

RoboCup 2021 Team Description Paper

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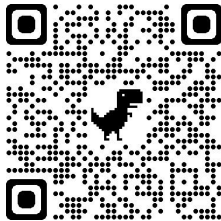
Info

Team Name: PC FBOT

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Introduction

During the COVID-19, we think that people working in quarantine hotels are very dangerous and are at risk of being infected with COVID-19 any time, so we decided to set up this project to help those workers to avoid it.

Inspiration

First of all, the robot won't be infected by any virus and cannot work. The robot can do high-strength work for a long time with only a short time of charging. The robot can effectively do repetitive tasks. Those features made robots competent in this job.



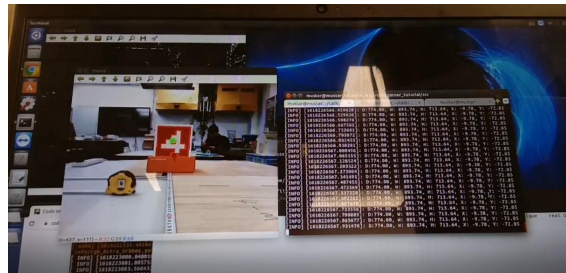
Existing Function

Software

- Vision:** Can identify the specified object and find the corresponding coordinates. Using OpenCV to identify images, we mainly use colors to identify objects. When the system recognizes an item of the corresponding color, it can measure the distance and coordinates of the item to the camera, and notify the robotic arm to move in front of the item.

How to find the objects?

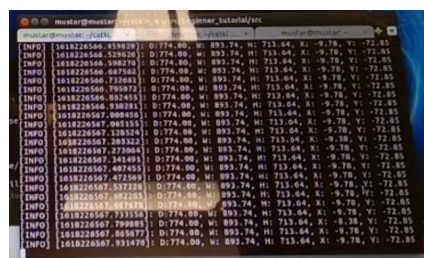
- we need to set the color of the object
- if the color of the item is the same as the set color, we used cv2.findContours to find the contour of the item
 - Used cv2.RETR_EXTERNAL, cv2.CHAIN_APPROX_SIMPLE to take out the outer contour



practical testing

How to find the coordinates?

- we need to find the center of the object
- Find the depth and radian first, and then calculate the true coordinates of the picture from the depth, write down the formula and let the computer calculate it.



practical testing

- Robot Arm:** Can take the corresponding coordinates. When the robotic arm receives the notification, it will move the robotic arm to the specified position, and after a round of calculations, the object can be picked up.

How to set a robot arm in the right position?

- Set x, y, z points in the program.
- Set the degree of each joint in the program.
- Use voice recognition to open/close the gripper.



- **Voice recognition:** Be able to identify the questions from users and provide the relative answers. When the problem is identified, the voice will be converted into text, and the text will be compared with the originally set keywords, and the comparison result will be spoken by the speaker.
- **Automatic navigation:** Use slam to scan the terrain around the robot, and move the robot to scan the terrain in different places, and combine the terrain in different places into a complete map. When the robot is ordered to a place that has been recorded on the map before, the robot will take the shortest distance and time to the designated place.

Hardware

It is divided into four layers on our robot.

- The first layer (the lowest layer) is mainly for NUC microcomputers and USB hubs.
- The second layer is for batteries, speakers, and laser cameras
- The third layer is for robotic arms and Mr voice.
- The emergency button and monitor are placed on the last floor, and a camera is also placed above the monitor.

Application

We can use these functions everywhere. For example isolation hotels(to help the cleaner to clean the room), home (to help office workers clean their homes), and also be used in hospitals(to clean the isolation ward).

Advantage

In the existing technology, there are many functions, but almost no one puts these functions together to make a robot about the new coronavirus, so this solution can be used in current life.

Future improvements

Because of the current epidemic, we want to use this robot in isolated hotels in the future. During the quarantine period, the cleaners were unable to clean the room every day, so the room may still be infected with the virus. At the same time, medical staff need to help patients monitor their body temperature every day, so that medical staff have a high chance of getting coronavirus.

Conclusion

In many countries, the new coronavirus is still in a state of recurrence. Many citizens have died in this incident because of the epidemic. So we want to use this plan and hope that it can be applied in our lives in the future, as we have to avoid medical staff contact with isolated people. Reduce the risk of people getting the virus.