For shake detection, Basically, it calculates the magnitude of the acceleration vector and converts the XYZ acceleration vectors at each point in time into scalar values. Regardless of shake orientation, this allows large changes. In order to avoid repeatedly noticing the shaken state, I set the difference between the current even time and the previous one, which is more than 200 milliseconds.

For pull-up detection, we have assumed that the phone will be in portrait mode all the time and that the user will not be doing the movements very quickly (At least one or more second per pull up). If on the y-axis, the acceleration component exceeds a certain threshold and the difference between the current even time and the previous one is more than 800 milliseconds, it is counted as one pull-up.