Student names: . . . (please update)

Instructions: *This week, you will be installing and testing the simulation environment that you will be using for the final project. Make sure to install it as soon as possible and get help from the TAs if you encounter any issues before you officially start the project next week.*

Simulation environment installation

The installation of the simulation environment can be completed using a script found in the Lab6 folder. You can run it by simply calling:

```
>> python setup_sim_env.py
```

This will install the *MuJoCo* simulator and the *dm_control* package which are software maintained by Deepmind for running robot simulations. It will also install the *farms_core*, *farms_mujoco* and *farms_sim* packages developed at the Biorobotics Laboratory (BioRob). If you are interested in knowing more about *MuJoCo*, you can find out more on the official website.

IMPORTANT: Make sure you have activated and are using your virtual environment and its python interpreter that that you have created for this course.

NOTE: If you are unclear about the basic steps then refer back to Lab 0 documentation here cmc-installation-help

Examples

We have provided an example based on next week's project to get you accustomed to the MuJoCo graphical interface. You can try running it by calling:

```
>> python example.py
```

This script is available under Lab6/Python.

Graphical User Interface Interaction

When you run the example script, a Graphical User Interface (GUI) should launch, like the one shown in Figure 1

You can use the left mouse click to move around the scene and right mouse click to rotate the camera. You can also select a part of the robot by double left clicking on a part. Once selected, you can then interact with it by holding the CONTROL key and dragging with left or right click. Try it out for yourself to familiarise with the interface.

There are many keyboard shortcuts also available

- Press SPACE to toggle play/pause
- Press "!" / "^" to change speed factor (between zero (0) and backspace)
- Press w to toggle wireframe
- Press t to toggle transparency
- Press s to toggle shadows
- Press c to show collisions
- Press f to show collisions forces, combine with p to show friction/reaction
- Press b to show external forces (try in water later on)
- And many more...

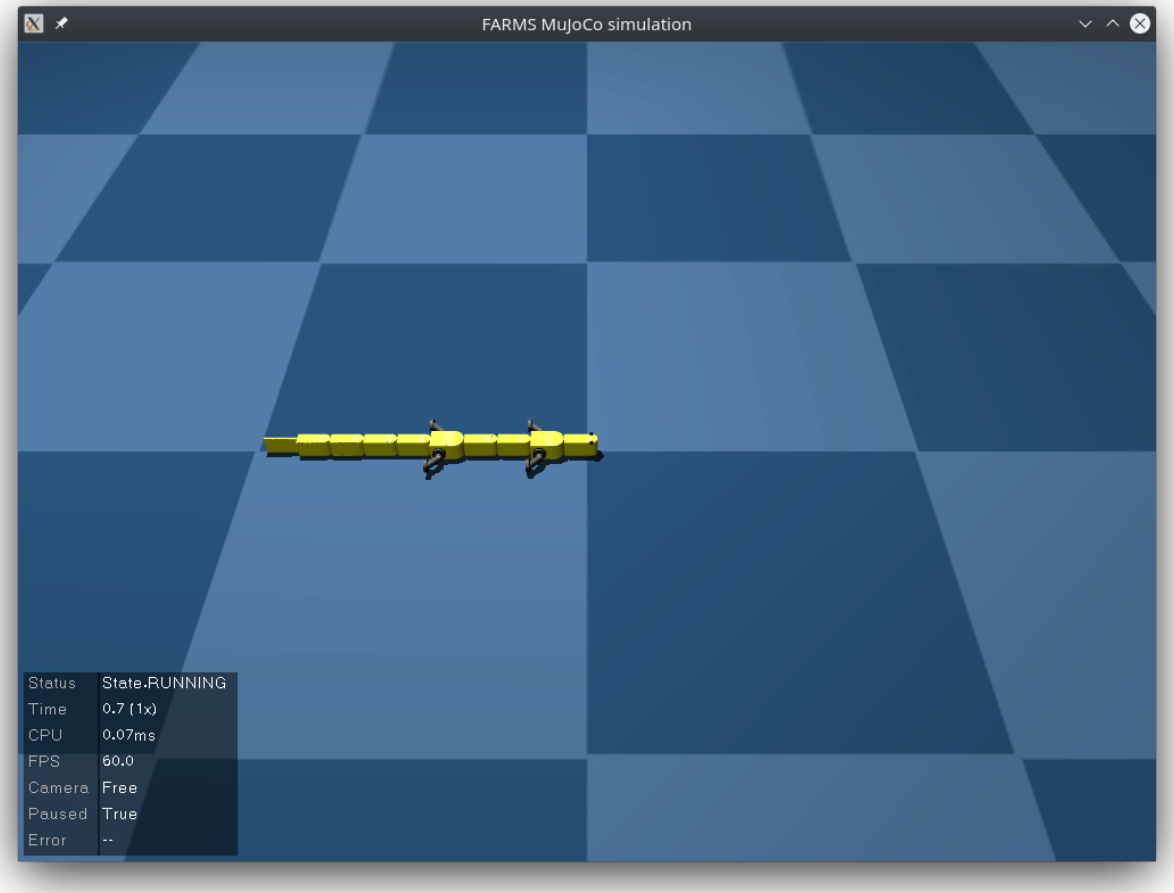

Figure 1: MuJoCo/dm_control Graphical User Interface

Important things to explore with the provided example

- Changing the view of the scene using the controls above
- Interaction with the objects in the scene
- Try changing to a water arena in the example script and showing the forces acting on the body (b)

Preparing for the project

Once you are done with the installation and have tried the simulation environment. The best way to prepare for the upcoming project is to read the two following paper in detail:

- Ijspeert, Auke Jan, et al. "From swimming to walking with a salamander robot driven by a spinal cord model." science 315.5817 (2007): 1416-1420.
- Thandiackal, Robin, et al. "Emergence of robust self-organized undulatory swimming based on local hydrodynamic force sensing." Science Robotics 6.57 (2021): eabf6354.

Happy reading!