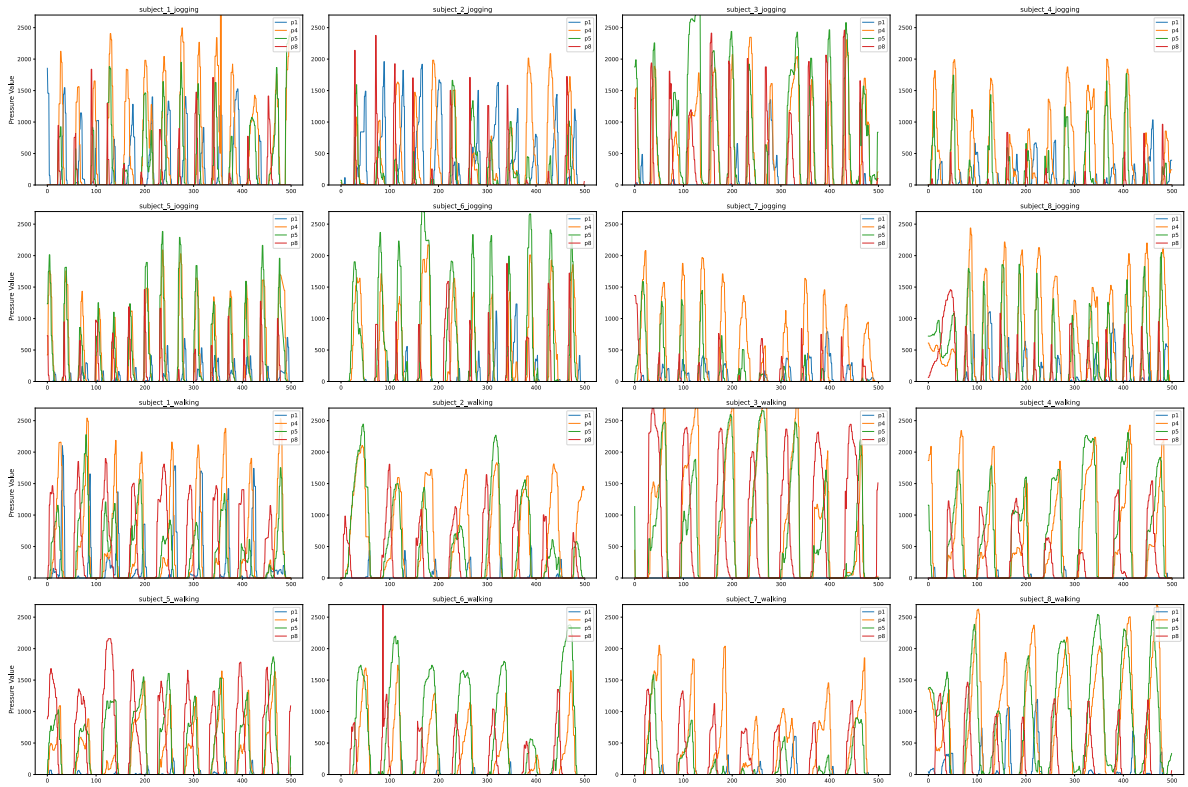
# CAPPIMU Dataset

The dataset consists of time-series data generated by plantar pressure sensors, accelerometers, gyroscopes, and magnetometer sensors. These data were collected as raw motion signals for each activity using the wearable insole pressure sensor ZNX-01 and the IMU (BWT901CL) device, with the IMU placed at nine different locations on the participant's body. All data were collected at a sampling rate of 50Hz. A total of 30 participants of different ages, weights and heights performed 21 activities in the same environment and conditions. This dataset can be used as a benchmark test for composite activity recognition methods and is also suitable for studying multimodal sensor fusion methods. The dataset is named CAPPIMU, standing for Composite Activities with Plantar Pressure and IMU sensors.




# Download

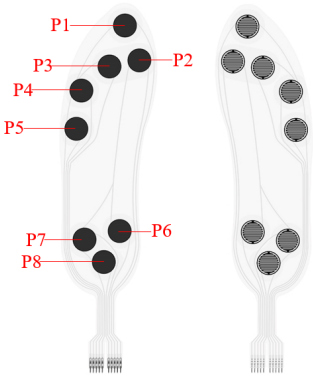
You can't find the data directly in your git repository, but you can download it from the following two cloud drives:

- Google Cloud: https://drive.google.com/file/d/1bt76udVakuRReMspNOyaZbHljo78ania/view?usp=share_link
- Baidu Netdisk:
  - 链接：https://pan.baidu.com/s/1j1tSjTwcmYdVbkYTR-w90g
  - 提取码：bs5p

# Dataset Description

## Sensor Device

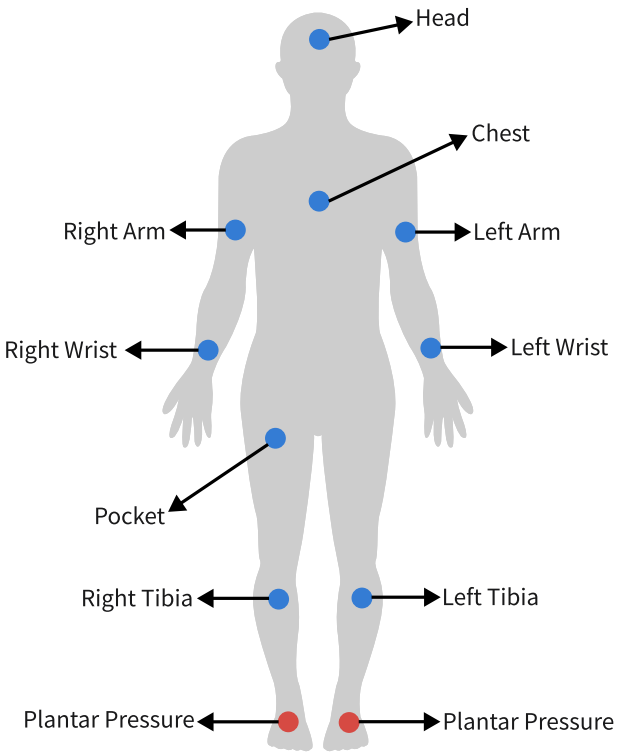
A pair of plantar pressure sensors purchased from Suzhou starr electronic technology co., LTD was used in this study as a device for plantar pressure acquisition. The FSR sensors are placed at eight common pressure points throughout the plantar foot, located in the heel, arch, metatarsal and under the big toe, providing comprehensive coverage of the locations where plantar pressure changes most dramatically during movement. A commercial nine-axis IMU sensor (WitMotion ShenZhen Co.,Ltd, BWT901CL) is worn on other parts of the body to acquire inertial data. As shown in the following Figure.





## Data collection protocol

In this study, data were obtained from 30 male subjects, aged 20-25 years, in good health without any history of limb injury. Each subject wore shoes equipped with an plantar pressure sensors, and nine-axis IMU sensors were mounted on the head, arms, wrists, chest, right side pocket of pants, and upper shin side, with the locations distributed as shown in the following Figure. We then asked them to perform 21 different indoor activities in a set home scenario. We asked them to do this as naturally as possible, as if they were going about their daily lives. The specific categories of these activities are falling, brushing teeth,  washing face, slicing, eating, washing dishes, folding clothes, sweeping, mopping, toileting, window cleaning, drinking water, hanging out clothes, ironing, using the computer, watching TV, jogging, walking, cycling, writing, play with phone.




The following table lists the number and percentage of samples of well-segmented activities (sliding window=300) captured by the plantar pressure system in the dataset. After discarding noisy data (including transitional activities between different activities), the amount of data recorded by the plantar pressure device reached 11922600.

| Activity Categories | Number of Samples | Percentage |
|---|---|---|
| falling | 1664 | 4.2% |
| brushing teeth | 1934 | 4.9% |
| washing face | 1917 | 4.8% |
| slicing | 1895 | 4.8% |
| eating | 1899 | 4.8% |
| washing dishes | 1919 | 4.8% |
| folding clothes | 2066 | 5.2% |
| sweeping | 1867 | 4.7% |
| mopping | 1876 | 4.7% |
| toileting | 1910 | 4.8% |
| window cleaning | 1897 | 4.8% |
| drinking water | 1901 | 4.8% |
| hanging out clothes | 1760 | 4.4% |
| ironing | 1794 | 4.5% |
| using the computer | 2025 | 5.1% |

| Activity Categories | Number of Samples | Percentage |
|---|---|---|
| watching tv | 1945 | 4.9% |
| jogging | 1873 | 4.2% |
| walking | 1906 | 4.2% |
| cycling | 1885 | 4.7% |
| writing | 1894 | 4.8% |
| play with phone | 1915 | 4.8% |

# Data format

There are thirty different folders, each containing all of the activity data files for each participant. The folder contains plantar pressure sensor data and inertial data collected at nine different locations on the body, along with a folder of synchronized data, and each data file is provided as a csv file. Each IMU raw data file is named with the location of the deployment.

Each IMU data file contains 11 columns per row, and the columns contain the following data:

- 1 timestamp (ms)
- 2-4 3D-acceleration data
- 5-7 3D-gyroscope data
- 8-10 3D-magnetometer data
- 11 activity labels

Each plantar pressure data file contains 18 columns per row, and the columns contain the following data:

- 1 timestamp (ms)
- 2-9 left foot-pressure sensing unit data
- 10-17 right foot-pressure sensing unit data
- 18 activity labels

The synchronized data folder 'joint' combines plantar pressure data and IMU data from different locations based on timestamp information, for a total of 9 data files. Each data file contains 27 columns per row, and the columns contain the following data:

- 1 timestamp (ms)
- 2-17 plantar pressure data
- 18-26 9D-imu data
- 27 activity labels