W23 CMPUT 412/503 Exercise 1

Duckiebot Assembly and Basic Development

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Written report due: January 22nd
Oral demonstration: January 25th/27th

Description

In this first exercise you will learn the basic knowledge and skills you need to operate a Duckiebot. This exercise will be marked **individually**, although we encourage you to work together with your labmates. Now, let's get quacking!

Procedure

1) Set up your own course website
    a) This is where you will be hosting your written reports for each exercise
    b) You will be required to maintain your website all semester to provide a self-contained written report of your exercise solutions
    c) You can use whichever platform you prefer (e.g., Google site template or GitHub Pages with Jekyll)
    d) Written reports will be due on the Sunday evening following the last lab session for each exercise
2) Set up your course GitHub repository
    a) You are expected to maintain a code repository on GitHub linked to your course webpage
    b) Include a README
    c) For each submission you will be asked to upload a link on eClass that points to the subfolder containing your code for the exercise
3) Read and do the following exercises in [RH1] Connecting and operating a Duckiebot
    a) Unit A-1 - Assembly duckumentation (**excluding** A-1.2)
        i) *Graduate students*: you will need to assemble your own Duckiebot
            (1) Model: DB21
            (2) **SKIP STEP 59 and STOP once you have completed step 62.** Ask a TA to come inspect your Duckiebot and then do steps 59 and 63
        ii) *Undergraduate students:* you will receive a pre-assembled Duckiebot
            (1) Be sure to carefully go over all the different components to test that they all work properly and you understand how they work
            (2) **Recommended**: go through the model DB21 build instructions; there is a troubleshooting section at the end that is useful

iii) Take a picture of your Duckiebot and post it in the Discord channel `#duckiebot-selfies`. Also include photos of your build on your website report. Feel free to customize your rubber ducky placed on top!
iv) **Warning**: the Duckiebot is equipped with a lithium-ion battery which can be dangerous if mishandled. Read Section 1.1 to learn more about the Duckiebattery and how to handle it properly.

b) Unit A-2 - Terminal basics
c) Unit A-3 - Duckiebot Setup
    i) *Undergraduate students:* your Duckiebot should already be initialized
d) Unit A-4 - Networking basics
e) Unit A-5 - Docker basics
f) Unit A-6 - Basic Duckiebot operation

4) Read and do the following exercises in [RH2] Basic Development
    a) Unit B-1 - Git and GitHub
        i) You can skip the tutorial in sec. 1.1 if you are already familiar with Git
    b) Unit B-2 - Python programs and environments
    c) Unit B-3 - Become a Docker Power-User
    d) Unit B-5 - Creating Docker containers
    e) Unit B-6 - My First Duckietown Python Library

Deliverables

Include in your written report:

- A video of your Duckiebot driving in a straight line for a distance of 2 meters
- A screen capture of the camera output and motor signals as seen from the Dashboard
- A video of your Duckiebot running the lane following demo
- A short write up on what you implemented, what you learned, what challenges you came across, and how you overcame the challenges

On eClass you will submit:

- To submit your website written report, first publish it to the public then upload a pdf printout of your published report on eClass by the deadline
- A link to your new course website
- A link to your new course Github repository with all the code from this exercise neatly in a subfolder

Finally, please fill out this Google form (pro tip - take a look before you start the exercises to know what information you will need to provide in the form).

Resources

You can use any material on the internet as long as you cite it properly. You are encouraged to collaborate with your labmates and if you develop a solution together please acknowledge who you worked with in your written report.