Steps to Install UR simulator and Connect it via Python script

Setup:

1) Install UR simulator zip file from this link: https://www.universal-robots.com/download/software-e-series/simulator-non-linux/offline-simulator-e-series-ur-sim-for-non-linux-594/. It requires creating an account to access the file.
2) Install VMware Player 16.
3) Install 7zip in order to unzip the UR simulator files downloaded from the link.

VMware Player:

1) Start 'VMWare Player'.
2) Press 'Open a virtual machine' and find the path where the zipped files were unpacked.
3) Select URSim in the list and press 'Play virtual machine'.
4) Press 'OK' when incompatibility dialog is shown.
5) Press 'Download and Install' if VMWare Tools needs to be installed.
6) Press 'OK' if keyboard hook timeout needs to be updated.
7) Press 'OK' when the Removable Devices dialog is shown.
8) The Virtual machine is now started.

Reference: https://www.universal- robots.com/download/software-e-series/simulator-non-linux/offline-simulator-e-series-ur-sim- for-non-linux-594/

UR Simulator:

1) Once the VM started, press the **URsim UR3** icon.
2) To start the simulator, press the red button on bottom left.
3) Press 'On' button and then 'Start' to start the robot.
4) Press the 'Exit' button to change the settings or play around with it.

Finding IP address of VM:

1) To find the IP address of the UR simulator, press the bottom left button on the desktop.
2) Press the 'System Tools' button and then 'UX Term' button to start the command window.
3) In the command window type 'ifconfig'. The address in front of **inet addr** is the IP address.

Python Script:

1) Install the necessary libraries: '**pip install hein_robots**' and '**pip install urx'**
2) The python script in **Figure 1** connects to the UR simulator.
3) Replace the IP address with the IP address of your UR simulator in the script.
4) The pose function gets the position of the robot.
5) Move_to_location function causes the robot to move to the coordinates passed as an argument.

6) Other functions can be accessed from the UR3Arm class to change the position or set the variables.

```
import sys
from hein_robots.universal_robots.ur3 import UR3Arm
from hein_robots.robotics import Location


# use the IP of your VM running the UR sim
arm = UR3Arm('192.168.48.128', gripper_base_port=30002)
position = arm.pose
print(position)
arm.move_to_location(Location(x=100, y=250, z=500))  # units are mm

position = arm.pose
print(position)
```

Figure 1: Python Script