

# Computational Intelligence in Engineering

## Project A: Gait Analysis

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## 1 Introduction

The aim of this project is to create a model of a person's gait through the use of neural networks. The collection of gait data will be accomplished using smartphone devices and using the Pyphox application. Several types of walking situations will be analyzed for 4 of the group members. Blabla, add onto this later when we know the further steps

## 2 Data

### 2.1 Data Gathering

The first important part of creating neural networks is the gathering of data. For each of the test subjects, 4 smartphones will be placed in 4 separate locations as shown in the figure below:

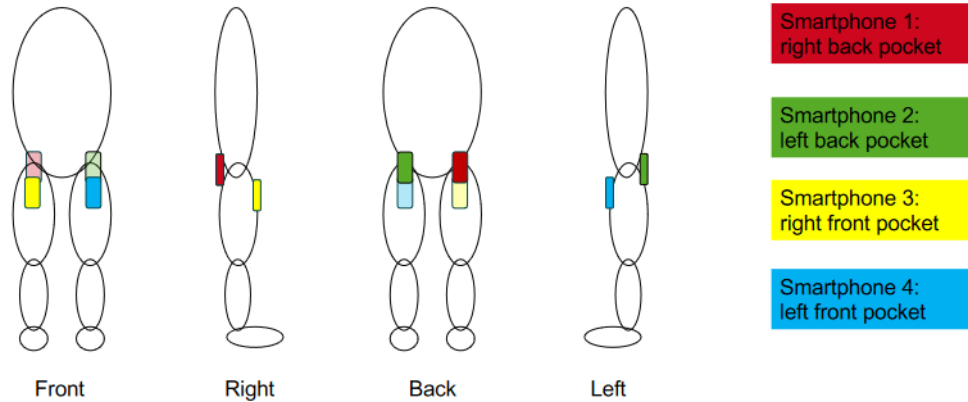


Figure 1: Smartphone locations.[1]

The location and amount of the smartphones allows for a more accurate capturing of a person's gait, as each leg acceleration is carefully captured. 3 experiments were conducted, and for 2 trials for each person. The following experiment procedures are found below:

### **2.1.1 Experiment 1 Procedure**

1. Place phones into the relevant positions as shown in Figure 1.
2. Begin the Pyphox application and begin the recording data procedure.
3. Stand still for a few seconds.
4. Walk 30 seconds in a straight line at a normal speed.
5. After walking for 30 seconds, stop the data recording and application.
6. Store the final data in csv format.

### **2.1.2 Experiment 2 Procedure**

1. Place phones into the relevant positions as shown in Figure 1.
2. Begin the Pyphox application and begin the recording data procedure.
3. Stand still for a few seconds.
4. Walk up 10(at least) steps at a normal speed.
5. After walking up the steps, stop the data recording and application.
6. Store the final data in csv format.

### **2.1.3 Experiment 3 Procedure**

1. Place phones into the relevant positions as shown in Figure 1.
2. Begin the Pyphox application and begin the recording data procedure.
3. Stand still for a few seconds.
4. Add an impariment device(small cube or rock) in the right shoe.
5. Walk 30 seconds in a straight line at a normal speed.
6. After walking for 30 seconds, stop the data recording and application.
7. Store the final data in csv format.

## **2.2 Data Preprocessing**

After gathering the relevant data for each subject, the data must be processed in several ways. Rather than repeating te above experiments twice, we simply left the recording running and repeated the previous steps. The data was then split in half and we are left with the following form:

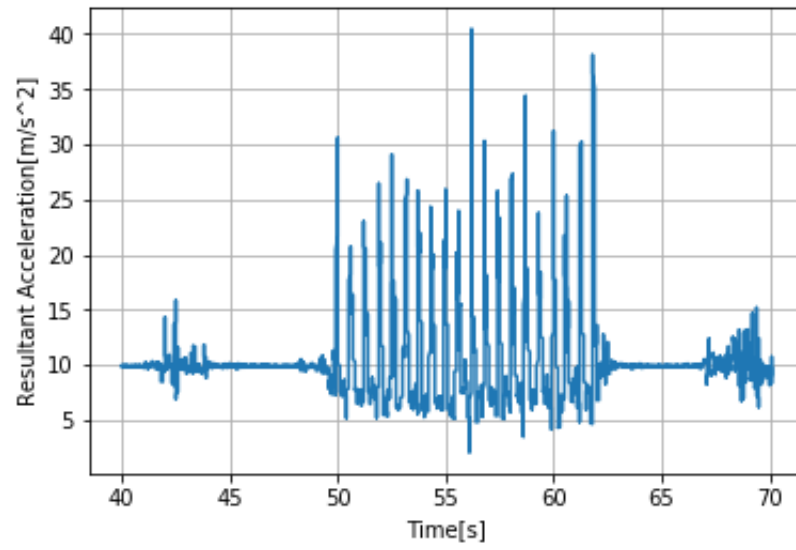


Figure 2: Example Acceleration Output

### 3 Bibliography

[1] - presentations