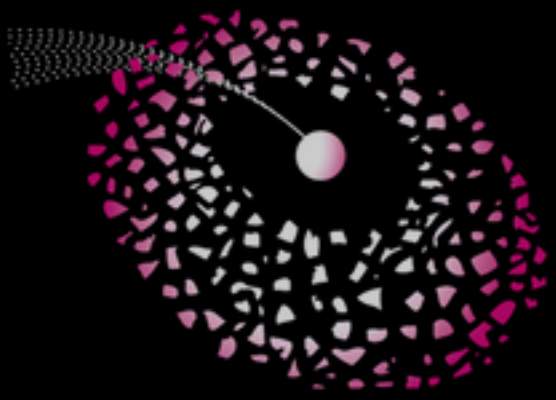


UNIVERSITY
OF TWENTE.

ATTRACTING PASSERSBY INTO A BUILDING USING AN INTERACTIVE INSTALLATION

Jelle Wolbers
Creative Technology BSc Thesis
January 2017

Supervisor
dr. ir. Edwin Dertien

Creative Technology

Faculty of Electrical Engineering,
Mathematics and Computer Science

University of Twente, Enschede, The Netherlands

Contents

Abstract

This report presents the results of a bachelor graduation project for the University of Twente, 100%FAT & Concordia. Concordia is an organisation that provides film, arts and theatre in Enschede who hired 100%FAT to design and build an interactive installation that will attract more visitors to their public art display building.

The projects goal is to develop strategies and form recommendations for 100%FAT for the design and implementation of this interactive installation. This is done through literature research, conducting interviews and building three testing devices which are then used to conduct user tests at Concordia.

One result is the significant advantage of a proactive installation compared to a passive installation which in the user tests doubled the amount of people that interacted with it. The report concludes that there are several ways that you can grab people's attention on a public street but it is hard to persuade people to come inside of the building. It also shows multiple recommendations that 100%FAT should keep in mind when building the final installation.

Introduction

Concordia is an organisation that provides film, arts and theatre in Enschede. One of their buildings located in the city centre is an art display open to the public. Its goal is to get people in contact with art as much as possible.

Despite several attempts, they haven't been able to reach the number of visitors they had in mind. Concordia attempts to solve this by hiring 100%FAT[1] to create an installation that will improve their noticeability on the street. 100%FAT is a company that builds custom installations for museums, galleries and festivals. These installations have different purposes, however, all consist of technology implemented in a creative and artistic way.

As the final interactive installation will cover a large part of the buildings facade, 100%FAT wants to have a solid theoretical foundation to attract the most and the best kind of attention. Building this theoretical foundation is this reports goal. It will be used to develop strategies and form recommendations for the design and implementation of the installation.

This project will run in paralel with Max Bode's graduation project which means the prototyping and testing phase will be done together.

Motivation

Although the research is mainly meant for 100%FAT, Concordia is their client and will therefore be taken into account as well. Because both parties have their own goals and interests (Concordia is passionate about art and 100%FAT is fond of fusing art and technology) this project is meant for explaining and crossing the gap between human-computer interaction and the creative practices.

While researching what works for Concordia's specific situation, it will probably also generate advice as to what to take into consideration when building interactive installations. This information could be used by 100%FAT as a basis for building interactive installations in the future.

Goals and Challenges

Figuring out how an interactive installation can attract the right people into Concordia's public art display is the main challenge. This will involve literature research into psychology in which the goal is to find out what parts of interactive installations attracts people's attention and what the best way for attracting the desired attention is.

Another part of the main challenge is discovering how to get people to want to go inside of the building and how to stimulate this using the interactive contraption. Besides literature research this will involve conducting interviews, building prototypes and testing these.

At the end, a collaboration between literature research, conducted interviews and the testing of prototypes should provide an accurate view of the current situation and produce valuable recommendations.

[1] FAT is an abbreviation for 'Fusion of Art and Technology'.

Research Questions

As the most important part of this report is forming recommendations for building an interactive installation on Concordia's facade, the main research question is formed as follows:

1. How can an interactive installation help with attracting people into Concordia's public art display?

This research question is broad and can be split up into several parts, each depicting a separate subject of the main question. One part that can be extracted from the main question is about attracting people's attention on the streets:

1a. What attracts people's attention on the streets?

Another part is about directing people into entering Concordia's building once you've grabbed their attention:

1b. How can we direct people into entering Concordia's public art display?

The last part that will be discussed is practical, involving the implementation of the obtained knowledge into an interactive installation mounted on the facade:

1c. How can we implement this into an interactive installation mounted on the facade?

Research Method

Methods of gathering the wanted information shall be described in this paragraph. For each subquestion, the method used to obtain this information will be discussed.

1a. What attracts people's attention on the streets?
A literature analysis will supply a theoretical foundation of how to obtain people's attention and the test setup can be used to (partially) confirm this as well as provide new insights about the specific location, users and environment of the interactive installations final location.

1b. How can we direct people into entering Concordia's public art display?
Again a literature analysis can provide interesting information about directing people and changing their behaviour. With a prototype, testing can also be used to research how to redirect people into entering the building.

1c. How can we implement this into an interactive installation mounted on the facade?
What works and doesn't work in the final installation is likely to follow from the interviews that will be conducted on several experienced interactive installation builders and experts in the area of psychological behaviour and human media interaction.

All in all the research method consists of several elements described in figure 1.

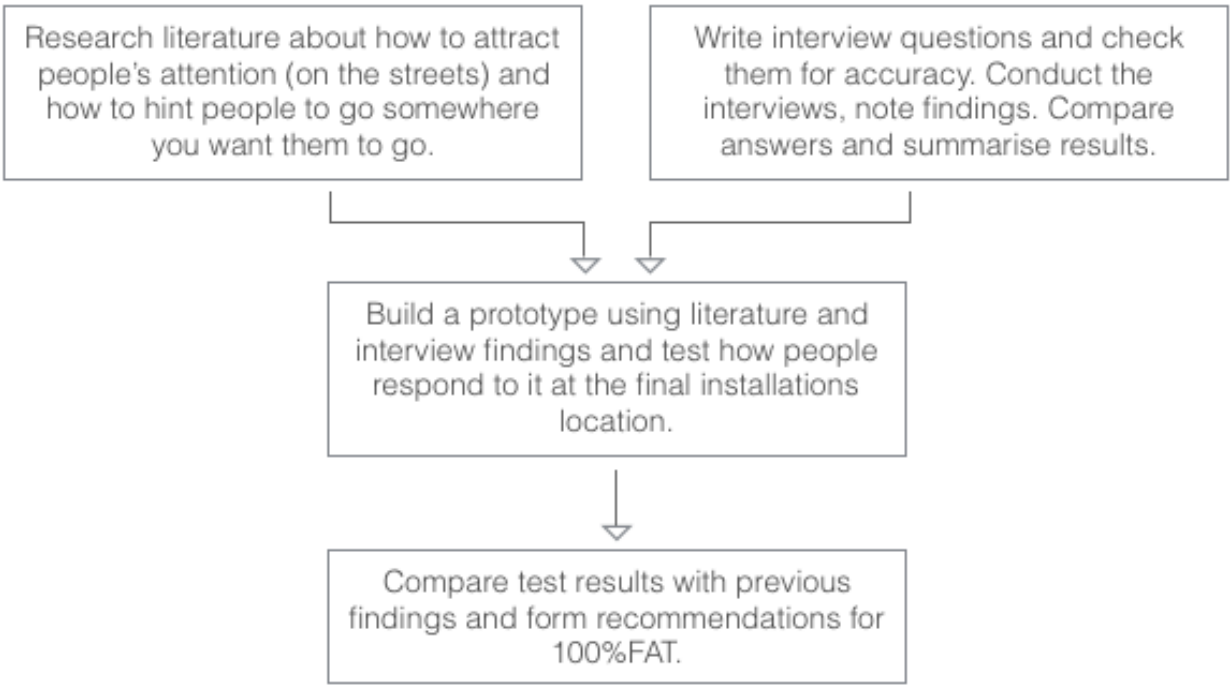


Figure 1: The Research Method

Report Organisation

The introduction chapter gives context and states the projects' research questions and methods. The next chapter, Analysis, will start by diving into literature concerning people's behaviour as well as a note on evaluations. State of the Art will show several other inspiring projects that in some way or form relate to this project. Users and Environment will discuss the location and people walking past the location of where the final installation is going to be located. The chapter, Interviews, will discuss the results of the conducted interviews and its findings. Now that most analysis is done, Requirements will show the specific requirements that must be met according to the analysis.

For the chapter Design and Implementation, a method involving an Ideation, Specification and Realisation phase will be used. This is a method often used in Creative Technology projects and described in a paper[1] by *A. Mader & W. Eggink* in 2014.

After these phases, the next chapter, Evaluation, shall discuss the testing and its results. A conclusion chapter follows which describes most obtained knowledge from the literature, interviews and testing. In the Discussion chapter, remarkable results will be discussed and recommendations will be formed as described previously.

Analysis

In this chapter we will discuss literature concerning people's behaviour, a state of the art analysis, notes on the users and environment at the final installations location as well as the conducted interviews and setting up recommendations that follow from all obtained information.

Theory

As mentioned before, it is necessary to research what draws people's attention on the streets. An important non-intrusive way of attracting attention is by invoking curiosity.

Curiosity & Attention

As *R. Tieben, M.M. Bekker & B.A.M. Schouten[2]* summarised in 2011, we can define five main principles for evoking curiosity: novelty, partial exposure, complexity, uncertainty, and conflict which can be seen in figure 2.

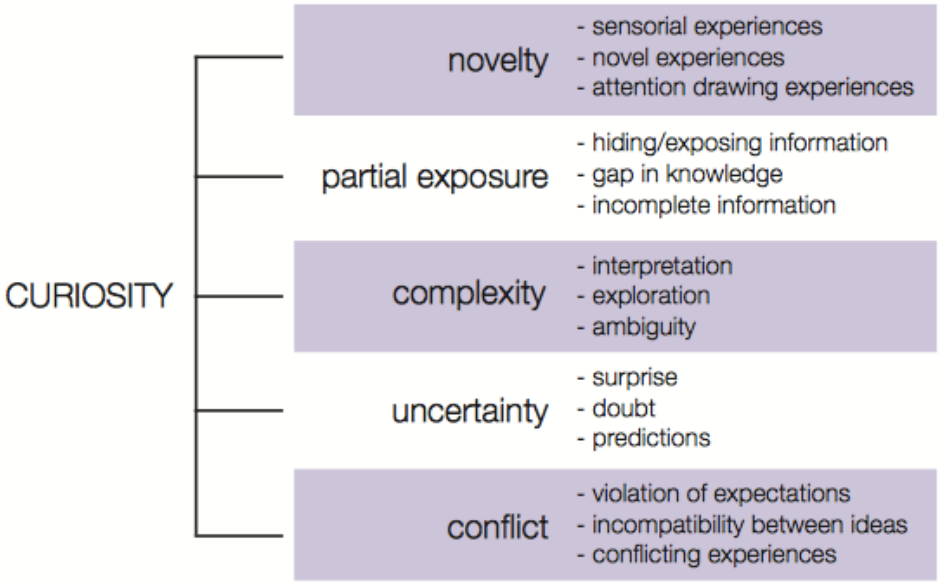


Figure 2: Five Main Principles for Evoking Curiosity

They also provide the curiosity process which can be found in figure 3.

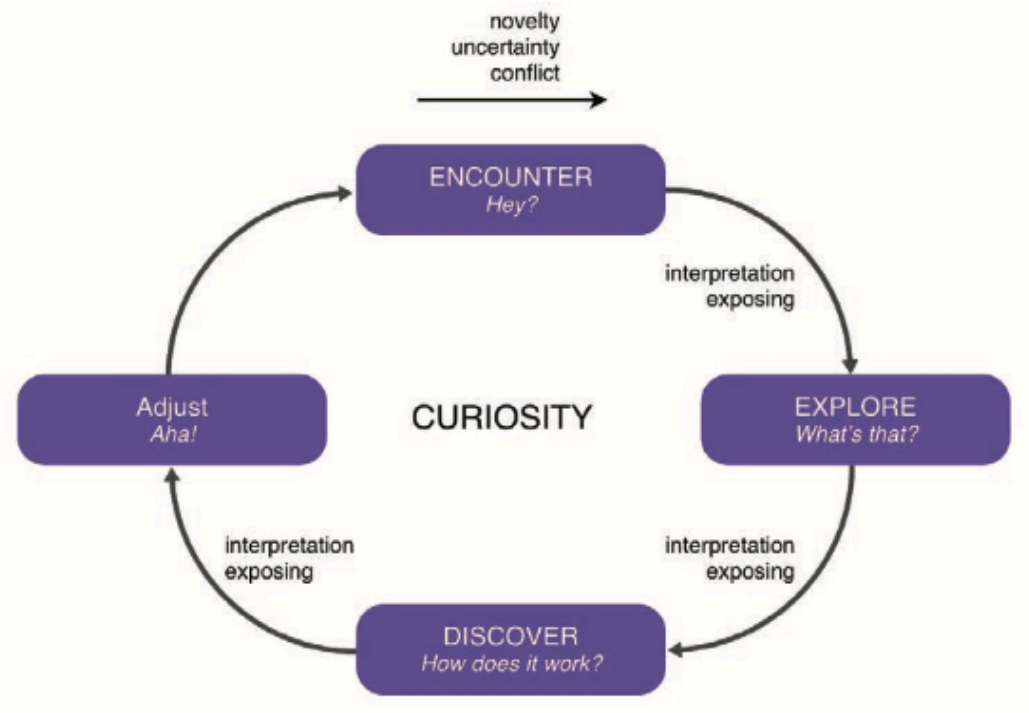


Figure 3: The Curiosity Process

These principles and this process provide a clear basis for evoking curiosity which can be applied to an interactive installation attracting attention from people walking on the street. This will be discussed further later in this report.

Participation
Jacucci et all showed several strategies for getting people to participate in interactive works[3]. These strategies are briefly explained below.

Enabling Authorship
The artwork allows participants to identify and 'project' themselves into a space or scene.

Affording Connectivity
Provide the sense of connectivity by using interactive technologies.

Interacting with Artificial Beings
Create environments where visitors can interact with artificial creatures and pseudo-life forms at various levels.

Reinterpreting the Visitor World
These works use live video footage as a means to mirror, reinterpret, and shape the visitors' relationship with both the private and the public space.

Engaging in Performative Acts
Placing a special focus on engaging the visitors in collective performances and social processes.

These strategies can be used to describe how to persuade people to come near the interactive installation and start interacting with it or get them to keep interacting.

Evaluating Interactive Installations
Morrison et all talk[4] about how evaluation of interactive art environments "*…requires an integration of art-criticism techniques with more recent Human Computer Interaction (HCI) methods, and an understanding of the different nature of engagement in these environments.*". In figure 4, an exploration of the artist perspective and priorities in the process of creating an interactive art installation are shown and where this intersects with the audience experience of the work.

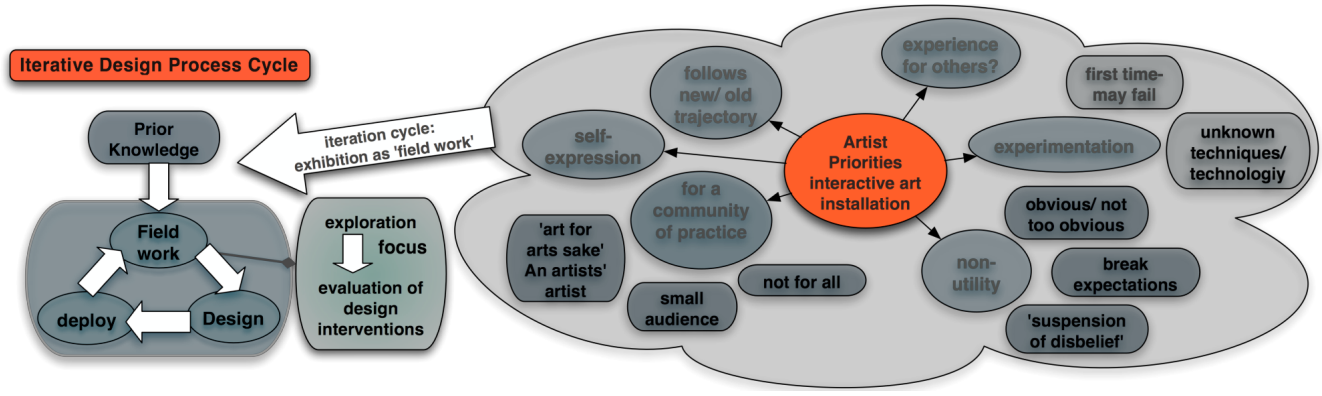


Figure 4: The Lens of Ludic Engagement

State of the Art

Besides the famous 'Piano Staircase' by TheFunTheory, there are a lot of other public art installations, many of them interactive. Below are several examples, in no particular order, showcasing installations that show similarities to this project.

Face in the Snow

Jonathan Trumbull, a designer menswear store, installed an interactive digital window entitled 'Face in the Snow'. It consists of a large mounted LED screen with falling snow which digitally sweeps across the display, whilst blizzard sound effects are piped through the window to create a magical and immersive effect.

Behind the magic of the window are several technologies including facial recognition software, which detects your face and takes your photo before posting it to Facebook. Plus Feonic sound transducers turn the glass shop window into a massive speaker that pipes the blizzard effect soundtrack on to the street.

The user experience is simple; shoppers simply stand outside the window, take their photo which looks as if you are standing in the snow, then use a unique code to see their photo in order to share it.

21 Balançoires

Image by Olivier Blouin

This musical installation called ’21 Balançoires’ (21 Swings) from Canadian design collective Daily Tous Les Jours is a whimsical, interactive experience. The contemporary-style swing set in Montréal’s busy Quartier des Spectacles is a giant musical instrument triggered by motion. Dreamy, pre-recorded sounds of pianos, xylophones, and more are programmed to play various notes creating complex melodies when the swings move together. He also included an eater egg in which secret song kicks into gear when all 21 swings are in use.

Every Passing Moment

Liverpool's Clayton Square exploded with a colorful, blooming garden when new media artist Maria Stukoff made cheerful use of peoples' Bluetooth devices in her installation, Every Passing Moment. When pedestrians moved across the shopping center, anyone with a Bluetooth enabled device saw a virtual flower being planted in a breathtaking landscape that was digitally projected onto a screen. Sound artist Jonathan Fischer created audio of running water and children laughing that emitted from speakers. If two people approached each other to talk, their flowers grew bigger. Casual onlookers passing by saw their flowers slowly fade.

A Tilt of Light

Image by Shannon Morris

An Australian art and design studio created A Tilt of Light and installed it in Melbourne's Federation Square. The group used LED strips activated by computer software that are tucked inside the body of a seesaw. When one end tilts, the lights glow and zoom across the seesaw's length. Studio Eness wanted to demonstrate the kinetic physics of the playground equipment, but make it a truly fun learning experience.

Rainbow City

To celebrate the opening of a section in New York City's High Line (a public park built on an historic freight rail line elevated above the streets on Manhattan's West Side), art collective FriendsWithYou created an art installation called Rainbow City. The vibrant, cartoonish installation invited visitors to play amongst a landscape of responsive, air-filled, minimalist sculptures, some of them towering forty feet in the air. The collective wanted to evoke toys and images of childhood in their design.

Time After Time Capsule
Sebastian Masuda, Dag Hammarskjold Plaza

Photo: twi-ny/mdr.

This nine-foot-tall crystalline-looking Hello Kitty may be the world's cutest time capsule, with Masuda encouraging viewers to fill the hollow doll with their personal effects. The artist is staging the interactive work in cities around the globe. Masuda plans to unite all the collected artefacts at the upcoming 2020 Summer Olympics, slated to be held in his native Japan.

Interactive Think Sphere

New American Public Art created this interactive sphere for TEDx Somerville, an organisation part of the TED program that helps promote “ideas worth spreading.” As people enter the group’s building, the bright sphere beckons for visitors to give it a spin. Since it’s a public work, it acts as an interface between conference attendees and people passing by, further emphasising TED’s messages about community and conversation.

Users and Environment

Concordia's public art display is located in the city centre of Enschede, near the 'Oude Markt'. This is shown in figure 5. The street at which the building is located is called the 'Langestraat' and runs south, away from the popular 'Oude Markt'. This central location makes sure that a lot of people pass by every day.

Figure 5: A Map of Concordia's Location
Image from Google Maps

Locatus (a big company specialised in data collection) counts visitors in Enschede each year. This data is published afterwards and, because one of the counting locations (marked in figure 6) is right next to Concordia's exposition building, provides information on the number of people walking past Concordia.

As can be seen in figure 6, in 2016 17400 people walked by Concordia's exposition building on a single Saturday[2]. The counting is done at 48 different locations in the city centre of Enschede.

Telpunt	Adres	2013	2014	2015	2016
12	Oude Markt 17	8.600	7.100	3.300	11.900
13	Oude Markt 28	400	900	1.100	1.300
14	Langestraat 54	8.900	8.700	11.100	17.400
15	Langestraat 19A	11.000	10.900	8.900	13.800
43	HJ van Heekplein 86	23.200	18.400	21.600	27.300

Figure 6: The Amount of People Passing by Several Locations per Year.

[2] Counted by Locatus on Saturday April 9th, 2016, between 10:00 and 17:00.

Although the location of Concordia's exposition building seems favourable, a lot of people probably also pass by purely for commuting purposes, focussed solely on getting to work or getting home without paying much attention to the buildings they pass. The mindset of people passing by the building plays a very important role in their choice to interact with things in their environment. How many people that pass by the building which attention can be grabbed, who have time and the right mindset is discussed later in this report.

Curiosity decreases with age as seen by *S. Harter* in 1981[5] which would mean that an interactive installation designed to attract people using their curiosity may work worse for elder people.

Ajzen's 'Theory of Planned Behavior' [6] describes that attitude toward behaviour, subjective norms, and perceived behavioural control, together shape an individual's behavioural intentions and behaviours. This means that we need to take into account that people care what other people think of them. So if people watch a subject use an interactive installation, it could lead to the subject stepping away because he/she is intimidated. It also means that if the installation is regarded complicated, people could feel unself-confident and stop using it because they just feel emotionally wrong about it.

Interviews

To gather information and tips about building interactive installations from not only experienced installation builders, but also from experts in the area of psychological behaviour and human media interaction, interviews were conducted. The first interview was conducted on Edwin Dertien in which he helped improve the questionnaire. Below are the translated and summarised results of the interviews per question.

What is your favourite way to brainstorm? What works and what doesn't?
This can be done in many different ways which are very dependent per person. One likes to enter a brainstorm completely unprepared to be as open as possible while another likes to discuss his or her ideas before the brainstorm to get a concrete starting point for the brainstorm session in order to get the session going more easily. One person likes to be inspired by festivals and expositions and watching the news a lot while the other doesn't deem it necessary.

Most important is that during a brainstorm there should be no limitations. Everybody must feel free to saw whatever he wants which often leads to a more successful brainstorm. Surprisingly, no interviewee liked to use technology a lot because they considered it not to really be helpful, quite distracting and they said it influences the natural flow of things.

How do you proceed in the preparation stage?
If you make the installation yourself you try to make it into a story by using the right techniques and setting. If you get somebody else to make it for you it can be helpful to figure out some details like the general concept, themes, look & feel of the installation etc.

Do you test your installations? How do you evaluate these?
It can be handy to test mostly technical and functional elements of your installation. Theatrical effects can be hard to test as they often are expensive, but smaller tests can be useful to determine if the end product will be exciting enough. If you want to test it, it can help to do these tests as early as possible so you can incorporate the results into the final design. Sometimes an installation is actually meant to look like a prototype, this isn't always negative.

What do you want to achieve with interaction in your installations?
To generate questions and excitement. Seeing the beauty of what the artist experiences in the installation and transferring that to the audience. It doesn't always need to have a huge impact.

Do you usually work from intuition or from proven research and why?
Artists usually work from experience and intuition. It is good to also look at other installations and to not reinvent the wheel.

Have you ever seen people not understanding your installation? How come?
It can sometimes happen that the technology doesn't respond fast enough, people instantly want feedback. Sometimes people are condescending of your installation but you can't please everybody. It could also happen that your installation is not as intuitive as you previously thought. Some artists try to put up text next to their installations for explanation purposes or for extra information, these almost never work.

Are your installations usually aimed at a specific target-group?
This is very dependent on the location where an installation will be located. The challenge is to get a target-group as big as possible which fits inside the locations target-group.

Does everything always work like you expected? What are your experiences?
Though experience plays a big part, a lot of things can simply not be predicted. Things that you didn't expect always happen.

What has, in your experience, always worked to get people's attention and what isn't?
Stratification always works well so make sure the installation does things even when it isn't being interacted with. You should trigger people to mess with the installation, luring people into it subtlety. The installation should work very intuitively otherwise people get bored. Text never works but sex always does.

Do people usually stay interested after luring them in (regardless of content)? If not, what is necessary and what does/does not work?
Timing is key. People don't want to wait at all, they get bored very easily.

Have you ever persuaded people to act with an installation? How was this achieved?
Some installations require more guiding than others. You can actively ask people to do something in order to stimulate people to act out of curiosity.

Do you or somebody else evaluatie your installations?
Is can be helpful to not only evaluatie the technical side of your installation, but also the artistic side. If you want to give the creator of an installation tips you need to be very careful about what you say. An artist could easily feel offended. In bigger projects it is nice to evaluate the installation with several people that play a different part in its exhibition to see what can be improved.

What are common pitfalls for building interactive installations?
Lighting is very important; look carefully at where the installation will be deployed. Sometimes there is too much explanation needed for installations which is unwanted. The interaction with a installation can also be too complex or not layered enough.

Do you see any trends happenings in the world of interactive installations?
Be careful when using monitors, people are a bit tired of seeing these. It could be that people nowadays walk more for commuting purposes than simply for the joy of walking.

Requirements

Because the prototype will be tested outside of Concordia's exposition building in a busy street there are several (technical) limitations we need to address as well as some requirements for what it needs to do for us to test exactly what we want to know.

The installation needs to be able to withstand a little force as people could use it a way that they're not supposed to. It also needs to not rely too much on LED lighting as the brightness of the day (when the building is open) can interfere with the desired lighting effects.

As we've seen in a previous chapter, curiosity can be triggered in these ways: novelty, partial exposure, complexity, uncertainty, and conflict. In order for people to be curious at what the device does and therefore interacting with it, it needs to fulfil at least one but preferably more of these factors.

In order to not only track the attention of people but also to track how to direct those people inside of the building, part of the installation or another installation must be built that convinces people to go inside of the building once their attention is drawn.

Design and Implementation

As Ann Morrison says in her paper 'The Lens of Ludic Engagement': "However, there is no escaping the functional: and even art is framed and viewed through a functional lens." This chapter will discuss the ideation phase, specification phase and realisation phase, of which the last will show requirements for designing and building the testing installation.

Ideation

At the start of 100%FATs cooperation with Concordia, a brainstorm was held by 100%FAT. Its goal was to develop several concepts that will be presented to Concordia. These concepts are shown below.

Concept 1: Kinetic Facade Game

A gigantic mechanical installation on the facade of the building where children and adults are invited to play with using levers and buttons. Input for the game is provided by the players who activate the device by turning mechanical discs and levers to solve puzzles where the goal is for example to guide balls through a maze. Elements for this device could be:

- lifting metal balls up through the installation
- pneumatic valves controlled by a pump
- generating power by turning a disc to power motors
- a tube which goes through the inside of the building where the game continues

A corresponding mood-board can be seen in figure 7.

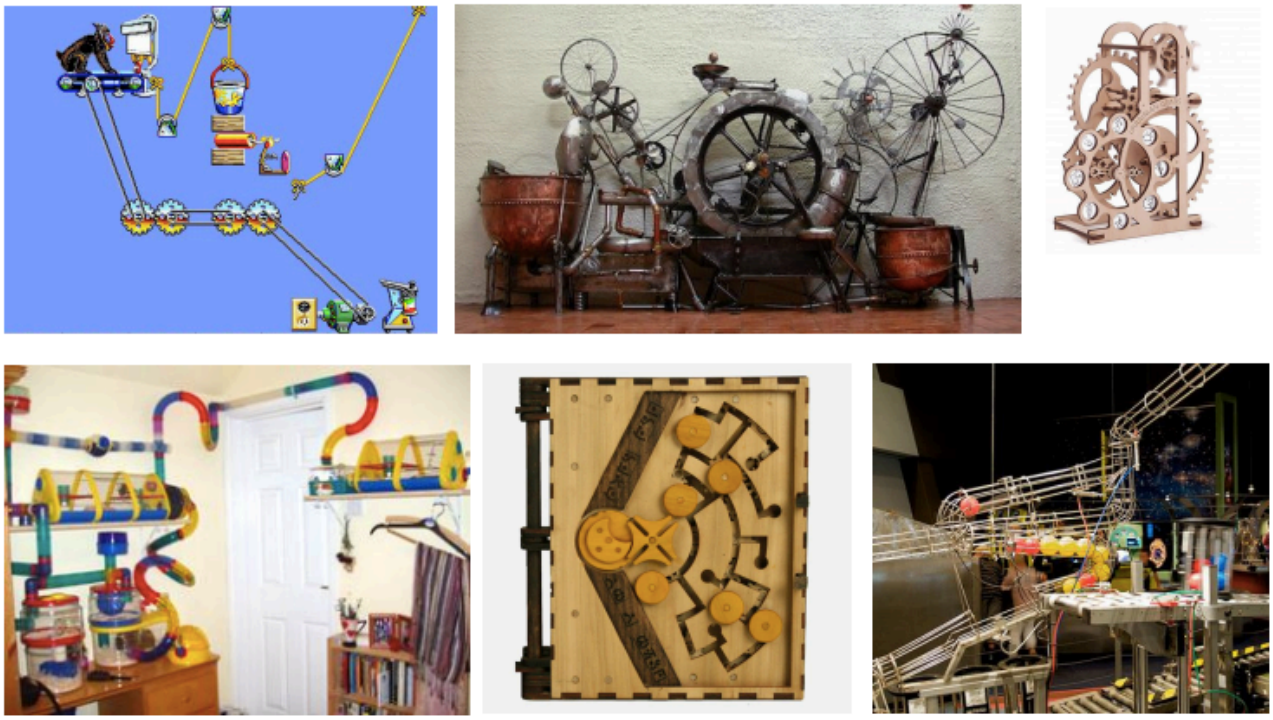


Figure 7: Mood-board Kinetic Facade Game

Concept 2: Interactive Approach
When approaching the building, several noticeable elements are implemented in the street that draw attention to the building where the frequency of these elements is at its peak. These elements could consist of glowing bricks, units that have reflecting mirrors in them or pressure-sensitive tiles that respond to people passing over them.

By letting the units communicate with each other, the units could behave as a swarm that can then be programmed to show entertaining patterns or games which can give people the feeling of a living identity that invites them to come in.

This concepts mood-board can be found in figure 8.

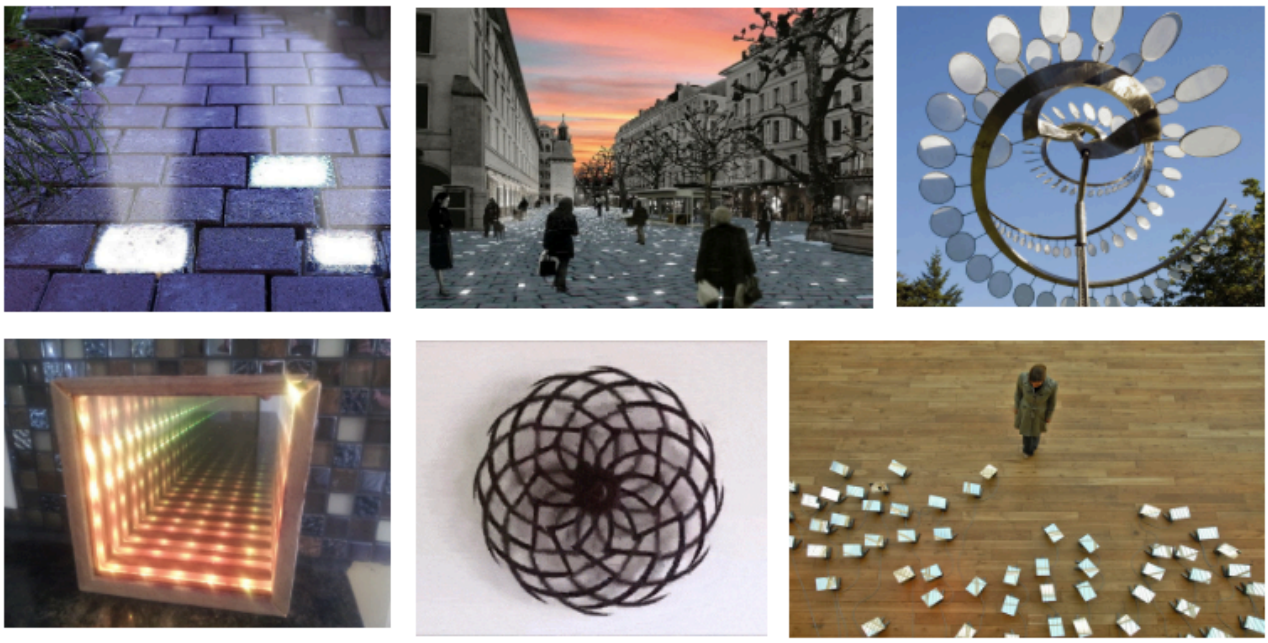


Figure 8: Mood-board Interactive Approach

Concept 3: Interactive Gateway
By substituting the front door with a crazy, artistic entrance which could be an experience on its own to pass through, you trigger the adventurous side of people in which they want to explore and see what's inside just by seeing the entrance. By using sensors and specific audio/visual elements you can create an experience in which the door opens in a creative way when you come close to the entrance, essentially forming around you dynamically. A mood-board can be found in figure 9.

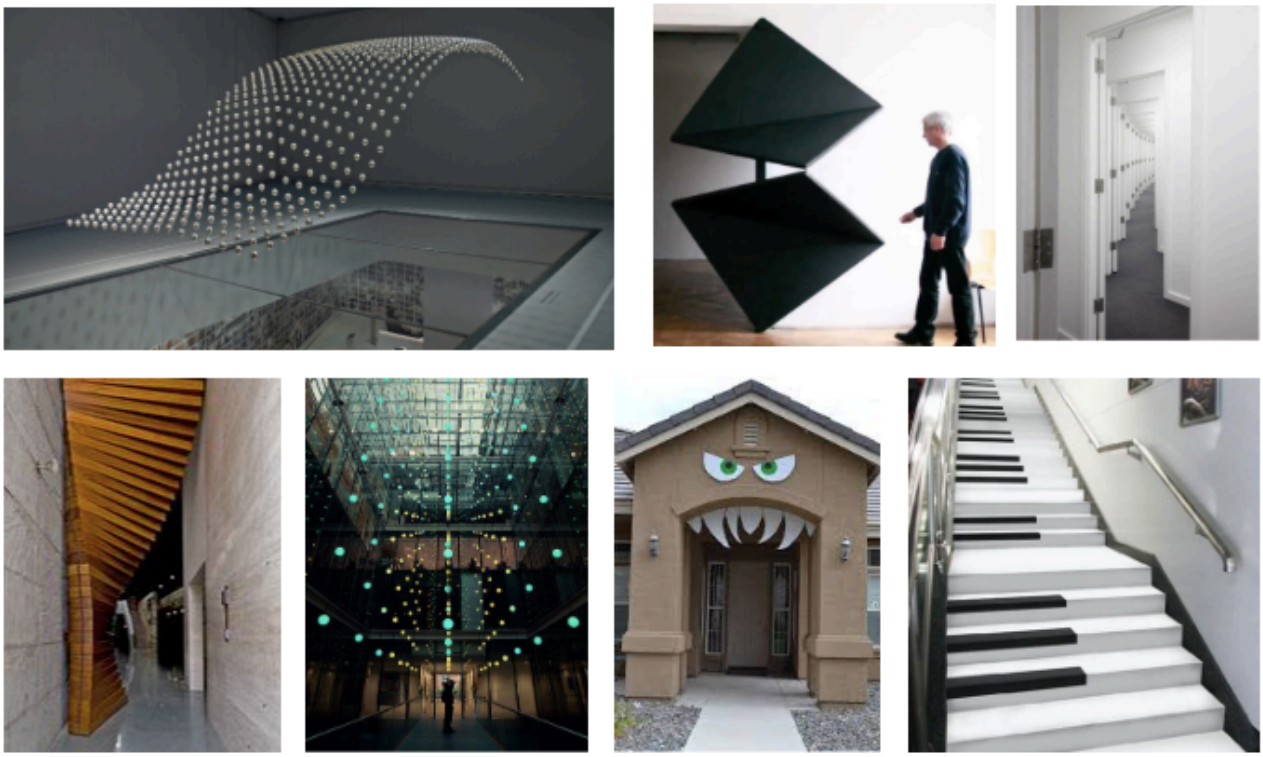


Figure 9: Mood-board Interactive Gateway

Variations:
- Glowing balls hanging from the doorframe that move away when you pass through.
- An interactive sliding door that folds open progressively when you come close (figure 10).
- Turn the door into a big monster that produces sound when you pass through it.

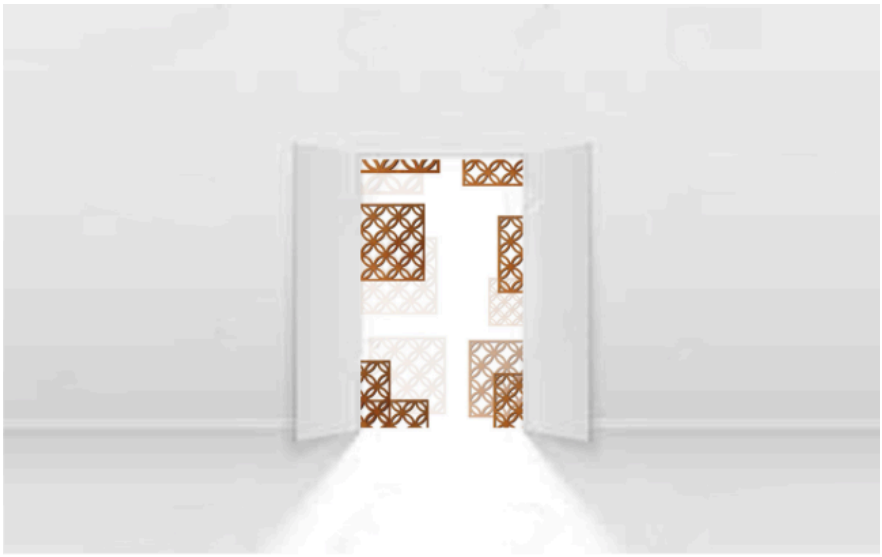


Figure 10: Example Interactive Gateway

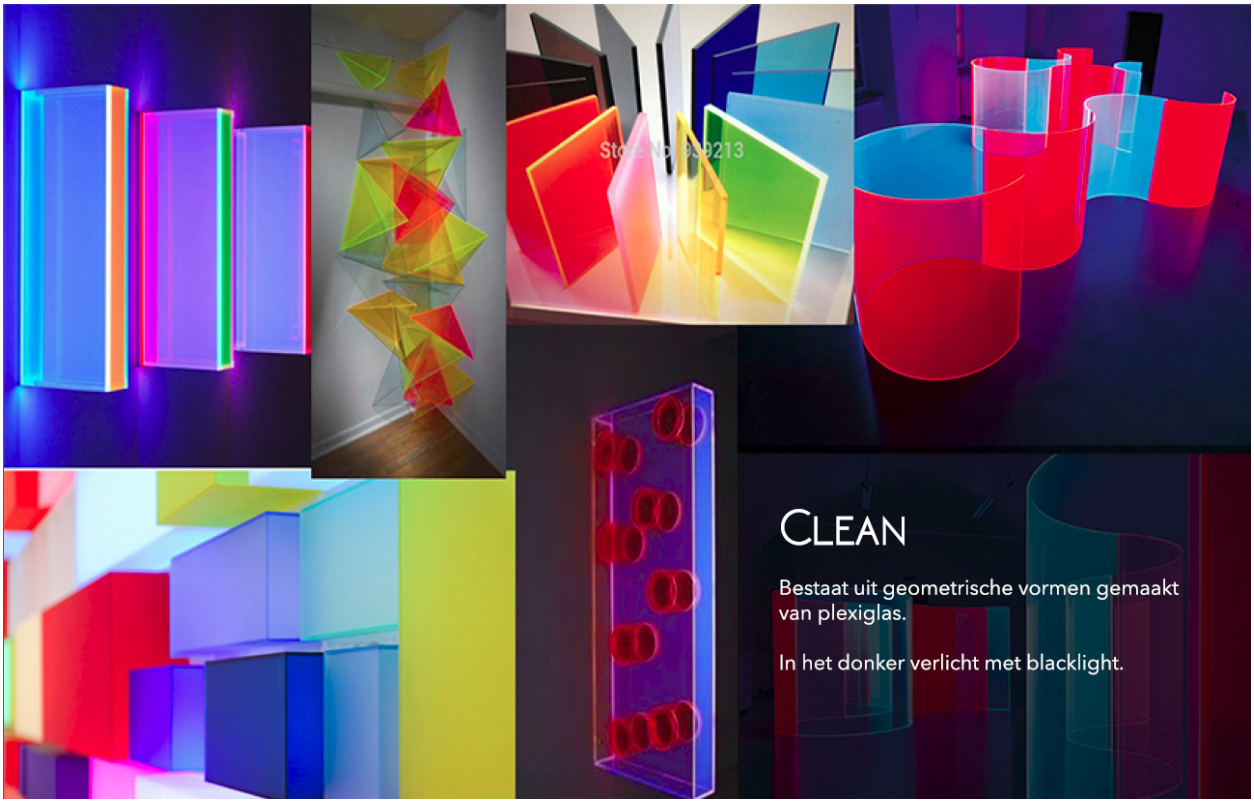
When these concepts were presented at Concordia, the Kinetic Facade Game was chosen to proceed with. After deciding on the functional side of the installation, several themes were considered for its look & feel. Of these themes, several are depicted below together with a persona that gives an example as to how people could experience these themes when implemented into the building's facade.

Steampunk

Steampunk is centred around the theme that the invention of electricity never happened. Gears, steam, windmills and oil represent important parts of this world.

Sophie studies history at the local college and is always fascinated by retro devices and old school installations. As she walks through the city of Enschede on her way to class, she notices from a distance several big gears turning at the facade of a building. She knows she has other places to go but can't help herself wanting to go there and explore some more. As she arrives at Concordia's building, she is very intrigued as to what is happening in front of her as she notices a small object that she previously researched in school. Looking for confirmation and further information, she walks inside the building to ask the employees about the project. They tell her there are several artefacts hidden in the installation that represent important parts of the history of Enschede. She spends the next hour looking to find all of them.

Clean



This theme consists of simple geometric shapes, forms and surfaces. It's as minimalistic and clean as possible.

Jim is an industrial designer and walks through the city centre almost every day going to work. He is especially interested in the architecture and design choices of newer buildings. After seeing a construction site around Concordia's public art display, each day wondering what will be placed there, he suddenly sees these big simple panels lit up from below. As bizarre as they look, especially in contrast to the environment, Jim takes several pictures and proudly shows them off to friends and coworkers as Enschede apparently isn't as simple as it sometimes may seem.

Toys

This theme is based on existing modular toys such as LEGO, K'nexx, Duplo, Domino and marble tracks.

Jitske is a 10 year old girl. She likes playing with her toys and mac n' cheese. She lives with her parents in Enschede and goes to school all by herself. She is not afraid of anything and is attracted to colourful things.

Jitske is shopping with her mother in the city center. As they pass Concordia's public art gallery Jitske stops to look at the new contraption on the front wall. The contraption got her interest because it had nice bright colours and it looked like a marble coaster she has at home. She spots a lever with a sign next to it which says: "pull me". She does not hesitate and walks to the lever to pull it. A Ferris wheel starts to turn and a ball drops out. The ball drops in a tube and makes a looping. After that it gets stuck. A tile in the sidewalk starts to blink and making noise. It looks like a button, so she steps on it. The ball gets released and goes through a few other elements based on LEGO. K'NEX and Duplo to finally disappear through the main entrance. She pulls her mother's hand and together they enter the building to look for the ball.

Again, these were presented at Concordia and Steampunk was chosen to be their favourite. Besides this theme, another idea popped up in the conversation about putting hints from famous people from Twente inside the installation. These hints could be picked up by people looking at the installation which may trigger them to keep looking for other hints. Now that ideas for the final installation were in place, a plan was needed to test specific features and themes to see how people will react to this.

After a brainstorm session and several discussions, two plans were made. The first contained a joke generator that would play jokes by a famous comedian from Twente, Herman Finkers, when a lever is pulled in order to attract the attention of people walking by. The second plan involved a system which goal is to 'lure' people inside of the building using sound and maybe LEDs.

The plans were combined in a way that the outside joke generator gets people's attention after which a voice near the entrance lured people inside saying that the game is ended by pressing a button on the counter after which they will receive a reward. A sketch of this situation can be found in figure 11.

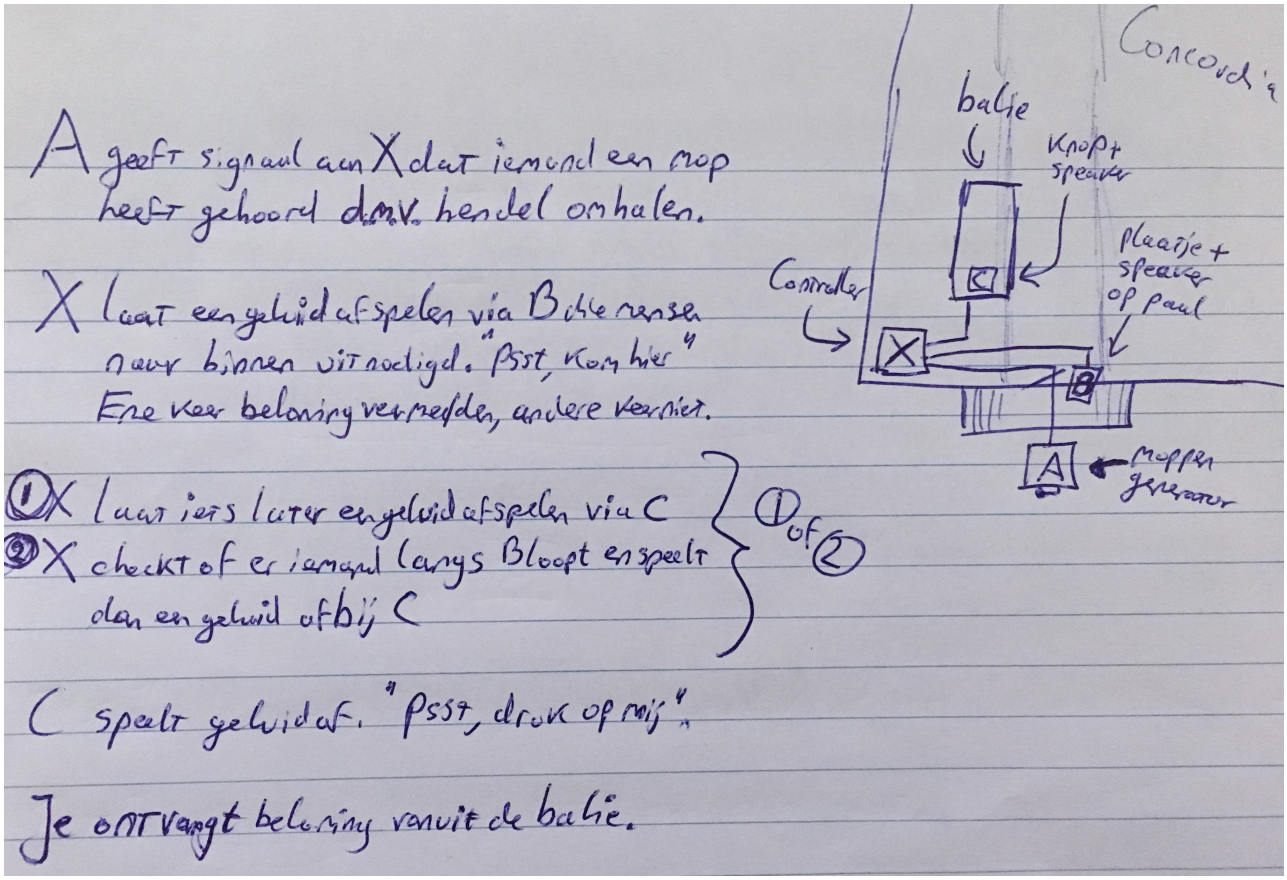


Figure 11: Sketch of the Prototype Ideas

Specification

While thinking about what was needed for the testing devices and how to build them, plans evolved. The joke generator would still generate jokes and the speaker at the entrance would still try to get people inside, but there wouldn't be a device anymore on the counter as it seemed unnecessary.
Next to the speaker at the entrance, something else to grab people's attention was needed. This was chosen to be an arrow with digital LED strips, programmed to display several attention grabbing patterns.

Device 1: The Joke Generator

This devices task is to draw people's attention and get them to stop walking (and, if possible, biking) and interact with the installation. After brainstorms and meetings it was designed as follows:
The device will feature a lever, which when pulled will turn 3 fruit machine-like rolls. The images of the rolls that ends up in front will be the subject of three jokes that will be played while an image of the famous Dutch comedian Herman Finkers will show up on the device using physical gears.

The device will be made out of wood and needs to be big enough for it to be clearly visible on the street. LED strips, signs and extra details will be added for visibility. Knowledge obtained from the conducted interviews describe a pro-active behaviour in order to be more noticeable which will be implemented in the form of a specific mode that will also trigger people when the device is not interacted with.

Device 2: The LED Arrow

The second device, necessary for drawing people's attention towards the door when the first device has told the jokes, will feature an arrow with LED strips all around the outside that light up brightly. In figure 12 a sketch of this device can be found.

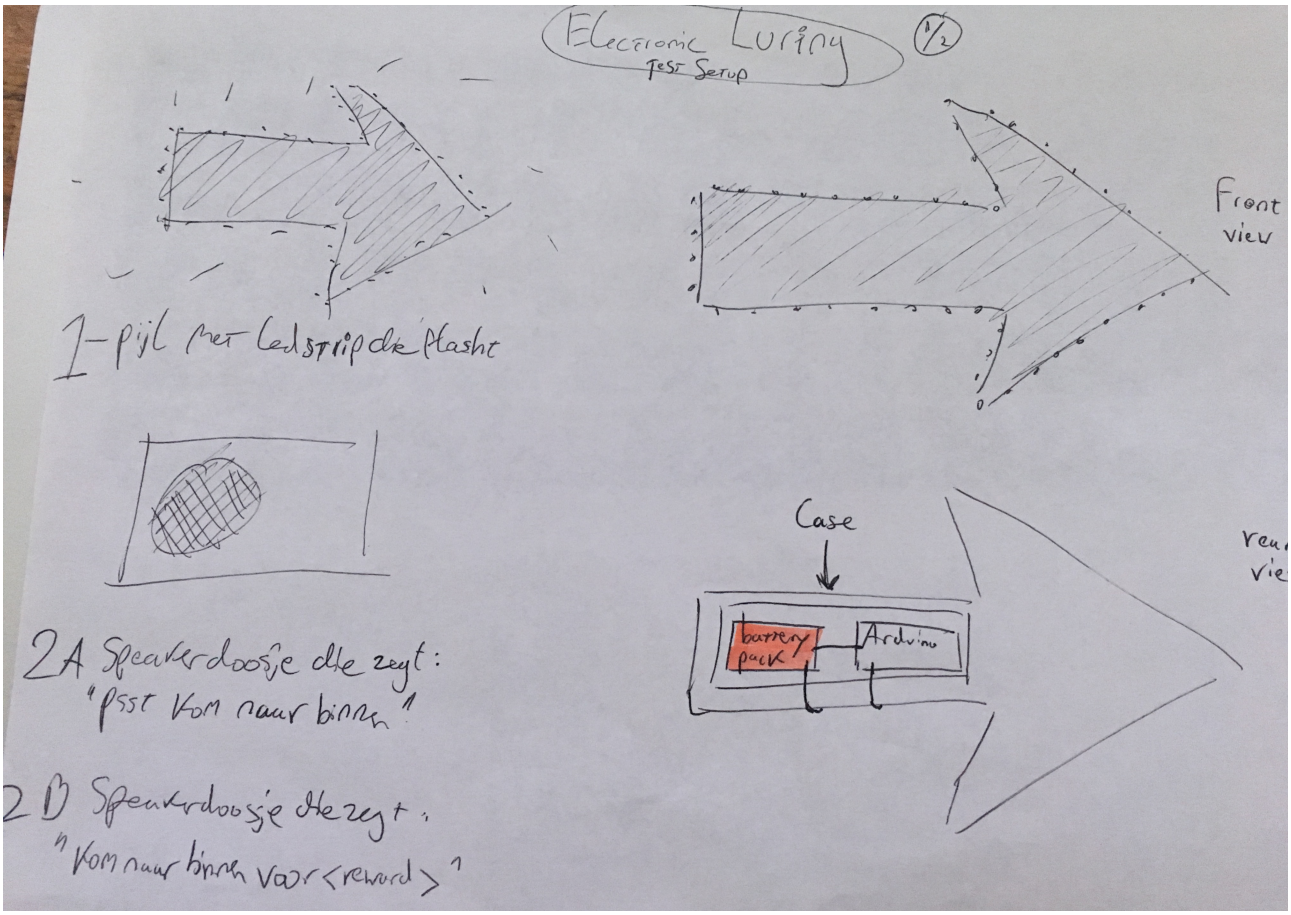


Figure 12: A Sketch of the LED Arrow

The arrow will be made out of wood and the LED strips will be digital[3] to have more animation options. The back of the arrow will contain a case in which the Arduino and other electronics can be placed. A battery pack might be added but won't be necessary.

Device 3: The Speaker Box
The third device will feature a box with an Arduino, speaker and RF (Radio Frequency) receiver. It might also include a PIR (Passive Infrared) sensor to let the device work on its own although this could not be necessary. In figure 13 a sketch of this device can be found.

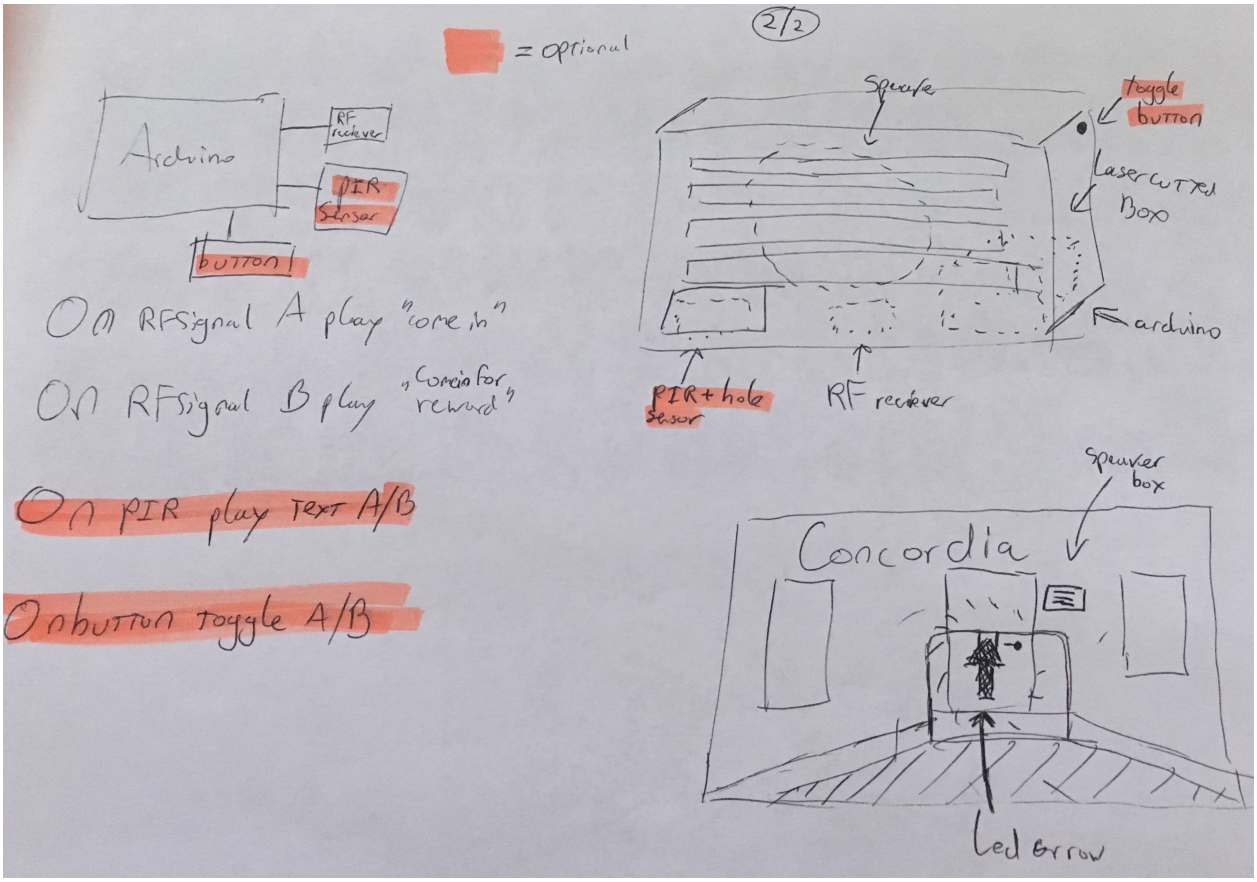


Figure 13: The Speaker Box Sketch

The box will be made out of wood and it will be just big enough to fit a speaker and the electronics inside. It can then be remotely triggered by an RF signal which will tell an Arduino with MP3 shield to play a sound from the speaker that will invite people inside of the building.

Coming back to the theory on curiosity described earlier in this report, several principles of curiosity will be triggered using these three devices. Because several devices that light up and make sound will be placed on a public street, a sense of novelty will be triggered as it draws attention from passersby. The devices will not trigger all their functionality at once, though some of these untriggered elements can be seen visibly to give a sense of partial exposure and uncertainty.

[3] In digital LED strips, each pixel or each group of pixels can be controlled separately. In an analog LED strip, the entire strip has the same colour.

Realisation

While the concepts of the three testing devices is explained above, this chapter will describe the realisation of these concepts into real prototypes that are to be placed on a public street in front of Concordia and used for testing purposes.

Device 1: The Joke Generator

This device is built using wood which was cut into specific dimensions which eventually produced a machine spanning 60 centimeters in width and depth while reaching a height of 2 meters. Big gears were laser-cut that use rotation to display an image of Herman Finkers to the audience while lightweight styrofoam rolls with images glued onto them will be used to spin the rolls to their randomised place as quickly as possible. As described earlier, the bachelor report of *Max Bode* (2017) focusses purely on this installation as a testing setup in which more information can be found on this device.

Device 2: The LED Arrow

First, an arrow was drawn on a piece of wood that was then cut out and sanded thoroughly. The arrow was painted bright yellow and then coated with a clear oil-based spray. A waterproof digital LED strip was then glued on the sides and held in place using elastic bands and clamps. Because the strip was a bit short for the entire arrow, a second strip was cut and glued after the first strip. Both strips were soldered together and three wires were soldered to the start of the strip. The electronics so far were waterproofed with heat-shrink tubing and hot-glue.

An Arduino was used to control the strip and software was written that would display several different lighting effects in order to grab people's attention as much as possible. It included a library from Adafruit and separate functionality made specifically for this arrow. The code can be found in the appendix of this report. A case originally meant for a Raspberry Pi was glued on the backside of the arrow in which the Arduino Uno fit snugly and waterproofed it as much as possible.

Finally, a 433 MHz power socket was used in combination with its remote to turn the arrow off and on remotely when people would stand near device 1. The battery pack option turned out not to be necessary as the device would be near a power source at all times during testing. A picture of the completed arrow can be seen in figure 14.

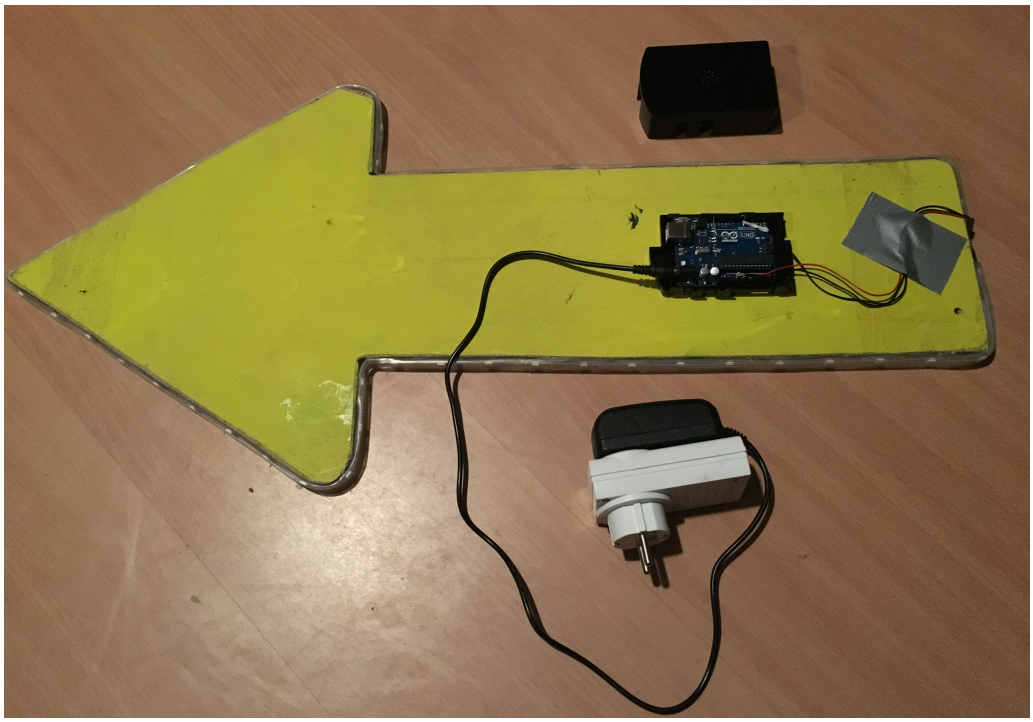


Figure 14: The Completed LED Arrow

Device 3: The Speaker Box
A box-designer[4] for laser-cut shapes was used to cut the 6 sides of a box out of wood that would hold the speaker and electronics in place. Speaker holes were drilled and then cut out using a saw to allow sound to pass through more easily and the left- and right side of the box were adjusted to fit the speaker inside. All sides of the box were then painted bright yellow and coated with a clear oil-based spray.

The plan originally included an Arduino with an MP3 shield that would play a voice message when the Arduino received an RF signal from its remote. Because the MP3 shield didn't work properly, a different solution was needed. People at 100%FAT suggested using their custom Raspberry Pi-based media player (the FAT Player) which could play media when one of the Pi's GPIO (general purpose input/output) pins was fed power. This option would require communication between an Arduino (with its 5 volt RF receiver) and a Raspberry Pi which meant converting between an Arduino operating at 5 volts and the Raspberry Pi's normal GPIO pins operating at 3.3 volts.

A voltage divider was then used as this could lower the Arduino's 5 volt signal to a 3.3 volt signal that the Raspberry Pi's GPIO input pins can handle. Some examples of a voltage divider schematic can be seen in figure 15.

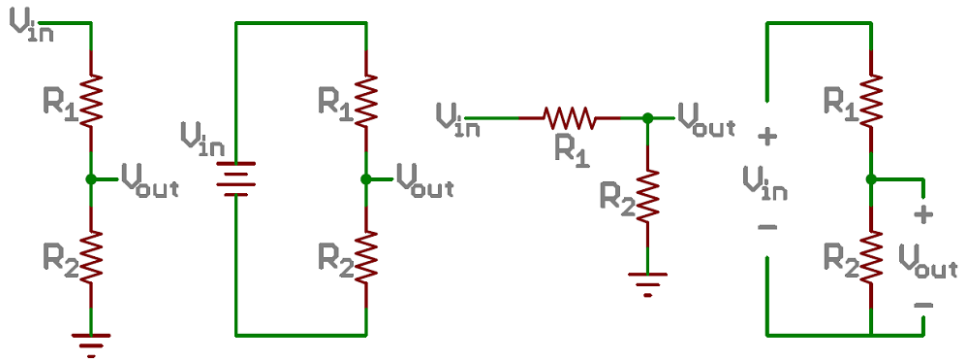


Figure 15: Examples of voltage divider schematics
Image from SparkFun[5]

The proportion of the resistance between the two resistors used in voltage dividers change how much the input signal is lowered. The equation for voltage dividers (figure 16) states that the output voltage is directly proportional to the input voltage and the ratio of R1 and R2.

$$V_{out} = V_{in} \cdot \frac{R_2}{R_1 + R_2}$$

Figure 16: The Voltage Divider Equation
Image from SparkFun

[4] http://www.makercase.com/

[5] https://learn.sparkfun.com/tutorials/voltage-dividers

This means that to convert a 5 volt signal into a 3.3 volt signal, resistor 2 should have double the resistance of resistor 1.

The Arduino was programmed to detect RF signals using a RF receiver that was taken out of a 433MHz socket and send out a 5 volt signal (the Arduino code can be found in the appendix). This 5 volt signal was converted to a 3.3 volt signal using the voltage divider while using a 100 Ω resistor as R1 and 200 Ω resistor as R2. The output of this voltage divider was then connected to one of the Raspberry Pi's GPIO pins.

A voice was then recorded saying '*Psst. Please come inside*' and the file was converted to a video file as the FAT Player can only play videos. The FAT Player software was formatted onto an SD card that the Raspberry Pi could read and configured so that it would play the recording when a specific GPIO pin received an ON signal (3.3 volts). The speaker was connected to the Raspberry Pi and the Pi's audio was routed through the 3.5mm jack port instead of the HDMI output. An image of this completed setup can be found in figure 17. It was decided not to include the PIR sensor as this testing setup did not need to work stand-alone.

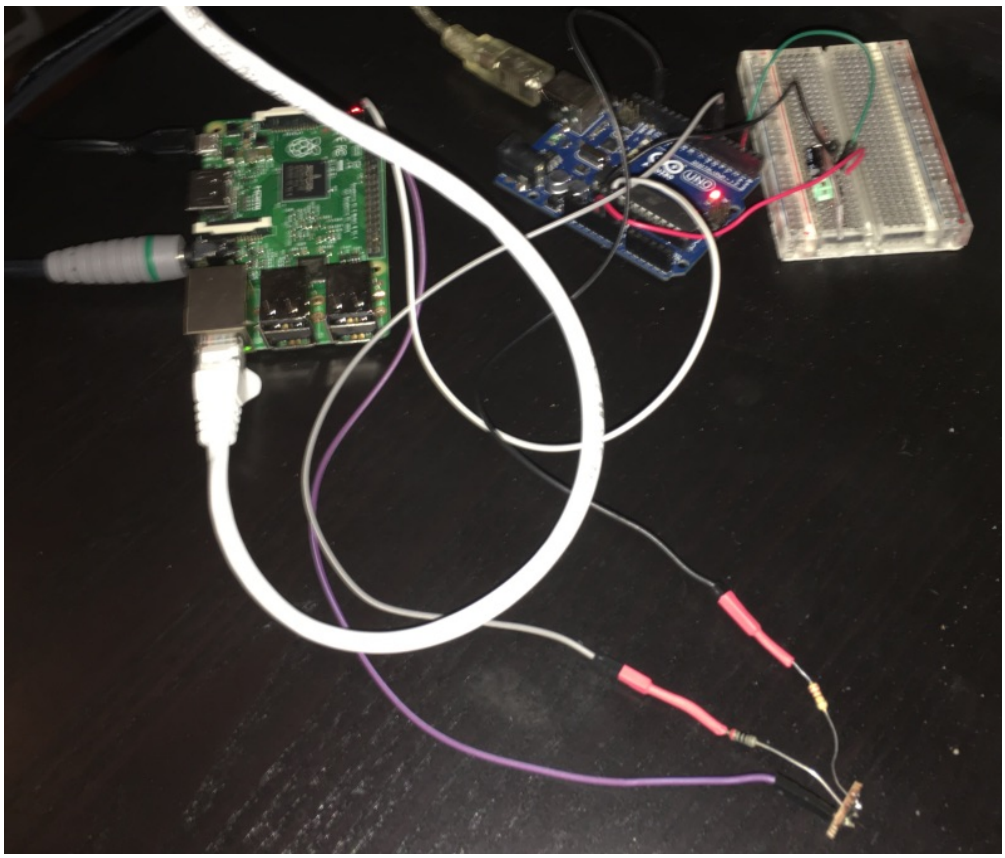


Figure 17: The Arduino and Raspberry Pi Setup.

The laser-cut box was then assembled and adjusted so the speaker would fit in the front and the electronics in the back. Two plastic parts (which originally held the LED strips) were then glued to the front of the box to make it look like a vintage movie projector. The inside view of the electronics fitting inside and the completed device can be seen in figure 18 and 19 respectively.

Figure 18: The Electronics Inside Testing Device 3.

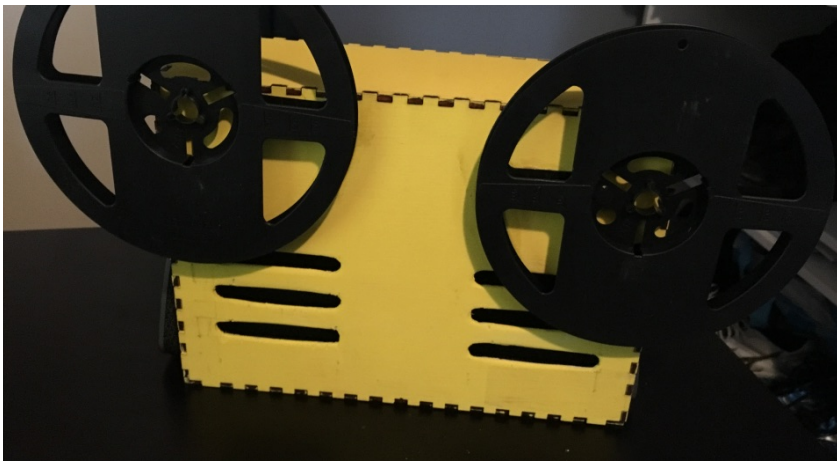


Figure 19: The Completed and Assembled Testing Device 3.

Evaluation

This chapter describes the testing phase of the project. It will explain how and why the testing was done, what the results were and what conclusions can be drawn from these tests.

Testing

After assembling the testing devices and transporting them to Concordia, testing could commence. The idea of the testing phase was to see how many people would respond to the devices placed on the public street in front of Concordia and to see if people could be 'lured' inside of the building.

The first test was to see how people would respond to only the first device (which was meant purely for attracting people's attention). The device was placed in front of the building and was left alone for people passing by to interact with. From inside of the building, a few meters away from the window, details on how many people interacted with the device and in what way were written down. The way people interacted with the device was split into three categories:

- Passing by without looking at the device
- Looking at the device
- Interacting with the device

In these last two categories, the approximate age was written down as well.

Right after testing began, it was noted that when one person interacted with the device and thus activating it, people walking by suddenly became more interested. This was quickly turned into a small adjustment in which the second category, looking at the device, was split into two sections in which one was now meant for people looking interested at the device on their own and the other was meant for people who are looking interested at the device because somebody else already activated it.

Next to the data about people walking past the device, other data about people biking or driving past the device was also noted as part of a grounded theory approach[6].

Figure 20: The Complete Testing Installation

[6] Grounded theory (GT) is a systematic methodology in the social sciences involving the construction of theory through the analysis of data.

After this first test, a second test included testing device 2 and 3, which were meant for 'luring' people inside, was executed. When people came close to the entrance or were done interacting with the first device, the arrow showed several different lighting patterns and the speaker played the voice message that invited the person inside. This interaction was written down as well. A picture of the complete installation can be seen in figure 20.

Counting will be done on three consecutive days, starting at Tuesday the 17th of January till Thursday the 19th of January. The goal was to count until a big enough sample size would be reached that will confidently represent the response of passersby within a small margin of error. For this purpose a sample size calculator was used(reference https://www.surveymonkey.com/mp/sample-size-calculator/).

In figure 21, a table showing the number of passersby at several locations in Enschede on a Saturday (reference: counting was done on Saturday April 9th 2016 between 10:00 and 17:00) can be found. The address next to Concordia is marked in the table. In the same report can be read that Saturday is the busiest day of the week so for the testing days, a maximum of 17400 people will pass by each day between the hours of 10:00 and 17:00. For a population size that should be entered in the sample size calculator described above, 17400 should therefore be more than enough. Using a confidence level of 95% and a margin of error of 5%, these values yield a sample size of 376 which meant that for each testing day, for both the passive and proactive mode, at least 376 people should be counted in total passing by, looking at the device or interacting with the device for the data to be accurate with a 95% confidence level and a 5% margin of error.

Bijlage 1: Aantal passanten per telpunt 2013 tot en met 2016

Telpunt	Adres	2013	2014	2015	2016
12	Oude Markt 17	8.600	7.100	3.300	11.900
13	Oude Markt 28	400	900	1.100	1.300
14	Langestraat 54	8.900	8.700	11.100	17.400
15	Langestraat 19A	11.000	10.900	8.900	13.800
43	HJ van Heekplein 86	23.200	18.400	21.600	27.300

Figure 21: Passersby Count of Several Locations in Enschede.

Results

In this chapter, several charts will be shown and discussed that were created using the obtained testing data. The raw counting data can be found in the appendix. In this chapter, 'this device' equals testing device 1, the reason shall be explained later in this report.

Figure 22 shows a total of how many people walked pass the device, how many people looked at the device and how many people interacted with the device as well as the total amount of passers-by counted for each testing day. In this graph can be seen that the sample size goal was reached almost every testing day.

Total People per Day

Date	Walking Past	Looking Interested	Interacting	Total
Tuesday 17/01	733	223	16	972
Wednesday 18/01	605	160	17	782
Thursday 19/01	665	217	24	906

Figure 22: The Total Amount of People Counted per Testing Day

Figure 23 displays several charts that show what percentage of people fell into which interaction category (walking past vs looking interested and interacting), sorted per day and per mode (passive vs proactive).

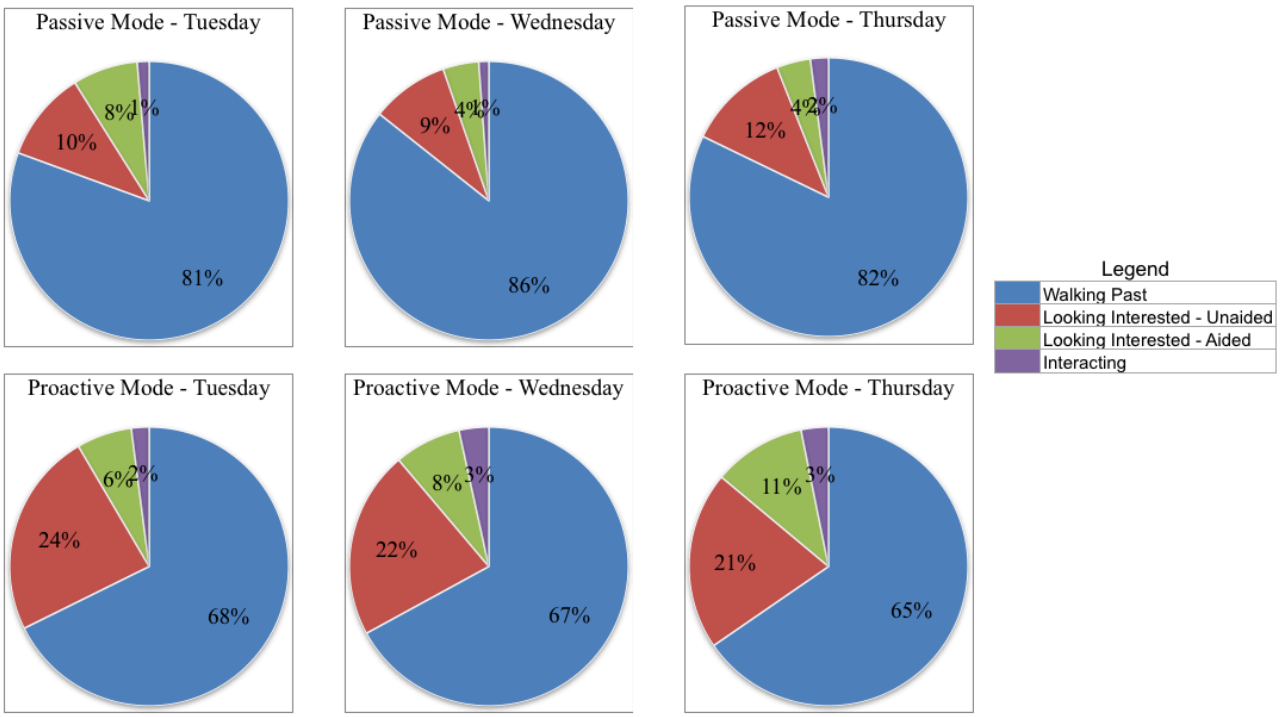


Figure 23: The Percentage of Counted People per Category.

In this last figure can be seen that each testing day approximately yields the same data, while the different modes clearly yield different data.

To more clearly see this difference, figure 24 combines the different testing days but separates the active and proactive mode in a table.

Days Combined

	Duration	Walking Past	Looking Interested Unaided	Looking Interested Aided	Interacting
Passive Mode	3:30:00	1195	151	79	22
Proactive Mode	3:05:00	808	267	103	35

Figure 24: The Combined Testing Days by Category

As can be seen in the figure above, the total testing time for the passive mode does not equal the total testing time for the proactive mode. To be able to compare their results requires normalisation by the duration time. The number of people counted in the proactive mode were therefore scaled up by the same proportion as their different durations. This can be seen in figure 25.

Days Combined - Normalised for Test Duration

	Walking Past	Looking Interested Unaided	Looking Interested Aided	Interacting
Passive Mode	1195	151	79	22
Proactive Mode	917	303	117	40

Figure 25: The Combined Testing Days by Category Normalised on Test Duration

Two pie charts of this table can be found in figure 26.

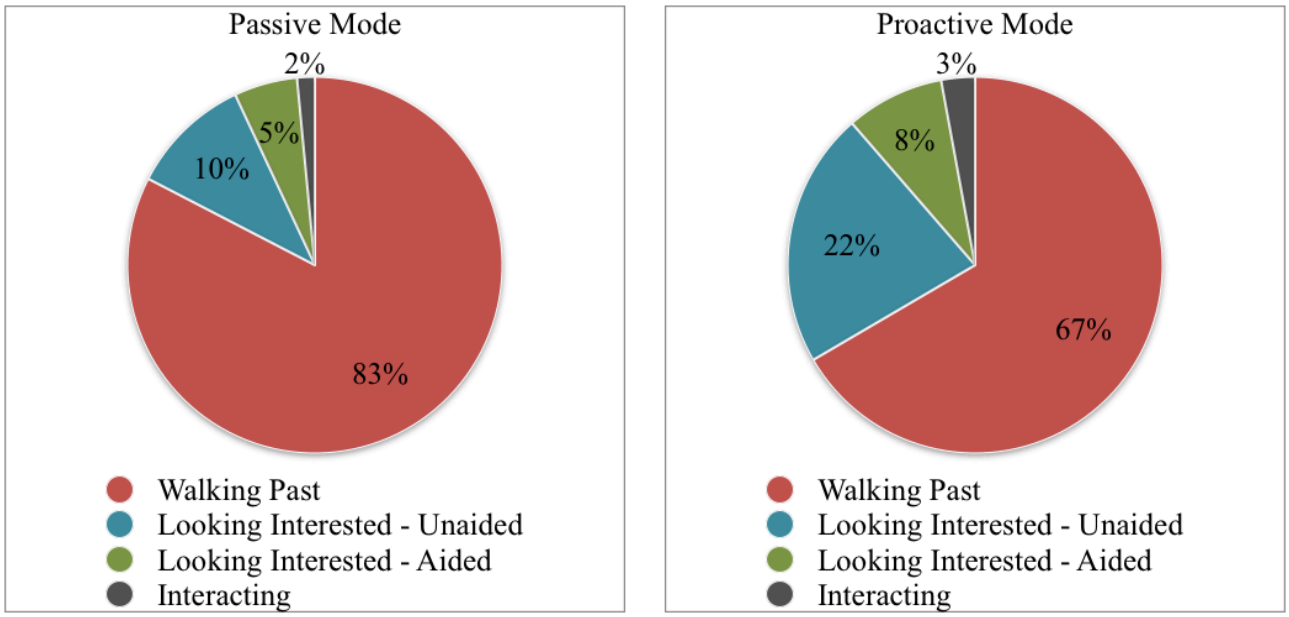


Figure 26: Passive Mode vs Proactive Mode

In figure 26 we can clearly see that the proactive mode has a big influence on the people walking past the installation.

Unfortunately, very few people actually entered the building during the tests and so not much quantitative data was gathered from the use of testing devices 2 and 3. It was noted, however, that they did grab the attention of people walking by as multiple people stared at these devices on different occasions.

Conclusions

The goal of this report was to answer the following research question:

1. How can an interactive installation help with attracting people into Concordia's public art display?

This was done by splitting it into three sub-questions. Using data obtained from the user tests and from the conducted interviews and combining these with the literature research, several conclusions can be drawn and these sub-questions can be answered.

1a. What attracts people's attention on the streets?

It is not easy to draw people's attention, especially in a public street where lots of people walk towards a specific destination instead of strolling around. Use as much principles of curiosity as you can (novelty, partial exposure, complexity, uncertainty, and conflict) and make the installation as big as possible. Even a device that was 2 meters tall, made from wood and with LED lighting on it was simply missed a significant number of times.

Using a proactive mode drastically increases the percentage of people looking interested at and interacting with the device when compared to a passive mode. In the user tests described in this report, these percentages doubled when the device played sounds and showed several lighting patterns instead of only showing a single colour light and no sound.

1b. How can we direct people into entering Concordia's public art display?

It is hard to grab people's attention and even harder to make them do what you want. In the user tests, testing devices 2 and 3 seemed to have no impact on the amount of people entering the building. They were not enough to convince people to go inside.

You can ask people to do something (either by a human or a recorded message) which can stimulate people to do what you ask out of curiosity about what will happen.

1c. How can we implement this into an interactive installation mounted on the facade?

When using a starting mechanism for an installation, make it very hard to overlook and very easy to understand. An installation can be way less intuitive than the creator may think.

Don't use too much text in interactive installations and don't make it too complex; the installation should be self-explanatory.

Discussion

This chapter discusses some lessons learned and observations that were made.

As stated previously in this report, during the testing it became clear that people are much more likely to stop and look at an installation when somebody else is interacting with it. This could be because the installation was already found interesting by another person which could influence others to do the same. It could also be because when people stand in front of the device, their bodies block off part of the street which could be more noticeable for passersby.

On day two in the proactive test, only 349 people were counted of the sample size goal of 376 because Concordia closed. Because this number was still very close to the goal, because the total of that day was well above the sample size goal and also because the different test durations were later corrected, this did not have much impact on the test results.

During testing, some people did not see the lever of device 1 that had to be pulled and tried changing other parts of the device which were not meant to be changed. On the second day of testing, signs were put up on the device pointing towards the lever side and a sign which said 'pull me' with an arrow pointing down was put above the lever. This resulted in some people pulling the sign instead of the lever and so for the third testing day it was replaced by two other signs saying 'pull the lever'. Plexiglass was also put in front of part of the device to stop people from touching it.

Other data that was obtained during the testing phase did not produce interesting results concerning the research so it was not further used. It was however noticeable that 31%[7] of the total people traveling past Concordia's building were cycling. This was more than expected and could be taken into account when building the final installation on Concordia's facade.

While testing, data was collected from a location inside of Concordia's building, a few meters away from the window. Some people saw this happening and adjusted their behaviour because of this (i.e. waving, laughing, walking away or towards the device) although this only happened after they had already seen the testing device and therefore did not significantly alter the results. On day three of testing it was decided to try different places for writing down the data. First through a window on the first floor of Concordia's building and then sitting on a terrace next door.

The location of the device could also influence people in a sense that people might be afraid to interact with the device as other people can see them interacting with it. Because the final installation on the building's facade will also be in public, this influence was decided not to be tested as it was outside the scope of this research.

Conducting the interviews yielded a lot of information, not all of which was used in this report but most of which could be useful for other people building interactive installations. This information might therefore be written down in an additional article stating tips for building interactive installations.

[7] The raw testing data can be found in the appendix. Formula used:
(236+240+189+184+200)/(837+653+645+549+655) = 0,314… ≈ 31%

Recommendations

This chapter describes recommendations for 100%FAT to keep in mind while building the installation on Concordia's facade but could also be used in other applications.

Use novelty, partial exposure, complexity, uncertainty, and conflict to attract as much attention as possible to the device and make it as big and bright as possible. Trigger as much senses as you can by using lighting, audio, touchable surfaces and possibly even smell.

Have these elements not only trigger when people are already interacting with the installation, but also proactively to drastically increase the amount of people looking at or interacting with the installation. Use a layered approach in which interacting with the installation triggers a different set of responses from the installation than the proactive mode and make sure people also get instant feedback when they trigger any single element of the device.

It could be helpful to either force people inside by having one or several elements of the installation continue inside the building or specifically ask people to enter the building, possibly with a promise of giving them a reward for their efforts and keeping this promise.

When using a starting mechanism for an installation it is recommended to make it **very hard** to overlook and **very easy** to understand. An installation can be way less intuitive than the creator may think. Don't use explanation texts and do not make the installation too hard to understand. It is recommended for the installation to be self-explanatory.

The final installation is recommended to show quick and simple interactions between its parts otherwise people could either get bored or not understand what is going on.

It is recommended to do more tests of which one could indicate if forcing people inside the building works. Another recommended test is about seeing if people are more willingly to come inside the building if they are promised (and given) a reward.

Acknowledgement

I would like to thank my supervisor, Edwin Dertien, for helping me throughout this project and sharing his knowledge with me. His enthusiasm and all-round capabilities are and have been of great inspiration to me. I want to thank Richard Bults for helping me find a great graduation project and getting me in contact with 100%FAT.

My thanks also goes towards the great people of 100%FAT, especially Floris Schreuder and Lieven Maes who helped me a lot, not only through their huge amount of knowledge but also for the great work environment and inspirational words, all of which I greatly enjoyed. Thanks towards the people that I interviewed and who shared their valuable knowledge with me: Edwin Dertien & Dennis Reidsma (University of Twente), Kees de Groot (Gogbot director), Elles van Vegchel (NEMO) and Karen Drost (Nederlands Instituut voor Beeld en Geluid).

Finally I would like to thank my friends and family for their continues support throughout this project.

References

[1] Mader, A. H., & Eggink, W. (2014). A design process for creative technology. The Design Society.

[2] Tieben, R., Bekker, T., & Schouten, B. (2011, July). Curiosity and interaction: making people curious through interactive systems. In Proceedings of the 25th BCS Conference on Human-Computer Interaction (pp. 361-370). British Computer Society.

[3] Jacucci, G., Wagner, M., Wagner, I., Giaccardi, E., Annunziato, M., Breyer, N., ... & Roussel, N. (2010, October). ParticipArt: exploring participation in interactive art installations. In Mixed and Augmented Reality-Arts, Media, and Humanities (ISMAR-AMH), 2010 IEEE International Symposium On (pp. 3-10). IEEE.

[4] Morrison, A. J., Mitchell, P., & Brereton, M. (2007, September). The lens of ludic engagement: evaluating participation in interactive art installations. In Proceedings of the 15th ACM international conference on Multimedia (pp. 509-512). ACM.

[5] Harter, S. (1981). A new self-report scale of intrinsic versus extrinsic orientation in the classroom: Motivational and informational components. *Developmental psychology*, *17*(3), 300.

[6] Ajzen, Icek. "From intentions to actions: A theory of planned behavior." Action control. Springer Berlin Heidelberg, 1985. 11-39.

Appendices

Appendix 1 - The LED Arrow Arduino Sketch

```
// LED Strip Arrow sketch
// using Adafruit's Neopixel Library
// by Jelle Wolbers

#include <Adafruit_NeoPixel.h>

#define PIN      6
#define N_LEDS 53

Adafruit_NeoPixel strip = Adafruit_NeoPixel(N_LEDS, PIN, NEO_GRB + NEO_KHZ800);

void setup() {
  strip.begin();
  strip.setBrightness(80); //0 - 255 (120 was too bright for a 9V 3A adaptor but
okay for pc, 80 seems to work fine)
  strip.show(); // Initialize all pixels to 'off'
}

void loop() {
  arrowPointer(strip.Color(255, 0, 0), 50); // Red arrow, 50ms delay
  arrowPointer(strip.Color(0, 255, 0), 50);
  arrowPointer(strip.Color(0, 0, 255), 50);
  colorWipe(strip.Color(255, 0, 0), 50);
  colorWipe(strip.Color(0, 255, 0), 50);
  colorWipe(strip.Color(0, 0, 255), 50);
  theaterChase(strip.Color(127, 0, 0), 50);
  theaterChase(strip.Color(0, 127, 0), 50);
  theaterChase(strip.Color(0, 0, 127), 50);
  rainbowCycle(20);
}

// Fill the dots one after the other with a color
void colorWipe(uint32_t c, uint8_t wait) {
  for(uint16_t i=0; i<strip.numPixels(); i++) {
      strip.setPixelColor(i, c);
      strip.show();
      delay(wait);
  }
}

void rainbow(uint8_t wait) {
  uint16_t i, j;

  for(j=0; j<256; j++) {
    for(i=0; i<strip.numPixels(); i++) {
      strip.setPixelColor(i, Wheel((i+j) & 255));
    }
    strip.show();
    delay(wait);
  }
}

// Slightly different, this makes the rainbow equally distributed throughout
void rainbowCycle(uint8_t wait) {
  uint16_t i, j;

  for(j=0; j<256*5; j++) { // 5 cycles of all colors on wheel
    for(i=0; i< strip.numPixels(); i++) {
      strip.setPixelColor(i, Wheel(((i * 256 / strip.numPixels()) + j) & 255));
```

```
    }
    strip.show();
    delay(wait);
  }
}

// Chase pixels by color
void theaterChase(uint32_t color, uint8_t wait) {
  for (int j=0; j<10; j++) {  //do 10 cycles of chasing
    for (int q=0; q < 4; q++) {
      for (int i=0; i < strip.numPixels(); i=i+4) {
        strip.setPixelColor(q+i, color);    //turn every third pixel on
      }
      strip.show();
      delay(wait);
      for (int i=0; i < strip.numPixels(); i=i+3) {
        strip.setPixelColor(q+i, 0);        //turn every third pixel off
      }
    }
  }
}

// Arrow pointer (back to front)
void arrowPointer(uint32_t c, uint8_t wait) {
  int i = 0;
  while (i < floor(N_LEDS/2)) {
    strip.setPixelColor(i, c);
    strip.setPixelColor(N_LEDS-1-i, c);
    strip.show();
    delay(wait);
    i++;
   }
   //one small exception; uneven strips now light up the middle led too
   strip.setPixelColor(i, c);
   strip.show();
}

// Input a value 0 to 255 to get a color value.
// The colours are a transition r - g - b - back to r.
uint32_t Wheel(byte WheelPos) {
  if(WheelPos < 85) {
   return strip.Color(WheelPos * 3, 255 - WheelPos * 3, 0);
  } else if(WheelPos < 170) {
   WheelPos -= 85;
   return strip.Color(255 - WheelPos * 3, 0, WheelPos * 3);
  } else {
   WheelPos -= 170;
   return strip.Color(0, WheelPos * 3, 255 - WheelPos * 3);
  }
}
```

Appendix 2 - The Speakerbox Arduino Sketch

```
/* Receiving RF Signals and sending a signal to a Raspberry Pi
   Using RC Switch library
   By Jelle Wolbers */
#include <RCSwitch.h>
RCSwitch mySwitch = RCSwitch();
bool DEBUG = true;
const int piPin = 6;

void setup() {
  if (DEBUG) Serial.begin(9600);
  pinMode(LED_BUILTIN, OUTPUT);
  pinMode(piPin, OUTPUT);
  mySwitch.enableReceive(0);  // Set receiver to pin 2
}

void loop() {
  if (mySwitch.available()) {
    int value = mySwitch.getReceivedValue();

    if (value == 0) {
      if (DEBUG) Serial.print("Unknown encoding");
    } else {
      //Serial.print("Received ");
      int receivedValue = ( mySwitch.getReceivedValue() );
      //Serial.print(" / ");
      //Serial.print( mySwitch.getReceivedBitlength() );
      //Serial.print("bit ");
      //Serial.print("Protocol: ");
      //Serial.println( mySwitch.getReceivedProtocol() );

      if (receivedValue == 17745) { //A ON
        if (DEBUG) Serial.println("Come in!");
        digitalWrite(piPin, HIGH);
        delay(1000);
        digitalWrite(piPin, LOW);
        digitalWrite(LED_BUILTIN, HIGH); //flash built-in led to see if it works
from outside the sound reachability
        delay(300);
        digitalWrite(LED_BUILTIN, LOW);
        delay(300);
        digitalWrite(LED_BUILTIN, HIGH);
        delay(300);
        digitalWrite(LED_BUILTIN, LOW);
      } else if (receivedValue == 17748) { //A OFF
        if (DEBUG) Serial.println("Come in for a reward!");
        digitalWrite(LED_BUILTIN, HIGH);
        delay(600);
        digitalWrite(LED_BUILTIN, LOW);
        delay(600);
        digitalWrite(LED_BUILTIN, HIGH);
        delay(600);
        digitalWrite(LED_BUILTIN, LOW);

      } else {
        if (DEBUG) Serial.println(receivedValue);
      }

    }

    mySwitch.resetAvailable();
  }
}
```

Appendix 3: The Testing Results

People Counting

Date	Starttime	Endtime	Duration	Proactive	Walking Past	Looking Interested											Interacting					Subtotal	Biking	Car	Scooter	Scootmobiel	Total People
					Total	Unaided					Aided (because of others pulling)					Total Looking					Total Interacting							
						0-16	16-30	30-50	50+	Total	0-16	16-30	30-50	50+	Total		0-16	16-30	30-50	50+							
17/1	14:45	16:15	1:30:00	0	469	1	30	24	6	61	3	22	10	9	44	105	2	3	3	0	8	582	236	5	9	5	837
	16:30	17:45	1:15:00	1	264	0	60	25	8	93	1	18	6	0	25	118	3	3	2	0	8	390	240	5	15	3	653
18/1	15:40	16:40	1:00:00	0	371	0	23	15	1	39	1	10	4	3	18	57	2	2	0	1	5	433	189	11	9	3	645
	17:00	17:50	0:50:00	1	234	1	46	26	3	76	0	17	8	2	27	103	2	6	2	2	12	349	184	4	10	2	549
19/1	14:30	15:30	1:00:00	1	310	2	54	19	23	98	0	25	14	12	51	149	0	10	3	2	15	474					
	16:00	17:00	1:00:00	0	355	0	39	9	3	51	0	10	3	4	17	68	2	3	1	3	9	432	200	7	10	6	655

Total People per Day

Date	Walking Past	Looking Interested	Interacting	Total
Tuesday 17/01	733	223	16	972
Wednesday 18/01	605	160	17	782
Thursday 19/01	665	217	24	906

Days Combined

	Duration	Walking Past	Looking Interested Unaided	Looking Interested Aided	Interacting
Passive Mode	3:30:00	1195	151	79	22
Proactive Mode	3:05:00	808	267	103	35

Days Combined - Normalised for Test Duration

	Walking Past	Looking Interested Unaided	Looking Interested Aided	Interacting
Passive Mode	1195	151	79	22
Proactive Mode	917	303	117	40