NanoTalk

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Table of content

Introduction

Next Nature

This project has been done within the theme Next Nature. Next Nature is culturally emerged nature. Next nature is the nature caused by people. Our cultural marks all over the world become such a great influence in that specific area that it nowadays more functions as some kind of ecological system or organism. It doesn't feel, look or reacts like a man made thing anymore. It became somehow part of nature.

NANO supermarket

Within Next nature we were assigned to the NANO Supermarket project. The NANO Supermarket is a traveling exhibition that presents speculative nanotech products that may hit the shelves within the next ten years to a general audience. The Nano Supermarket shows by means of very interesting designs what the impact of nanotechnology on our society can be.

Design brief

Our goal is to come up with a concept which translates nanotechnological trends to everyday products for the next ten years with the aim to stimulate discussion and debate. We both mention the positive and negative side of nanotechnology to get the discussion started in the public to let them form their own opinion.

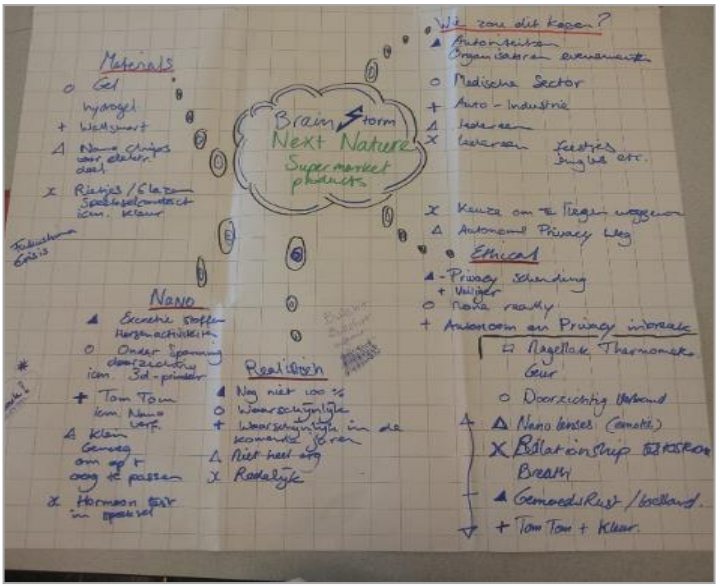
Approach/method

For our concept there were several terms and guidelines we had to try to follow as good as possible. Within Next Nature and Nanosupermarket the terms and guidelines were as following, the concept should:

- Incorporate the use of nanotechnology.
- Be a viable supermarket product in the near future.
- Be possible to realize within the next ten years.
- Invoke a duality within society to create discussion.

After the first presentation we were introduced to each other and our tutor. Our group sat together for the first time with the available Next Nature and Nanosupermarket material, to explore the range of concepts already devised. Now that we submerged ourselves a little into the world of the Nanosupermarket we decided that for our next meeting everyone should investigate the visions behind these themes further and come up with three concepts within it. The method we chose as a beginning to create discussion was looking at well-known ethical and social dilemmas and using those as an inspiration for these first nine concepts. The thought behind this, was that a dilemma is by definition, a situation that will never please every group that is affected. The ideas could range from solutions on these dilemma's to just merely tapping into its morality as long as it was able to create a discussion.

The next meeting we sat down with our ideas. We assessed to what degree, each of the facets of these nine concepts, fell within the set guidelines. The concepts were discussed so that we eventually came down to three that we liked the most and were the most plausible in our opinion.



These are the three concepts that were chosen;

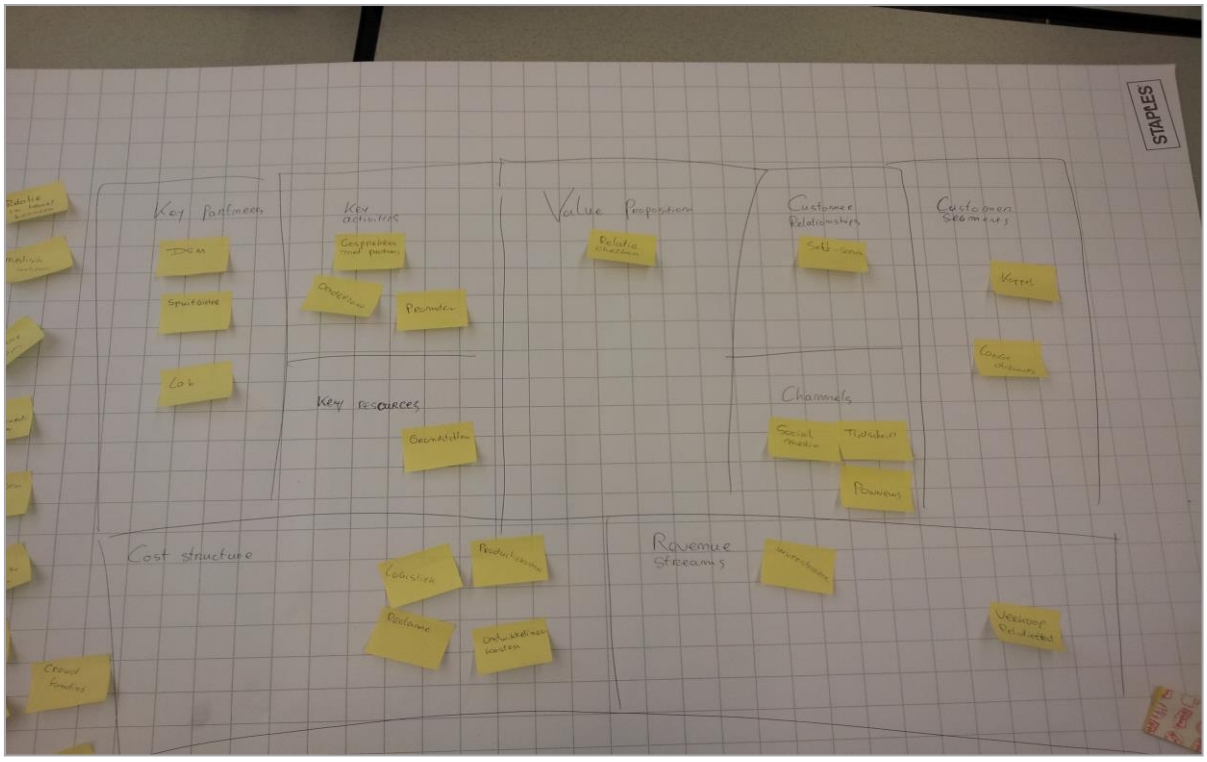
1. Romance test, showing peoples availability.

2. Changing car paint based on certain situations (speeding, stolen, wanted..).

3.Preventive security system, detecting anomalies in the mood of a crowd (riots, fights..).

We delved deeper into the world of nanotechnology and its developments and researched which nanotechniques were available to incorporate in these concepts. We tried to define how each of the concepts would be realized and decided that the romance test was the one with the most foundation. The relation between testosterone levels, in saliva and blood, and relationship statuses has already been researched extensively. Testosterone level tests are also already possible to some degree. So the foundation for our concept was already there.
We now needed to determine how we would incorporate these findings in our concept. Splitting this up in three major questions; How are we going to test the testosterone levels? (input), how is it going to look or communicate to the users? (output) and in what context will it be used?

One of the DG000 assignments was to make a business model canvas, forcing us to look at the needed resources, possible partners or investors and also the revenue stream. With local chemical giants such as Chemelot and DSM we quickly came upon the idea of creating a testosterone detecting layer or spray, in cooperation with these companies. To create revenue and a market for our concept we thought of some beverage companies which we stated Bacardi as an example.



These companies aren't just always looking to market their product through different new ways, but are also grounded in the going-out life for which we thought our product would be ideal. It would become a testosterone test communicating visually if someone was single, interested or not.
Not only stimulating interaction and drinking but also a great way to promote a drink.
We decided to call this product Nanotalk. Now that we had name we also started work on a logo, flyers and a poster to communicate our concept as strong as possible with some great advice from our coach.

The decision to test the testosterone levels through saliva was easily made considering the connection to drinks and going out. Therefore we came up with the idea for straws to be the medium for our concepts. However the amount of drinks that people use straws for made this a very limited one. As a reaction we thought up a spray usable on all surfaces that could come in contact with saliva, easy, washable and re-applyable, removing the problem of limitation.

We tried to get into contact with the biochemical departments of DSM, Chemelot and Maastricht University, asking if this idea of a spray was feasible and if so if they would be able to produce it in the near future.

After getting almost no response or negative ones, we decided to look further into other options from chemical to technical solutions. There were several articles about LOC's (Lab on a Chip), that were being developed and were able to detect and determine testosterone concentrations. Sending an e-mail to the Spanish university form which this research was, we got an answer stating that they thought that within the next ten years the chip would be cheap enough to use in our project. As well as that their method using gold-plated nano-lithium-tubes, was also ideal to detect testosterone in small samples such as used in our concept.

Other researches showed that levels of male and female almost never collided so that distinction between these levels was automated by nature.

Now that we had found the context for our concept and the way to collect the input, we needed to search for the output. We needed to find a way to visualize the input to the users and designing a smart system that would make this possible. Now that we already knew of a chip we thought it very easy to connect this with other electronics such as LED's in a glass. The use of changing colors or lights was already talked about in the earliest concepts. We came up with a traffic light system already sometimes used in parties with the use of simple wardrobe colors. Green would stand for single, orange for interested but doubting, and red for people who were in a relationship. The first prototypes were designed and made and we had accomplished our three major deliverables for the first demo day, input, output and context, which together formed our concept.

The overall reception on the first demo day were good, a lot of people were amazed by the fact this was ''possible''. We were asked to present Nanotalk to some groups of kids and parents who came to visit the ''open dag''. Within these groups after our pitch or after we asked if they would use this, some moral discussions started immediately. The most useful feedback came from some of the coaches who still saw room for improvement in our output.

"You are almost discriminating people with a red color making them visually not interesting and someone with the color green might be harassed by everyone , including a lot of people which they would't even want''

Joris van Gelder

"The system that you use to communicate your concept is very archaic and not as smart or interactive as it could be, it reminds me wearing certain type of clothes or accessories to visualize your allegiance''

Flip Ziedses des Plantes

Several coaches also stated that this project would be perfect to do a Wizard of Oz test to see how people would react on using Nanotalk.

We knew that we had to improve the way our system worked. In trying to do this we could not come up with a way to make Nanotalk more interactive and playful to which everyone could approve. We brainstormed and ping-ponged but could not get to a mutual solution.

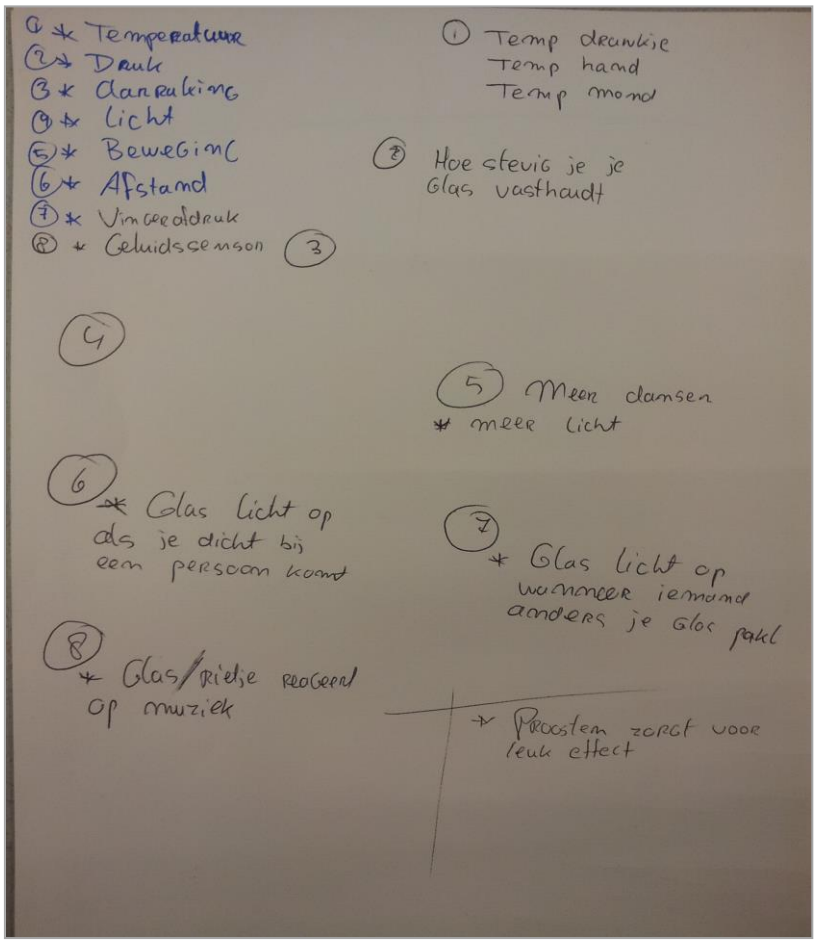
That is when we decide to also look at other contexts and uses for our concept.
We thought of using it in the sports world or as a home test to define how healthy your relationship was before making big choices, such as becoming pregnant or living together. With the relationship test being the sketchiest considering morality we decided to go further with this one.

Though there were researches indicating testosterone levels were connected to different sides of relationships, it was impossible to make a reliable system indicating the health of all these facets. With the use of the transformative reflective assignment we came to the conclusion that Nanotalk still was the purest concept considering the initial terms and guidelines.

We decided to continue with Nanotalk under the condition that we were prepared to drop some of the initial conditions of the concept. We also made plans with the help of our coach to make sure we wouldn't get into the same dead end with the interactivity and output again. We both interviewed acquaintances and analyzed the flirting process. Afterwards we showed them a storyboard of our concept and asked about their opinions.

From that we devised a sort of game using colors connected to certain testosterone levels. The users wouldn't know the meaning of these colors and needed to figure out these meanings by conversing with other people. The colors weren't a traffic light anymore and were chosen much more randomly out of a bigger palette. When talking to someone who gets aroused (rise in testosterone level) the pulsation both of your glasses will synchronize. With this game you tackle some of the basic problems encountered in flirting and meeting new people. With giving people the same color they feel more connected or familiar without actually knowing each other, therefore lowering the threshold to step up to someone. By making people curious to the meaning of the colors they try to figure out what they have in common so that quality of a conversation goes up and people will actually get to know each other. The pulsing of the ring of light will give continuous feedback to ''how you are doing'', making the process more efficient and takes away doubting.

We also thought of incorporating more forms of input such as heartbeat and temperature sensors, to make the system more interactive, but in the end concluded that it would only make the concept too complicated, to clearly communicate to the user. Also the product itself would get overly complicated, big and expensive to realize.



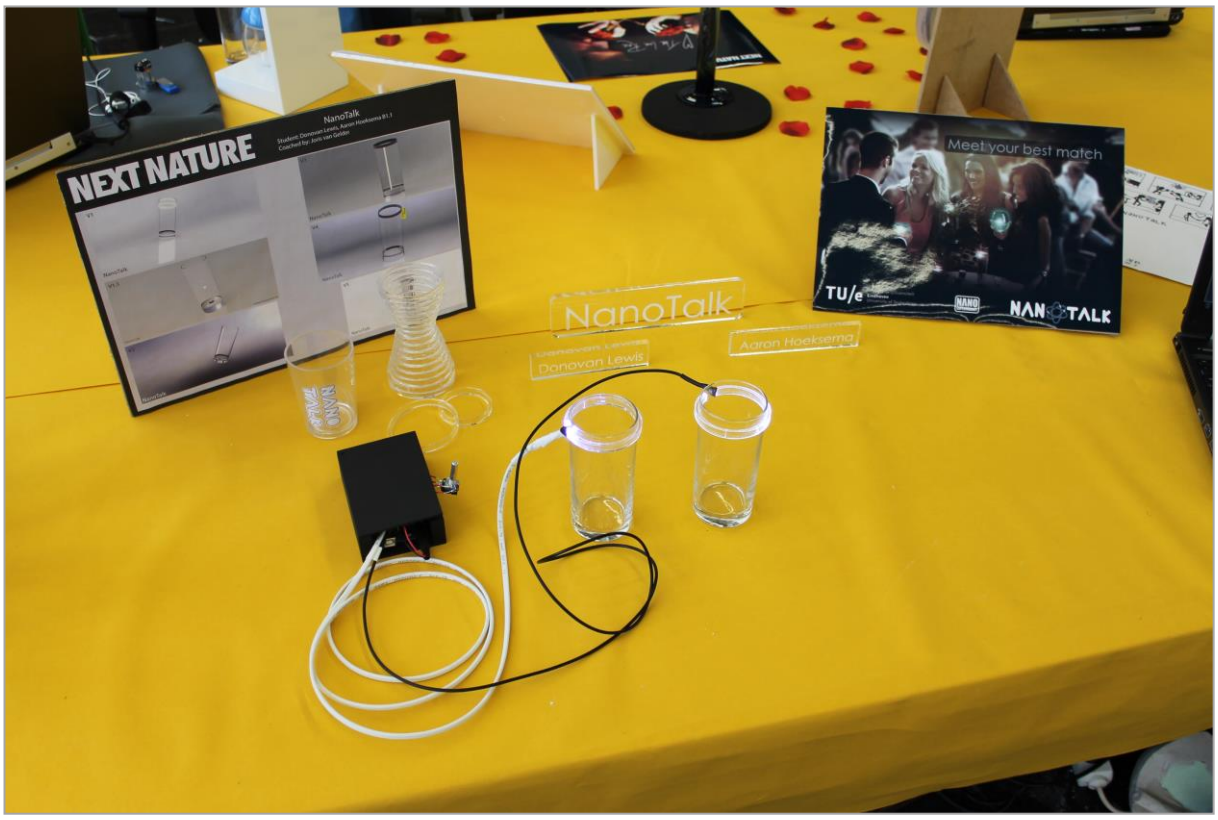
Now that we had our finalized concept we wanted to test it on some people. For this too work we needed a prototype that would work to a degree in our concept. We needed a setting or location, a research plan and a planning for documenting it all. We couldn't get any bars/cafes to cooperate with our plans so we decided to test Nanotalk on the first demo day.

User test (Aäron Hoeksema)

introduction

In testing Nanotalk we chose for a Wizard of Oz type test, making the user believe it works and documenting his or hers reaction to our prototype. For this to work, we first had to determine exactly what we were trying to accomplish with Nanotalk and visualize that as well as possible. The first idea was to set up a test in the going out circuit, but in contacting bars and cafes we were not getting along with this. So afterwards we wanted to host a party ourselves. That's when started to look for ways to duplicate our concept so we could test it on the users. We looked into pH measuring strips as well as temperature sensitive materials. However the pH values of beverages lay to close together to measure properly, temperature sensitive materials were too expensive and just using colored bands took away all interactivity. We chose to test that part of our concept that was most realizable to us in making prototypes and testing properly. That became the pulsing of the rings in a conversation to show how the conversation is going. The pulsing between the glasses synchronizes more if people are a ''match'' and desynchronize when this was not the case. We wanted to see how people would react to the change in pulses and how this would infect the conversation. Our expectation is that it will be a conversation opener as well as that people are going to try and determine the meaning of it.

User test Method



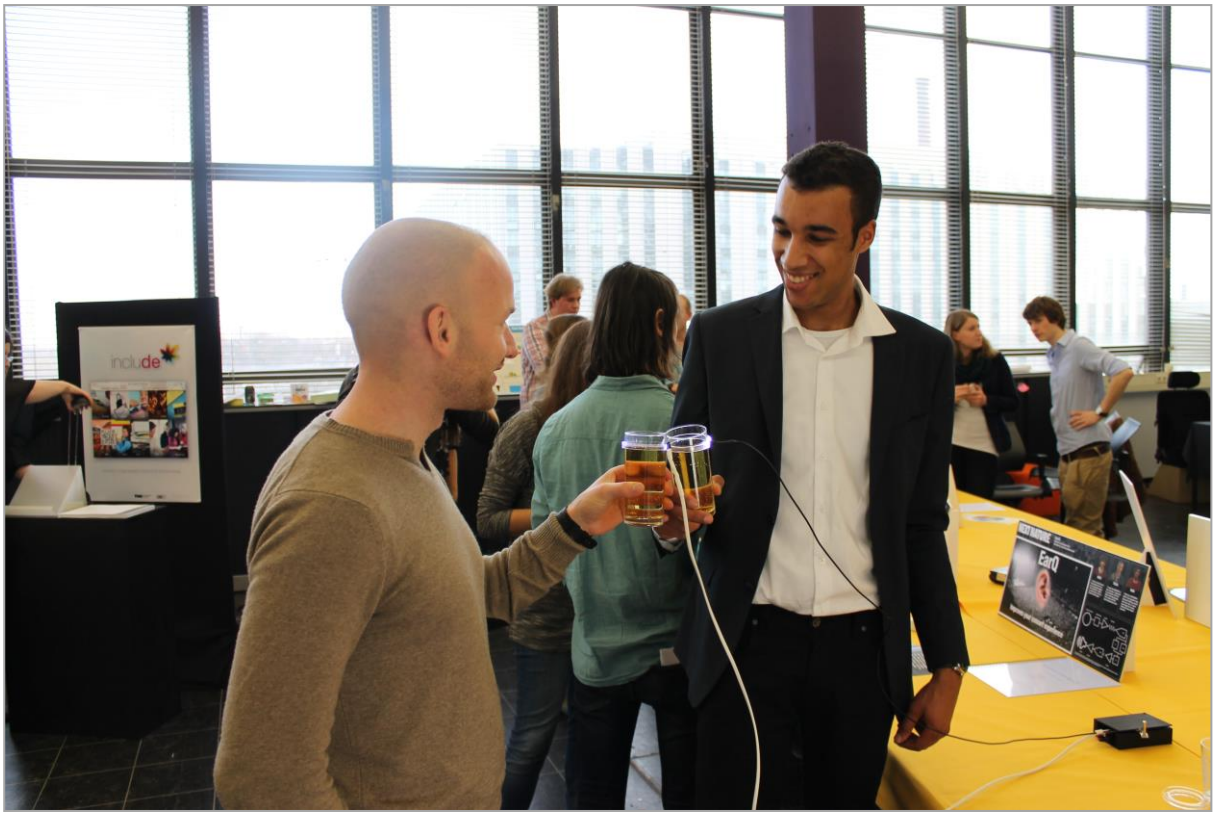
The Nanotalk set-up.

For the test we made use of a set-up with two rings on two glasses. Both pulsing, only one slightly out of balance with the other. One of the rings was rigged to an adjustable resistor so that it pulsing rhythm could be manipulated into going faster, slower or synchronized with the other ring.

To create the setting around our booth we tried to emulate the situation of going out with some music and lighting.

We contacted a professional photographer for tips on how to make pictures and carefully document our testing. She told us that it was important to get to know the camera and therefore make some test shots of the scenario. So we created a test scenario and storyboard as means of preparation.

She also told us that the best lighting for such a shoot would be using regular daylight and because of the dwindling daylight hours during the winter it could be a good idea to get a daylight lamp. This lamp was provided by our ever helping coach Joris. Using the light of the lamp we made some test shots from different angles to depict what would work best. One of us, was doing the pitch and presentation, when the other documented it from afar.



Cheers Joris!

So one of us, was by the booth and the other on a distance with the camera to shoot pictures. When interested people came up to our booth, prior to the pitch, the pitcher would offer them a drink. During the pitch we would manipulate the pulsing of the rings on these drinks.

User test results

As we expected almost everyone immediately saw the change of pulsing. The first reactions to it were very varied, but mostly comical. After the got a bit used to it they started to contemplate what was happening as very clearly seen in some of the pictures. People first asked the pitcher why this was happening , but there is nobody to help user with this at a party as well. So we asked them what they thought. In some cases botch of the users or groups would actually engage in conversation and work together to try and come to a solution from which some got pretty close to our concept. Afterwards when we explained to them what they just saw happening there were some very varied reactions as well. It varied from people wanting to use it or seeing it help them with their shyness, to people who thought it shamed their privacy communicating things to the world in which they found they had to be in control. There was almost no one who couldn't understand what was happening or couldn't find themselves in the concept. Some people even started to discuss among themselves why it could work and should be used. Others said that when they eventually would have discovered the meaning of their color they would be interested to discover what other meant then.

User test pictures


GAP

User test conclusion

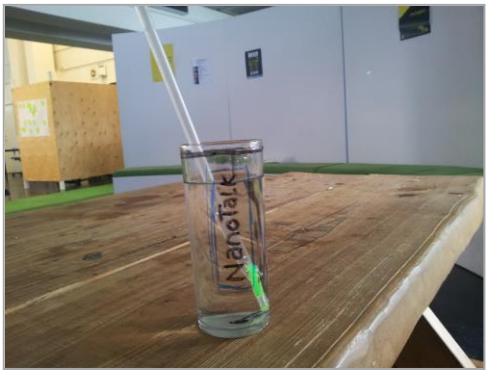
In the end looking at the results and how close they fitted to our expectations we can conclude that this test was a great success. The majority of people were very enthusiastic and some even managed to almost completely understand the underlying thought. However it was only one facet of our system and concept that was tested and in the future more testing would be needed in order to actually produce Nanotalk.

Design/Result (Donovan Lewis)

First prototype

First we thought of a straw which is able to detect testerone levels. After the straw had detected the testeron level the straw will change color. It changes from colorless to green if the person is single and red if the person isn't single.

The next step was to make an easy first prototype to have an idea what it will look like. The following pictures shows that we just put a glowing drinking straw into a glass to get a first impression.



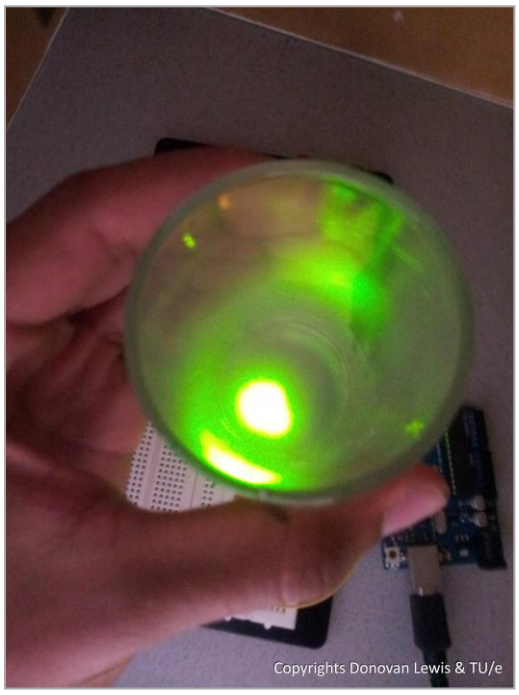
But we immediately ran into some problems. The fact that we need to develop some kind of plastic that is able to detect testeron was a problem also developing this special plastic is very expensive and most drinks in a bar like wine and beer are not being drunk with a straw. So we decided to put our technology into a glass rather than in a straw.

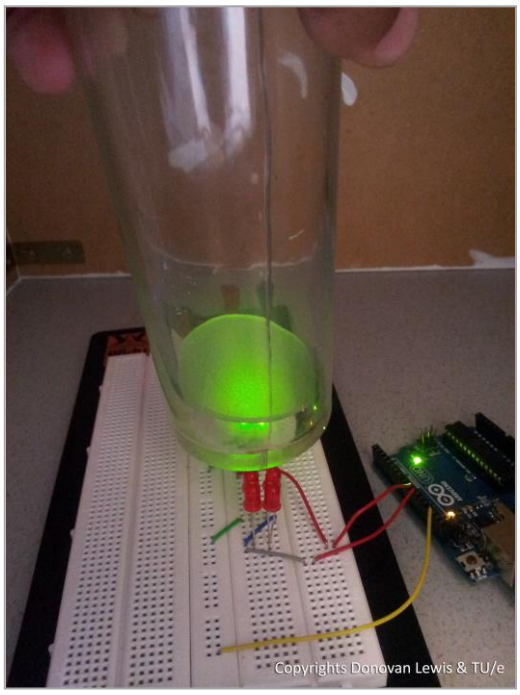
Second prototype

Then we thought of a glass that's releases some kind of pigment depending on the testeron level which is measured. But we didn't choose this technique, because we all experienced ourselves that sometime, when you are in a club or bar it's really hard to see the color of a drink. Besides that your drink would be disgusting to see, let alone drink.

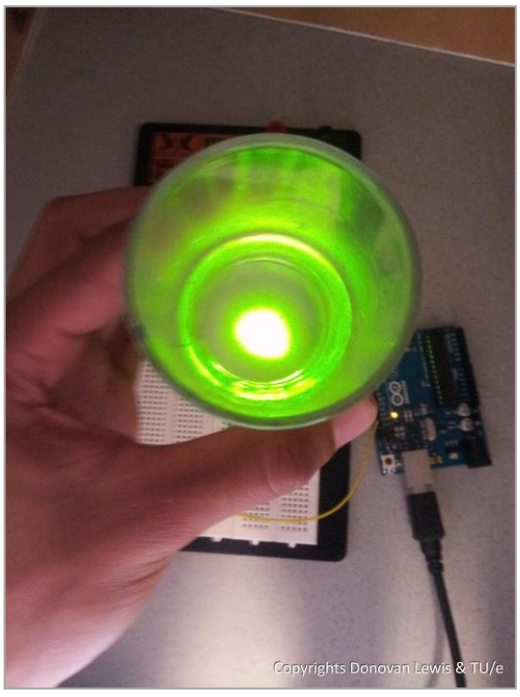
That leads us to change the pigment dispenser to a LED which change colors. A led is very easy to see, very small and easier to implement.

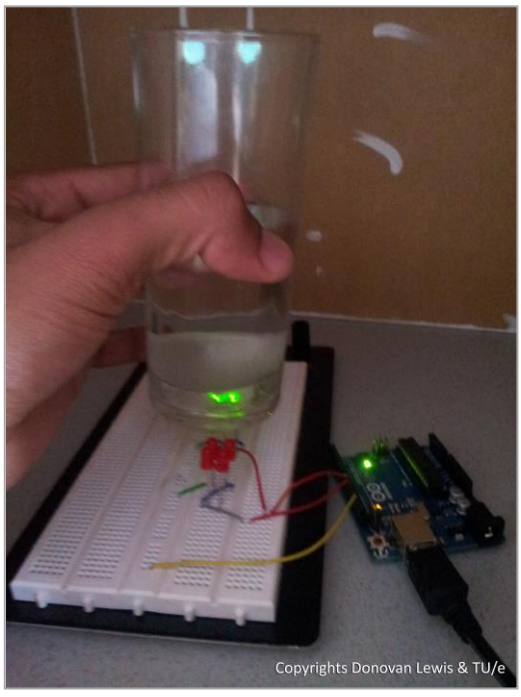
Testing lightning technique





These pictures are taken without water in the glass



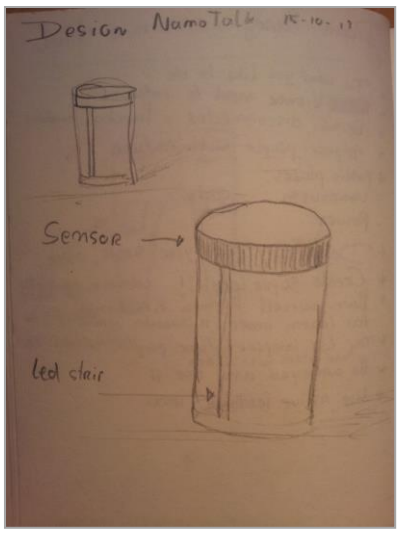


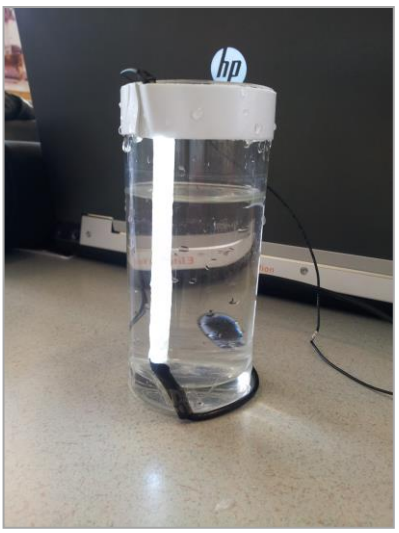
These pictures are taken with water in the glass

The pictures show that the light is very good to see if there is a doll Perspex layer which diffuses the light. But this only happens when the glass is empty. If there is water in the glass then you can only see the light good from the top. The light is too weak from the side to see it properly in a night club.

Third prototype

Brainstorming about different prototypes was the next thing I did. This is the phase were I generated a lot of visuals to discuss the certain prototypes with my team and to see what is working and what is not.



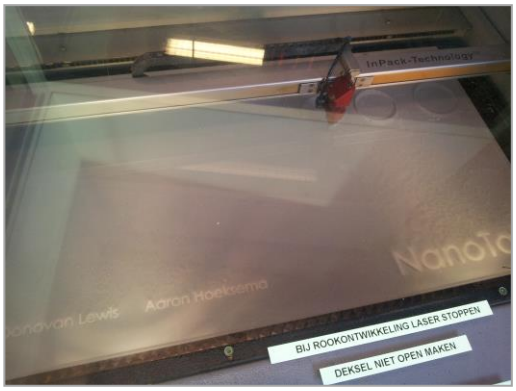


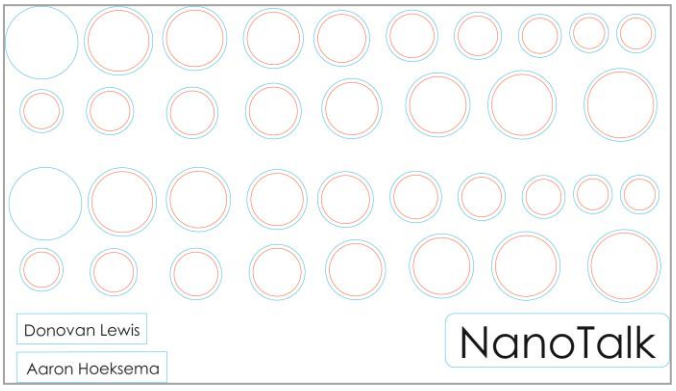
At certain stage I started looking at other glasses, because the glass will be used for serving different drink. So I tried to combine certain elements of common glasses to come up with a type of glass which resembles them al.

I was very content with this model. So I decided that I am going to make a physical model of it.

How to build my prototype was a question I couldn't answer on my own, so I went to Chet Bangaru, an expert in making prototypes. We discussed my prototype and the problems I was struggling with. In the end we came up with the idea about laser cutting different rings and place them on top of each other to construct the glass.

I made a big mistake while making the lasercutfile. I oversaw the fact that you can place smaller rings inside the bigger rings to spare the expensive material. It didn't affect the prototype, but it did affect the material cost which could be much lower if I took this into account.





When I assembled one of the glasses I discussed my prototype with my coach. His feedback was…

"Your prototype is something which a designer makes, not particularly something which an Industrial designer makes"

He was right, this was just one prototype. It would be expensive to produce these glasses on large scale with the LOC's placed in it, not even mentioned it that it would be even more expensive to replace the glasses when they break or the technology in the glass fails. This is when my coach came up with an idea;

"Why not make bracelets since you already have many rings in different sizes"

It was funny that he came up with this idea, because some people already thought I was making bracelets when they saw all the rings on my table when I was assembling my glass. I start looking at different bracelets and at the same time was thinking how this will work in the concept.

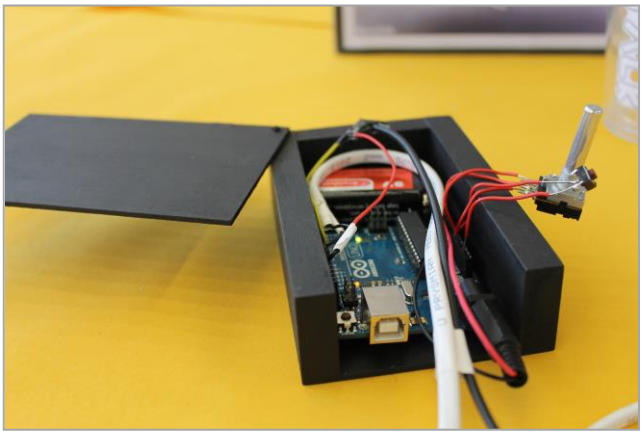
Fourth prototype

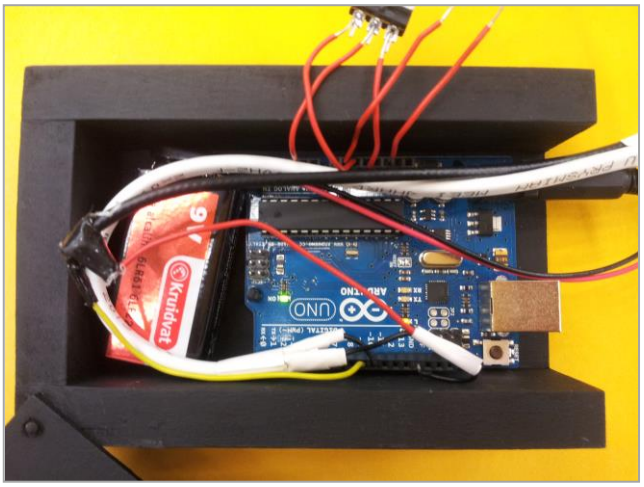
After some research and discussions with my teammate I decided to make a bracelet which you can attach to the glass but also wear like a normal bracelet. There were some reasons why we thought this was the best way to develop our product:

- It is cheaper to make on a large scale
- It is less expensive to replace broken bracelets
- You are able to participate (interact) without constantly holding a glass in your hands
- It's a more subtle way of displaying relation status
- Barkeepers aren't stuck to one type of glass

I already had the bracelets I only had to light them up somehow. Since I already some experience in lighting up Perspex material, because it was part of my end project in high school. I already knew a little bit how it will look like. I cut the ring at one point and attached a LED to it with a wire connected so I was able to control with an Arduino.

We thought it may be interesting to control the pulse rate of one of the glasses when somebody picked it up to give him or her the feeling it really worked. So first I programmed the pulse which was more difficult than I first thought. After that I connected a potentiometer so that I was able to control the pulse rate of one of the glasses.





Again I discussed this prototype with my coach and explained what I had done and why. The only feedback I got is that it may be interesting to do something with the look of the bracelet, giving it a pattern for example. I tried making a pattern on a sample ring but it starts to look a bit messy, it doesn't look sleek anymore so I discarded the idea.

Discarding this idea got me to my final prototype. I learned a lot by making this prototype. I developed my Integrating technology competency very much as my form and senses competency. I learned to stay focus on Industrial design, designing products/services which were also relatively easy to produce and not very expensive. I learned how going through multiple iterations helped me to come up with a better design and I learned that by actually making prototypes people start believing in your concept. I experienced this myself very well when I was explaining the concept to people on the final demo day and showed them the prototype.

Conclusion

We came to the conclusion that our concept, NanoTalk is very feasible. We think this because the only “big” problem is the LOC. If that chip is designed and produced it is really easy and inexpensive to make it work within our concept.

We also came to the conclusion that people are most likely to stand open for innovation, new things to do or to experience during going out. Almost all of the people we spoke to about the concept would like to give it a try. The people who wouldn’t want to try it told us because of the lack of privacy they don’t want to use it.

We think that NanoTalk, if it turns out to be a very accurate product that the next big thing is to also incorporate emotion in some way. By adding that that and maybe more it can become some sort of measuring device to measure the human psychological and mental state (PMS), which can be interesting in many situation such as in trail, job interview, medical research and so on. The only questions that then remains are, Is it right to measure someone PMS, who is able to see your PMS, how can a product decide if someone is mentally ill, who sets the borders and so on.

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Biosensors and Bioelectronics Volume 24, Issue 7, 15 March 2009, Pages 2177–2183

Article Electrochemical Detection of Testosterone by Use of Three-Dimensional Disc–Ring Microelectrode Sensing Platforms: Application to Doping Monitoring Olivier Laczka , F. Javier del Campo , Francesc Xavier Muñoz-Pascual , and Eva Baldrich * Institut de Microelectrònica de Barcelona (IMB-CNM), CSIC, Campus Universitat Autònoma de Barcelona, 08193 − Bellaterra (Barcelona), Spain Anal. Chem., 2011, 83 (11), pp 4037–4044 DOI: 10.1021/ac1031594 Publication Date (Web): April 15, 2011 Copyright © 2011 American Chemical Society

An Electrochemical Immunosensor for Testosterone Using Gold Nanoparticles – Carbon Nanotubes Composite Electrodes V. Serafín, M. Eguílaz, L. Agüí, P. Yáñez-Sedeño*, J. M. Pingarrón Article first published online: 27 OCT 2010 DOI: 10.1002/elan.201000419