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Robotics Systems I

Final Project

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| **Article Info** |  | **ABSTRACT** |
| ***Article history:*** |  | This lecture demonstrates the applications and implications of MyCobot in the lab environment. As automation technologies continue to evolve, robot with six degrees of freedom emerge as versatile and adaptable solutions, promising increased efficiency, and flexibility in the industry. This lab shows the demonstrations of the lecture in the graduate level course “Robotic System 1” to offer the hands-on experience of the robot on how it is functioned, and the knowledge of controlling it with image recognition integration. |
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# INTRODUCTION

The purpose of this Lab, the YOLO Integration, is to get the hands-on experience of the robot, which let us demonstrate the Cobot’s capability by utilizing image recognition with the method which is applicable. MyCobot is a robot with six axes, often being used to let operator has the basic knowlege of the robot in the cleanroom. It can be controlled to move things with the end-effector. With the programming skills, we can set up the movements of the robot, which can detect the image with the data and move the images to the specific position.

# METHOD

As for the method, I want to move the image when detected, and the image detection can also activate one after another so that the extra manual operations are not needed, only the image capture needs to be done. Therefore, I programmed the robot to detect the images or any other color in the frame and implemented my own tic tac toe engine alongside the YOLO and OpenCV code so that I can create grid lines for the tic tac toe board and then robot could detect the crosses and zeros along with the color of the blocks so anyone can play with either blocks and/or crosses and zeros. Moreover, it uses YOLO to identify if a space is already acquired by an object or not. If it is acquired and player tries to play the same move, it will let the player know that position is already taken so they cannot play that position. At the end, I have added a small part where robot gets angry at the player when it loses so it tries to knock all the blocks on the board out for portraying anger and then it prints that player wins.

# RESULTS AND DISCUSSION

## Demonstration of the tasks in each lab

The video of the demonstration: https://youtu.be/bkjiPzGDTo0

## 3.2 Discussion

The most challenging part is to come up with the idea of how to design and program the structure of the codes. I come up with the idea with writing the loop for those movements eventually. Moreover, the overheating issue which may cause the inaccuracy for the robot so that I need to modify the ideal values of the coordinates to adjust those position. In addition, the camera of the workspace is also an intractable part, even the images are all built and stored in the data that the package provides, however, there are certain images which are not detectable for somehow, therefore I have been tested for the images that are detectable so that the lab could be continued.

# CONCLUSION

A crucial aspect of this process was modifying and extending existing code to achieve the YOLO integration, also the demonstration showed the execution of the image detection tasks, including the robot's ability to discern different objects and move them to certain locations. The challenges encountered during the project, including the intricate design and programming of the code structure. For overcoming issues such as overheating and adjusting coordinate values so that the developed process can be executed successfully.

This hands-on experience not only deepened our understanding of robot programming but also underscored the importance of adaptability and problem-solving in real-world applications. The YOLO Integration lab is a platform for us to developed practical skills in robotics, building the foundation for future advancements and innovations in the field.

1. **RESOURCES/REFERENCE**

Resource Package: <https://github.com/elephantrobotics/aikit_V2> The serial number of the robot: ERMC2800120230201216