Introduction to Biomedical Engineering: Spring 2020

Homework 2

Due: **4/15 PM 1:10**

1. In Dec 2020, the **ECG** and **irregular rhythm notification** Apps of Apple Watch have been approved by Taiwan Food and Drug Administration (台灣衛福部食品藥物管理署) as a class-2 Software as a Medical Device (SaMD). In other words, the Taiwan users of Apple Watch Series 4 can measure their ECG and heart beats at any time in 30 seconds. In addition, an alert of atrial fibrillation (AFib, 心房震顫或心房顫動), one of the most common causes of irregular heart rhythms, would be notified if it is detected. Obviously, Apple Watch doesn't used the disposable ECG patch/pads that were introduced in class. Instead, the users only need to hold their index finger of the right hand on the Digital Crown (a metal button of the side of the watch) to measure ECG. What kind of sensor is used on Apple Watch instead? How does it work?

Warning: These functions are not intended to be used by people under the age of 22. The Apps might provide helpful information, but they are not intended to replace traditional methods of diagnosis or treatment. Also, the irregular rhythm feature is not intended for people who have previously been diagnosed with atrial fibrillation.

2. In recent years, the body fat analyzer (i.e. body fat monitor, or body fat meter), which is a medical device to measure body fat in percentage, becomes popular as a tool for individuals to maintain healthy or fitness because of its ease to use, portability, and its affordable price. In most of commercially available body fat analyzers, bioelectrical impedance analysis is commonly used to estimate body composition, including body fat in particular. Please explain its measuring model and try to record your body fat by a body fat analyzer. You can find one in our university at 衛保組自助量測區 and attach the results in your homework. Try to change the condition of your measurement (for example, different postures, timings, or any other effect you want to test) and make comparison.