myCobot Labs

EGR 545: Robotics Systems 1
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Serial No of the Robot: ERMC2800120230201208

Procedure:

In this laboratory session, we used a 6-axis collaborative robot (cobot) namely myCobot 280 M5 2023 (by Elephant Robotics and M5 Stack) for performing a specific sequence of steps that involved the moving of the robotic arm to a certain angle and opening the gripper (end effector) halfway.

1. Set up Python on our laptop. Python 3.11.2 was installed with PATH dependency.
2. Download files from https://github.com/elephantrobotics/pymycobot.git into a new folder on the system and make it your working directory.
3. Using Device Manager, find the COM port of the robot after connecting the display to the laptop.
4. Next, set up the robot by burning the required firmware Transponder on the Basic. We also need to burn Atom v6.2 using myStudio.
5. Now we can write the code for robotic manipulations. Calibrate the robot motors at their zero (home) position with the script below:

```
from pymycobot import MyCobot
import time

mc = MyCobot("COM5",115200)

for i in range(1,7):
    mc.set_servo_calibration(i)
    time.sleep(0.5)
```

6. Once calibrated, using *get_coods()* function in an infinite while loop, check if the axes are aligned.
7. Set all the motors to 0 degrees (Home position) using the *send_angles()* function and then again using the same function set the angle along the Y axis as 50 degrees. Refer to the below code:

```
from pymycobot.mycobot import MyCobot
import pymycobot
from pymycobot import PI_PORT, PI_BAUD
from pymycobot.genre import Coord
import time
import os
import sys
from pymycobot.mycobot import MyCobot
from pymycobot.genre import Angle, Coord
import time

mc = MyCobot("COM5", 115200)
```

```
mc.send_angles([0, 0, 0, 0, 0, 0], 50)
time.sleep(0.5)
mc.send_angles([0, 50, 0, 0, 0, 0], 50)
time.sleep(0.5)
mc.set_gripper_value(50,80)
time.sleep(0.5)
mc.set_gripper_value(0,80)
time.sleep(0.5)
mc.set_gripper_value(50,80)
time.sleep(0.5)

i=2
while i > 0:
    print("::get_angles() ==> degrees: {}\n".format(mc.get_angles()))

mc.release_all_servos()
```

8. Use set_gripper_value() function for the opening and closing of the gripper. Set the positional value as 50.
9. Run an infinite (while) loop where the robot joint angles are continuously printed using *get_angles()* function.
10. Finally end the code with the function *release_all_servos()* to ensure the robot is in a free-moving mode once the loop is broken.

Observations:

- Python language is used to control the robot.
- Calibration of the robot motors at their zero position is vital as future joint movements take place concerning it. This position is when the robot is in a fully extended state.
- Miscalibration can result in the robot colliding with the camera module setup which will damage the same.
- The first argument of *set_gripper_value()* function sets the position of the end effector (gripper). It ranges from 0 to 100 and 50 signifies the halfway mark.

Conclusion:

This lab helped us to understand the essential home position calibration of the robot arm and moving along a single axis while controlling the end effector using the Python language.

References:

- Lab Document (up to page 7) - https://docs.google.com/document/d/1kWq4milBgbxbNO80HPnsYiMwxRQ8QIYt01OGePCYDU8/edit
- Datasheet - https://docs.elephantrobotics.com/docs/gitbook-en/2-serialproduct/2.1-280/2.1.6-M5-2023.html