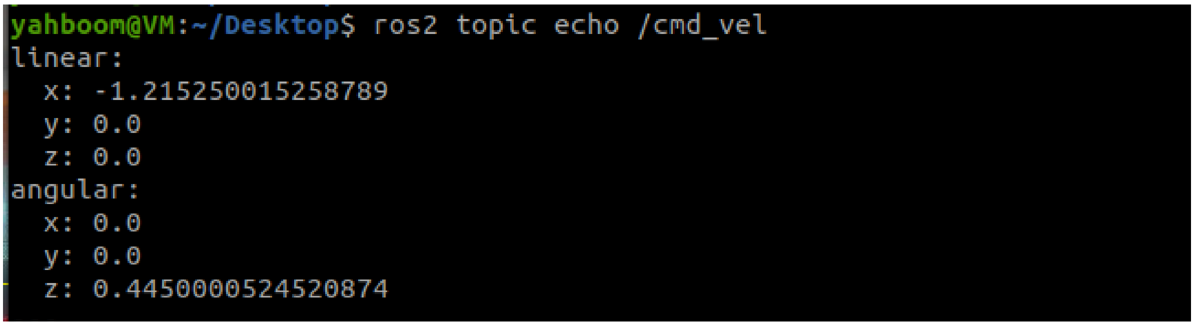
After the program is successfully started, the screen will appear as shown in the picture above. Select the object that needs to be tracked with the mouse. After releasing it, it will be framed, as shown in the picture below.



Then press the space bar to start tracking the object. The terminal will print out the center coordinates and distance of the tracking object.

Similarly, since there is no robot chassis driver, the phenomenon of object tracking cannot be seen intuitively, but object tracking can be reflected through changes in terminal information and /cmd_vel topic data. To view speed topic data, enter the following command:

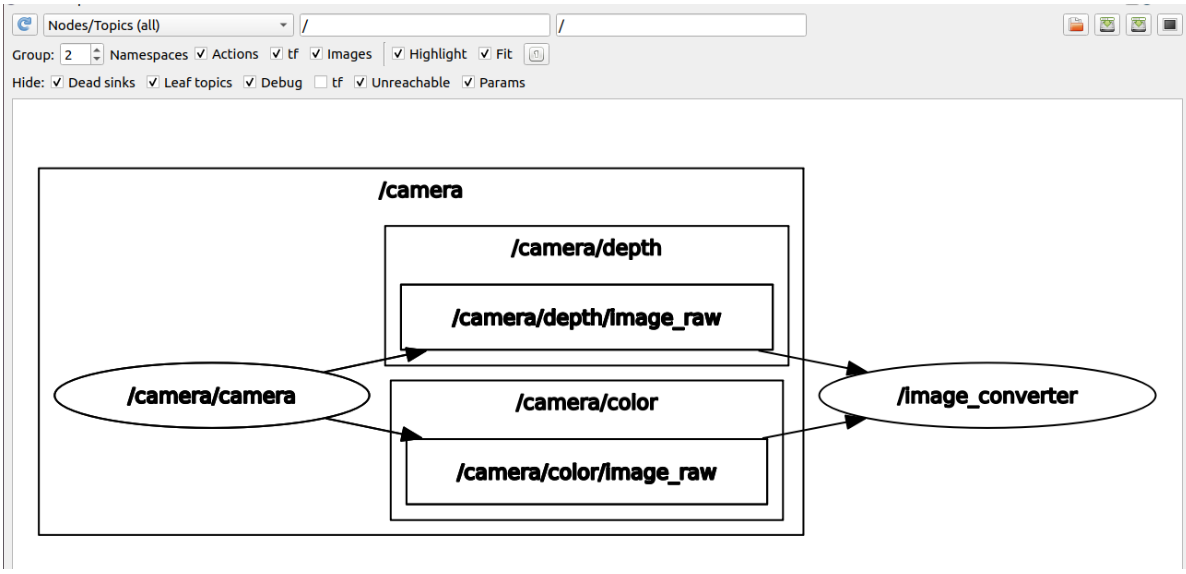
```
ros2 topic echo /cmd_vel
```



As the tracked object moves, the speed data here will also change.

Check the communication between nodes, terminal input,

```
ros2 run rqt_graph rqt_graph
```



4.2. Core code

Code reference path,

```
~/orbbec_ws/src/yahboomcar_KCFTracker/src/KCF_Tracker.cpp
```

The principle of function implementation is similar to that of color tracking. Linear velocity and angular velocity are calculated based on the center coordinates of the target and the depth information fed by the depth camera, and then released to the chassis. Part of the code is as follows:

```
//This part is to get the center coordinates after selecting the object, which is used to calculate the angular velocity.
if (bBeginKCF) {
result = tracker.update(rgbimage);
rectangle(rgbimage, result, Scalar(0, 255, 255), 1, 8);
circle(rgbimage, Point(result.x + result.width / 2, result.y + result.height / 2), 3, Scalar(0, 0, 255),-1);
} else rectangle(rgbimage, selectRect, Scalar(255, 0, 0), 2, 8, 0);
//This part is to calculate the values of center_x and distance, which are used to calculate the speed.
int center_x = (int)(result.x + result.width / 2);
int num_depth_points = 5;
```

```
for (int i = 0; i < 5; i++) {
if (dist_val[i] > 0.4 && dist_val[i] < 10.0) distance += dist_val[i];
else num_depth_points--;
}
distance /= num_depth_points;
//Calculate linear velocity and angular velocity
if (num_depth_points != 0) {
std::cout<<"minDist: "<<minDist<<std::endl;
if (abs(distance - this->minDist) < 0.1) linear_speed = 0;
else linear_speed = -linear_PID->compute(this->minDist, distance);//-
linear_PID->compute(minDist, distance)
}
rotation_speed = angular_PID->compute(320 / 100.0, center_x /
100.0);//angular_PID->compute(320 / 100.0, center_x / 100.0)
```