Detecting beginning and end of activities

The purpose of this exercise is to assess your programming (clarity, style, utilization of python packages) and problem-solving skills.

You have measurements from a subject's accelerometer, gyroscope, and magnetometer during everyday activities (see shared CSV file). You will be asked to develop an automated algorithm to detect the beginning and end of an activity so that you can segment the signal and remove parts with no action (e.g., rest).

1. Load and visualize the .csv file. How many activities do you think this dataset contains, and are they of a different kind?
2. Create an automated procedure to detect the beginning and end of an activity so that the signal can be segmented accordingly. Your function should accept the raw time series of a sensor and return multiple pairs of begin and end time corresponding to the regions of interest (e.g., not rest).
3. Test the robustness of your algorithm by adding random noise to the raw signal and recalculating the begin/end time for the different events.
4. Ideally, work in a Python Jupyter notebook and include comments and explanations.