K-Visio

Prototype

1 Executive summary

Introduction

Visio de Brink is an institute that supports people with severe visual and intellectual disabilities by offering them information, advice, several kinds of assessment, revalidation, education and residence. These clients show little intrinsic motivation for physical activity. Movement mentors support these clients during exercise sessions. (Visio, 2011)

In June 2011 a team of ICT students led by Aly Waninge (physical therapist at Visio) and mentored by Jos Bos (Hanze Institute for ICT) developed a system that links heart rate with playing music. This system was developed to motivate the clients during physical exercise. Another advantage of the system would be the ability to support more clients during one session, which could result in more sessions per client each week. The system has not yet been tested in practice, so the question is how useful the system in the current form turns out to be.

This was the situation at the beginning of our project. At the time being we ran a pilot and concluded the system developed by the ICT students is not useful when you consider the motivation of clients to be the main goal.

Description of the system

The system consists of a laptop, a smartphone, a router and a Bluetooth Pulse meter. The pulse meter sends information about the heart rate to the smartphone by Bluetooth. The smartphone sends this information to a laptop by Wifi. The laptop perceives if the heart rate is between an in advance adjusted minimum and maximum BPM. Depending on the BPM the laptop will stream music to the smartphone. When the client is training between the in advance adjusted minimum and maximum the music will start playing. When the heart rate gets lower than the minimum the music will stop, however, when the heart rate gets higher than the maximum, the heart rate on the monitor of the laptop will change from blue to red.

On the smartphone app you can select a client by name or you can select STANDARD. When you select STANDARD you can adjust the minimum and maximum rate manually.

The options on the laptop are pretty comprehensive. It's not only a tool to stream music to the phone. At the tab "monitor" you can watch the heart rate of up to 4 clients live. When you want to see exercise data and efforts of previous training sessions just click the tab "statistics" and there will be a nice list of training sessions and data.

Storyboard

To make clear what the system and software looks like, here's the storyboard.

Visio

1

Sluit de router aan.
1. Sluit de adapter aan op het stopcontact.
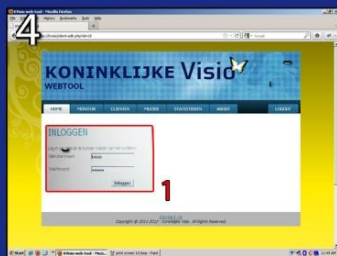2. Sluitdat de andere stekker aan op de router

2

Sluit de laptop aan.
1. Sluit de adapter aan op het stopcontact
2. Sluit de andere stekker aan op de laptop
3. Open de laptop
4. Zet de laptop aan.

3

Start de webapplicatie.
1. Dubbelklik op het icoontje.

4

Log in op de webapplicatie.
1. Klik op inloggen

5

Zet de telefoon aan.
1. Houd de "aan/uit" knop een 2 seconden ingedrukt.

6

Opstartprocedure.
1. Controleer Bluetooth & WiFi. Bij groen staat het aan.
2. Controleer of batterij vol is.
3. Start "KVisio" applicatie.

7

Selecteer cliënt.
1. Selecteer in het bovenste venster de cliënt.
2. Druk op "Starten".

8

Doe de hartslagband om.
1. Maak de pads aan de binnenkant van de band vochtig.
2. Stel de lengte van de band in.
3. Doe de band om om de buik van de cliënt
4. Plaats het apparaat onder het borstbeen van de cliënt.

9

Check
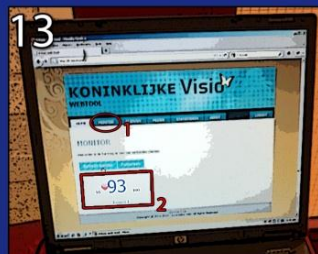1. kijk of de applicatie een hartslag weergeeft (0 mag ook)

10

De cliënt fietst, de hartslag stijgt.

11

De cliënt fietst niet, de hartslag daalt naar normaal.

12

Bij overschrijding van de plafondwaarde wordt de aanduiding rood.

13

De monitor.
1. Open het tabblad "monitor"
2. Observeer de hartslag(en)

14

De statistieken na de training.
1. Open het tabblad "Statistieken - metingen bekijken"

Initial State

To assess the usability of this system to motivate the clients firstly there must be established an initial state. This test consists of a normal sport session in which the client will be observed. The following points will be assessed; heart rate, rounds per minute, stops and reaction on verbal and non-verbal encouragements of the movement mentors. The heart rate data obtained out of this test will be used to determine the exercise heart rate.

Principle test

After the assessment of the initial state a principle test has been performed. This test was performed for the examination of the influence of music on the motivation of this client group. During this test it became clear the clients reacted less on the music then on the verbal encouragements of the mentors. This is why the next step was making recordings of their verbal encouragements and putting them in the playlist.

2 Problem statement

The clients supported at the institution of Visio de Brink are both intellectual and visual severely disabled. The level of intellect of most of the clients is comparable with the level of intellect of children between 1 month to 5 years. This means they need intensive guidance at almost every step they take. A problem that logically occurs is that there are insufficient attendants to support these clients. Ideal would be when the movement mentors could provide training to 5 or 6 clients at once.

3 Alternatives

Because the heart rate is adapting pretty slow to decreasing intensity we also expect an interval between intensive trainings and possible stops. This automatically results in an interval between the moment the clients stops training and the moment when the music stops playing. It's likely this makes the relation between the music and the intensive training hard to understand for the clients. There are more direct techniques to measure motion, for example;

Kinect, which measures movement in joints of our body by laser. It might be possible to link a kinect to a computer to measure direct movement.

A magnetic sensor with one part on the treadle and the other part on the bike could solve the problem without spending big amounts of money. This sensor could measure the amount of rounds per minute and can be adjusted to the needs of every client.

For both adjustments a modification in software is needed.

4 Conclusion

The system we tested turned out to be unuseful. The interval between stops during training and the moment the music stops is too big for the clients to relate motion to music. As well, we found out the verbal encouragement of the movement mentors is much more effective to get the clients moving again then the music. For the system to work we need a way to make the system react much faster then it does now. This will be effectuated by putting a magnetic sensor on the cardio equipment. And implementing this new sensor into the current system.

5 Implementation

The system will not be implemented yet. Before we can implement the system it will need some modifications. For example, where the goal is to reduce the labour intensity of the movement mentors the system should be feasible with less actions, as previously said, the system should react faster on stops and there should be voice recordings of verbal encouragement in a 2nd playlist to encourage clients when the training intensity drops or when they stop training.

6 Participants

Our contact at Visio de Brink is Aly Waninge.
Our contact at hanze ICT is Jos Bos.
Our team consists of 6 enthusiastic members. One of the strengths is the multidisciplinarity of our team.
Rutger Abrahamse   (Mechatronics)
Riemkje Keizer   (physiotherapy)
Robin Koert   (Human Technology)
Tetske Koopmans   (nutrition and dietetics)
Wouter Lamers   (Human Technology)
Jelmer Schaaf   (Physiotherapy)