**Data Collection Documentation**

**Smartphone and Smartwatch Preparation:**

1. Smartwatch is put on the dominant hand.
2. Smartphone is put inside the pants’ pocket (whether it is a loose or tight pocket, it does not really matter) and facing down-outward.
3. Make sure both smartphone and smartwatch are connected to the internet.
4. Make sure the Python server is running and accessible through the internet.
5. Make sure the smartwatch is connected to the server via a WebSocket connection to receive recording signal from the smartphone.

**Data Collection Procedures:**

1. Make sure the smartphone and smartwatch have been positioned correctly.
2. Set the activity type using the dropdown list in the smartphone’s application. This activity type will be sent to the smartwatch for labelling the collected data when the “Start Recording” button is pressed.
3. Set the number of seconds that we want to record for this activity in the smartphone’s application.
4. Click on the smartphone’s “Start Recording” button to start recording the sensor’s data (there will be a “beep” sound one time to mark the start of the recording).
   1. As soon as this button is pressed, the smartphone will send a “start recording” command to the smartwatch with the server as an intermediary party.
   2. This is done by sending the server a HTTP request.
   3. The server then notifies the smartwatch through the WebSocket connection.
5. Start doing the activity until the timer goes off (there will be three “beep” sounds).
6. Send the data collected to the server.
   1. Press the “Send Data” button in the smartphone to send the data collected from the smartphone to the server.
   2. Once the data from the smartphone is received by the server and stored in the form of a CSV file, the server will notify the smartwatch via the WebSocket connection.
   3. The smartwatch will now send the data to server via a HTTP request.
   4. The server should now have received sensory data from both smartphone and smartwatch and stored the data in the form of CSV files.
   5. The server continues with data pre-processing (sampling, windowing, and feature generation) automatically.

**Important things to note:**

1. Since there is delay when notifying the smartwatch to start recording, the smartwatch recording may not start at the same time as the smartphone.
   1. **So, please wait for 1-2 seconds for the smartwatch to start recording as well!**
   2. This issue is handled when data sampling process is conducted by trimming the first and last few seconds (configurable).
2. The timestamp used in the smartphone may not be the same number as the smartwatch possibly due to unsynchronized date and time setting.
   1. This issue is handled by subtracting each timestamp in each CSV file by the first timestamp found in that file.
   2. Therefore, the first timestamp will always have the value zero. This is reasonable since the exact timestamp value is not really important. The important part is the matching between when the smartphone and smartwatch start recording.
3. The smartwatch has a maximum time limit of 5 minutes for turning on the display.
   1. After 5 minutes, the display will turn off.
   2. Since the display is turned off, probably the Tizen OS thinks it can kill the WebSocket connection of the data collection application.
   3. Hence, it is either we cannot take data for more than 5 minutes straight without tapping the smartwatch display a few times during the data collection or we have to check the smartwatch connection frequently and reconnect when needed (there is a button in the smartwatch application to reconnect).
   4. The application has already had a mechanism to try reconnecting when the socket is closed. However, it seems it is not working in this case although it is working in other case.

**Activities Documentation**

There are 15 different activities that we are collecting for this project. We would like to divide these 15 activities into two categories:

1. **Frequent Activities (can also be thought as activities which do not really focus on the hands movements):** these are activities that we most frequently do in our daily life.
   1. **Walking (5 minutes):**
      1. Walking as usual without stopping with usual hand movements.
      2. Walking around the Canopy K, may have to push 1-2 doors from global lounge but not really slowing down / stopping the walking movements.
      3. 5 minutes data is taken in one shot.
   2. **Running (5.5 minutes):**
      1. Running as usual without stopping.
      2. Running at the running track along hall 11 to hall 12.
      3. 5.5 minutes data is taken in one shot.
   3. **Lying (5 minutes):**
      1. Stationary lying on a chair at Global Lounge (the one that is kind of a sofa but not really a sofa, can be found in the inner part of Global Lounge).
      2. Hands are put on top of my chest for the whole 5 minutes (with possible slight hands movements)
      3. 5 minutes data is taken in one shot.
   4. **Sitting (6 minutes):**
      1. Sitting on a chair as usual with possible slight hands movements but minimum thigh movements.
      2. Using the black chair in Global Lounge.
      3. 6 minutes data is taken in one shot.
   5. **Standing (6 minutes):**
      1. Standing still as usual with possible slight hands movements but no lower body movements.
      2. 6 minutes data is taken in one shot.
   6. **Going upstairs (6 minutes):**
      1. Going upstairs as usual with usual hand movements.
      2. **PLEASE NOTE THAT THE STAIRS HAVE SOME FLAT SURFACES IN BETWEEN THE STAIRS!!** The effect of this is minimized by taking the right steps to get to the next stairs as quick as possible.
      3. The first session was conducted at South Spine emergency exit stairs near Canteen B, the second and third session were conducted at the Hive stairs.
      4. 6 minutes data is taken in three sessions (2 minutes each).
   7. **Going downstairs**
      1. Going downstairs as usual with usual hand movements.
      2. **PLEASE NOTE THAT THE STAIRS HAVE SOME FLAT SURFACES IN BETWEEN THE STAIRS!** The effect of this is minimized by taking the right steps to get to the next stairs as quick as possible.
      3. The first session was conducted at South Spine emergency exit stairs near Canteen B, the second and third session were conducted at the Hive stairs.
      4. 6 minutes is taken in three sessions (2 minutes each).
2. **Less Frequent Activities (can also be thought as activities which focus more on the hands movements):**
   1. **Brushing teeth while standing (5 minutes):**
      1. Brushing teeth while standing as usual, there may be some stopping hand movements and movements on the lower body (usual movements when you are brushing).
      2. 5 minutes data is taken in one shot.
   2. **Typing keyboard while sitting (5 minutes):**
      1. Typing nonstop as usual while sitting, possibly slight hand movements when finding the correct key.
      2. This keyboard typing may have different sensory data reading depending on how good the person is at typing (remembering where the keys are, etc.)
      3. 5 minutes data is taken in one shot.
   3. **Writing while sitting (5 minutes):**
      1. Writing using a pencil and a paper as usual while sitting, possibly stopping for a while intermittently to rest the writing hand (I think this is usual when you are writing for a long text).
      2. 5 minutes data is taken in one shot.
   4. **Reading while sitting (5 minutes)**
      1. Reading a book while sitting but possibly flipping the pages too fast.
      2. 5 minutes data is taken in one shot.
   5. **Eating while sitting (4.5 minutes)**
      1. Eating using only spoon while sitting (canteen A’s western chicken cutlet) as usual with only the slightest movements when chewing.
      2. 4.5 minutes data is taken in one shot.
   6. **Food preparation while sitting**
   7. **Folding clothes while standing (5.5 minutes)**
      1. Folding clothes while standing as usual with possible lower body movement (because sometimes when you are tired of standing when folding, you will reposition your leg a little bit) when folding.
      2. Only the same T-Shirt is actually used, so after it is folded, it will be unfolded and used again.
      3. 5.5 minutes data is taken in one shot.
   8. **Sweeping the floor (5 minutes)**
      1. Sweeping the floor of my hostel room, walking around the room with some stops in between (usual in sweeping) but the sweeping activity is nonstop.
      2. 5 minutes data is taken in one shot.