

Hospital Hunter

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1. Introduction

The goal of this project was to identify objects through their colours. The robot would explore the rooms and try to detect the colour of objects. A mini Database with the colours and the objects name was made. By identifying the colours, the robot would be able to know what the item is.

2. How I solved this task?

- I created a mini-representation of a hospital scene in CoppeliaSim.
- I got the robot moving around and rotating when it encountered an object.
- I set up the camera aspect of the thymio robot and connect it with a computer vision library called opencv.
- I worked on the colour detection of the objects.

2.1. How the project was built

This sections goes through the detail of how the project was built.

2.1.1. Scene Making. This section goes through the details of how the scene was made.

- I looked online for free resources for model objects.
- For some of the objects in the scene, I imported the models in the format that coppeliasim allowed, in some of the cases it was .obj file.
- I got some resources from here for the model objects[1]:
 - Put the shape for each of the objects in its own group and renamed it. In those groups, I would make changes such as:
 - I would change the colour of the object – Scene object properties →shape →colour →ambient/diffuse component,

then change the rgb colour to what u want. Sometimes, the objects come with texture, which you can use, but because I want to do colour detection, it was best to have them just one colour.

- I also scaled the size of some of the objects because they were too big for the scene - Scene object properties →common →scaling, then change the size to whatever to fit the scene

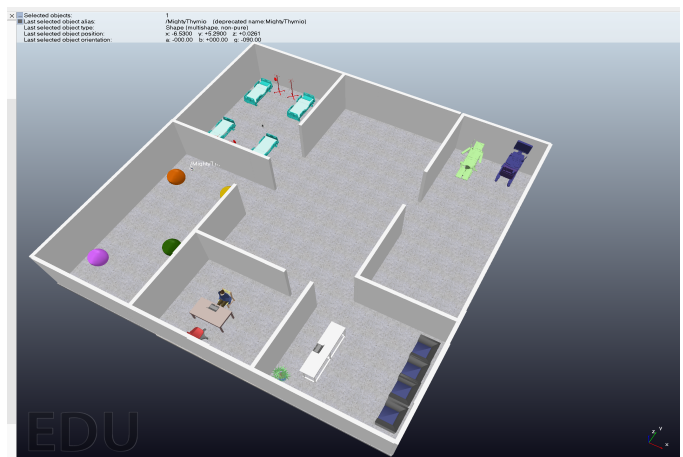


Figure 1. An image of the scene

2.1.2. Colour Detection. The detection was done using the thymio camera sensor and opencv. The thymio camera was used to detect the objects in the scene. Because it uses opencv, another window is opened with the camera which views the scene that the thymio camera uses. There was a problem here because the camera kept freezing on the frame for the opencv window, so it was not able to detect the object as well. Figure 2 shows the image of the database based on the objects in the scene. The database contains the heading colours, the objects and its rgb values, which I extracted from the coppeliasim.

```
robotics23@robotics23-vm:~/dev_ws/src/HospitalHunter$ /bin/python3 /home/robotics23
```

	Colours	Object	RGB
0	Palatinate Purple	Purple Circle Shape	85, 39, 100
1	Stormcloud	Hospital Bed	86, 100, 98
2	Caput Mortuum	Orange Circle Shape	85, 39, 0
3	Spring Bud	Green Circle Shape	16, 39, 0
4	Rosewood	Blood Bag Stand	100, 0, 0
5	Black Olive	Machine Checker	60, 60, 60
6	Gray-Asparagus	Surgery Bed	77, 100, 66
7	Chocolate (Traditional)	Yellow Circle Shape	85, 71, 0

Figure 2. Colour Database used to find objects

3. Difficulties

There were some difficulties encountered while working on this project.

- Capturing realtime videos with the camera for thymio robot. This was a difficult part because I was using the opencv library, so it had its own visualisation for the camera, if wanting to use video. But when I connected the opencv with the thymio camera, the display window would only display frames of the images from the camera. Then it would freeze and not capture another frame.
- Another problem encountered was the use of the thymio robot sensors. The thymio robot is small in size, so it has limited view of objects that were not on a small size. When I tried to increase the scaling size of thymio to make it bigger, there were some technical difficulties with using its sensor. Also with the measurements did go right with the sensors, as the factors were too large. The camera with the thymio robot sees only from a limited field view, which also made it hard to detect the objects.
- Getting Images for making the scene was a bit tricky. CoppeliaSim only accepts imports of certain files such as .obj, .dae etc, so getting those objects with those particular type for a hospital scene was limiting. At the end, I went with inserting shapes in the scene.

4. Areas of Improvement

In my opinion, there are many area of improvements for this project. Below are some area of improvements:

- Computer Vision aspect with the connection of both the opencv library and the robot camera.
- Finding a better robot to use because the thymio was too small for detecting certain things in the scene.
- Integrating object detect : I went with colour detection for identifying the objects.

5. Conclusion

In conclusion, I wanted to make a mini representation of how robots can be used in hospital for detecting objects. This project was a learning curve personally, with lots of areas for improvement. As well as some many possibilities to further build on the project for future work.

References

- [1] H. Kopka and P. W. Daly, *A Guide to L^AT_EX*, 3rd ed. Harlow, England: Addison-Wesley, 1999.