

## CMSC 628/491 Assignment 1 – Sleeping/Sitting/Walking Application Writup

Christopher McGee and Ian Koplowitz

We decided to take a rudimentary approach in terms of a decision process as to what the user of the application is doing. We felt that a good approach would be to decide what the user was doing at fifteen second increments, and decide which action was the “winner” at the two minute mark.

To do this, we kept a log of the x, y, and z coordinates at all sixty 250-millisecond increments within the 15 second period. We then calculated the variance in the y direction of these 60 points in time. Through experiment, we determined a good benchmark for variance would be 1 m/s in the y direction. We felt this was acceptable because when sitting, the phone never varied by more than a hundredth of a unit. Thus, it is practically impossible for it to vary (accelerate) by more than 1 m/s when a person is sitting. On the other hand, if a person is walking, the phone will accelerate in the y direction by a much greater amount, generally (even at a very slow pace) the acceleration is at least  $|1|$  m/s. Therefore, if it is determined that the phone is accelerating by  $> 1$  m/s, the person is walking/running and we simply log such to our list view.

The problem gets slightly more complicated when the person is not moving (i.e. the y variance is  $< 1$  m/s). In this case, we calculate the angle of the phone, using 45 degrees as the benchmark. In this case, we’re making the very strong assumption that the phone will stay parallel to the user’s body. In this case, if the user is sitting straight up, and the angle of the phone is greater than 45 degrees (and less than 135 degrees), the person is sitting. On the other hand, if the angle of the phone is less than 45 or 135 degrees, and person is laying down. To get these degrees, we use a rotation vector object which allows us to capture the rotational angle as an (x, y, z) coordinate.

We felt that this simple tallying and calculating winner approach allowed us to use the hardware that is native to the phone and easily output the actions to the user through the list view, and store those movements to an output file.