INFO-I399
Undergraduate Research in Informatics
Spring 2012

Final Paper

Design of effective health related mobile applications & Impact of interactive systems (mobile phone, computer, sensors) on users' daily behavior to foster healthier life

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1. Abstract

With the influences of advanced technology, our society adopted the convenient life style. Consequently, the obesity and other various health related problems became the serious issues around the world. On the other hand, many IT products and smart phone applications are developed to solve these issues. Our research is to help finding what features of the interface can provide a better fitness condition and encourage the people to use them. Our team chose three smart phone applications to meet with our research topic. With final outcome of the research, we will figure out the best effective design of an application that will fit the users' wants. Also, our research will find out these features would attract users to become more active by choice.

2. Introduction

In modern society, people are living busy lives. Technology has made their lives faster and more convenient, however; it has also caused the health concerns with the ease of doing things nowadays. Our society is now realizing and being healthy is becoming a serious issue. People rarely spend time to consistently exercise and eat properly. Technology also has a part in helping to solve this problem, as it also had a part in causing it. With the growth of smartphone ownership, companies are producing devices that can be used with the processing power of the phones to maximize the exercise that we get and to help us keep the track of our workouts. These inventions provide and guide the users to become physically active and help them to understand the need of exercising. Currently, thousands of applications and products exist and they are created for different reasons. Many apps and products mostly focus on calculating distance and calories burned. Based on our primary research, we assume that the design of these products and apps are not effective enough to fulfill the users' wants.

Project goal:

Come up with some ideas for designing better fitness products and apps for people. In order to design better interfaces and to increase people's attention to fitness products, we must know what they want.

The fitness apps and products contain many different systems for instance, a heart rate sensor, GPS sensor, calories burned, running pace, elevation of course, and distance ...etc. Our research will mainly focus on Adidas Micoach for the heart rate sensor, Nike Plus for stride sensor and Runkeeper for GPS sensor. Nike Plus uses a senor that is kept in your shoe to track your steps and sends a wireless signal to your phone during your workout. The Adidas MiCoach application uses a heart rate monitor that is kept on your wrist by an elastic band. The sensor sends a wireless signal to your phone and tracks your vitals that way. The RunKeeper application uses the GPS feature of the phones to track your distance and calculates your calories burned.

3. Background and Related works

As we previously stated, becoming more fit is not only a major accomplishment for an individual, but it is also a major problem with our society as a whole with all the issues that arise with bad fitness. There seem to be three major things to track when trying to improve overall fitness. You want to keep your heart rate at a high pace, but not as fast as you can possibly get it to beat. It is ideal to keep it raised, but to keep it constantly raised as opposed to getting your heart rate really fast and then letting it go back down constantly. Another key component to improving your fitness level is to track your calories burned. Obviously, it is a basic science that if you take in more calories than you burn off, that your body will store it as fat. That means that you should be tracking your calories on both intake and expend while trying to improve your fitness level. The last key component to tracking and improving your fitness level it is your recovery time after exercising. This is the time that it takes your heart rate to return to its normal pace after a workout. The quicker that your heart rate returns to normal, means the faster that your heart can recover from stress.

To help track these key ingredients for better fitness we have decided on three sensors, that each do a different thing. The Adidas MiCoach application uses a heart rate so that you can track your heart rate during your workouts. If you continued to use it during your cool down after the workout it would also help to track that as well. Another application that we chose to use is the Nike+ application. It's main peripheral is a pedometer to track your steps. We felt that it would give us an accurate reading on the amount of calories that burned while using the application compared to other applications. Our last application chosen is called RunKeeper. It is like our baseline application. Its only peripheral is the GPS to track your distance traveled. It uses this to estimate your calories burned during your workouts. We felt that these applications give us a broad range to test with and include things that will help to measure the keys to improving your fitness level.

4. Research Methodology

A. Secondary Research

- Nike+

http://www.engadget.com/2010/09/07/app-review-nike-gps/

This article talks about the nike + GPS application and speaks on the features that it has. It also talks about the strengths and weaknesses of the application.

http://techcrunch.com/2010/10/09/going-the-distance-nike-gps-vs-runkeeper/

These articles talk about the nike+ GPS, but the concept for our paper will be the same even with this information.

- RunKeeper

http://thenextweb.com/shareables/2011/09/29/23-billion-calories-burned-on-runkeeper-and-other-fun-stats-infographic/

Talks about the total user base for RunKeeper

http://techcrunch.com/2010/10/09/going-the-distance-nike-gps-vs-runkeeper/

This is the article that compared the two applications again.

- MiCoach

http://gizmodo.com/5479456/adidas-micoach-pacer-review-like-nike%252B-only-better
Talks about MiCoach's features and range of possibilities.

http://www.dailywireless.org/2010/08/05/adidas-micoach-vs-nike/
Compares MiCoach and Nike+

The reason we chose research with these articles was because we wanted to focus on the usability aspect of the featured applications. We felt that with technology advances, it is now much easier to gain possession of a health related or fitness application. Technology is readily available to many people in advanced countries, but if they aren't user friendly or functional, then people will not see fitness results due to the lack of use once they lose interest in the applications. These articles focus on the ease use of the applications and then review them from users and a technological aspect. They speak about the facts that they feature the GPS aspect, but then talk about how seamlessly you can scroll through the screens without losing any data. They point out the parts of the applications that could be done without (trimming the fat) and also feature things that could use a little work.

We first chose to research exactly what users should track to get healthier. After trying several times to reach a professional at the HPER we never heard back. We then noticed that at their core, the apps all pretty well seem to track the same things, just in different ways. So after noticing this we decided that rather seeing what is better to track, we were going to track what features kept users intrigued and actually improved the experience of exercise. Our sources we used were basically reviews for the applications that really focused on how well the features worked and what features they carried. A couple of our sources actually did comparisons on two of our three chosen applications against each other. All in all our research decided to focus on what features people really liked and what intrigued users to want to exercise more. We also wanted to see what features we would include to make the ideal application based on our research answers from our self-evaluations and user testing.

B. Primary Research

a. Self-evaluations

Nike+: Sunghoon Kang

Based on my own experience using Nike plus application, I realized some pros/cons about this application. Nike plus is one of the most popular application that is related to the health technology. First thing came up to my mind was that I actually had to buy the sensor addition to the running shoe. Nike running shoe was about $90-$100, and sensor was $29. Compare with other good applications from App Store, it's pretty expensive.

RunKeeper: Patrick Bauer

I have been focusing on the walking aspect that the app features since I'm not a person who enjoys running. I used the GPS feature to track my progress which is nice so I do not have to map my route with distances either before or after my exercise. The GPS feature is nice but it is not 100% accurate when it comes to measuring short distances, such as walking to class, which is what I use it for. I also think that maybe a pedometer attachment could improve the accuracy of the app. I have also been using the feature that tracks my distance and tells me my time for a predicted mile. This is a nice feature if you are running for distance and time, but as the GPS might not be completely accurate I probably would not use it all the time. Also along with the distance it tries to calculate the amount of calories burned from your size and gender. I do not think this feature is completely accurate as it said I burned 160 calories just walking to class. The interfaces are clean and only feature the essentials, which I believe is crucial when it comes to a mobile app.

Micoach: Jinhwan Jun

Micoach uses GPS sensor and equipped with real-time voice coaching in ear to pace. It has various training plans which provide the feedback both delivered to iphone and Micoach web site after workout. Micoach displays the detailed analysis of workouts such as measurements of distance, pace, calories burned, and elapsed time. I found this passcode program awkward because I do not see why we need passcode to fitness application personally. I realized that Micoach does more than just calculating what have you done in workout but also provides many other sport trainings to support users. Also, Micoach allowed the users to not have trainer physically that Micoach can do for users.

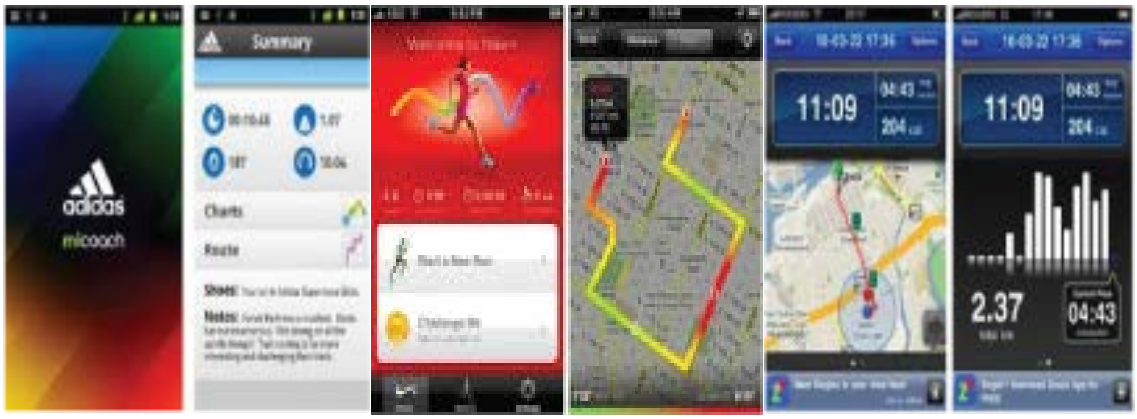
b. User Testing

- User demographics
- Different types of users, range for not active to very active
- Three stage interview questions

Our research subjects were diverse in sex, occupations, and activity levels but were all under the age of 27. It seems that they all do live busy lifestyles, making them ideal for a mobile health application. Our first subject was a 23 year old female student, who was very active and runs about two hours each day for exercise. She has a very active lifestyle and does not currently use a health application, which could really help her workouts if she finds one that works for her desired statistics. Our second subject was a 23 year old computer technician. He was not very active at the time, but was wanting to start an exercise routine, once again a good user to test. He could potentially be swayed to workout routinely if the application made working out better for him. Our third test subject was a 19 year old female whose occupation is an oral surgeon's assistant. She was also interested in becoming active, but was not currently following a workout

routine. Her schedule leaves her set times that are available to work out on a regular basis, so an application would have to make an existing routine better instead of having to create one that she tries to squeeze in between classes etc. Our fourth subject to be tested was a 23 year old male student. The busy lifestyle of a student makes them ideal to test an application in our eyes. It's something they can carry on them at all times and get in a quick workout when they have a open window, which can be different every day of the week. The fifth subject for the testing was a 27 year old male student. This person was very active so a mobile health application could help make their existing workouts better with the statistics and screens that it shows. Subject 6 was a 20 year old female student that was not active, nor thinking of becoming active on a regular basis. Our biggest goal with people like this was to show them that becoming more active could be a better experience with the right application. Subject 7 was a 25 year old male student that was moderately active and had a plan that they wanted to follow. If a mobile application could help this subject to create a good workout plan and would help them to follow it and track the appropriate things, it would be very valuable in that regard. Our last subject, number 8, was a 25 year old male that was not active nor thinking of becoming more active. Once again an application could persuade them that getting healthy can be fun and interesting at the same time and not boring and suffering like most people think it is.

To capture the information from the users we had several sheets for them to fill out to get the basic information that we found to be helpful when evaluating the results. We had a pre-interview sheet that we had all subjects fill out. This sheet served as a way for us to get their current physical activity levels and to see if they were currently wanting to get more active and if they were using any mobile health applications at the time. We also came up with a workout sheet that we asked the user to fill out every time they used the application, which we gave them 3 copies to fill out. This sheet basically recorded the type of activity, the time, and what interface they used for the application. We wanted to see what they were actually using the application for and what they thought about what the application had to offer for that activity. The last thing we collected from the users was a post study interview sheet that we conducted after they were done with the applications. This was to see if they changed their feelings on the applications and what they thought about them. We also wanted to get suggestions on what could be done to make it a better experience for them in the future. This is where we got the idea that we could make a prototype that people would like and utilize all the features, instead of boasting a lot of "fatty" features that nobody ever uses like some applications tend to do.



Below table is our three stages of interview questions:

Pre-Study Interview	Workout Diary	Post-Study Interview
How would you describe yourself? (1-6) 1. Not thinking about becoming physically active. 2. Thinking about adopting a physical activity but have not yet started. 3. Sometimes do physical activities (describe what you are doing and how many times a week you do it), trying to figure out my fitness goals. 4. Involved in a physical activity at least once a week for the past one month, have decided what physical goals I want to achieve and how am I going to do them. 5. Have been physically active for almost 6 months, focused on some fitness goals 6. Have a very active lifestyle (regularly perform an activity), maintaining my fitness goals	What activity were you doing?	Describe your experience with this product on a scale of 1-10 (1 being a terrible experience and 10 being an amazing experience)?
How many times a week do you do them? How long does it last each time?	How long did you do the activity?	What do you like or dislike about the product?
What health-related information are you interested in collecting or monitoring (heart rate,calories burned, etc...)?	Which interfaces of the application were you using at that time?	What interfaces did you use most? and why?
Are you currently using any fitness products or mobile applications?(If so please tell us which product or application)	While looking at the screen did you find all information that you wanted? If not, what do you want to see from this interface?(Feel free to provide us sketches of the interfaces that you think better serve your purpose or can improve the interfaces that were being used)	Do you feel that the product provided the required information?
	How would you rate your experience with this product on a scale of 1-10(1 being the lowest and 10 being the highest) Do you think it was useful? How could it be improved upon?	How was your experience with the feedback from the product and what would you do to improve it?
		What do you like or dislike about the physical design?
		Which app/ sensor did you like the most? The least? Why?
		How would you describe yourself now?

Our user testing yielded several things that seemed to help our group in our design of a final product. The users allowed us to either see that our thoughts were common, or they brought new issues to our minds by filling out the interviews for us.

5. User Testing Analysis & Result

	Micoach	Runkeeper	Nike+
Most Interested	● Calories burned ● Distance ● Pace	● Calories burned ● Pace ● Distance	● Distance ● Calories burned
Liked	● "lock" feature, feedback	● Music interface ● GPS(map) Map interface ● Social interaction with friends ● simple design	● useful interface ● feedback ● good interface design
Disliked	● carry a phone ● map feature ● physical design of Micoach(band)	● carry phone ● requires to purchase related product(shoes)	● carry phone ● it stops when user stops ● it seems to focus on for active runner
Most Wanted	● self-customize option ● move option to main screen ● how accurate the data shown ● simple feedback (show on one page)	● how accurate the data shown	● improve on GPS interface

Users liked:

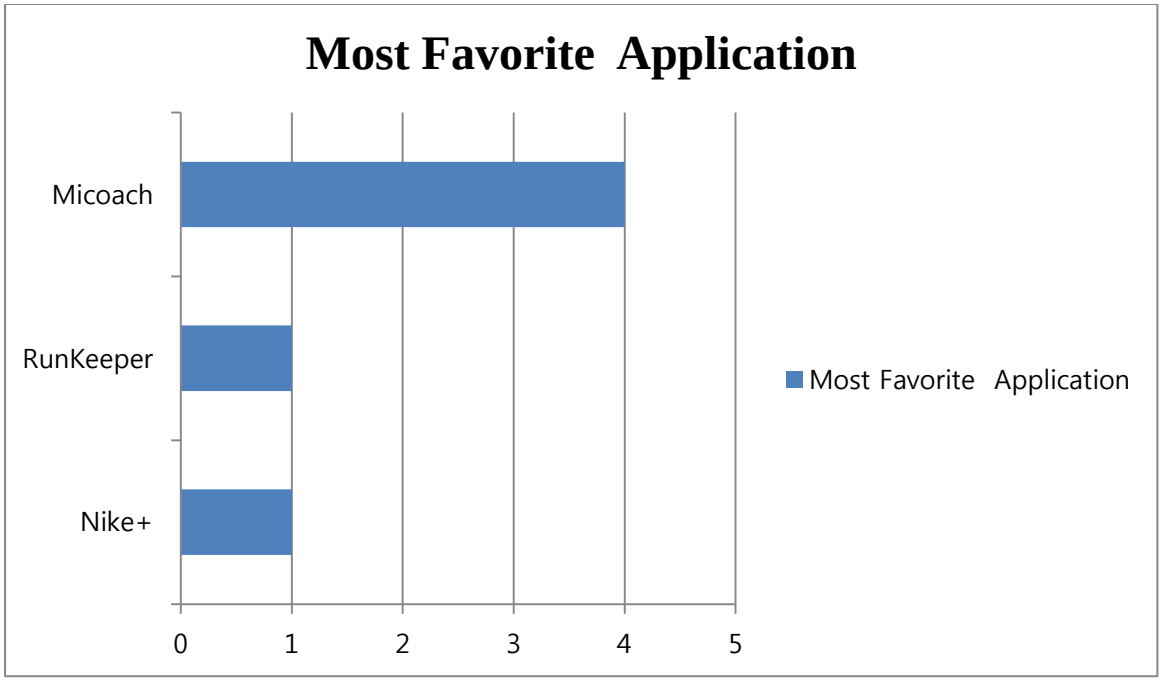
Feedback

GPS Interface

Users Disliked:

Carry a phone

Is data accurate?

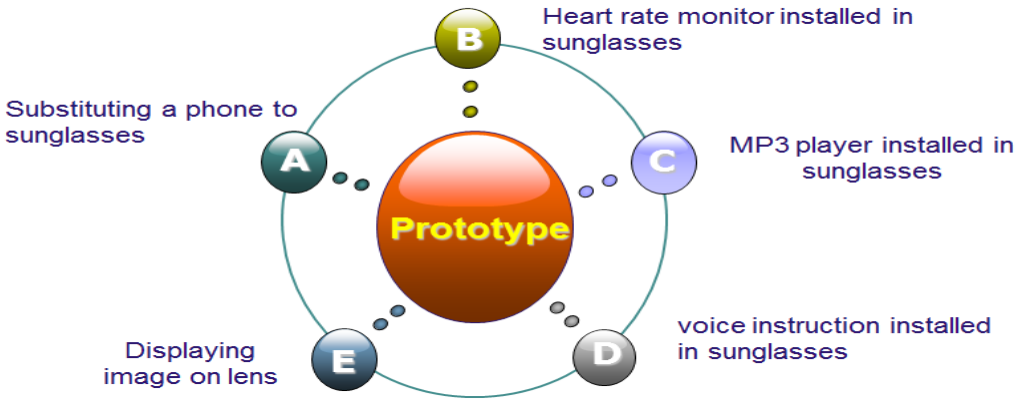


These are the summation of all of our user results on the interviews. It seems that people liked the simplistic design of the interfaces. This is like a less is more sort of thing when you consider that they are meant to be used on the go. That means that there is less garbage that they put in just to say that they have it, as opposed to just putting in several things and making them really good and easy to navigate. Calories being burned are also something that the users, including researched users on the web, liked to track in order to maintain better fitness.

6. Conclusion

The results from our testing and research did yield us with some concrete ideas that majority of people seemed to like. Our idea is to take the best of the features and combine them into one application that does all the things that a good mobile application can do based on our study. The first feature that we want to include is the fact that people don't always like keeping their phones on them while they workout and run. We would still make it optional to keep your phone on you if you want, but the application does not require it. The main integration that will make this possible is the fact we are going to incorporate the new Google glasses that are due out soon. These glasses already have the possibility to be used by themselves, so why couldn't they be linked to transfer data with your phone. The users also liked the fact that the MiCoach application utilized the heart rate monitor and found it to be very useful on helping them maintain their pace for the workout. Without cluttering the person with a heart rate monitor to put on their wrist we want to allow the glasses to incorporate the heart rate monitor in the spot where they rest on your temples of your head. With the wireless signal that the glasses use, it also allows us to use the Google glasses with an integrated Google feature, which the users really seemed to want and enjoy was the route mapping feature that uses Google maps to show you the route and to share it easily. Sharing was also a feature that many people liked in the RunKeeper application, which is a social networking feature that allowed users to share their routes and results with their friends or with the public. The glasses would also feature a small hard drive that could sync with your phone from the application in order to store songs from the phone so that people could listen to music still without needing their phone on them while exercising. The glasses also feature a microphone which would make voice commands possible, such as switching songs and such. The glasses also feature a heads up display that would show everything that the user could want, such as the route and heart rate on the go. The glasses also allow people to take phone calls if the need arises while they might not have their phone on them at the moment. The glasses would also be able to work as sunglasses in order to help the people that want to exercise outdoors when it is sunny outside.

Prototype features:



Prototype Final:

We chose these certain features because we felt that they will provide the information that almost any type of exercising person would want to see. It basically could work well for beginners who want to learn about what will help them, but also people who exercise frequently will find all the things that they want to see, without all the junk that other applications put in just to say they have the features.

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