PROJECT EXHIBITION

SMART SPACES & RESPONSIVE ENVIRONEMENTS

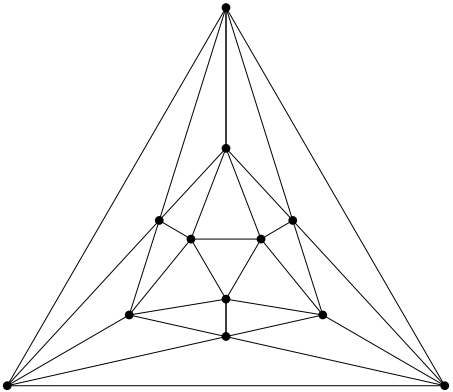
STUDIO 4 /
KTH_Architecture/

11/04-15/04
Vernissage 15.00 in
DOME OF VISIONS

Exhibition of student projects about smart living and new ways of making architecture, organised by Master Studio 4 / KTH School of Architecture.

DOME OF VISIONS

KTH VETENSKAP OCH KONST



SMART LIVING

studio 4

Project Exhibition on Smart Living

Architectural interfaces:
Smart Spaces and Responsive Environments

Architectural exhibition in the Dome of Visions, curated by the students in Master Studio 4, KTH School of Architecture 2015/2016

For us, Master Studio 4 is a platform for architectural investigations closely connected to research. Our studio seeks to push the boundaries of what architecture is, by exploring what architecture can be. We choose design themes that relate to ongoing research and invite our students to discuss how architecture, both as a profession and a discipline, is affected by recent developments in, for example, communication technology and sustainable design.

Our chosen theme is architecture for extreme conditions. As a team, and with input from practitioners and researchers in various fields, we investigate the conditions for architectural design in extreme environments. Temporary architectural structures are increasingly needed globally, not only in crisis areas but also to meet needs that emerge in our networked society where people are distributed globally, yet have a demand for effective social spaces for communication and interaction. One example is the Dome of Visions (www.domeofvisions.se), a temporary pavilion built on KTH campus and a project to which our studio contributed in the academic year 2014/2015. An innovative collaboration between KTH and the Swedish construction and property development company NCC, the Dome of Visions has created a temporary architectural structure on KTH campus that promotes public debate relating to shared interests in the development of a sustainable society. Also this academic year, the Dome of Visions is our venue for exhibitions with architectural propositions for a sustainable future society.

In this particular exhibition our students show their results from a course in which they explored how interactive media can be used in architectural design. The studio has taken an experimental approach in which, besides traditional drawings and conventional representation of architectural projects, we have used interactive prototypes. During a few weeks we learned how to programme electronics; how to read sensors of different types and how to control actuators such as lights or motors. This enabled us to design architectural interfaces that actively react and respond to the users of the building. The exploration of how interactive media components can be incorporated to architectural design is relatively new, and in the process we will effectively be designing mediated spaces, based on how real and virtual spaces interact and affect both environments and people. We have produced manyof the prototypes through the use of Arduino, a platform increasingly used by artists, designers and architects.
In their design work, the students addressed the user needs as part of an ongoing project developing on KTH campus; three student housing buildings to be built by Einar Mattsson Bygg, designed by Semrén & Månsson Architects. The buildings form part of an experimental test bed that involves teaching and research at KTH: KTH Live-In Lab. Over the coming 10 years, different research groups at KTH will carry out measurements and experiments relating to these buildings. Also the design will change over time and Studio 4 has been invited to propose changes: how should the flats be transformed? What is smart living in today's society? Smart for whom?
During the course, the studio momentarily developed into a research lab. Rather than providing answers, we have posed questions dealing with the limits of architectural representation and design methodology; the role of time and space in architecture, as well as the possibilities relating to an immaterial architecture created from information. A seamless integration of real and virtual space?
How may we include live media streams to the design of physical environments?

Finally, we want to thank our industry partners for their input to our teaching in this course: NCC; Einar Mattsson Bygg; Semrén & Månsson Architects, Scheiwiller Svensson Architects; Anna Pang Architects and Daniele Corsaro Architects.

Ori Merom, Charlie Gullström, Pablo Miranda Carranza
Master Studio 4 teachers 2015/2016

LEDS, MIRRORS & POCKET UNIVERSES

CONNECTING WALLS

SPACE TO WORDS

A GUIDE FOR THE STAIRCASE

LAUNDRY LIGHT

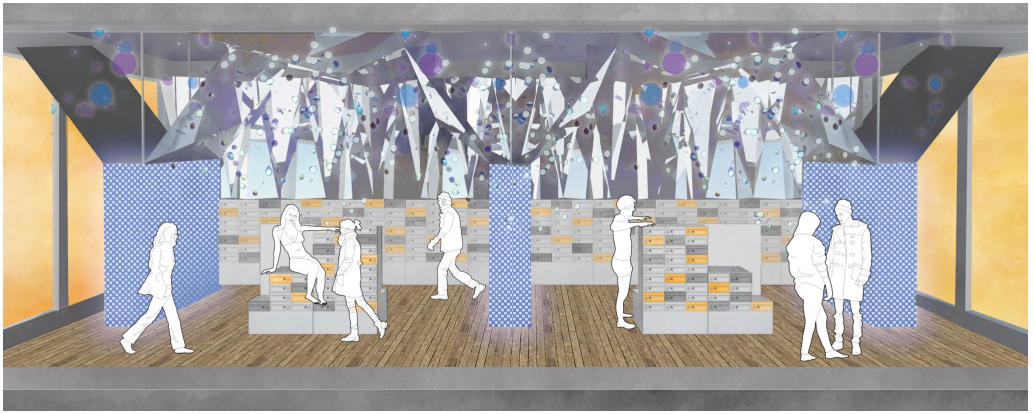
FOLDING A SPACE

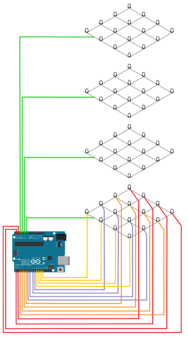
SMART SOCIAL SOCIETY

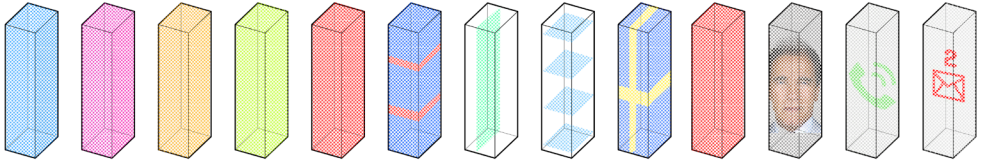
THE MUSICAL ROOM

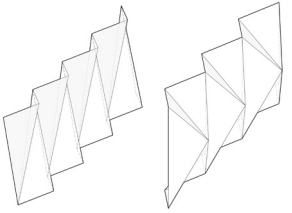
SILENT STUDY SPACE

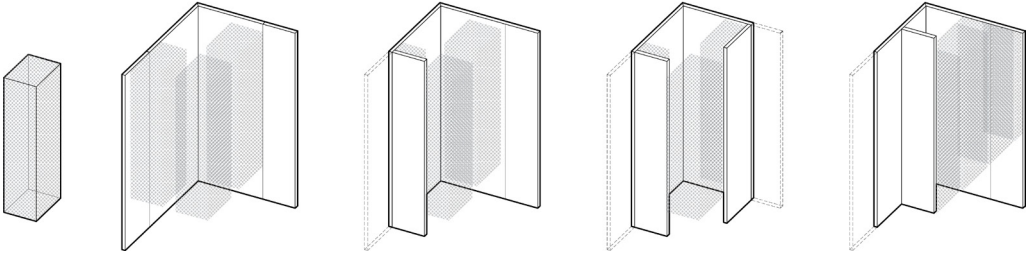
LIGHT LANDSCAPE

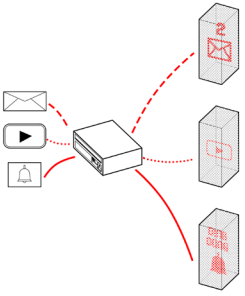


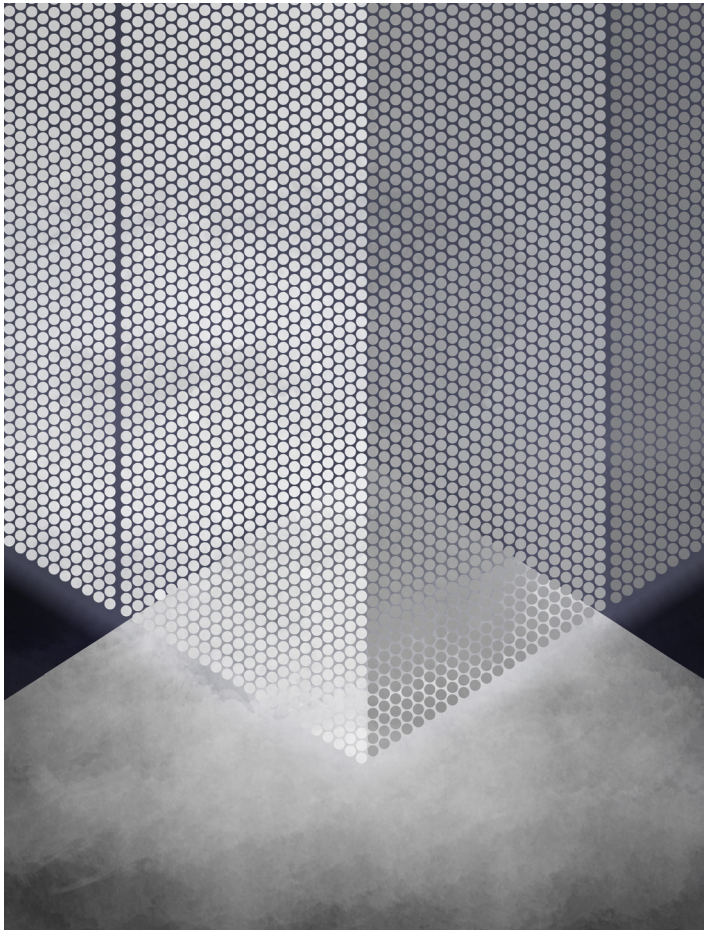










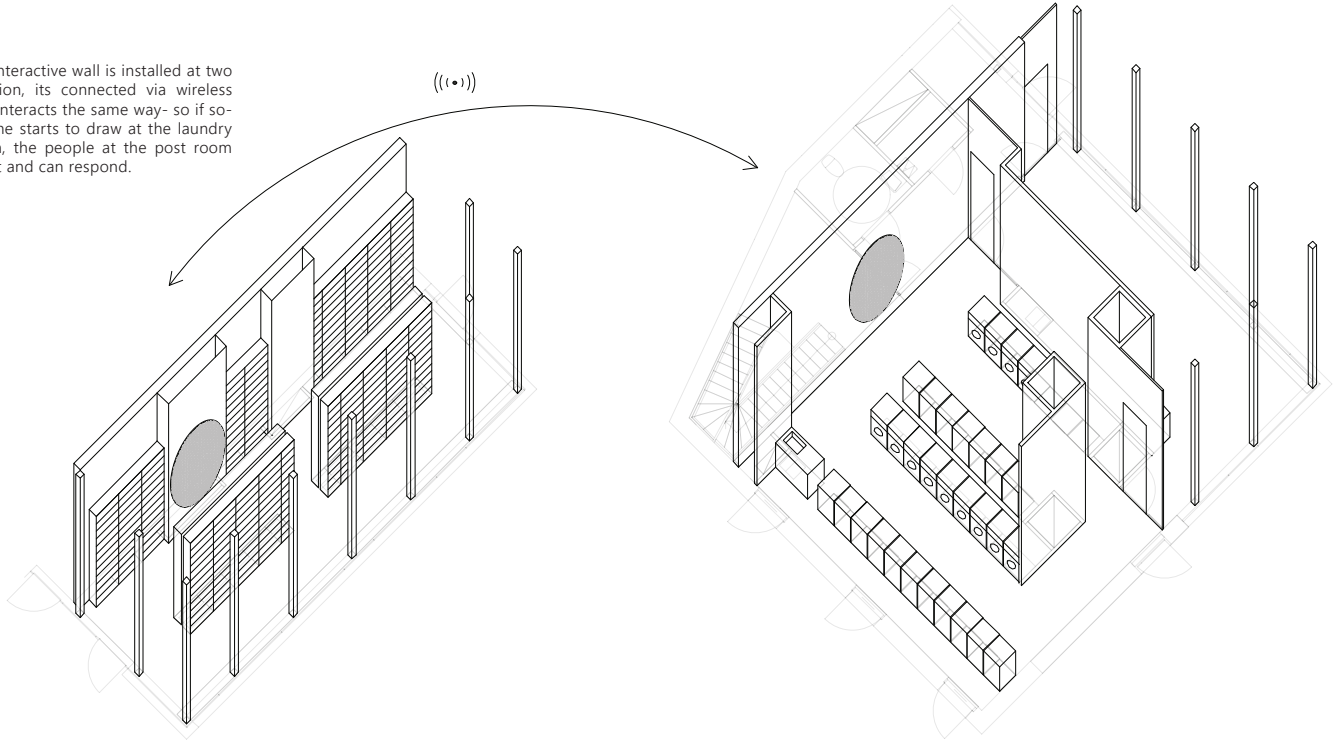


LEDs, MIRRORS & POCKET UNIVERSES

Barbara Gensler

The idea behind the project was to discover spaces within spaces, barriers that we can perceive but that are not actually there. To fool the mind into believing in virtual reality. Smoke and mirrors. We are however in the digital age. Why not diodes ? LEDs are cheap and multifunctional. LEDs and mirrors to create your own personal universe.
The new student housing project at KTH Campus provides students with the bare essentials to live with. How about taking it one step up ? To not only allow each student their own corner with amazing wonders they can personalize, but also make it smart. Why not connect them with each other ? To make communication easier and more intuitive. To make a room not just a room, but a real living space, not only a place to live, but a space that becomes a part of their life. The LED display can be transformed with the use of mirrors and reflections, changing the perception of space. It can also be connected with the post room, changed into a message space, providing information about guests, messages and notifications. But the usage of displays is not limited to this. Connecting people of a different level, the display connected with sensors can make one feel less alone when walking through the campus, as it registers movement and presence, creating parallel displays in two neighboring spaces. Mirrors make the space seem more alive, and when tilted, more vague.
And who doesn't like a bit of uncertainty ?

the interactive wall is installed at two location, its connected via wireless and interacts the same way- so if someone starts to draw at the laundry room, the people at the post room see it and can respond.

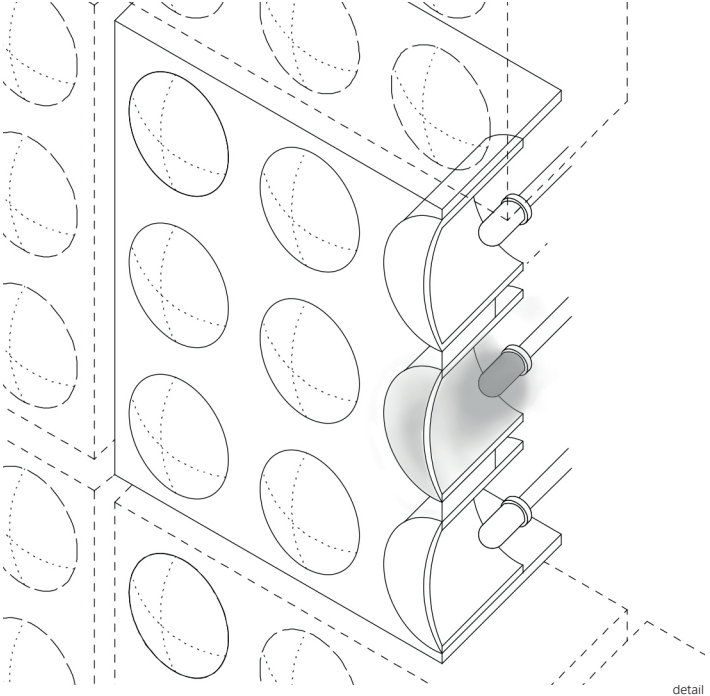


axo post room

axo laundry room

CONNECTING WALLS

Cécile Baumann



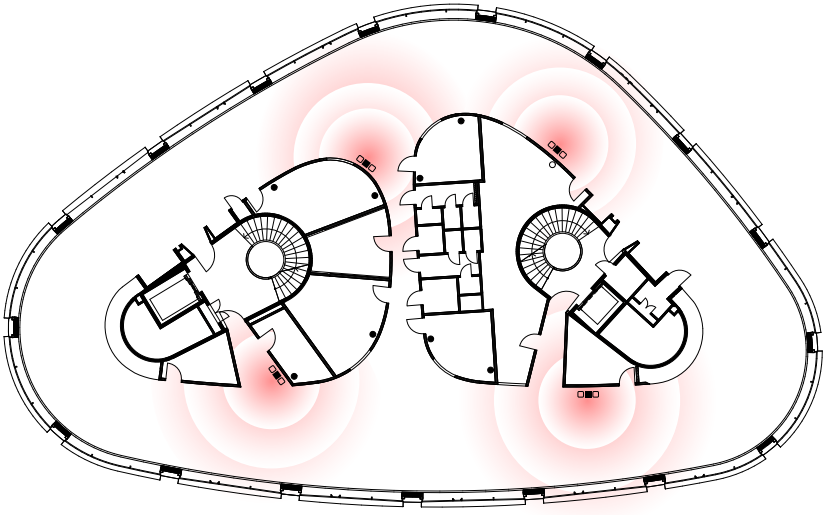
detail

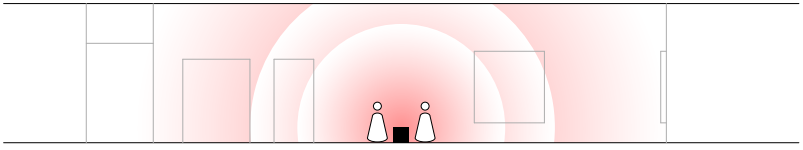
During my research I was fascinated by a project called " mes etoiles" by Hernando Barragán, an interactive wall that responds to proximity of people with light on its surface. The goal is that people can use the wall to express and play using their bodies as instrument.

Thinking of students and the life at the student housing I wanted to adopt the idea of an interactive wall. Students really like to share and express their self on platforms, so I design an anonymous note wall in the post room and in the laundry room. This wall creates an interaction between the two rooms and establishes a communication between the students located at two different places.

The connecting walls are composed of modular units that are arranged on the wall. A big pixel surface is formed out of the modules, which work with touch sensors and led lights. When you touch a single pixel the led shines for a particular time. The two walls at the different locations are connected with wireless and interact the same way.

So Students have the possibility to express themselves (during for example the waiting time at the laundry room) and have a simple way to communicate with the other building. In order of the wireless connection, you can respond directly to the person at the other room and an interaction between two anonymous people is created.





range of action for 1/3, 1/2 and 1/1 of the power

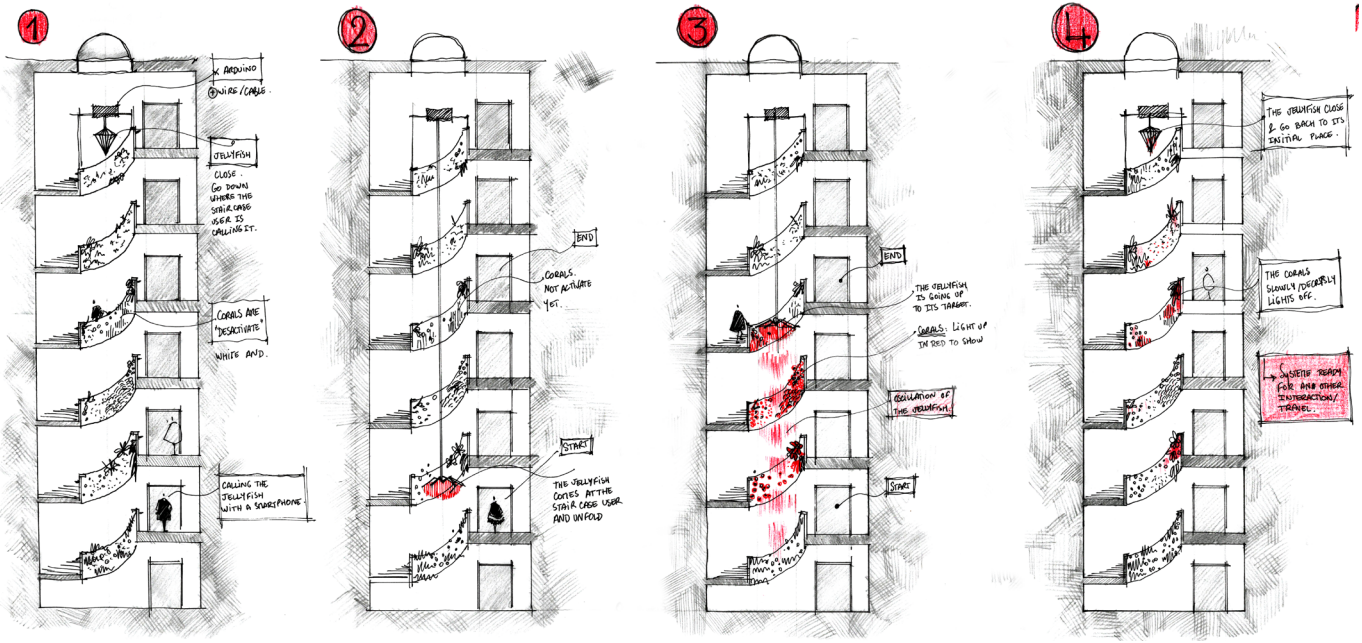
SPACE TO WORDS

Federico Sforzi

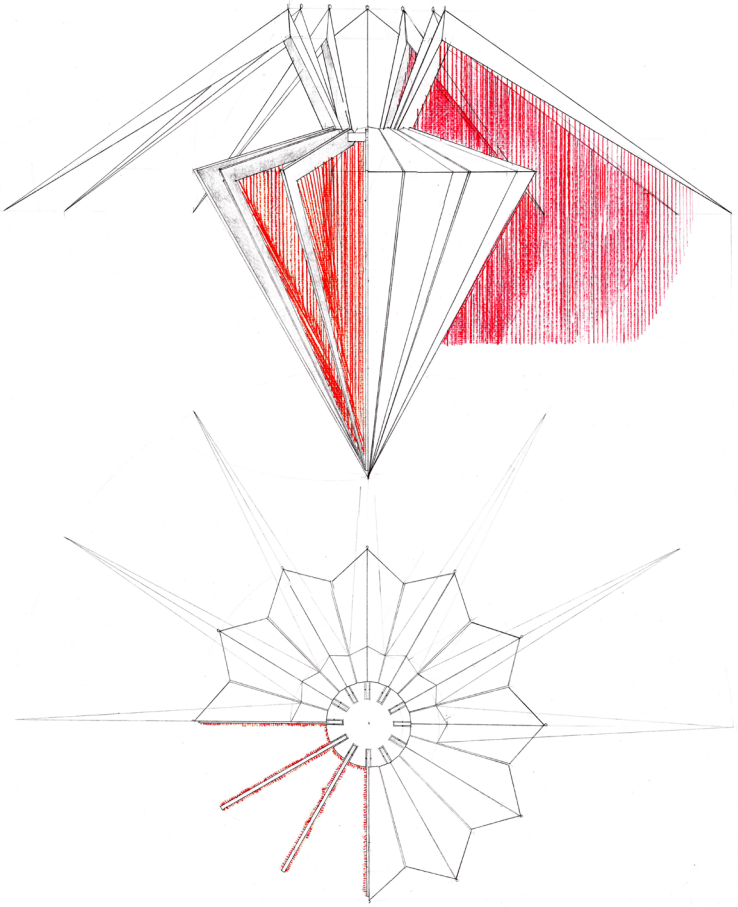
What is architecture about?
Is it just represented by drawings?
If we use another medium is it still architecture?

Sound. In architecture, the role of immaterial materials is usually underestimated. However, it is possible to use them to create a space. To investigate the potential of sound as architectural element is the aim of the project. Despite its immateriality it has a range of action where it affects the spatial perception and consequently the architecture itself.

Sound here has the form of White Noise, a signal produced by random frequencies. Reducing the background noise, it helps to relax and to concentrate. These functions were applied to the act of conversation. To create a space where communication is facilitated, the White Noise was integrated in a table, the best representation of social interaction. The table as support and speaker, with a knob which controls the volume as well as the range of action and allows different scenarios in the architectural space.
Designed and tested in the School of Architecture at KTH.



The different steps of running of the ecosystem



Anatomical drawings of the main organism (section, and view from above)

A GUIDE FOR THE STAIRCASE

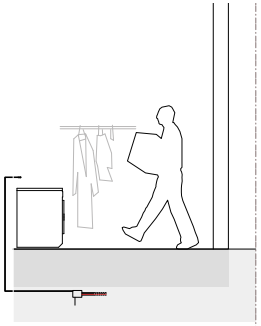
Jean-Philippe GUIGNARD

Initial observation: The staircase of the Kth-A is a transitional space between the groundfloor, open space for exhibitions and different kind of venues, and the working spaces (studio, research, administration). This circulation space is however quite empty and inactivated, people just pass by without really paying attention to the other people or the space itself. Moreover each floor is the same as the others and it's really difficult to orientate yourself when you're not used to it.

This project tries to activate the staircase, and to develop interractions between the users and the space trough an ecosystem.
This ecosystem can be split into two parts, on one side a main organism that goes up and down, and on the other side a coral reef on the external surface of the stairs.

The role of the main organism is to guide a staircase user trough this vertical space by stopping at a starting and an ending point, on the way this organism „wakes up" the coral reef that lights up in red. There is also, in some specific points, moving and sounding corals to create interaction with the other users of the circulation space. The red color plays the role of signal to guide people in this black and white space.

The whole ecosystem creates animations that will lead people to stop and talk about it. The chance factor is also important, the system is not always working and a first user has to trigger it with the main organism.



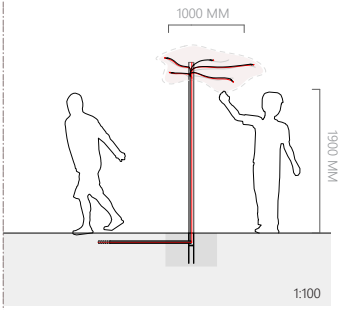
```
int micPin=A0;
int soundInput;
int ledPin=9;

int silence=2;
int baseInputLevel=498;

int ledVal;

int minimumLight=2;
int memory=minimumLight;

//this controls how often the program reads the microphone
long inputInterval=100;

//this controls how fast it dims down
long dimInterval=100;

//these are used for the intervals
//so the program remembers when the last time
//it did an input or dimming was
long lastInputTime=0;
long lastDimTime=0;


void setup() {
  Serial.begin(9600);
  pinMode(ledPin,OUTPUT);
}

void loop() {

  //this line can be used (when comment off)
  //to get the actual reading of the microphone/sensor:

  //Serial.println(analogRead(micPin));

  //we measure the difference from a base value, which
  //will be constant when it is silent
   soundInput = analogRead(micPin)-baseInputLevel;
  // Serial.println(soundInput);

  //abs makes negative values into positive ones
   soundInput=abs(soundInput);


   if(millis() - lastInputTime > inputInterval ){

     if(soundInput>silence){ //if there is some sound

       //add to memory the soundInput, scaled.
      memory += map(soundInput,silence,1023,0,1000);
      //make sure that it does not exced the maximum value
      //255, since we will use it for the analogWrite()
      if(memory>255){
        memory=255;
      }
    }

    lastInputTime=millis();

   }

   // dim it every dimIntercal milliseconds
   if(millis() - lastDimTime > dimInterval) {

    //if not silent, make it smaller

    if(memory > minimumLight){
      memory--;
    }

    lastDimTime=millis();

    Serial.println(memory);
   }

   analogWrite(ledPin, memory);
}
```

setting the "normal" level of sound, as well as what should be interperated as silence [IMPORTANT VARIABLES!]

controlling timing and speed [IMPORTANT VARIABLES!]

adjusting how the input (volume) is interperated

regulating how and when the LED should be dimmed down/upp

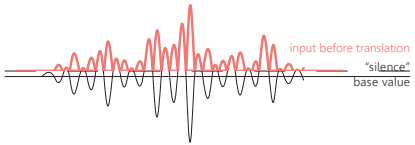


Grounding the structure:

The structure is experienced as something "free-standing".

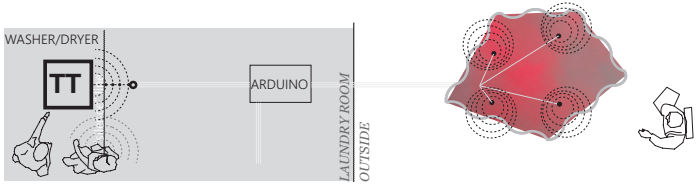
A foreign object, a sign.

The experience of the floating glowing light fluffy substance is pushed by putting it in contrast to a heavy, stable, frigid, material.



LAUNDRY LIGHT

Jenny Övergaard



VARIABLES IN:

CODE
translating information

PHYSICAL MATERIAL
communicating +
amplifying information

READINGS/RESULTS
meaning of signal
+ consequences manifested in
actions by people

person arrives to laundry to wash clothes, washingmachine makes noise

microphone picks up volume - interprets sound as action, "senses activity"

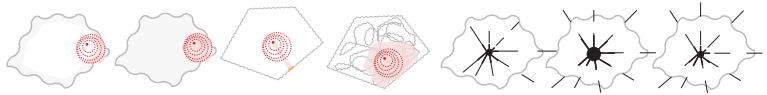
arduino recieves input and translates it using code

arduino sends output to cloud

depending on output from arduino, LEDs shine

person sees cloud shine and interprets

PHYSICAL VARIABLES : using material to experience (amplify) the light



"shell"

material "holds" light

"shell"

material "holds" light

1 LED doesn't have the effect of "filling"

A lightbulb "fills" the cotton

In the dark, 1 LED has the same effect

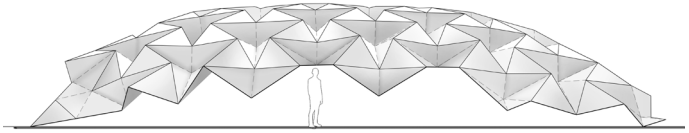
DISPLACING PRESENCE OF PUBLIC SPACE:::::::::::::::::::::::::::::::::::::

CAMPUS LIFE :
KTH can be an isolated place. People disappear into "public" but silent buildings. This project sugests a new way to display signs of life on campus.

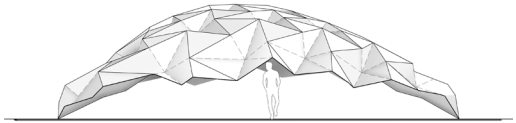
TRANSLATING AND CONNECTING SPACES :
What is „experiencing space", and what is presence?
The elements that compose our experience of space may be picked up as input, and translated into output. How can this develop our perception of the possibility to read or communicate space? As an architect considering this communication, it interested me how digital information can be communicated and amplified with the help of materials, as well as the variables within this translation: For example, the possibility to program delay into the translation would mean that the output is actually a trace, living on its own separate, delayed timeline.

EXTENDING LIMITS OF EXPERIENCE / SPACIAL EXPERIENCE BEYOND PLACE :
This project explores the concepts of experiencing beyond where you are, as well as the experience of affecting space beyond your immediate vicinity, challenging your perception of how you occupy and affect space. Commenting how unaware we are of the results of our actions: the negative consequences our displaced effects may have, but also the possibilities of this fact.

OPEN PATTERN

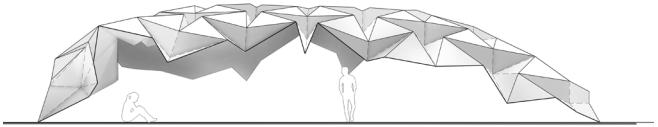


West Elevation

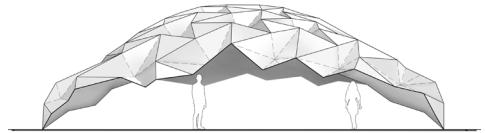


South Elevation

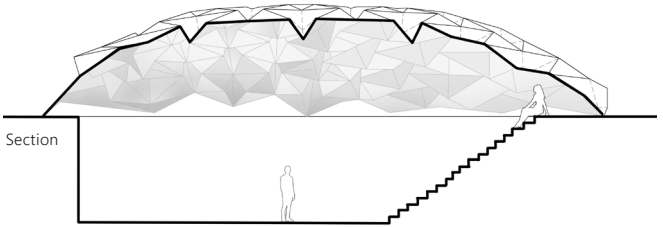
CLOSE PATTERN



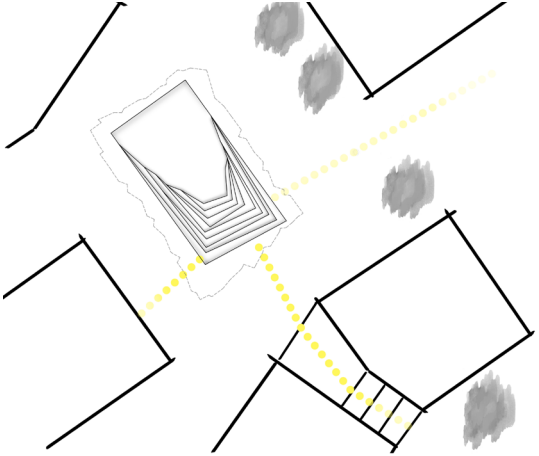
West Elevation



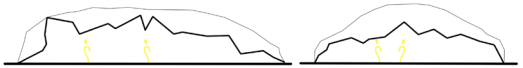
South Elevation



Section

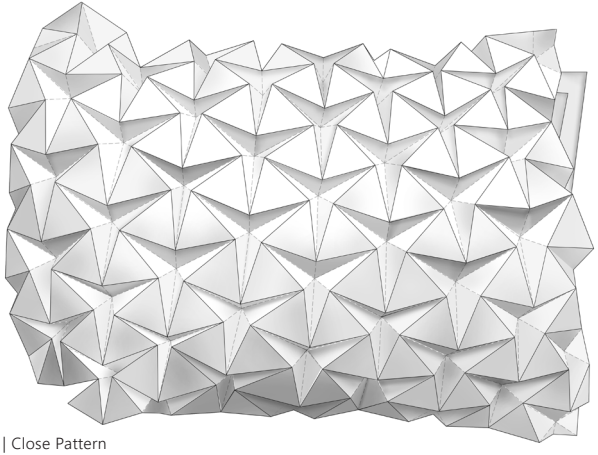


Access | Close pattern state creates higher entrance points

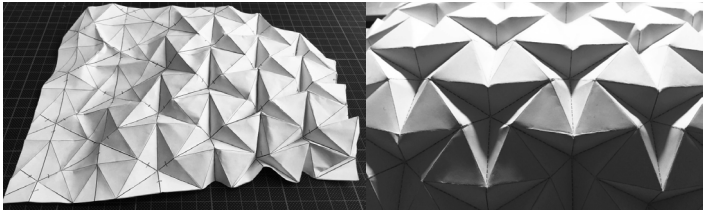


FOLDING A SPACE

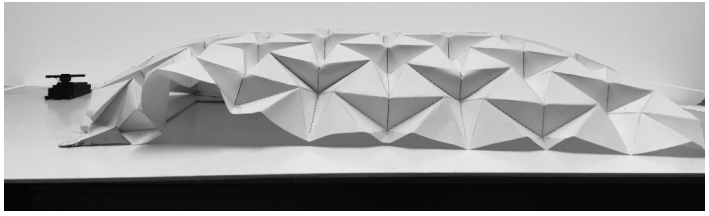
Mariana Paschidi



Plan | Close Pattern



Prototype



Inspired by the pattern of Ron Resch for self-supporting structural units of folded paper, I designed an outdoors shelter. The pattern is based on the repetition of geometrical modules and especially triangles. Although Resch initially used the folded pattern, because of the structural qualities that creates, I decided to take advantage of the folded paper's ability to expand and contract, in order to create a transformable space. The folded surface acts as a roof that can transform and change the qualities of the space underneath. In general, the open pattern state generates a higher and closer space with lower points of access, while the close state creates multiple points of entrance with different heights.

The shelter can change due to a number of factors. It can transform because of the weather conditions (wind, rain – open, close shape) or the lightning conditions. Considering the materiality, the pattern consists of smaller triangles, vwhich are formed from a solid material, and bigger ones made by a transparent material. As a result, the two different states of the pattern produce different light qualities under the shelter. The roof can also change its shape according to the activities it hosts (open or close space) and the desired connections between the student housing buildings that are around.

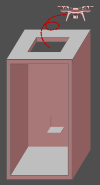
CATALOUGE

for users

\+

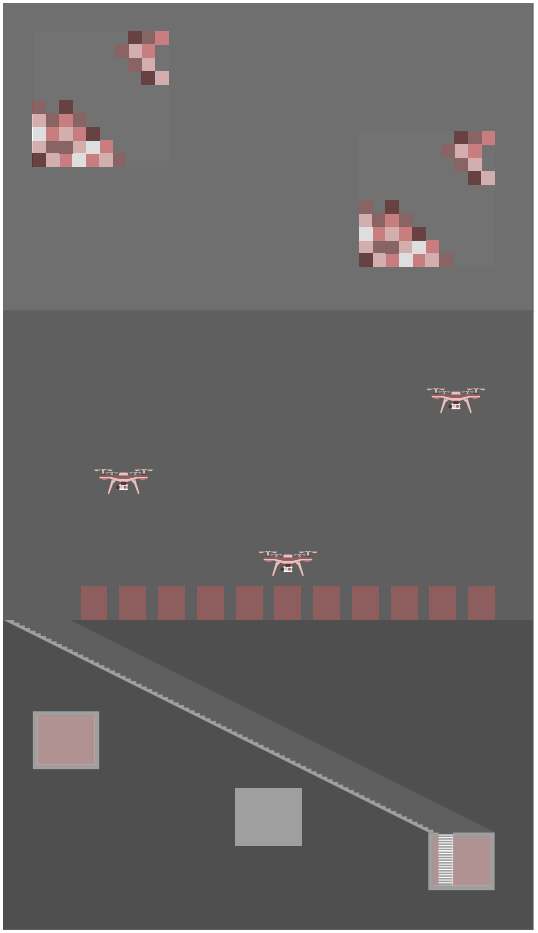
I

II



III

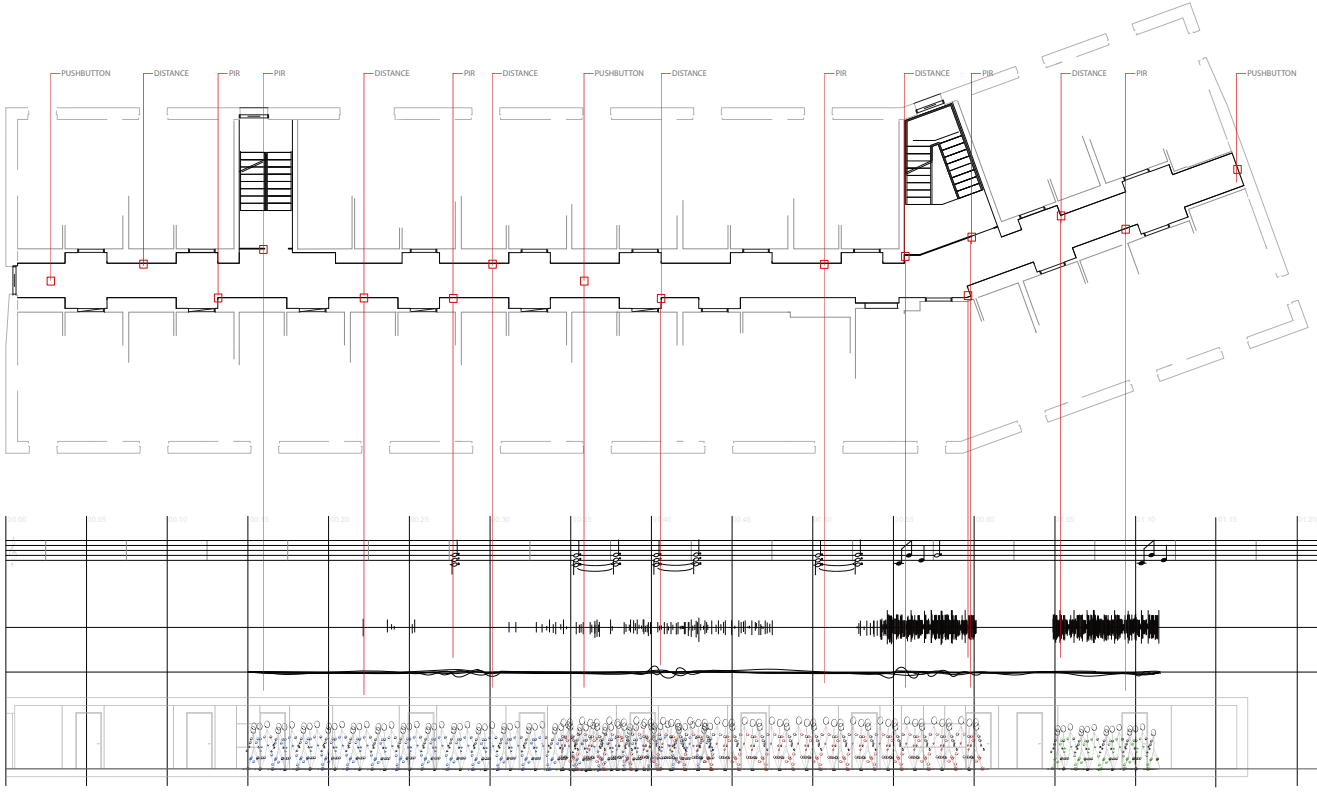
Every smart box comes with our super cool VR-glass.
Designed for a unique experience.
YOU share - WE care!



SMART SOCIAL SOCIETY

Marlene Gratzer

Is the future living lying in virtual reality? And who is going to design and decide what images or worlds we are going to explore? How smart do our buildings really have to be? How do smart spaces effect our social interactions? Is our society doomed? Questions that a dystopian view on smart living is trying to answer. A smart society that consist of hackers, users and technophobes is fighting for regaining control over their lives and society. While the hackers are using and controlling the users for their filthy games, the users don't know that they are being controlled by them. They even think it is their own choices that they are making. Hiding in the underground wearing protective clothes the technophobes are trying to ignore what is happening to their environment and continue their live how they used to live it before.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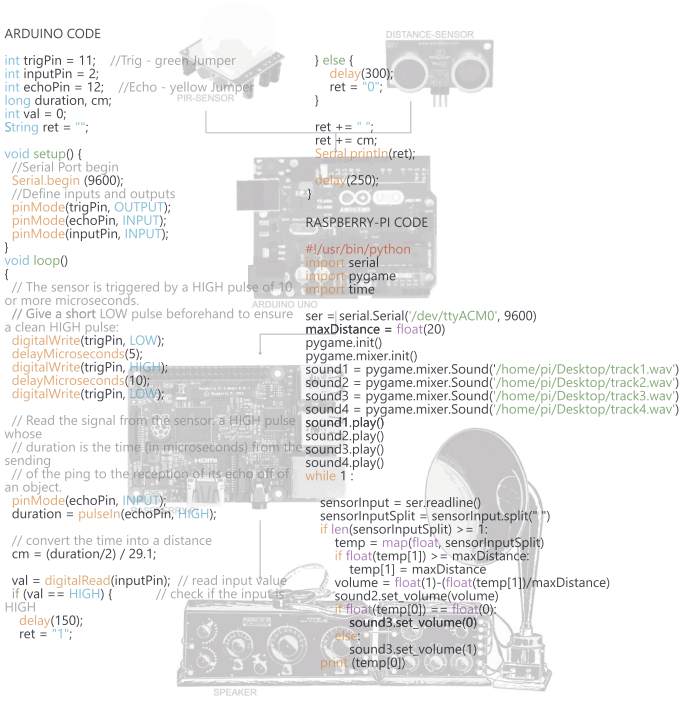
THE MUSICAL ROOM

Matilda Andersson



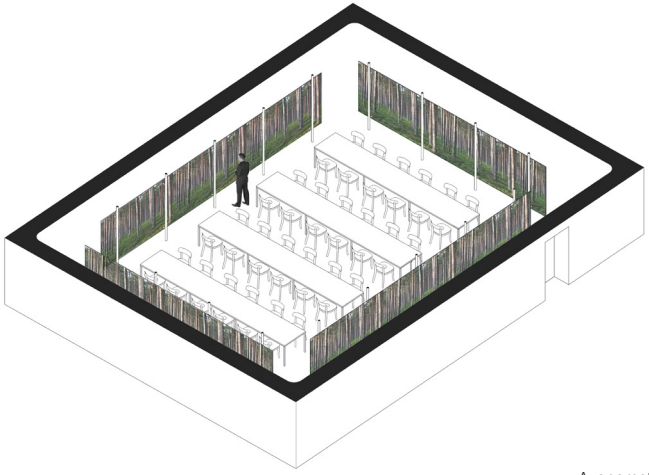
THE MUSICAL ROOM is a project based on sound, exploring how sound and architecture can work together in a responsive environment.

The project takes place in a corridor in student housing, there will be music playing in the coddiore on a loop throughout the day. Sixteen different
sensors are installed in the corridor. Each sensor changes the music playing in the room in some way. Some of them turn a melody on or off, others change the volume of the drums and a few create a drop in the music. But all of these work together to create coherent music in the corridor. The more people who are in the corridor the more music there will be, or the more changes to it they can control. Exploring how this installation change the way people move through the room, the awareness of the room and the feeling in the room and the way people interact with each other around it. How sound can be a part of the building.

The hardware used to create this environment is sensors that are connected to an arduino, the arduino sends data to a raspberry-pi and the raspberry-pi controls the different speakers in the room. The music and sounds that these different sensors can trigger is several different tracks of the same song, all playing at the same time but individually controlled thus making it possible to create coherent music.

SILENT STUDY SPACE

Arthur Salonen



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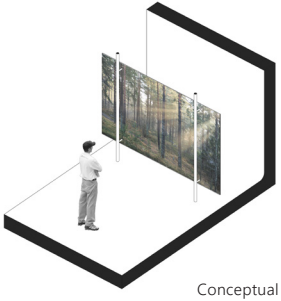
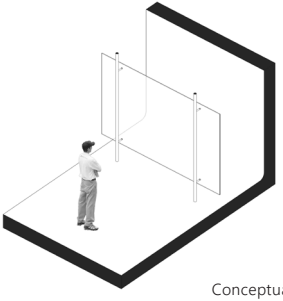


Conceptual Diagram
Projection On

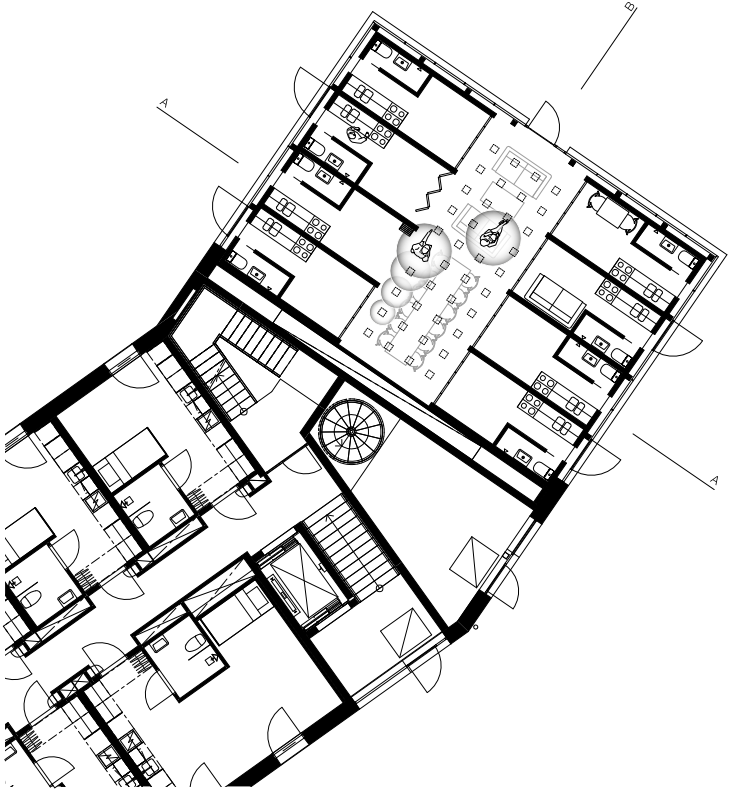


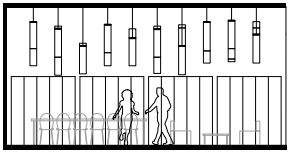
Conceptual Diagram
Projection Off

The aim of the design was to work against the confined space of a basement. The design is forced to compensate for the lack of natural daylight and connection to the outside. The use is also to remain temporary in its nature, as it is not a suitable space for apartments. Since the basement is part of student housing, the idea was to introduce a study space for the tenants.

The project explores the possibilities of technology as a design tool for creating architectural space. The room is arranged in a simple order consisting of four desks with 48 seats in total. The tables are surrounded by four big transparent screens. In the ceiling there is inbuilt ultra short throw projectors. The projected image is responsive to sound - it fades away if it hears too much sound. This works to ensure in a simple and polite way that the study space remains quiet for studying.

The basement walls surrounding the study space are painted white, and removed of all detailing. The edges are rounded in order to remove all visual cues of perspective. This helps to reduce the feeling of confinement. With an even and balanced interior lighting the shadows are removed. So in the surrounding space there is no distinction of the floor, wall and roof.





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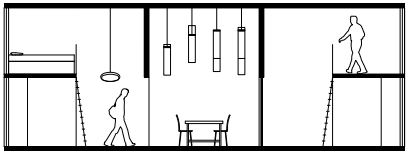

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LIGHT LANDSCAPE

Fredrik Gärdhammar

Through my research of this technology I´ve encountered one aspect I think is interesting. That's how mediated architecture could create interactions between humans instead of humans interacting with the technology. In a previous project, we were asked to draw a proposal on how future student apartments would look like. I suggest a proposal that took advantage of hall space by making it a little wider so it could serve as a shared space. So for the Arduino project I chose to use this technology to create social interactions and activating this space.

The installation consists of several light volumes that direct the light downwards, but which also has a luminance in the other direction due to its semi-transparent white milky plexiglass. When you pass under the lights it fades up and down leaving a tail of fading lights after you. But if you are just standing there waiting the light above you are constantly shining. Another idea behind the installation is also to save energy by make the technology sense your presence.