Sonnengarten
introduction
This project was developed as an concept for the course „urban interfaces“ in the Bauhaus-University Weimar. It was a cooperated work between the master of architecture and master of media architecture study program with the help of the Human-Computer Interaction department in the summer semester 2015.

The goal was the create and light installation for the „City Visions Jena“ festival, connected to the UNESCO International Year of Light 2015. As one of the finalists „Sonnengarten“ was chosen to come real at the festival with the help of Public Art Lab and Carl Zeiss e.G.

more information:  https://sonnengartenjena.wordpress.com
content

concept
Concept

The idea of the installation „Sonnengarten“ was to create a counterweight to the dominance of concrete and steel at the “Sonnenhof” in Jena. Connected by adopting given shapes of the courtyards modern architecture and design, the installation was supposed to be a temporary suggestions to improve the quality in public places by nature. The two existing ventilation shafts are used for the installations. By using organic materials for the construction and green walls with grass and plants, the installations are an contrast to the surrounding so that the site gets the attention it deserves as a central place in the city.

While being neutral on site at daytime, at night the project set the courtyard in a new light and creates a completely new atmosphere. The top and bottom covers of the installation are transparent and allow to visualize a play of light from the inside.

To involve the idea of a new way to get attention for nature in cities, while touching the plants the proportion of light changes. Not only so that people get connected to the place also they should directly get in touch with the plants and use them in a way the might never thought about before.
construction
The construction system

For the main construction a strong and easy reusable system was needed. Powerful connections are created by overlapping the joints in each face of the installation. With that not only a equal assembly of building materials was made, it also characterised the aesthetic outcome of the whole system. Each joint is connected through bolts and nuts, three or four, depending each case. In this way not only the possibility to take the installation easily apart is given also a fast assemblage is possible.

To lower costs and work high attention was put into the whole amount of needed materials even while having impact on the visual appearance.
But it also took a long time to finish the drawings of the specific faces to make even the first prototype as simple as possible to construct.

Installation 1

Because of the small size just a general frame was needed. Only the different angles in the each corner from the given shapes at the site created difficulties. These needed to be figured out in the further process but also simplified in the drawing process on the computer considering the whole effort and the short time before the final assambley with all the different angles.
Installation 2

While having less issues with the different angles in the bigger installation, additionally to the main wood construction an extra subdivision was needed to keep the general stability. At the same time transportation sizes needed to be considered because of the longer sides and like before in the small installation material length and usage needed to be figured out before starting the building process. Especially here a long time was spent to be sure that a plain but strong construction frame was created to keep the simple look of the smaller installation.
**Inner construction**

For additional stability an inner construction was necessary. Also to fix the lights and other electronical parts inside a structure with simple smaller wood batten was helping. But the most of the inner construction couldn’t be planned before on the computer, especially because the stability was only possible to be identifiable in a prototype.

**The panels**

After the main and inner construction finished a system for the panels was needed. But not only a the weight and transportation possibility of the panels itself was important to consider also a fast rebuildable system for the roll grass and pots had to be created. Inspired from complex green wall systems the panels been divided into suitable parts and are planned in layers. With a small frame in the inside and outside on a plywood the basic panel with enough space for soil and roll grass was planned. Divided by a simple plastic cover the wood got a better protection from the humidity of the plants. To keep everything in place a strong grid with additonal screws was used.
The technical part

In order to equip the installation with interaction several technical elements had to be included. The interactive plants had influence on the way the lights appeared inside of the installation. When a visitor touched one of the plants they changed the color of the corresponding light.

To use as few as possible of the internal space some of the technology was placed in the underground parking below the site. This ensured to protect some fragile parts like the laptops or the DMX controller.

To transfer the touch of a plant to a light first the plant (A) needs to be connected to a microcontroller (B) via a simple wire which has to be surrounded by soil on the one end and connected to a input connection on a special shield on the other end.

On this shield input signals from the plant are received and if a person touches the plant a change is recognized using the capacitive touch approach.

Those signals whether a person touches the plant or releases it are send to a laptop (C) via USB.

On this laptop the signals get analysed, adapted and transferred to a software which is capable of controlling the lights.
The lights inside of the installation (E) are connected to the laptop through a DMX controller (D). When the signal is recognized as a touch input the DMX software sends a command to the light in order to change it’s color until it receives the input that the plant contact was interrupted. Then it resets the color to the default state.

For the necessary power enough supplies (F) been integrated in the setup, connected with an T-cable between lights and DMX controller.
building process
The prototype

Because of the very late finished agreements and money transferring it was a challenge to build everything in time. At the beginning of the project we planned to build a prototype for both, the installation frame and the technology parts. But after we realized that we won’t have the possibility to build a complete prototype we select only a small side to build, to anticipate and identify which problems we may have in relations with logistics and construction of the complete installation. Due the complexity of the connections we created a tag system to categorize the different cuts, divided in full cuts, half cuts and by angle. Thus we avoided the confusion when using the cutting machines.

On the technical side the lights which should be used for the installation were ordered from a company situated in China to stay within the limits of the budgeting. After the delayed payment it was critical to receive them in time. This forced us to use different lights for the development and testing of the interactive plant technology and complicated the process. Despite those issues we managed to finish everything in time. Some nice-to-have features couldn’t be implemented but the main functionality, the interaction with the plants to change the lights worked.
ordered lights for the final installation

process of filling the panels

building progress on the technical side

interaction test with multiple plants

first working interaction

first finished panel

tests with different plants

tests with different plants

first finished panel
The construction in Weimar and assemblage in Jena

We decided to construct first the structure and then, based on this real measurements proceed to adjust the drawings of the other elements, like grass panels and plastic covers to minimize the error factor and mistakes in the fitting of the whole installation.

The construction time in Weimar was planned for two weeks, but because of a delay on the construction material delivery, time was shorten to nine days.

First day was assigned to draw and check all cuts in the wood, later on we prepared the pieces to cut in the ground floor machine, and then we take the pieces to the first floor to do the last cut. When the structure was assembled and tested, we found out that was not really stable, so we had to place cross connections to strength the stability. Finally the structure was sanded and protected with a layer of waterproof oil.

The installation was designed to be easily taken apart in elements no longer than 4.50 m and be transportable in a truck with standard measurements. The assemblage in Jena took three days and was easier than in Weimar because all marks were properly done and also we had the planter as a base to connect all parts together.
The progress of the installation

Looking back the festival the installation was a great success for us. When participating in such a big event many expectations have to be satisfied. On one hand aspects like the time frame and budgeting, both given from external positions need to be considered. On the other hand personal demands should be fulfilled to shape such a project to a pleasant accomplishment. We managed to satisfy both, the external and our own requests.

Even a lot of things went better than expected especially because of the time pressure we needed to improvise and had to solve unexpected problems.

At the first evening of the festival we had the light reaction adjusted in a way that the default state of one installation was with the light turned off and while touching a white light turned on at the corresponding position. The second installation had the opposing effect so that the light was turned on per default and while touching it turned off.

We found out that this way of light reaction was not appropriated enough for the space because other nearby installations “Light Walk” and “Videopainting” worked with strong and colorful light effects. Thus we decided to change the plant touch reaction on the next evenings. Now the installations default color had a strong hue and when touching the color changed to white.

We also noticed that the interaction possibility often was not clear at the first glance. Especially on the first evening when the lights were not this prominent in contrast to the other installations many people just passed by. This changed during the next evenings. Thanks to some volunteers standing next to our installation and explaining it to the visitors the people got more in touch. But also more visitors already knew the interactive aspect and suggested their friends and family to try it out by themselves. Additionally information about the interaction was provided in flyers and descriptive texts attached next to the installations to explain the work more in detail.
picture while the setup process of the small installation

daytime with first light tests

picture while the setup process of the big installation

installations without lights
Improvements

Even we been happy how the festival was going for us we still see some possible improvement when setting up the installation for a second time. Especially on the technology side an easier possibility to adjust the touch-release threshold for the plants would be useful. Not only that it would lower the work and effort which needed to be spend every evening before the festival to set the threshold new, also the general function could be improved. In particular the connection between plants and the microcontrollers could be a huge improvement so that the wires, which are connecting plants and shield, are included inside the flower pot to have a more stable system. Also an implemented water system for the pots and panels could be possible if the setup should run longer than two weeks. Without it was always necessary to check the humidity because of the thin layer of soil and grass in the panels, even while the building process. This would also lead to the necessity of using different material for the building in general for the main construction. But besides that we are not sure if the unambiguousness of interaction should be improved even it caused some problems at the beginning. In our opinion it makes sense that the people need some joy of discovery and that the interactive aspect is not directly visible, but recognizable if visitors put some effort in it. In this way the result of a successful interaction acts as a kind of reward and people think about the installations and the ideas behind.

Conclusion

So looking forward to the future we hope to set up this project again. But we also hope that the visitors and especially all the other involved people enjoyed the project like we did since the beginning. And maybe we inspired some of them to create new installations in other modern concrete and steel dominated places like we tried, to get a bit more nature in our daily life back.
night atmosphere
discussions with visitors

a lot of families visited even late at night

especially children enjoyed the interaction

view on the top of installation
thank you
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