PAT 562 Digital Sound Synthesis
Assignment #5: Sonification
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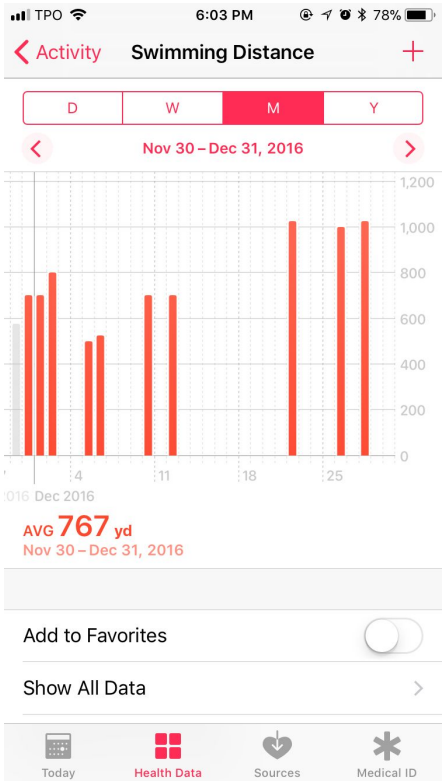

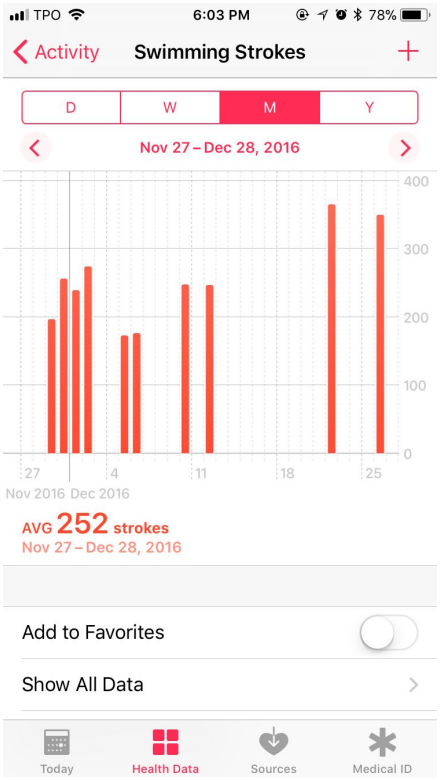

1. Data

The data that I sonified are the various activity data in my Apple Watch, recorded when I had lap swimming for about 30 minutes: **heart rate, energy burned, swimming distance, and stroke count.**

I acquired the raw data through Apple Health app, converted it to csv using a tool that I found in github(https://github.com/spodzone/Apple-Health-CSV), and finally reformatted it to be parsable by ChucK's string tokenizer. Each data entry has **start time, end time, value**, and some extra.

2. Mapping

1) Time

There is a global variable RATE, which determines the speed of playback. If RATE is 1.0, it plays as the same speed when the data was recorded. Now, it is set to 5.0, so it plays five times faster.

The most challenging part of this assignment was dealing with the time data. Since the apple watch can record data in any time, the timing of each event is not

regular (comparing to the example data), I had to manage the time to trigger each event and also the duration of it.

2) **Swimming Distance => Speed/direction of panning**

Apple watch records distance each lap. This data is mapped to control panning to tell where the swimmer is located. For each lap, the direction of panning is switched. The swimming speed determines the pan updating rate. The reason for this mapping is that panning would be the best way to represent spatial information in sound.

3) **Heart rate => BPM of FM sound**

It is directly mapped to the BPM of beeping sound. The sound also represents the location of the swimmer. This mapping is very straight forward, so anyone can interpret how active the swimmer is with the sound without further explanation.

4) **Energy burned => Frequency of FM sound**

The energy data is first divided by the duration of the event, in order to get how active the swimmer is. This energy burning rate is interpolated into carrier frequency of FM synth sound. As the swimmer is more active, frequency of the beeping sound increases. Changes in carrier frequency is very easy to perceive.

5) **Stroke count => Filtered noise sound**

For each stroke, it plays water splash sound made from noise source. The sound moves with the heart sound. The count of this sound in each lap represent how efficiently the person swims: same distance with fewer strokes. I wanted it to have very distinctive sound than the heart sound so that listeners can easily distinguish them. The activeness of metabolism (heart rate, energy) and the dynamic movement of the swimmer (stroke count) should be distinguishable, even though they might be related.