

Welcome!

We appreciate your interest in bogaziciAI! We hope that you will be a part of our community and we will work together in further challenges. Nevertheless, we have to be sure that you have the mind-set of a real researcher, who is passionate, dedicated, and knows how to expand their knowledge on their own. For this purpose, you are requested to complete a series of tasks, which has a deadline of 2 weeks each. These tasks include basics of Python, and an introduction to machine learning. You are expected to learn step by step on your own as the tasks are prepared with the assumption that you know NOTHING about python nor programming. As it is emphasized above, research skills are crucial in the area. By completing these challenges, you will become a valuable member of bogaziciAI.

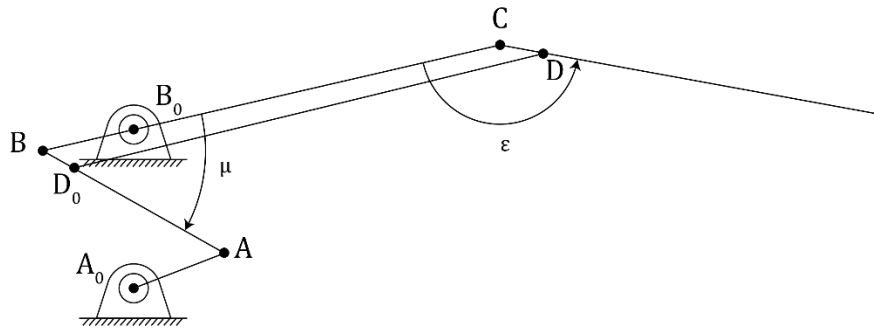


Figure 1 The simulated mechanism schematic.

Artificial intelligence projects demand a decent competence in data management. Thus, in your first task you will get familiar with data manipulation and visualization in Python. The file attached with this mail includes 1 datasheet and 5 output files. The datasheet is extracted from a mechanism simulation “numerically”. Data represents displacement, velocity and acceleration values for 5 different points. Theta represents the angle between  $A_0A$  and ground. Other columns are the displacement, velocity and acceleration components of the dependent points. You are asked to:

- 1-) Clear data, so that error caused by numeric methods at the start of the simulation is removed. Also, the simulation is in a loop, so you must clip data to a suitable range ( $-\pi$  to  $\pi$ ) without repetition.
- 2-) Using x and y components, extract the magnitude using Pythagoras’ theorem.
- 3-) For each point, plot those values for the range of  $-\pi$  to  $\pi$ . (Theta for x axis, value for y axis.)
- 4-) Configure and save the plots in a readable format.

All the steps above MUST be completed in one python script, without the requirement of any user interaction. You are requested to use: numpy, matplotlib, and pandas(optional) libraries.

Submission must only include the python script file, and be submitted to:

[bogaziciaicommunity@gmail.com](mailto:bogaziciaicommunity@gmail.com)

You are always encouraged to get in touch via our Slack server.

Slack server: [https://join.slack.com/t/newworkspace-psy1013/shared\\_invite/zt-nvj0bpyv-XF4cphsJqHXstFhY9cdZ0Q](https://join.slack.com/t/newworkspace-psy1013/shared_invite/zt-nvj0bpyv-XF4cphsJqHXstFhY9cdZ0Q)

## **Appendix:**

To work efficiently with python scripts, we recommend using PyCharm and Anaconda, or Visual Studio Code.

Installation guide for PyCharm and Anaconda:

<https://medium.com/@GalarnykMichael/setting-up-pycharm-with-anaconda-plus-installing-packages-windows-mac-db2b158bd8c>

Installation guide for Visual Studio Code:

<https://code.visualstudio.com/docs/python/python-tutorial>

Importing .csv files using Pandas:

<https://towardsdatascience.com/how-to-read-csv-file-using-pandas-ab1f5e7e7b58>

Selecting specific data using Pandas:

[https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html)

Column creation using Pandas:

[https://pandas.pydata.org/docs/getting\\_started/intro\\_tutorials/05\\_add\\_columns.html](https://pandas.pydata.org/docs/getting_started/intro_tutorials/05_add_columns.html)

Plotting data using matplotlib:

<https://matplotlib.org/stable/tutorials/introductory/pyplot.html#sphx-glr-tutorials-introductory-pyplot-py>