

- 1 We read the robocup image from command line
- 2 We create "onMouse" function and using "setMouseCallback" we have access to that function which it check what key the user inter, if click on left button we have access to mouse pointer using "userdata" and create a Mat according to the mouse pointer location and then using Vec3b we can print the value of each channel of the location that pointer refer to that
- 3 Using the code which professor provided for us , we calculate the 9\*9 neighborhood of the point that pointer of mouse clicked and we printed in previous task. In other word, we create a rectangle and calculate the average value of the pixels in that rectangle.  
so now we have the average of 9\*9 block near the point that user clicked.
- 4 We set threshold to 50. Using double loop check all the pixels in the image. If all the values of the all channels minus by be mean value of the 9\*9 near pixels less that threshold so we set that pixel to 255 or white. Else we set that pixel to zero or black.  
we create a mask that return an image which return the T-shirt of the robot white, otherwise return black.

5. We expand task4 and almost all the code remain unchange, we just add this part of code  

```
("cvtColor(img, img, COLOR_BGR2HSV);")
```

in other work we convert image to HSV space and then apply our previous algorithm from task4 on the new image from HSV space. In my opinion, the result for detect robots shirt improve. I add the result to the last page.

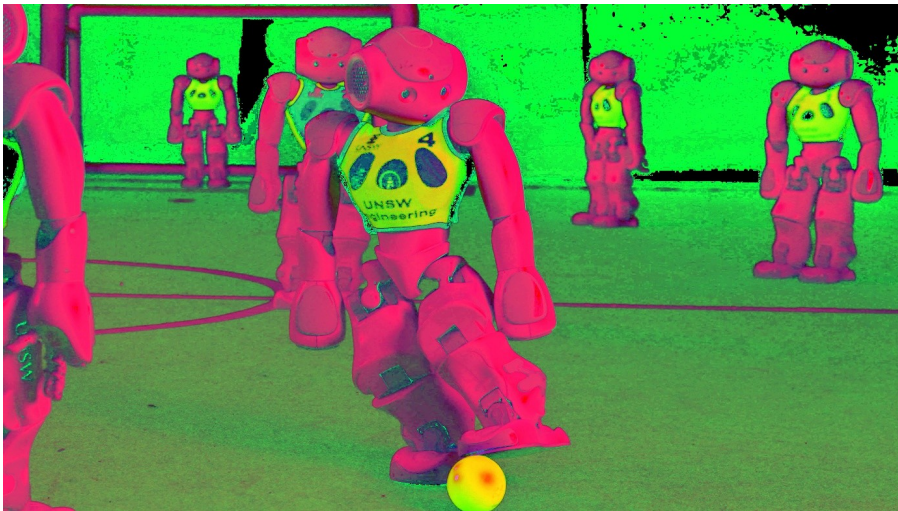
6.  
We set threshold to 80 this time for test. again using double loop access and check each pixels of the image. If the pixel is black in original image so we set the original pixel value to our new image otherwise set the given value to pixel. in other word we give a color to the mask so the result is the new color for T-shirt of the robot. for the second question, yes we can change the color of the ball. At the last page you can see the output

1)

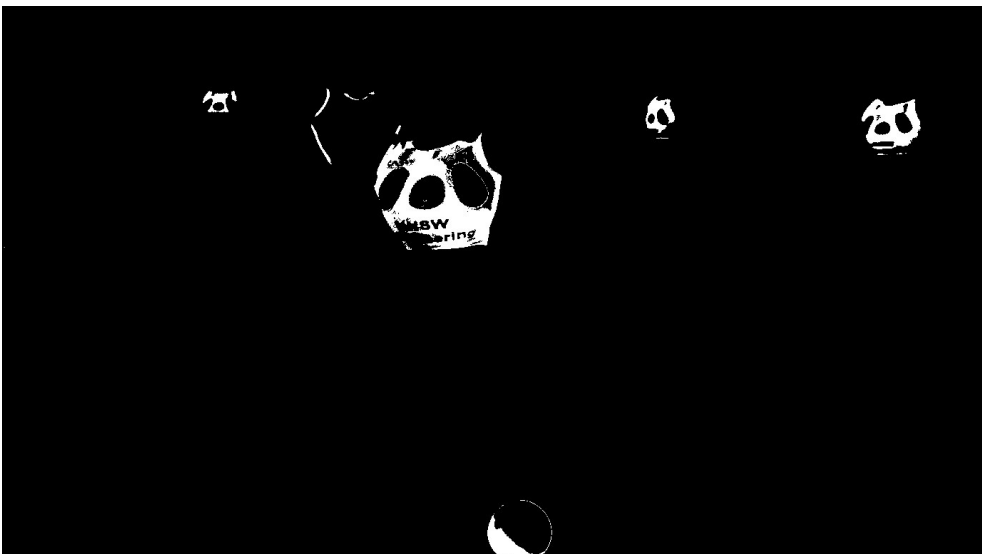


5)

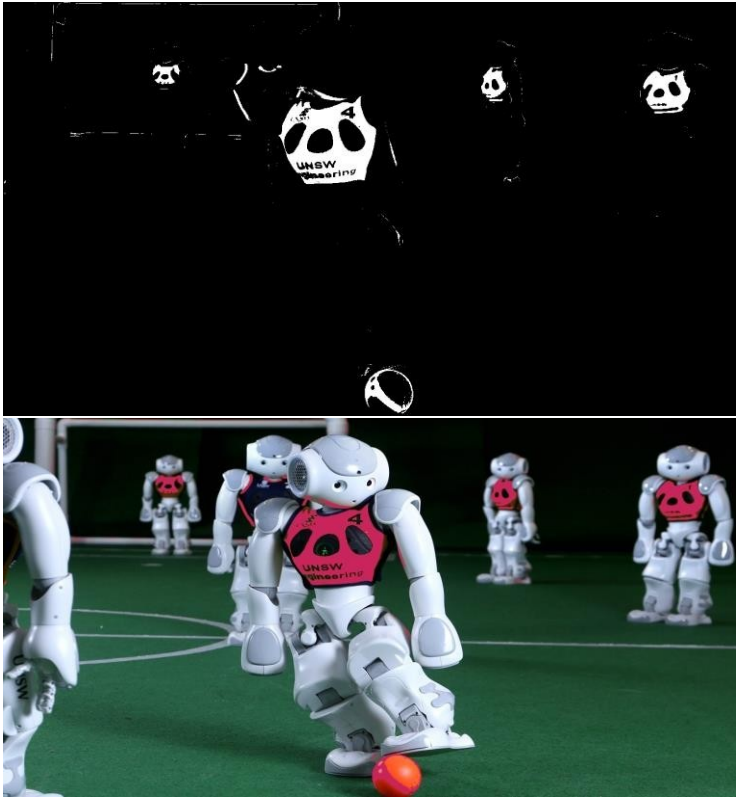
HSV space



5) mask T-shirt



6) change T-shirt color



6) change ball color

