Opponent Record

Author of thesis: Jacob Norlin Andersson.

Title of thesis: App For Improving Heart Rate Monitor Based Endurance Training in Running Athletes Through Heart Beat Sonification.

Opponent: Fredrik Ollinen Johansson.

1. Title, Abstract and Introduction to the Thesis

The title of the thesis is very long, but I think it is necessary for this particular thesis and it tells us everything we need to know about the thesis. The only thing that caught my eyes was the word sonification, since I have never heard of it before reading the thesis. I will come back to this particular word later on in this chapter.

The abstract was well written in both English and Swedish apart from a minor spelling error in the English one. The introduction, problem statement, method and conclusion were all included as they should. However, I did not like the way some words were cut in half at some new line breaks (This happens a few times in the report as well, but not as frequently). There is no rules about such things and it is a completely subjective opinion, but I felt that I needed to make a comment about it.

The contents of the introduction is good and the problem statement is quite accurate about what the question being answered is. Although there are a few problems. The biggest problem is the lack of a definitions sub-chapter within the introduction chapter. Sonification is not a word that most people are familiar with and therefore it should be described early on in the thesis. I know that it is explained later in Chapter 2, but when I reached that part I had already googled the word and I do not think that should be necessary. I also think that you should specify that endurance training is when the heart rate is at 60%-75% of the maximum heart rate in the problem statement, because it would make the problem statement more clear to the reader. In Chapter 2 you explained that you specifically chose endurance training because of its specific demand on the heart rate, but in the problem statement you just said that you focused on endurance training, without telling us why.

In the introduction, you said that one of the goals with your thesis was to survey existing running applications, but that is not mentioned in either the problem statement or the method. You do this in the background chapter, but perhaps it should have its own chapter or not be presented as a goal of the thesis?

Otherwise the problem statement and the purpose of the thesis are comprehensible and accurate about what is going to subsequently come in the report when you have found out what sonification actually means.

2. Background of the Thesis

The background starts out with the survey of existing running apps mentioned in the introduction. They are all presented well and I could not find many spelling errors. You then go on to describe key concepts of the thesis such as sonification and endurance training. The only problem with this is that you would have to read the background before you can even understand the introduction. Therefore there should have been a light introduction to these two concepts earlier on as well (or a reference to the explanation in Chapter 2) as the more in depth description in the background section. However, this is more criticism of the introduction rather than the background. I think your background is

very well written and relevant. It manages to give a detailed view of current applications and key concepts.

3. Choice of Method

The choice of method is presented well with user interface for the application, how sonification will be used and some basics about how the Zephyr heart rate monitor works. I like how it is focused on how it will work for the test subjects, rather than going into technical details. As long as the application works as it is intended and the heart rate monitor gives an accurate heart beat reading, it is more important to make sure that the tests run correctly.

I do think it lacks some more in depth description of the heart rate monitor though. It seems that it is a very important piece of equipment for the method and should therefore be more accurately described. After reading the method I still do not know how it actually reads the heart beat of the person wearing it. A picture of it would not hurt either.

The flow chart presented in Chapter 3.2 is very nice and gives the details needed to understand the application itself.

The interaction between application and user is particularly well described and the distinct sounds used are presented very nice as well.

Overall the method in my opinion is justified and presented well. There is not really a discussion about whether the method chosen is sufficient, but I think it is straight forward enough to not need it. Apart from the lack of in depth information about the heart rate monitor, the method is presented very well.

4. Presentation of the Results

There is not really that much I can say about the results section. It is very short and concise, but it still has all the data needed, except for the test subjects maximum heart rate. I am a little bit curious about how you obtained it, since it would be needed to set up the limits.

5. Discussion and Conclusion

The conclusion was that sonification does help people to maintain the pulse below a certain limit, but at the expense of an even heart rate. This is according to you due to an annoying sound being played when the test subject reaches the upper limit. I think the conclusion sounds credible and that more tests should be carried out with different sounds for the different limits. I also agree with you that using the Android platform for this kind of application would be a good choice, since an Android smartphone is something that a lot of people carry with them at all times. I think it also could be expanded to cover iOS as well.

6. Bibliography

The bibliography seems like it is relevant with books written by authors that is supposed to be knowledgeable within this particular subject. However, I do not have any chance of actually reading the sources since I do not have any way of getting my hands on them.

7. Additional Comments

The best thing about the thesis was the structure and how every part fitted in where they where supposed to. It was overall presented in a scientific manner and it was easy to

understand how you had thought it all out.

The worst part was several spelling errors and that it was hard to understand the introduction without reading the background. I think that you might not have proof read it enough or that you have not let anyone else proof read it without being told what sonification is beforehand.

I think that it is news worthy to use sonification in endurance training. The way a sound is presented could prove to be a better way to communicate with someone who is practicing endurance training than by using a voice telling them information about the training. During practice it could prove harder to be able to hear what a voice is telling you rather than having a sound do it.

To have a healthy lifestyle is also something that probably will not go out of style in the coming years.

8. Summary of the Work

The thesis has had a lot of thought put into it and the methods used fits perfectly. The project also perfectly fits the course in terms of size and you have put down a lot of work preparing the data. However, it should have been more thoroughly proof read and especially by a person that has no idea what the thesis is actually about.

9. Questions to Author

1. How did you measure the maximum heart rate of your test subjects? Did you use the max heart rate test presented in Appendix A or the age method?

2. How much experience did your test subjects have in more detail?

3. Is there something you think in particular that could have been executed better and could possibly have lead to a different conclusion than the things stated in Discussion and Conclusion?