**Design of Experiments**

Various criteria are required to be considered at the time of designing experiments. It has been divided into different categories as follows.

**A. Sampling Rate**

The acquisition of data is one of the most critical steps in event classification as re-running experiments with test subjects is not always possible. Under-sampling leads to loss of information and oversampling can result in information buried in unwanted noise. In the latter case, longer computational time is needed for analysis as more data needs to be processed. The minimum sampling rate fsampling is dependent on the maximum frequency contained in the data signal fmax (the sampling theorem).

**B. Segmentation Method**

One of the challenges of data preprocessing following acquisition consists in deciding which points to actually use in the live stream of data. Several different segmentation methods exist to divide a larger data stream into smaller fit for processing chunks. The selection of the right segmentation technique is crucial, as it immediately impacts on the extracted features. Therefore even the best classifier performance will be weak when the extracted features are non-differentiable. Moreover, the segmentation method also dictates how often features need to be extracted and classification algorithms need to be executed. There are different segmentation techniques used in various research projects, such as: Fixedsize Non-overlapping Sliding Window (FNSW), Fixed size Overlapping Sliding Window (FOSW), Top-Down (ToD)], Bottom-Up (BUp)], Sliding Window And Bottom-up (SWAB), Symbolic Aggregate appro Ximation (SAX), String Matching (SM), Reference-based Windowing (RbW), Dynamic Windowing (DWin) and Variable-size Sliding Window (VSW). The significant difference in these techniques resides in their online and offline capabilities. The meaning of an online technique is that the data can be segmented before the complete data is collected, while offline methods require the entire dataset first. For real time applications, only online techniques are of interest.

**C. Selection of Persons**

We selected persons with running habits and without running habits at different age groups which can be used for patho-physiological model of running style analysis. In particular persons with running habits have more stamina for running and can run for more time as compared with persons with no running habits. So the major focus of the system is on the classification of styles of running in the selected sample space. The sample consists of 5 males and 5 females from which 3 males and 3 female were athletes while 2 male likes to run occasionally and 2 females were housewife. Participants took part in this activity voluntarily and written informed consent was obtained from them.

**D. Selection of Sensors**

To predict the running styles of the runners we have analyzed motion and movement of lower back of the volunteers. Some other body part movements can also be used to detect running style, but in the proposed framework the focus is on movement and orientation of lower back. A three axis gyrometer is used and its part no. is GY-521.

**E. Place for Sensing**

To analyze and classify running styles the gyrometer sensor can be placed at different location on the body. We have selected lower back position for placement of GY-521 gyrometer as in this position the sensor is safe and will not get removed from the body at the time of running.

**F. Sensing Time**

Volunteers were allowed to run on the treadmill for the duration of about 5 minutes. As the focus was on classification of running styles so volunteers were selected randomly and were made to run for 5 minutes at random time of the day. Height and Weight were also measured for the classification process.

**G. Experiment Constraints**

* The runners were given treadmill to run in an in-house environment.
* The room temperature was maintained at 25 degree Celsius.
* The runners were not given any tiring job before running.
* They were told to take rest on chair for 15 minutes before start of running session.