CS590 Project Proposal

How to Make Today's Wearable Health Devices more Trustable

You should look at stress testing the application, using some standard technique from software testing such as fuzz testing.
You should look at bug reports on the software of these devices from public bug repositories, if available.
You should quickly decide on a device to experiment on and let me know so that we can purchase it.

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Motivation and Problem Statement

Health & Wellness apps for wearable devices are very popular as people use them for their fitness. Typical uses include tracking the number of calories they have consumed and the number of calories they have burnt by doing exercises. Also, these wearable devices can measure many other healthy signals and provide them to their users. Some examples of theses apps are:

- **The Nike+ Running** [1], which integrates with the Nike+ app for iPhone to display relevant information for your ongoing run right on your wrist.
- **Strava** [2] differs from Nike+ by showing additional information such as elevation gain, and heart rate.
- **Runtastic** [3] adds additional information of how many calories you've burned.

By other hand, the Google Moto 360 wearable [4] was the first smartwatch that incorporated a sensor that is constantly monitoring the user heart rate, and not just when on demand. With these signals, users can maintain a healthy life. But many of these users want to know: *Is the data provided by these devices reliable*? If so, *how reliable is it*? *Is there a way to distinguish the reliable data and unreliable one*?

Until now, no one has the answers to these questions, since no detailed study towards the reliability of theses devices has been done. However, as the wearable devices become the new trend of healthy life, it is important to let the users know how much they can trust on their devices.

In this project, we will run experiments on one or some of these devices. With the objective of understanding when they fail and some pre-defined metrics (for establish the reliability of the devices), we will develop some methods to avoid the failures.

Our Plans and Goals

To get a better understanding of these wearable devices and the healthy apps running on them, our plan includes:

1) We will first study and compare the different apps and the algorithms they use.
2) From a hardware perspective, we will also do experiments on the sensors to study the accuracy and restrictions of them. During this process, we will record the experimental results, especially when and where the failures happen.
3) With these obtained data, we will then try to pinpoint the bugs both from software perspective and hardware perspective.
4) Eventually, and if possible, we will try to develop an algorithm (using the Android Wear API) to automatically test and/or pinpoint the bugs and failures.

Typically, our experiments will be applied with Android devices. But we will also provide some experimental results obtained with iOS devices for comparison (using an Apple iWatch first generation). We have yet to define an android device to use for the experiments.

Reference

[1] Nike+ running. Available at: http://www.nike.com/us/en_us/c/running/nikeplus/gps-app. Last accessed on: September 12, 2016

[2] Strava. Available at: https://www.strava.com. Last accessed on: September 12, 2016

[3] Runtastic. Available at: https://www.runtastic.com. Last accessed on: September 12, 2016

[4] Brent Rose, “Moto 360 Smartwatch Review: The Best Might Not Be Enough”. Available at: http://gizmodo.com/moto-360-smartwatch-review-you-were-the-chosen-one-1633200545. Last accessed on: September 12, 2016