

Setting up the simulation environment

We will use Python as the programming language in this unit, and we have a standard environment setup that we recommend you use. You may use other programs which provide similar functionality (that you prefer), but in this case, the teaching team may not be able to provide support. If you encounter difficulties with a custom environment setup, we recommend that you revert to what is described here.

Install python 3.10 or above

Download and install a recent version of python that is compatible with your operating system. Choose at least version 3.10.

Note: When installing, if prompted, allow long file names.

By default, the python installation will come with a package manager called `pip` and a tool for managing virtual environments.

Make a new working folder for the unit

Create a folder called `Robot` in a suitable location where you have both read and write access.

Create a virtual environment within this folder

Open the command prompt / terminal and navigate to the folder that you created above. Then create a virtual environment using the following code.

```
python -m venv Robot_venv
```

Activate the virtual environment

Activate the environment by typing the following

```
Robot_venv\Scripts\activate
```

Dont forget to activate the environment each time you work with code in this unit.

Install the libraries that we will use in this unit

It is a good idea to update `pip` if you have not done so before.

```
python -m pip install --upgrade pip
```

Install the robotics toolbox:

```
pip install roboticstoolbox-python ipython notebook sympy pytest ipynb
```

If you run into issues with scipy, downgrade to an earlier version

```
pip uninstall scipy  
pip install "scipy<1.12.0"
```

Install libraries that will help us communicate with the CoppeliaSim simulation environment:

```
pip install pyzmq  
pip install cbor  
pip install coppeliasim_zmqremoteapi_client
```

Install CoppeliaSim EDU

Download from here: <https://www.coppeliarobotics.com/downloads> and install it.

Tell CoppeliaSim where the Python interpreter is located.

Open the following file:

On windows: `C:\Users\<some name>\AppData\Roaming\CoppeliaSim\usrset.txt`

In this file, modify the line that says defaultPython.

The path must point to the python.exe located in the virtual environment that you made above.

```
defaultPython = C:\<enter appropriate path here>\robot_main\robot_venv\Scripts\python.exe
```

Install a suitable code editor of your choice

It is a good idea to have a code editor like Visual Studio Code installed. This helps you improve your programming and debugging skills.

Install VS Code from here <https://code.visualstudio.com/>

The VS Code extension `pylance` provides extensive language support for Python. We recommend installing it (through the extensions button in VS Code) if it is not already.

For `pylance` to operate correctly, VS Code must be told which Python environment you are using. By default it will select your system Python environment which is incorrect. To select the correct environment, on mac press cmd + shift + p or ctrl + shift + p for Windows/Linux and type Python: Select Interpreter and then select it. From the drop-down list select `Python 3.xx.x ('Robot')` (where the x will be a number depending on the exact Python version installed). If VS Code does not automatically show the option, click on the `Enter Interpreter Path` button and point it to the `python.exe` in the `Robot_venv` environment like we did in the step above.

This step will need to be performed each time you open a new folder in VS Code.