Be Here, See There

Concept: Branch Out

ABSTRACT

Be Here, See There

DPL57

Theme: Wearable Senses

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The focus of this project was to pull society's current focus away from the overly social smartphone, back into the real world.

The intention was to create something that attracted attention, without being blatantly obvious.

The final product resembles an omniscient friend. Always interested, unpredictable and curious. Its appearance mystical and inviting.

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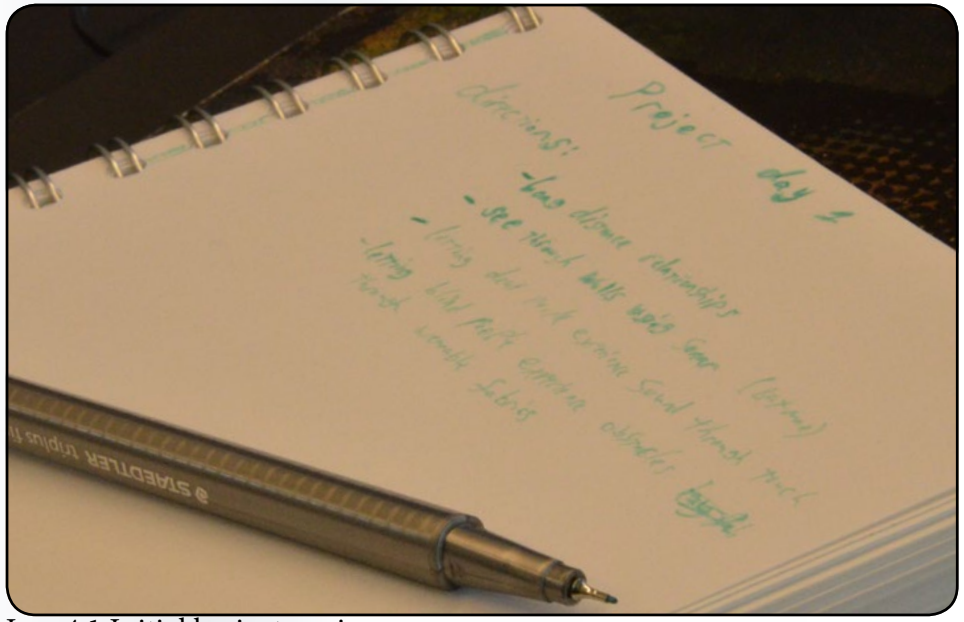
INTRODUCTION

From the official project description:

> *"I can touch what is here, but I cannot touch what is there. I can see things in front of the wall, and I can hear behind the wall. You can hear what I hear, but not touch what I touch. Sensory qualities are different from one modality to another. Moreover, technologies help us to see further, to perceive in the virtual world, to see what others can hear. They can be used to access new fields of perception (either physical or virtual) and to make sense of what would be incomprehensible otherwise."*



Img 4.1 Initial brainstorming.

In the project 'Be here, See there' the focus is on different methods of perception. How can one perceive what is not there and which senses can be used for perceiving, and in which ways can this new way of perceiving help us in our daily lives?

BRAINSTORMS

In order to understand the design challenge and be able to set a direction, the group started by having individual brainstorms. In these brainstorms, each member came up with 3 or 4 ways to use ‘Be here, see There’ in daily life.

Ideas of Lars Hottentot:

- Seeing through walls using preset sonar modules in the other room. Purposes: Security, safety or emergency help.
- Letting deaf people experience sound through touch.
- Low energy GPS built into a watch.

Ideas of Jasper Schenk:

- Letting blind people experience their surroundings through wearable fabrics that give feedback.
- A bass (audio) shirt (img 5.1). The shirt tightens to the beat, or uses a Piezzo speaker to a create bass feeling for the wearer. This can be used to record a concert, and through virtual reality, recreate the concert, with bass effects and everything. This will make the person feel as if he is at the concert. Useful for people who are not able to go to concerts because of, for example, fear of crowded places, illnesses, handicaps, etc..

Img 5.1 Testing the concept of a Bass Audio shirt.

BRAINSTORMS

Ideas of Luca Giacolini:

- Google maps for blind people. At home they set a destination, and on the way the feedback from a wearable unit tells the user where to go. Installed sensors in, for instance, pavements can tell the user when he is walking too close to the street.
- Connect smell with touch. For a mother and her child in a crowded place: If the child moves out of a pre-set safe zone (for instance more than 3 meters away from mother) , a device worn by child releases a smell or smoke and the mother is alerted. The smoke allows the mother to find the child through smell or sight.

Ideas of Nikki Butter:

- Homesick children who still want the comfort of their parents in bed. A pillow or teddy bear that reacts and mimics the movements of a parent.
- Couples apart. Pillows that connect to each other and relay data to each other, which allows for long distance pillow talk.
- Design for long-distance relationships. Knowing the other person is thinking about you through interactive and reactive objects.

After explaining the ideas, a point-system was used to select the favorite directions. Each team member was allowed to grant 3, 2 and 1 point to 3 different ideas. This resulted in the following selection:

First: The mother and child in a crowded area.

Second: The interactive pillow or teddy bear for homesick children.

Third: -The seeing through walls for security
-Letting blind people experience their surroundings.

BRAINSTORMS

7 September 2012

HOW TO FIND YOUR SON - HOW TO FIND YOUR MUM AS WELL!

TARGET GROUP: Children aged 2-10 and their parents

WHERE DO I START FROM: inspiration given by that already existant products which consist of two devices. The first one might be everything which contain a wireless or a GPS sonar. The first one is made of a display screen which let you know where the sonar is. (i.e. Locator)

↓ IMPROVING!

↓

- MAIN PURPOSE: The only draw-back of that kind of product is that doesn't take into account the child's point of view. My purpose is to design something which allows the child finding his parents, so that he does not go panic.

TALKING BEAR 1

That special teddy-bear can let the mum talk with her son, so that he can quiet down.
The bear will also use the locator system in order to give tips to the child (i.e. go left, go straight-on...)

TASK DIVISION
- Creating the bear
- Creating the locator system

LASER SHOES 2

On the top of that kind of shoes, you have a laser pointer, which will indicate the direction to take to reach the parents

TASK DIVISION
- Creating the shoes (maybe adopting existant one)
- Creating the locator system

FAKE MUM'S HAND 3

The child can handle that fake hand which will bring him to his mother in that way:

the hand contains a ball and the small pistons inside will put pression in the right way to take.

TASK DIVISION
- Creating the hand
- Creating the locator system

BRAINSTORMS

Teddyfriend

Target group:
Homesick children. Children that suffer from homesickness often miss home or something that relates to home.

Design challenge.
What if we can give these children a 'friend' that they can always take with them? This friend can comfort the child and will always be around.

Solution.
A 'living' teddybear. The teddybear is soft and cuddly and at the same time it mimics the moves that the parents make while they are asleep. Also the chest of the bear rises and falls, as if it is actually breathing.

Individual parts and competency areas involved:

Research: - What do the children want in a 'living friend'?
- Will the teddybear work?
- What fabrics are most suitable for the bear?

Involves: User focus and perspective, social and cultural awareness, form and senses.

The fabric: - Making the bear, soft enough and cuddly enough.
- Sewing etc.

Involves: Form and senses, ideas and concepts.

The 'robot'part: - Making the 'skeleton' and robotic part.
- How do we get the bear to move like the parents?
- How do we integrate the technology into the bear?

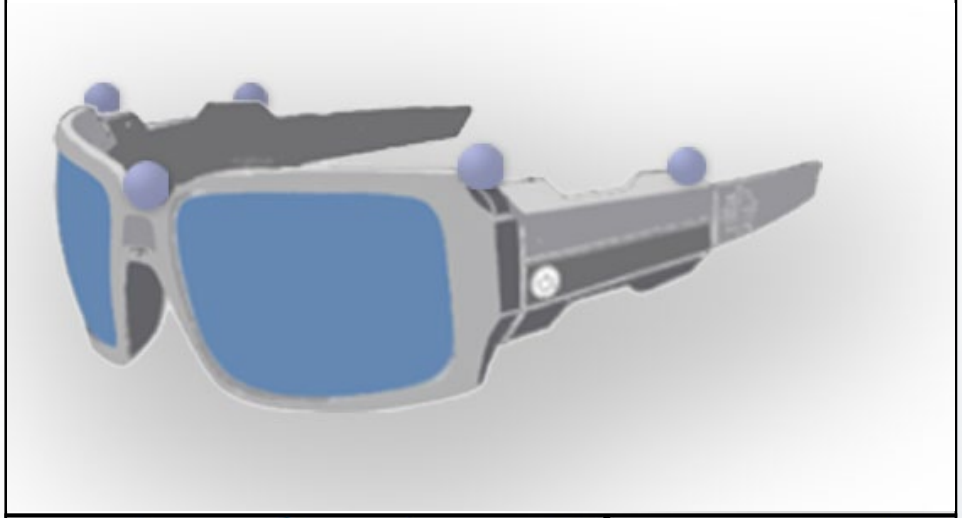
Involves: Descriptive and mathematical modelling, integrating technology.

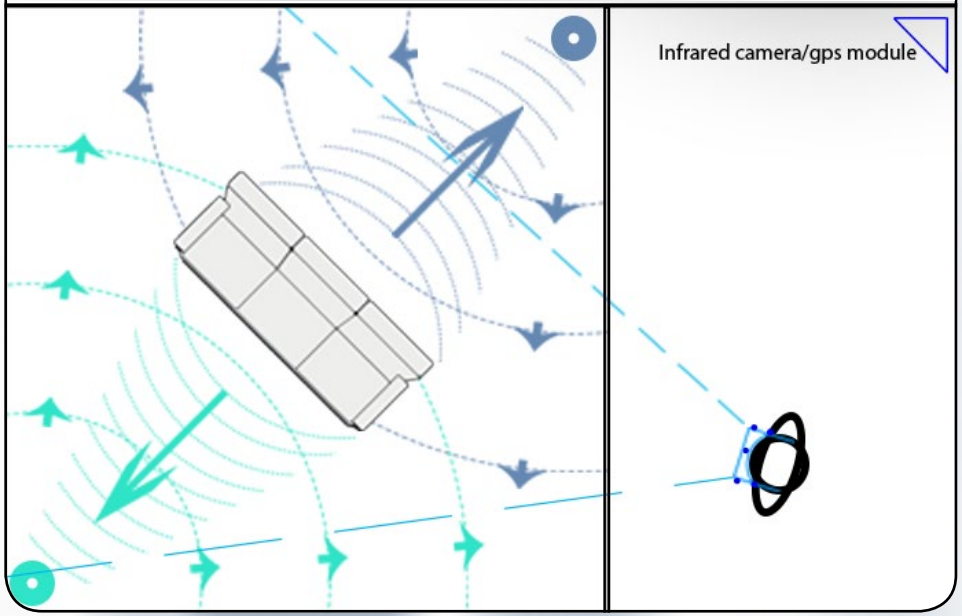
Programming: - Programming the bear to move like the parents move

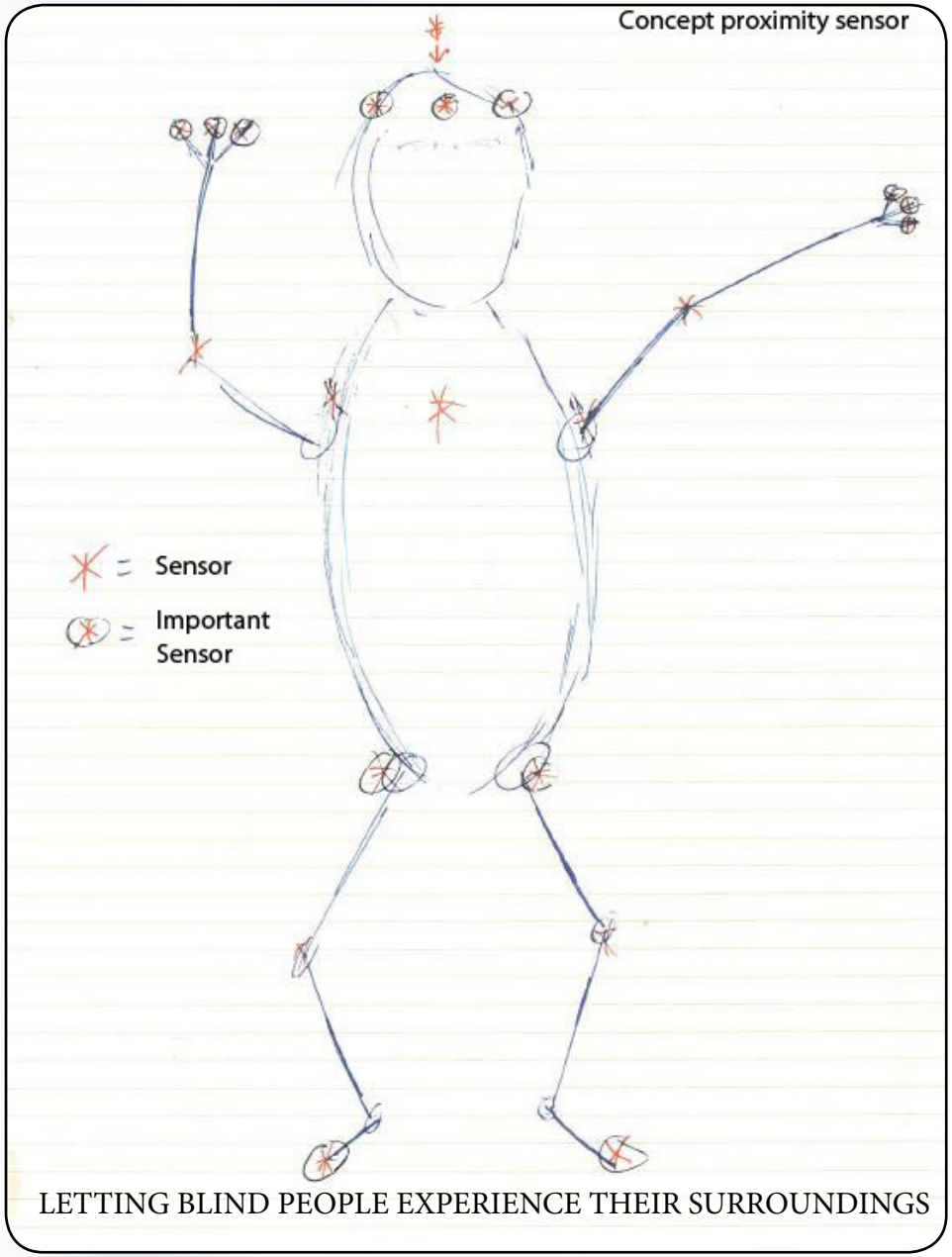
Involves: Descriptive and mathematical modelling.

BRAINSTORMS

SEE THROUGH WALLS



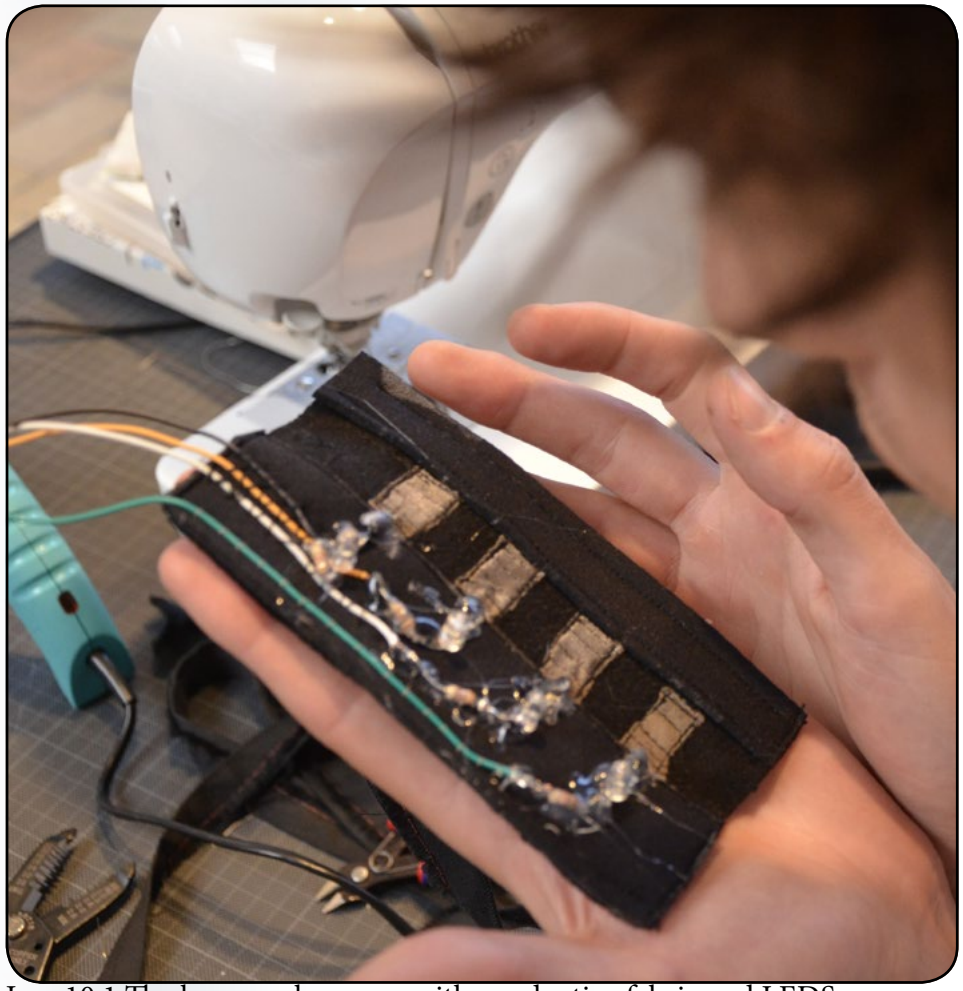




LETTING BLIND PEOPLE EXPERIENCE THEIR SURROUNDINGS

BUDA WEEKEND

A great chance to improve ourselves was offered by Naomi Kerkhove, an artist keen on smart textile, who held a two-days workshop in Kortrijk, Belgium, on the 15th and 16th September, during the opening weekend of the BudaFabriek. The “Measurable Body Challenge” goal was to be able to measure the width of the angle beneath the knee. In doing so, we were provided with conductive fabric, components, regular fabric, sewing machines, soldering irons and a variety of basic tools. At the opening ceremony, Luca and Jasper showed their prototype, and Lars documented the entire weekend on video.
The prototype works as follows: When you bend your knee, a narrow band of elastic connected to you upper leg, gets pulled down by your lower leg, running over your knee. Four pieces of conductive fabric, positioned at the front side of the upper leg, are linked to a battery, and each piece of fabric has an LED attached. Underneath the elastic band is a piece of conducting fabric as well. This fabric is connected to the negative terminal of the battery. As you bend you knee, the conducting fabrics touch, creating a closed circuit and the corresponding LED starts glowing. That experience had a twofold effect on the teams’ development. The team members could really work as a group for a long time, getting to know each other, and raised their awareness of the possibilities represented by the conductive fabric in the area of the so called “smart textile”. The team could practice or develop from scratch their soldering and sewing skills, which turned out to be useful a few weeks later.

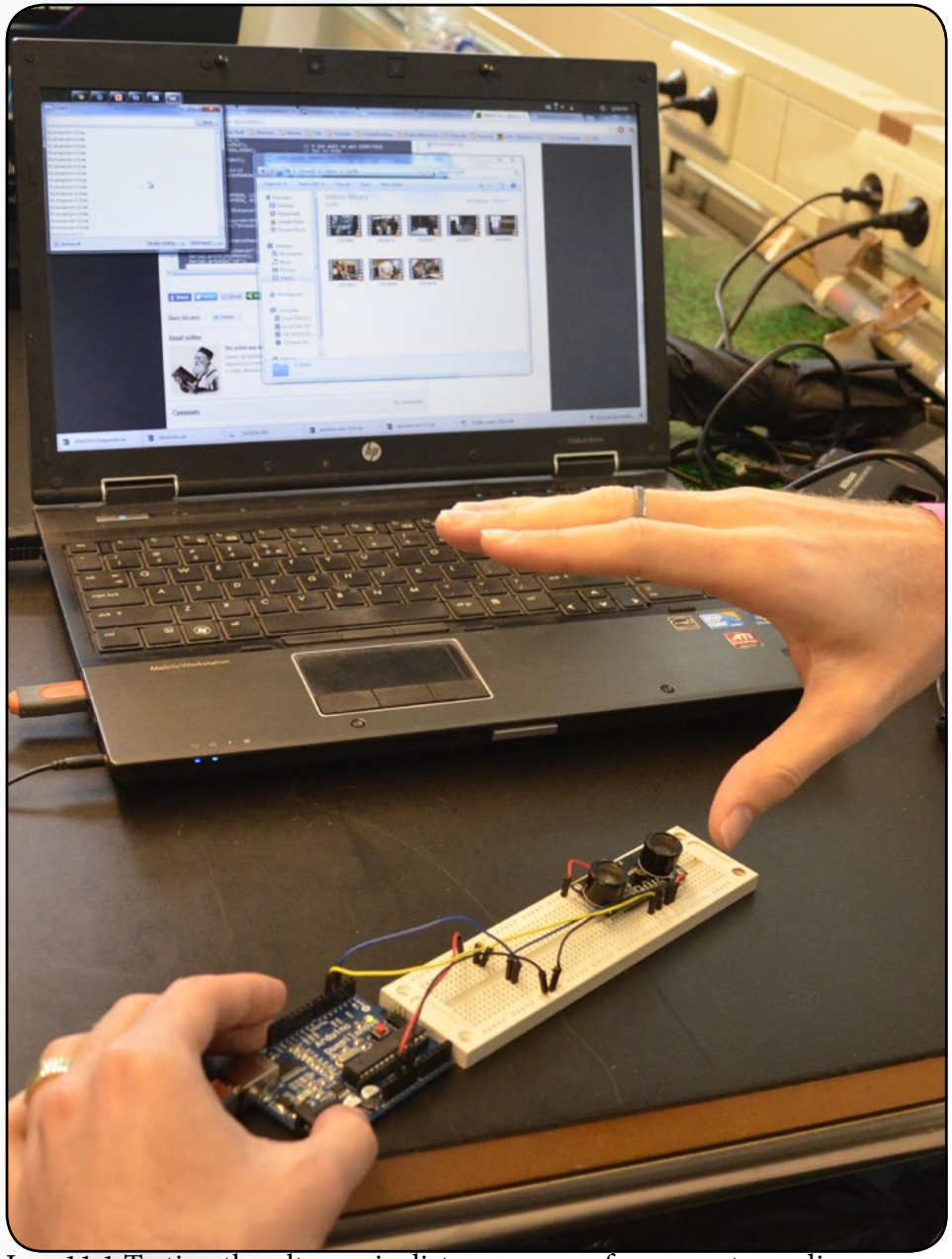


Img 10.1 The knee angle sensor with conductive fabric and LEDS.

Page written by Luca Giacolini

FIRST CONCEPT

The ‘City Guidance for Blind People’ concept involved allowing users to travel to unfamiliar places without the possibility of getting lost. It was a combination of two ideas: Google maps for blind people, and letting them perceive what is in their direct environment through a feedback system.
The idea was to create gloves that would let the blind person see with his hands. Every finger of the glove would have a tip that would vibrate as soon as the sonar system sensed something nearby.
The city guidance part is that these gloves could also guide people to particular locations; stronger vibration on the left pinky finger would indicate that a left turn is coming up, and right pinky vice versa. The glove would be linked to a system like Google maps, and inserting the destination could be done by voice or a braille keyboard.

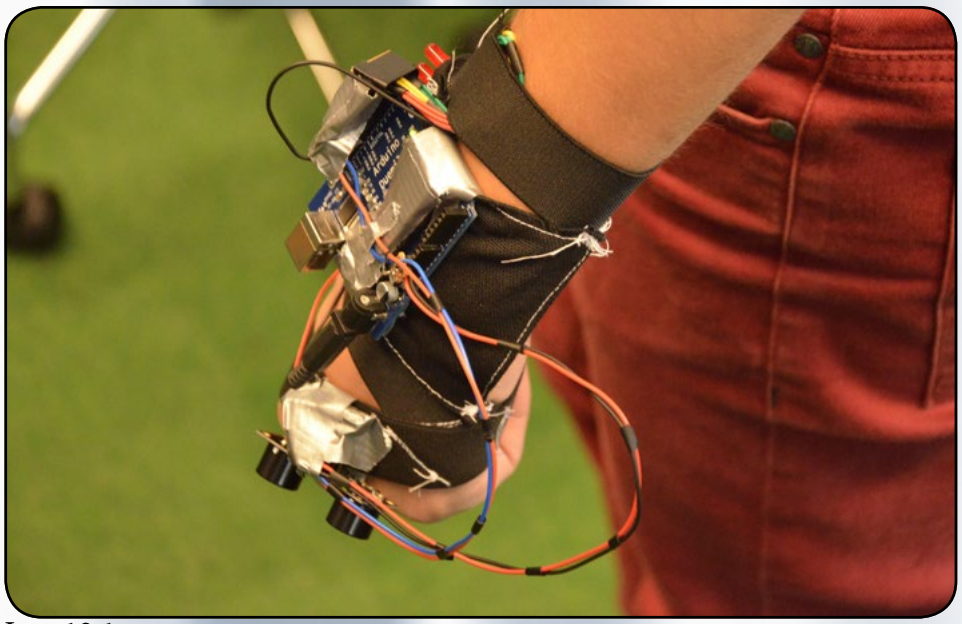


Img 11.1 Testing the ultrasonic distance sensor for accurate readings.

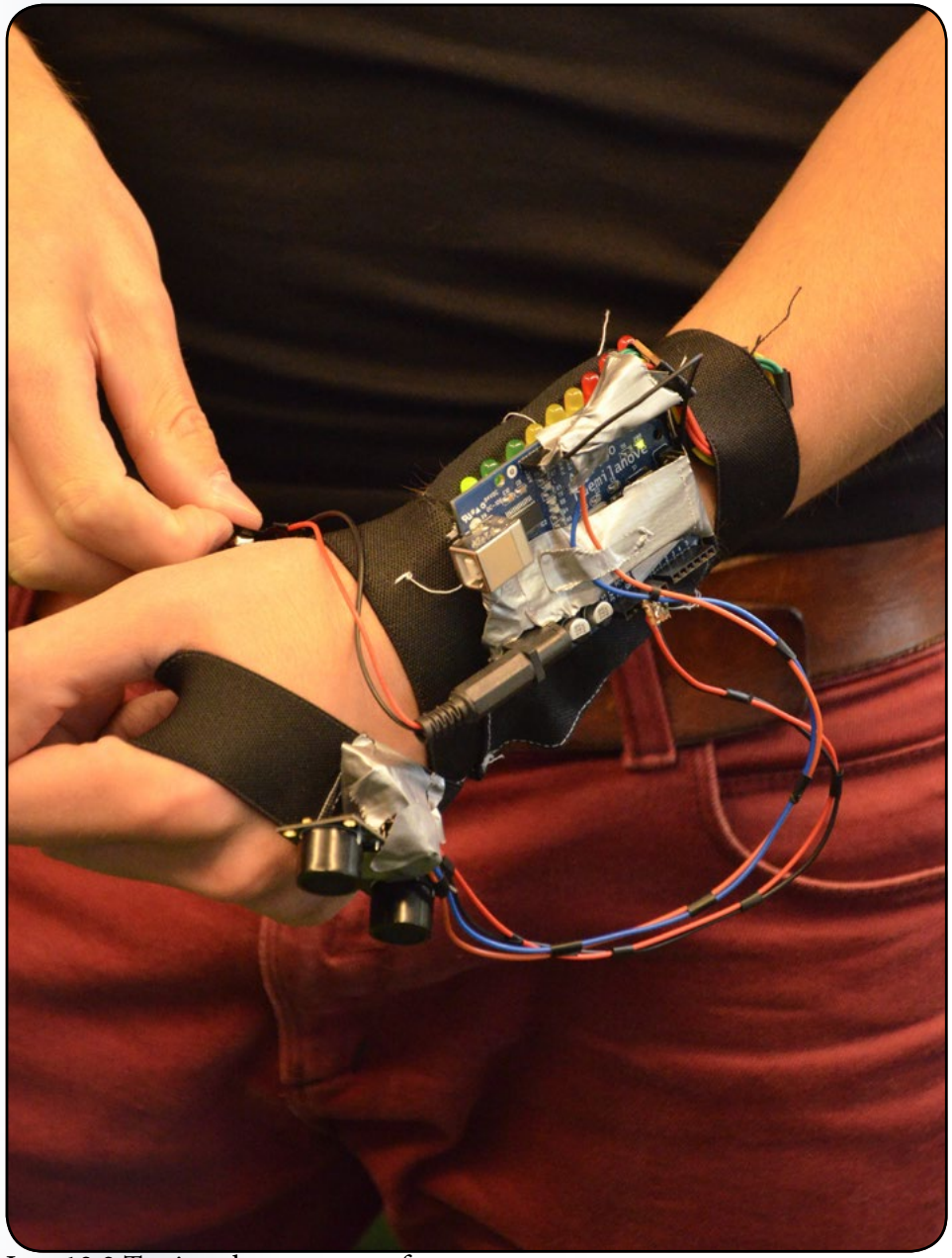
Page written by Jasper Schenk

PECHA KUCHA

The team presented the Navigation for Blind people concept at the Pecha Kucha presentation. The main concern raised was that the project had gotten extremely specific in a very short amount of time and that the team should take a step back and broaden their vision to see what else is possible. Having a working prototype, however, was commended, and motivated the team to continue to build experiential prototypes.



Img 12.1



Img 12.2 Testing the prototype for accuracy.

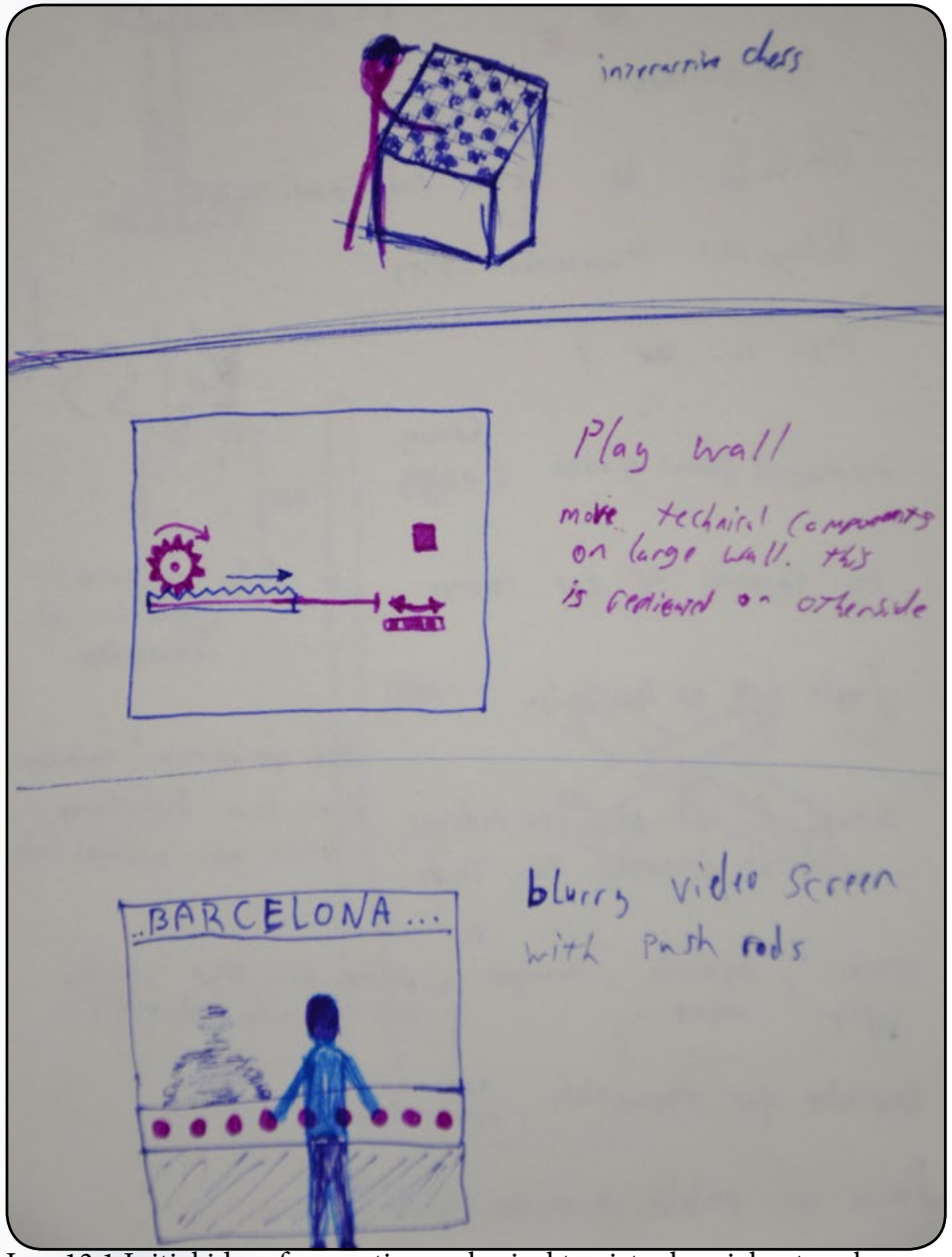
Page written by Lars Hottentot

NEW FOCUS

The first question addressed involved the concept of social media. The team realized that in contemporary society the role of social media has been changing, affected by technology. People are bound to link social media with social web applications. Facebook, Twitter, and Instagram are the most used social networks, especially amongst the youth. However, when looking deeper, one can see that web-based social media is twisting our way of experience, since they only allow you to share media files, such as videos and pictures. Although it may let you chat with your friends, it does not allow you to share an experience. That is what is missing. A good example of a social network can be represented by a tennis club, where

people subscribe since they want to share an interest and they can play with people fond of the same sport, whereas with Skype you cannot reach the same effect.
To sum up, the value of a social network lies in the strength of the experience that makes you feel.
This is the starting point, the feature that will underpin the projects further development.

The first few ideas regarding the new focus involved physical interactions over a virtual network. (see image)
These ideas were then discussed with Pierre Levy.



Img 13.1 Initial ideas for creating a physical to virtual social network.

NEW CONCEPTS

After the discussion with Pierre Levy, the team decided to generate some more ideas with the information just gained. Two different concepts were thought of that would both be very suitable for the idea of a new social network. It was decided to work them both out for the midterm, in order to get good feedback on which concept works best.

The Avatar Tree

Avatar was the jaw dropping movie from James Cameron. In this movie, all the plants and animals were connected by an energy source that ran through the many roots of the plants. This magical looking phenomenon was the inspiration in building the theme day setup.
At the theme day there was a setup where people could experience the idea in an abstract way. There were glowing branches that hung from the ceiling with which you could communicate to the other side, and had a big projection of a photo-shopped scene of the movie to give the setup a magical and mysterious appearance.

In the background you could hear the distorted whispers of a student that was speaking in to a microphone at a different place and if you took one of the branches you could say something back.
The intent was to create a setting where people could have a very basic first encounter with the idea, the idea to create an opportunity for random people to connect, rather than letting them stay focused on their smartphone screen and their safe group of “friends”.

NEW CONCEPTS

The Interactive Floor

This concept is based on random encounters. We want to connect squares by making the people that are on those squares meet randomly. We want to create the idea of those people on different sides of the word walking on the same square. This is done by letting them see each other, not in person, but in an abstract way.

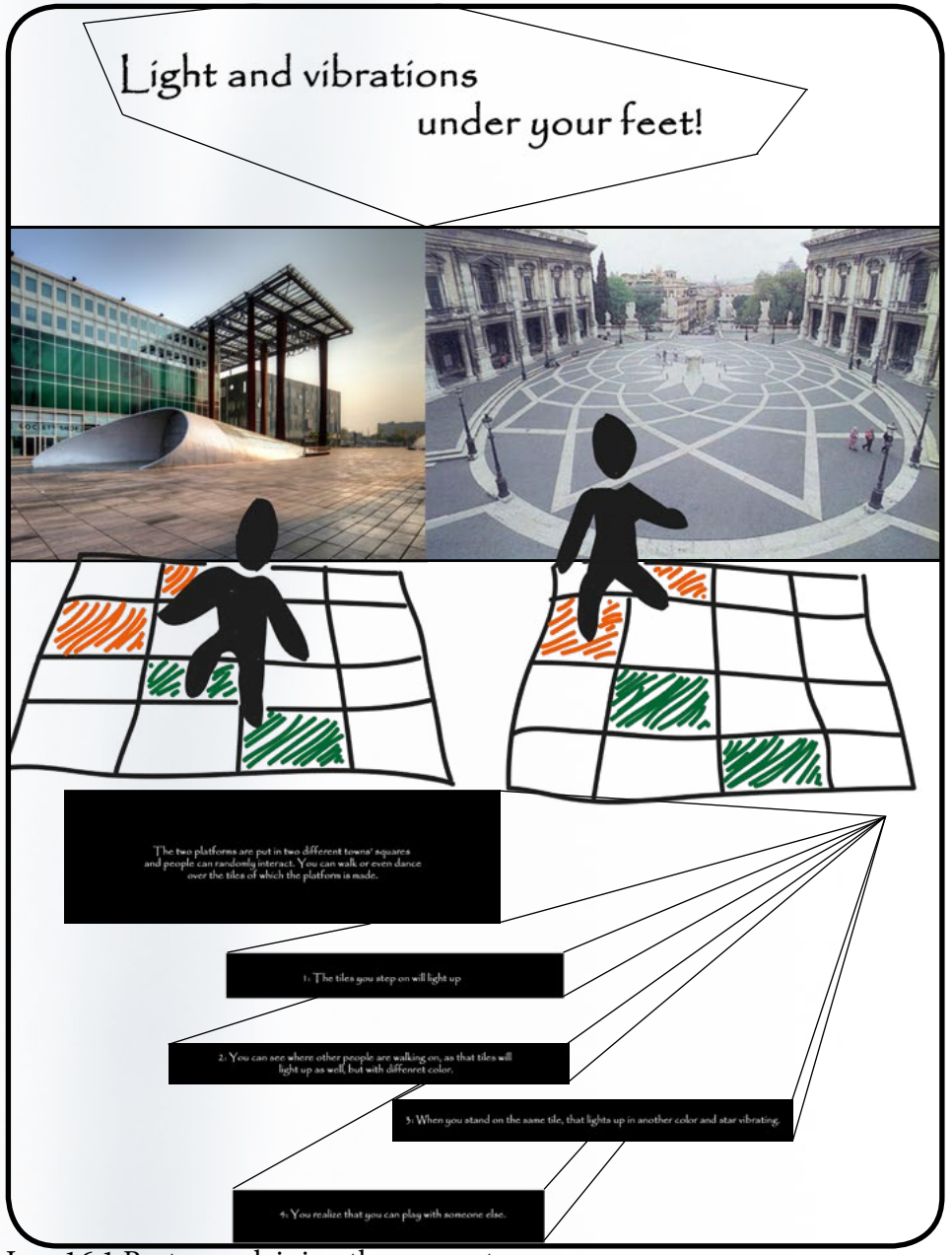
Imagine, you are walking on a square. When you look behind you, you see that the steps you have taken, have formed a path of light that slowly fades away. Wondering what will happen, you jump a few meters, make different shapes as you walk. Suddenly you see another trail moving around the square, in another color. It looks as if someone else is also making a trail, but you can see nobody else. When you walk towards the other trail, you see that the trail responds to you. You start to 'play' with the other trail, walking around each other. Curiously you step on the other trail, and suddenly the colors of both trails change into the same color. The ground starts vibrating. It almost feels as if you are standing somewhere you should not stand.

The idea is to link different squares around the world by showing the persons on the squares not only their own trails, but also the trails of the persons on the other square. The idea of other persons being present on the square is very abstract, but therefore will trigger curiosity and playfulness. The way of the paths moving will indicate that it is another person controlling it.

MIDTERM EXHIBITION

Feedback Interactive Floor

During the Midterm, Luca and Nikki presented their concept, supported by a prototype. The main and most useful criticisms were moved by Pierre Levi. According to him, the music platform was a good playful solution, but he pointed out the risk that non-musician could perform even annoying tunes, so in that case the incapability of playing could represent a limit to the experience itself. As far as the glowing platform is concerned, the main advice was to do some research in what was already designed before. On overall, what helped us the most was the last piece of advice: Pierre suggested to us to not focus on the final aesthetic appearance of the product, because the value lies in the experience we want to convey.



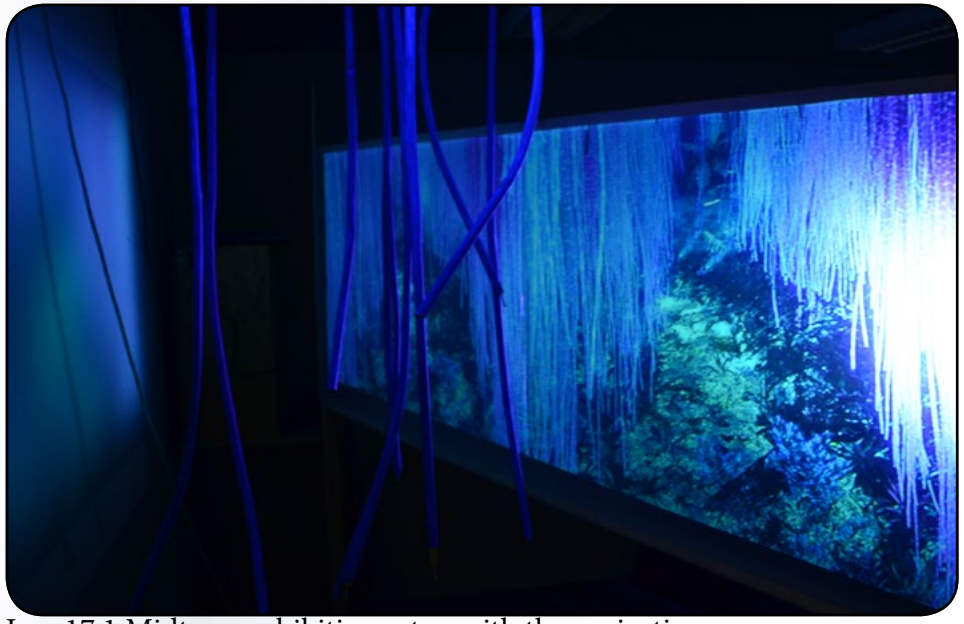
Img 16.1 Poster explaining the concept.

Page written by Luca Giacolini

MIDTERM EXHIBITION

Feedback Avatar Tree

During the Theme Day, the Avatar Tree idea sparked quite some interest. The concept started quite a discussion, with many topics and opinions. The main discussion points were the question of what the experience felt like and how it should be felt. What is the border between a fantasyland and a creepy experience? Is it scary to realize there is someone on the other end of the line? These points were raised and allowed the team to see what needed improvement.
Now the question becomes: to what level and capacity should the concept be realized? If the light is synonymous with the sound, would that not create two layers of interaction, possibly complicating things? Is the idea about the raw communication between people in a primitive and poetic form, or is it about the fantasy experience that in the end allows you to make contact with complete strangers? From a physical design perspective one must realize that different cultures will react differently to certain elements. One way to bypass this is to create the system and infrastructure needed to support each tree (web server connecting all the trees), and allow the physical tree to be design by local artists in each location, artists who have knowledge of the cultures do's and don'ts.



Img 17.1 Midterm exhibition setup with the projection screen.

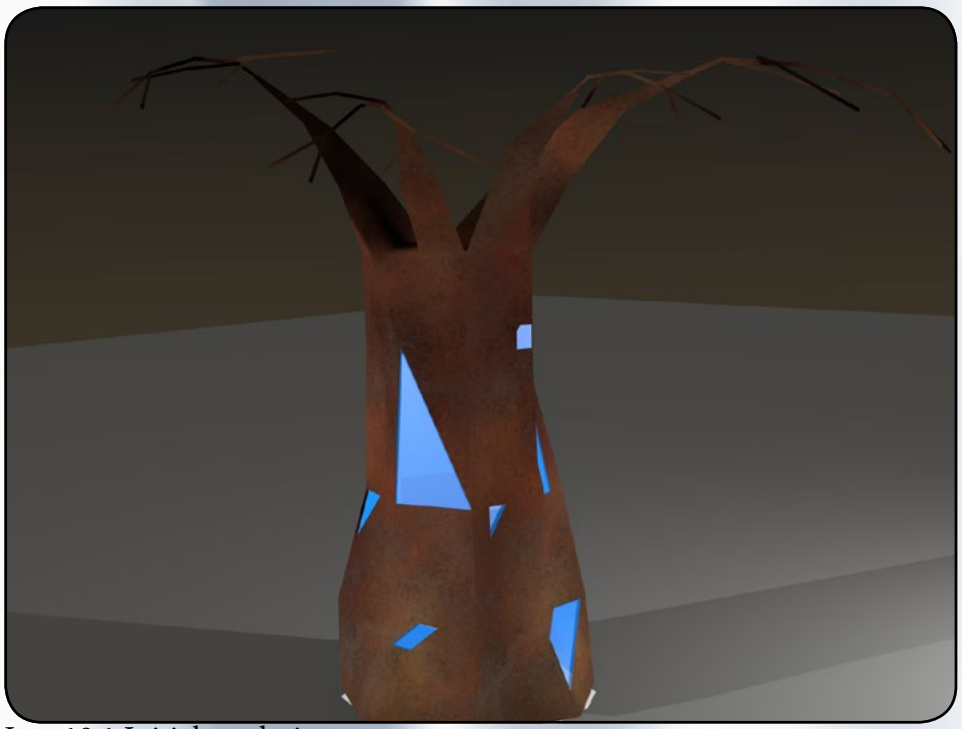
Img 17.2 The program that allows for the sound connections.

Page written by Lars Hottentot

BRANCH OUT CONCEPT

Social media has changed the way we perceive and interact with the world. A side effect of this new connected world is that we tend to confine ourselves more and more to the social circles we are already involved in. We are sometimes so focused on the social world displayed on our phone screens, that we neglect the social opportunities in our direct environment.

In this project we have tried to create an object that draws the attention into the real world, away from that glowing screen that everyone holds in their hands.



Img 18.1 Initial renderings.

Form Process: Tree

The Avatar tree from the midterm now got a new name: Branch Out.

To get to the form of the tree, many sketches and renderings were made, but none of them could really convey what a universal tree should look like. Every country is different, every culture is different, and different people look at things in their own way.

Therefore we made a basic design; a design that could be interpreted freely by users. The idea is to contact a museum or university with the possibility of setting up a “Branch out” Tree. If they agree, they will ask a local artist to create their own version of the tree that fits in with the local culture and is inviting to the local users. The technology in the tree remains the same, just the implementation of design changes per location.

BRANCH OUT CONCEPT

Form Process: Leaf

The shape of this model was crucial for our concept to work. Therefore we set a number of requirements the model had to comply with.

- Organic shape with resemblance of a phone
- Ergonomic shape
- Mysterious look
- Room for electronic components

Img 19.1 Models of possible curved designs.

Research

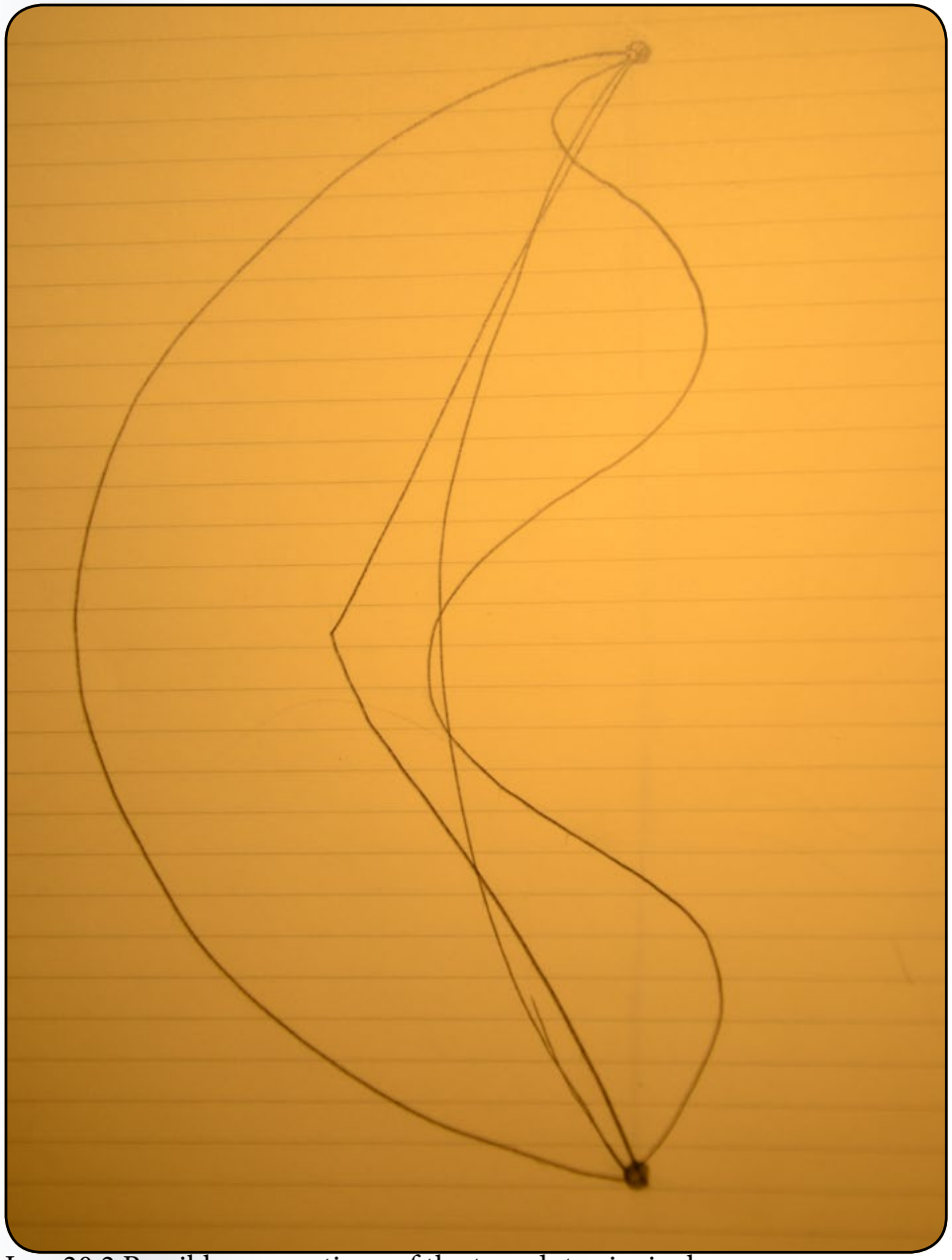
First we had to find out how people experience a phone. What does a phone look like, how do people like to hold it. What kind of interaction do they have with it.

During a trip by foot through the city of Eindhoven, looking through windows into shops and offices gave a good view on what kind of phones are used most nowadays. A simple curved design (Img 19.1) was found to be most common.

A closer look at this design gave two insights. First, a phone can be perceived as two dots, one for hearing and one for speaking. second, you need a connection between these dots to, in most cases, make a functional design that can be held, although sometimes it is not necessary. (Img 20.1)

BRANCH OUT CONCEPT

Img 20.1 An intercom system not using a handheld design.



Img 20.2 Possible connections of the two-dot principal.

BRANCH OUT CONCEPT

Form Exploration

Trying to create a shape that complied with the preset requirements on paper resulted in a failure. No inspiration was found and bad designs were made. Therefore other ways of creative form giving had to be found.

Working directly in 3D gave better results. First, the most common phone was copied in foam and abstracted into a more organic shape (Img 21.1). Second, the most common phone was copied in wood and also abstracted into a more organic shape. This was done because wood has other characteristics and at the workshop there is more equipment to model wood and therefore more possibilities. At the end of this second cycle, one shape (Img 21.2), stood out and asked for further exploration.

The main focus of this last exploration lay with getting a ergonomic shape that big enough to fit all the needed electronic components. The shape has been gradually widened en lengthened until it seemed to have the optimal shape.

Img 21.1 Foam models to express common and abstract phone shapes.

Img 21.2 The most intriguing shape, the basis for further exploration.

BRANCH OUT CONCEPT

Final Modeling

This final model in wood (Img 22.1) was then transferred into a digital Illustrator drawing. Components and holes for assembling and LED's were added into the file and it was readied for laser cutting a 5mm thick Perspex sheet.

With the cut materials sanded, sandblasted, threaded and drilled (Img 22.2) the final model was nearing its finished state. Next, the LED's were glued into place, wired and soldered. Last, the front shield was glued into place which resulted into the final model (Img22.3).

Img 22.2 Threading of the holes to allow assembly with bolts.

Img 22.1 Final wood model used as reference.

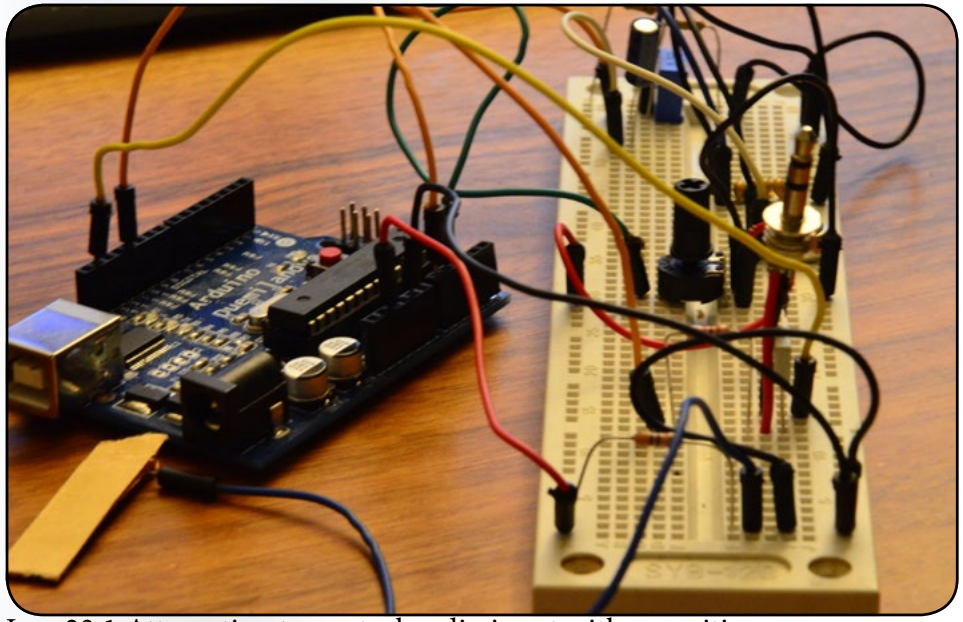
Img 22.3 Final assembly of the parts, with the HC logo to cover the gap.

BRANCH OUT CONCEPT

Technological Aspects

To get the tree to function properly, a lot of technology had to be implemented. The speakers, microphones, and lights all had to work together in the end. Ideally, the system would work as follows:

One of the objects glows, inviting the user into a mystical world, and as they get closer, they hear whispers. These whispers are hard to understand as they have been filtered and have effects applied to them. Once the person touches the object to interact with it, the filters and effects are disabled and the person can understand what the other side is saying. At the same time, the lighting sequence changes to visually confirm a connection has been made. Once one person lets go, the filters and effects are applied again, and the user is once again in a mystical wonderland, waiting for a new connection to a new person.

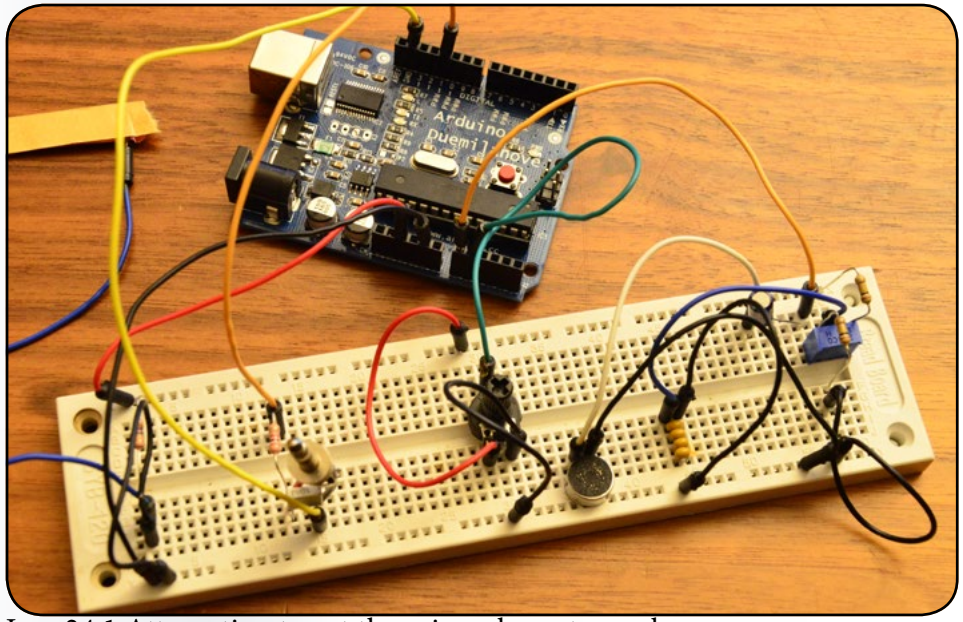


Img 23.1 Attempting to control audio input with capacitive sensor.

BRANCH OUT CONCEPT

Sound

The process started with attempting to alter sound through an Arduino so the entire system could function using a single processing board. The AT328 microcontroller installed on the Arduino Duemilanove can hold, and therefore process, 2Kb of data at a time. To process audio live with this little memory means asking a lot from the system to produce very little. Nevertheless, an example was found on the web and an attempt was made to replicate the system.



Img 24.1 Attempting to get the microphone to work.

However, the example showed an active input into the Arduino (such as sound coming out of an amplifier), yet the sound the project needed was from a microphone input. This meant building an active microphone amplifier circuit. Examples were found on the web, but due to shortage of specific parts, it was necessary to purchase a prebuilt circuit at a higher cost. Connecting this microphone to the Arduino input should have allowed the Arduino to send the signal directly through to another port, but no direct examples could be found on the web. Digging into the bare code essentials, every possible command was tried, to no avail. Even contacting experts led to a dead end.

BRANCH OUT CONCEPT

As the Arduino-only route was starting to seem more and more unlikely to be achievable, a choice was made to leave the audio processing out of the final prototype. This processing was meant to alter the sound into mystical whispers and activate the audio connection only when the object was touched. At the midterm exhibition, two laptops were used to simulate an active connection between two sides. This was achieved by connecting the microphone input of one side to the speaker output on the other, with the laptop in the middle processing the signal and altering it slightly to convey more echo. The program used for this was VirtualDJ, a program meant for digital music mixing. The decision was made to simulate the audio connection again for the final prototype, just so it actually works.

Img 25.1 Using two laptops at the final exhibition, both running VirtualDJ.

BRANCH OUT CONCEPT

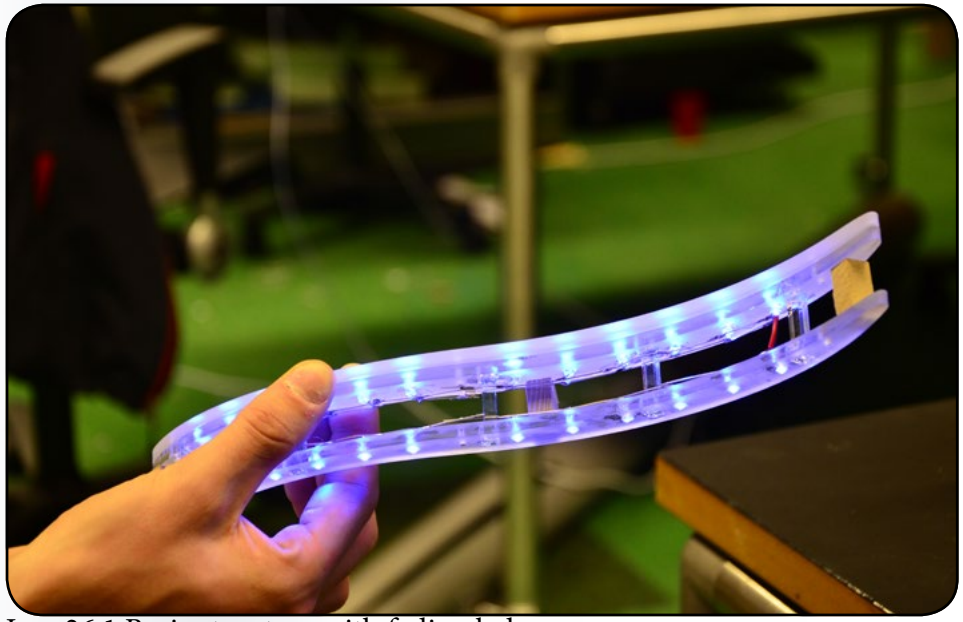
Lights

The lighting of the prototype was an essential part of the concept. It was meant to interact with the user and adapt to changes in its environment. For instance, there were different light sequences and patterns to represent the independent states of “There is nobody at the other end”, “There is sound at the other end, but nobody is interacting”, “There is somebody trying to connect to you”, and “You are connected to a person”. Each of these states needs an appropriate pattern to convey the message.

For the state “There is sound at the other end, but nobody is interacting”, the choice was made to let the objects fade in and out slowly, suggesting that there is no sense of urgency to interact.

For the state “There is somebody trying to connect to you”, the lights fade from the ends of the interaction object to the center, pointing towards the microphone and suggesting that there is an interaction available.

For the state “You are connected to a person”, the choice was made to pulsate the light from the object, up the branch, and down the sides of the tree into the ground,

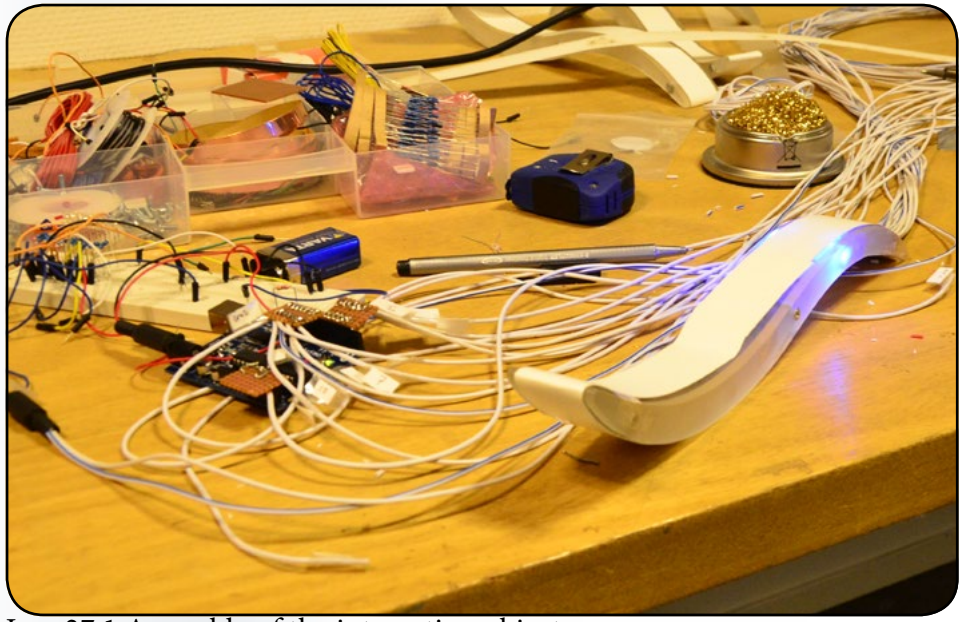


Img 26.1 Basic structure with fading leds.

where it would pulsate up the other tree and towards the other persons interaction object. This state, due to financial limitations, was only half completed in the final prototype, with only the object lighting up from bottom to top, suggesting a connection to the other person.

BRANCH OUT CONCEPT

The choice was made to only create one object that actually works, considering the amount of technology and wires that need to be put into it. However, having only one object hang from the tree would not convey the actual concept, thus some other dummy ones were created, giving a total of eight. Three of these would stay in the “There is sound at the other end, but nobody is interacting” state. The other four would be turned off. This is for two reasons; one is that it would convey the idea that there is nobody there, so it is not worth trying to interact, and the other is that one of the experts, Pierre Levy, suggested that working with only sound could be a stronger concept. This would allow for future testing to see what actually works better.

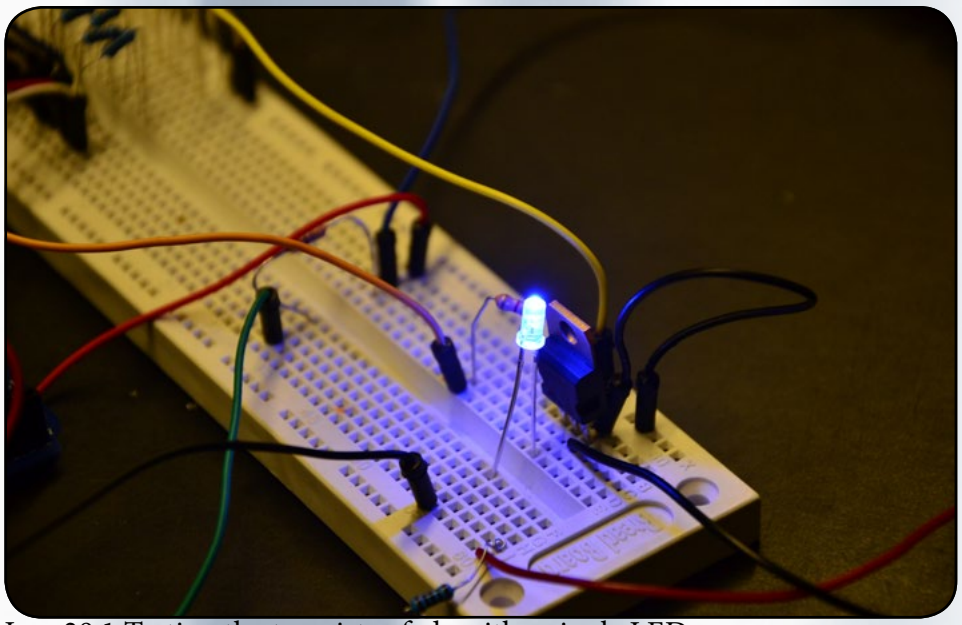


Img 27.1 Assembly of the interaction object.

To get the one interaction object to work meant a lot of wires. The object contains twelve individually controlled LEDs, a capacitive touch sensor, a microphone, and a speaker, creating a total of eighteen connections. Ideally the Arduino microcontroller would be implanted inside the object, but in this case it was too big. The capacitive touch sensor would trigger the state change between “Somebody is trying to connect to you” and “You are connected”.

BRANCH OUT CONCEPT

To create the three pulsating objects, it was necessary to build a relay using a transistor because the Arduino cannot handle the amount of current the LEDS require. This involved using the Arduino to control the amount of current let through the transistor from the battery pack to the LEDS. The Arduino sends an analogWrite value between 0 and 255, corresponding to the amount of current to let through, and a few milliseconds later changes the value up or down. This repeats until the limit of 255 is reached, and then reverses the process until it reaches 0, looping all over again, and resulting in the fading effect. The code and diagram can be found in the appendices.



Img 28.1 Testing the transistor fade with a single LED.

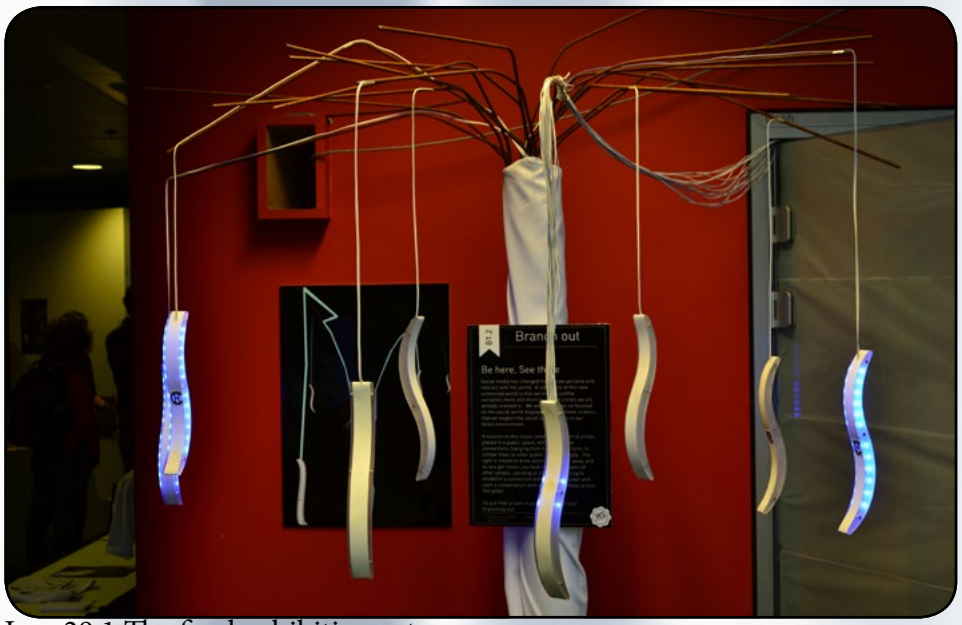
Img 28.2 The pulsating objects in action.

FINAL EXHIBITION

The effect we wanted to achieve at the final exhibition setup is that most of the attention gets drawn to the leaf shaped communication devices.

First, the height of the tree was determined to keep a safe distance between the metal rods at the top of the tree and the eyes of visitors. Metal rods were used to mimic the flexibility of real branches. Then the height of the leaves were adapted to the optimal interaction height. The black and white fabric had to give it a bit of a flowing look and create unity in the setup. The red background completed the picture with a good contrast.

Img 29.2 Rendering of connection pulse along the tree into the ground.



Img 29.1 The final exhibition setup.

Img 29.3 A user communicating with another person.

Page written by Jasper Schenk

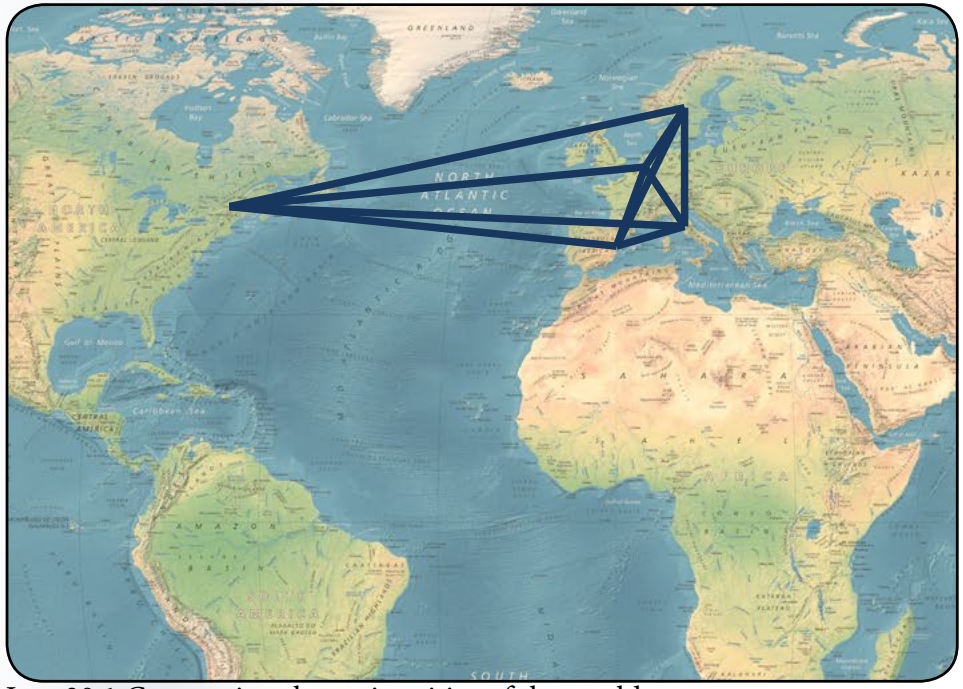
FINAL PRODUCT

When finalized, our product would enrich museums and universities all over the world. Its beautifully blinking shapes would attract and activate people to explore its possibilities. The attention will be captured and drawn to the leaf shaped communication devices. Soft whispers and blinking lights will invite to interact and as soon as it is touched it will establish a connection with another tree.

The whispers start getting louder, clearer; parts of sentences can be heard through the mist of random words in all kinds of languages. Suddenly there is a clear voice, a real person. Formalities are exchanged and the wave of questions and answers starts.

One person standing at the TU of Eindhoven, the other standing at a TU in Norway; both happen to have great interests in the technical developments over the past months. A passionate conversation about something not many people understand is on its way, and a connection that would otherwise never have been made, has been made.

Accidently one of the guys let's go of the leaf and the connection is lost, he quickly picks up the leaf again and hears the whispers. They start getting clearer, and just as last time, suddenly a clear voice says Hi! Sadly, it is not the previous person, but now it is a girl standing at the Deutches Technikmuseum at Berlin, and a new conversation is on its way.



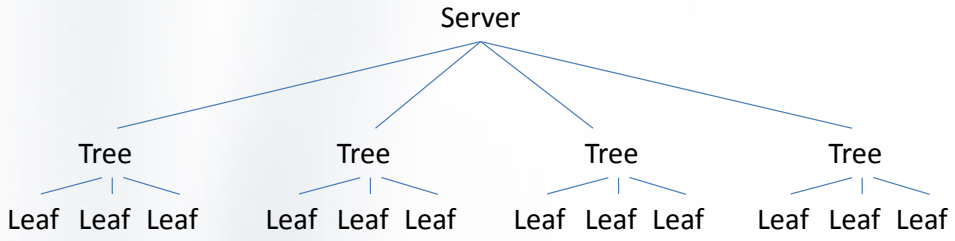
Img 30.1 Connecting the major cities of the world.

FUTURE DEVELOPMENT

In order for the concept to work, every tree would have to be connected to a computer. In turn, this computer will connect through the internet with a server. This server functions as the mother tree that connects all the other trees randomly with each other. This complete system is very technical with a lot of programming, not something where a lot of competencies can be developed and therefore it was decided to lay the focus on the other aspects of the project.

The project also misses proper user testing. There has been some user testing during the exhibitions, but this was not an official test environment and therefore the observations are not representative of the general public, but rather the opinions of future designers.

The final product is actually the system behind the concept. The implementation of the design is up to the local artists. This would mean that the cost of the product, on our end, would be limited to the electronics and maintenance of the server system. The physical parts would be limited to the microcontroller unit, with the user being able to plug in their own LEDS and audio equipment. Not a difficult system to create, but one with a large social impact.



Img 31.1 Diagram of the virtual system.

APPENDIX A

ARDUINO CODE FOR INTERACTION OBJECT
(adaptation of original capsense example from arduino.cc)

```
#include <CapacitiveSensor.h>

int led0 = 2;
int led1 = 3;
int led2 = 4;
int led3 = 5;
int led4 = 6;
int led5 = 7;

int led6 = 8;
int led7 = 9;
int led8 = 10;
int led9 = 11;
int led10 = 12;
int led11 = 13;

//capacitive settings
CapacitiveSensor cs_14_15 = CapacitiveSensor(14,15);

void setup()
{
   //set pin modes for interactive leds
   pinMode(led0, OUTPUT);
   pinMode(led1, OUTPUT);
   pinMode(led2, OUTPUT);
   pinMode(led3, OUTPUT);
   pinMode(led4, OUTPUT);
   pinMode(led5, OUTPUT);
   pinMode(led6, OUTPUT);
   pinMode(led7, OUTPUT);
   pinMode(led8, OUTPUT);
   pinMode(led9, OUTPUT);
   pinMode(led10, OUTPUT);
   pinMode(led11, OUTPUT);

  cs_14_15.set_CS_AutocaL_Millis(0xFFFFFFFF);     // turn off
autocalibrate on channel 1 - just as an example
  Serial.begin(9600);
}

// the loop routine runs over and over again forever:
void loop()
{
          long start = millis();
          long total =  cs_14_15.capacitiveSensor(30);
          Serial.print(millis() - start);       // check on performance in
          milliseconds
          Serial.print("\t");                   // tab character for debug windown
          spacing

          Serial.print(total);                  // print sensor output 1
          Serial.print("\t");

   if(total <= 10680)
          {

           digitalWrite(led0, HIGH);
           digitalWrite(led11, HIGH);
           delay(150);
           digitalWrite(led0, LOW);
           digitalWrite(led11, LOW);
           digitalWrite(led1, HIGH);
           digitalWrite(led10, HIGH);
```

APPENDIX A

```
        delay(150);
        digitalWrite(led1, LOW);
        digitalWrite(led10, LOW);
        digitalWrite(led2, HIGH);
        digitalWrite(led9, HIGH);
        delay(150);
        digitalWrite(led2, LOW);
        digitalWrite(led9, LOW);
        digitalWrite(led3, HIGH);
        digitalWrite(led8, HIGH);
        delay(150);
        digitalWrite(led3, LOW);
        digitalWrite(led8, LOW);
        digitalWrite(led4, HIGH);
        digitalWrite(led7, HIGH);
        delay(150);
        digitalWrite(led4, LOW);
        digitalWrite(led7, LOW);
        digitalWrite(led5, HIGH);
        digitalWrite(led6, HIGH);
        delay(150);
        digitalWrite(led5, LOW);
        digitalWrite(led6, LOW);
        delay(150);
       }

      //leds on active state
else
       {
        digitalWrite(led0, HIGH);
        delay(150);

        digitalWrite(led0, LOW);
        digitalWrite(led1, HIGH);
        delay(150);

        digitalWrite(led1, LOW);
        digitalWrite(led2, HIGH);
        delay(150);

        digitalWrite(led2, LOW);
        digitalWrite(led3, HIGH);
        delay(150);

        digitalWrite(led3, LOW);
        digitalWrite(led4, HIGH);
        delay(150);

        digitalWrite(led4, LOW);
        digitalWrite(led5, HIGH);
        delay(150);

        digitalWrite(led5, LOW);
        digitalWrite(led6, HIGH);
        delay(150);

        digitalWrite(led6, LOW);
        digitalWrite(led7, HIGH);
        delay(150);

        digitalWrite(led7, LOW);
        digitalWrite(led8, HIGH);
        delay(150);

        digitalWrite(led8, LOW);
        digitalWrite(led9, HIGH);
```

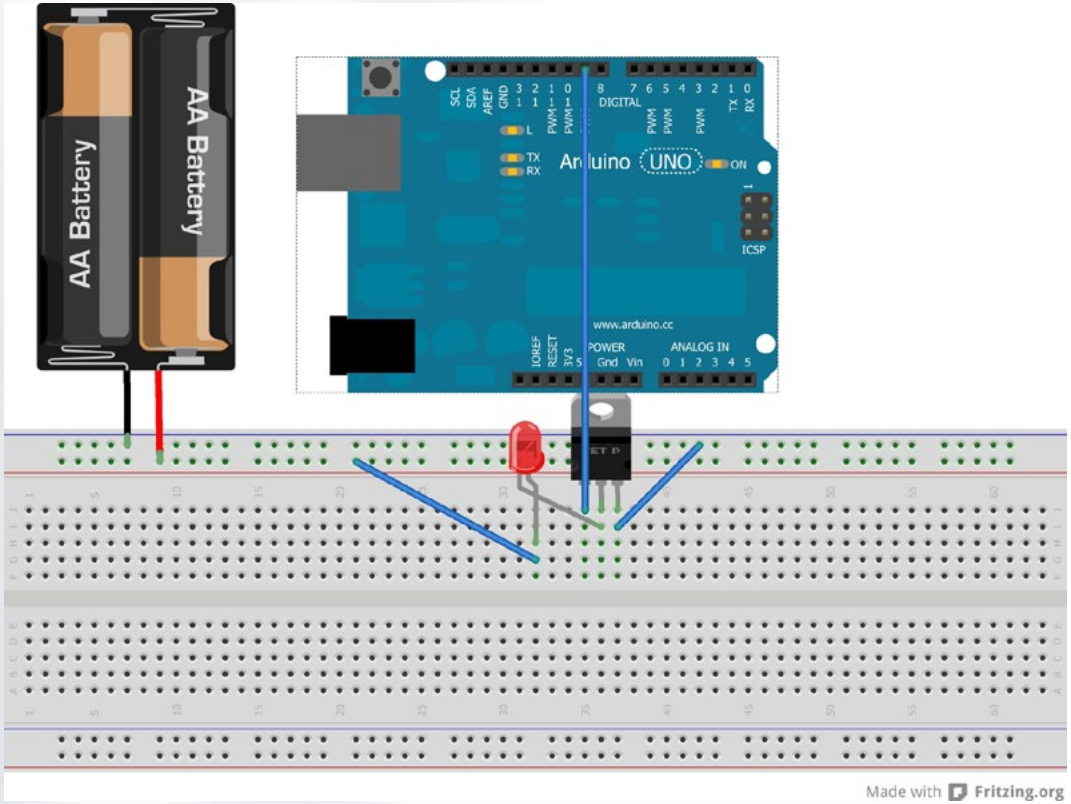
APPENDIX A

```
        delay(150);

        digitalWrite(led9, LOW);
        digitalWrite(led10, HIGH);
        delay(150);

        digitalWrite(led10, LOW);
        digitalWrite(led11, HIGH);
        delay(1000);
        digitalWrite(led11, LOW);
       }



}
```

APPENDIX B

ARDUINO CODE FOR FADING OBJECTS

```
//////////////////////////////////////////////////////////////////
//©2011 bildr
//Released under the MIT License - Please reuse change and share
//Simple code to output a PWM sine wave signal on pin 9
//////////////////////////////////////////////////////////////////

int fadePin = 9;

void setup(){
  pinMode(fadePin, OUTPUT);
}

void loop(){

  for(int i = 0; i<360; i++){
    //convert 0-360 angle to radian (needed for sin function)
    float rad = DEG_TO_RAD * i;

    //calculate sin of angle as number between 0 and 255
    int sinOut = constrain((sin(rad) * 128) + 128, 2, 255);

    analogWrite(fadePin, sinOut);

    delay(30);
  }

}
```



APPENDIX C

Portal Project Concept

The Portal Project
Lars Hottentot, Jasper Schenk, Nikki Butter, Luca Giacolini

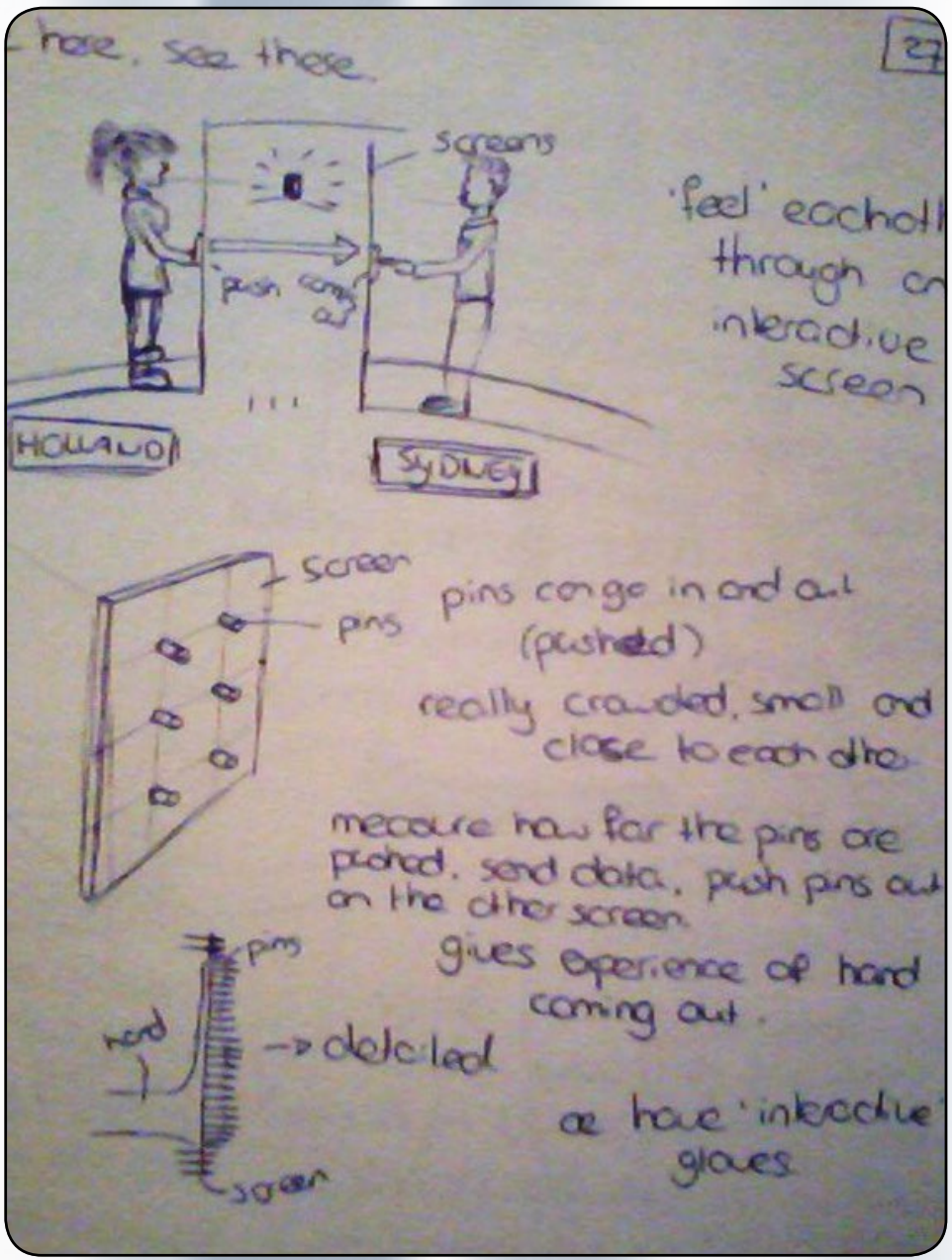
Imagine you walk through a cold snowy city. It's 8 pm and you are just passing the main square of the city. You are bored, no one posted anything interesting on Facebook and you are on your way home. As you walk, you catch a glimpse of a warm glow in the corner of your eye. As you turn your head, you hear people laughing. Your natural curiosity is triggered and you decide to find out what the laughter is about. As you come closer you see people throwing snowballs at a glowing wall. You wonder, "Is this a new game or something?" Then it hits you, it is not a game, it's a camera image, an image of a sunny square in a crowded city! The laughing people are throwing snowballs at the people on the screen and they try to dodge them. They are talking with each other and interacting physically, their hands appearing to go through the wall and coming out the other end. They are meeting and interacting with other cultures, and you decide to get in on the fun, making a few friends along the way.

Going on the feedback received at the Pecha Kucha presentation, the team went back to the drawing board.

After some discussion, the idea came up to target current social media. The problem with current social media is that it generally means people are glued to the screen on their phone or their computer, and defies the definition of 'social'.
The purpose is to give people the opportunity to experience and meet new cultures and people by chance, allowing to explore cultures they would otherwise never take the active decision to explore. Furthermore, the users should be able to interact with one another physically through a virtual gateway.

The following pages contain situation sketches and pictures of the first steps towards our initial user test. This user test is meant to find out how people would interact with a visual gateway to another place, and find out what actions they are missing.

APPENDIX C


hae, see these
27
screens
'feel' eachoth
through
interactive
screen
HOLLAND
SYDNEY
screen
pins
pins can go in and out
(pushed)
really crowded, small and
close to each other
measure how far the pins are
pushed, send data, push pins out
on the other screen
gives experience of hand
coming out.
pins
hand
-> detailed
screen
we have 'interactive'
gloves