Supplementary Material

Recording images and pre-processing

1. Record images perpendicular to the plane of the leg and at the level of the knee joint (Fig. a).
2. Rotate so that the patient's head is positioned at the top of the screen (Fig. b).

OpenPose download and joint angle measurement

1. OpenPose version 1.7.0, installation instructions in https://github.com/CMU-Perceptual-Computing-Lab/openpose/releases (Fig. c). "openpose-1.7.0-binaries-win64-cpu-python3.7-flir-3d.zip" if you use CPU for analysis, or "openpose-1.7.0-binaries-win64-gpu-python3.7- flir-3d_recommended.zip"if you use GPU. Unzip the downloaded .zip file in an easy-to-understand directory, such as C:\. (Replace \ with a backslash.)
2. Add "C:\openpose-1.7.0-binaries-win64-gpu-python3.7-flir-3d_recommended\openpose\bin" to the Path system environment variable on Windows to pass the path (Fig. d). (Replace \ with a backslash.)
3. Open the "models" file in the unzipped folder and click "getModels.bat" on it to automatically download the models.
4. In the directory where the "bin" file exists, click in the field at the top of the screen where the directory is displayed, type "cmd" and press enter (Fig. e). The command prompt is automatically launched (Fig. f).
5. Copy and paste the following program into the red box in Fig. f.
   bin\OpenPoseDemo.exe --image_dir C:\Users\Desktop\inpose\ --write_images C:\Users\Desktop\outpose\ --write_json C:\Users\Desktop\outpose\
   ① Replace \ with a backslash.
   ② Fill in "C:\Users\Desktop\inpose\" with the directory where your image files exist.
   ③ Fill in "C:\Users\Desktop\outpose\" with the directory where the output image and json files will be stored.
6. Calculate joint angles from joint position coordinate data stored in the created json file using your favourite calculation software. The programming language python 3.8.10 was used in this study (Fig. g). The python 3.8.10 installation instructions are in https://www.python.org/downloads/.

Fig a. Recording image.

Fig b. Image conversion.

Fig c. OpenPose installation instructions.
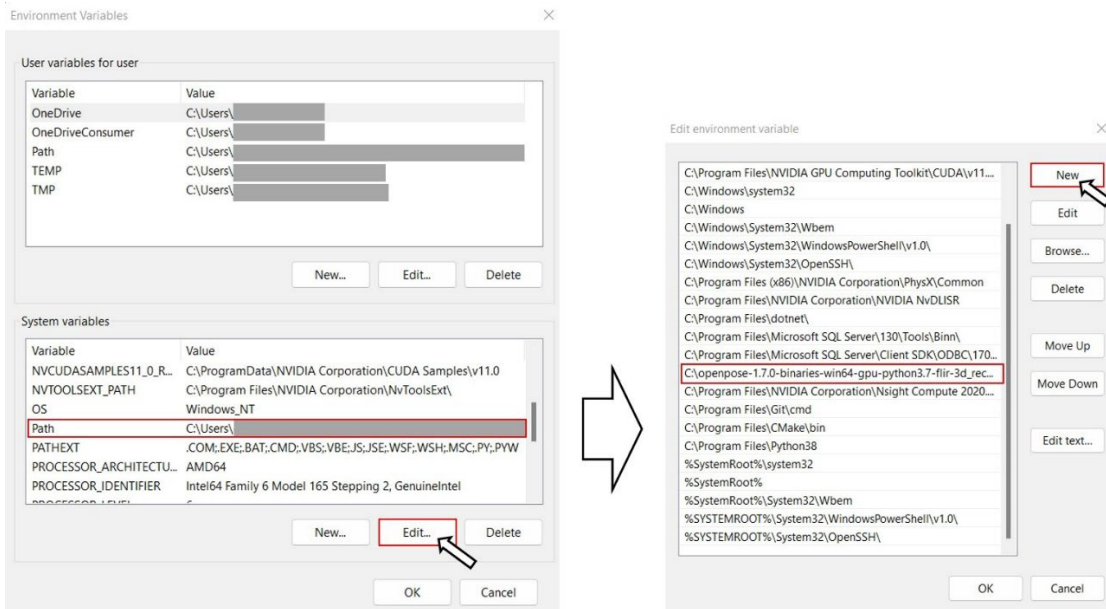
Fig d. Passing path to the environment variable.
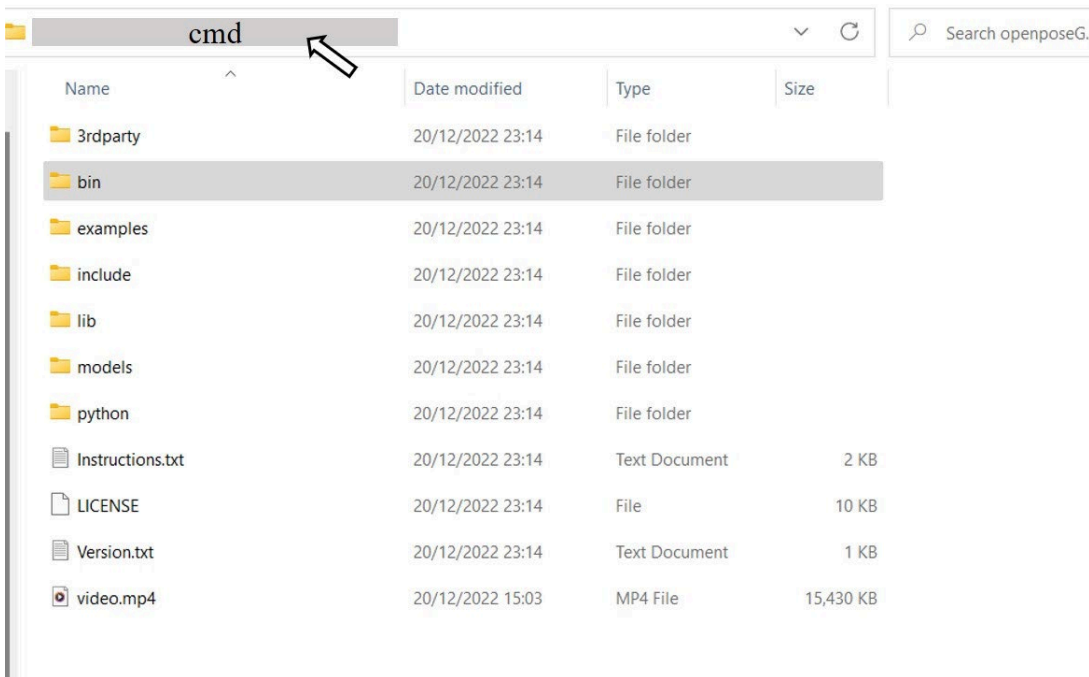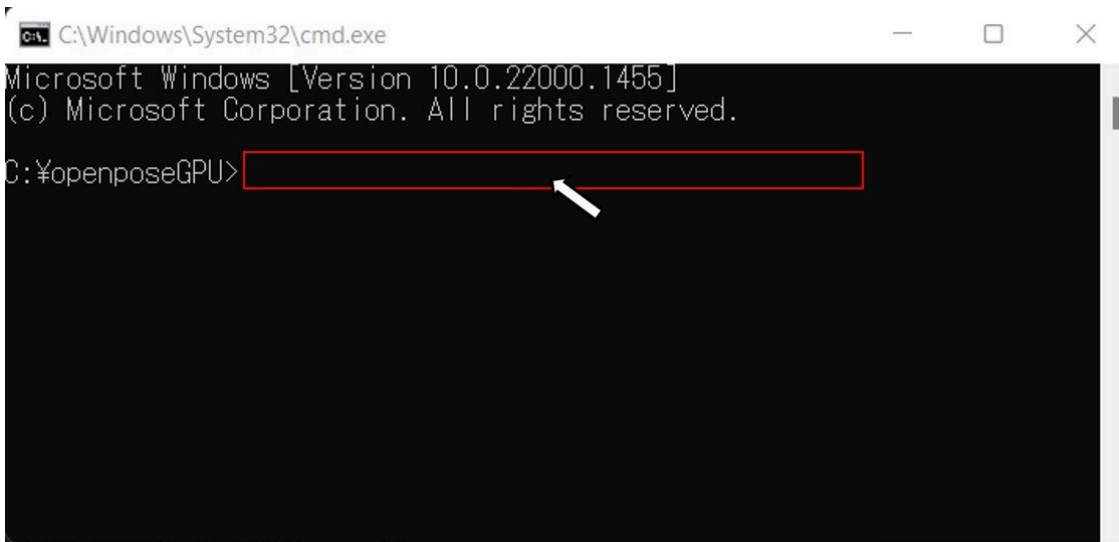

Fig e. Launching the command prompt.
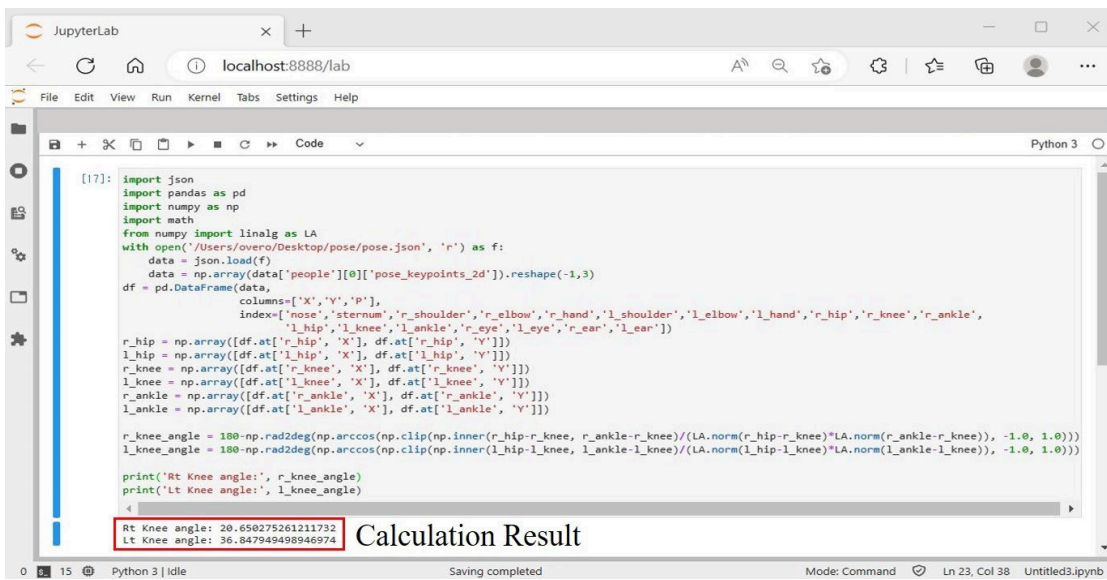
Fig f. Loading image files into OpenPose.

Fig g. Calculation of the joint angles.