Light and Shadow Play –
The sun as an aesthetic trigger for urban textiles

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Introduction
The project investigates how the sun can be utilized to enhance aesthetics through textile surfaces in urban environments. The project explores the interplay of textiles as a sun-screening element within the outdoor public architectural space.

What happens when we use the sun's heat and light to trigger a light and shadow play through a textile surface?
What happens when designing with an unpredictable parameter – the sun – in relation to the predictability of the textile design processes?

The exhibited objects; an interactive 3D model, two animation films and six storyboards, will summarise the research process and results. The interactive model is open for the audience to interact with via their own observations and explorations.

With this project we put forward the concept of dynamic, energy generating sun sails which incorporate printed solar technology. In this way we can create areas of shadow and generate energy at the same time. We also use thermochromic dye (heat sensitive dye) for a playful colour change in the sails. The sun’s changing light will create a dynamic light and shadow interplay. Thus its variation in heat will trigger colour changes. Thereby the aim is to enhance aesthetic experiences within the urban environment.

The emphasis of this project has been to develop design dimensions/solutions to be able to create pattern compositions for a continuously changing pattern. No longer is the designed pattern purely on the textile surface, a second pattern is created. The textile surface and the sun form a constantly moving light- and shadow pattern in the 3D space.

Design Context
Textiles are widely used as sun shading elements in urban environments, be it in old historical environments, like in the south of Spain, or in modern architecture. (Cf. [1])

"Why should sunlight always be shut out? [2]" Why not capture both light and heat and make use of it in design. We believe that the integration of solar technology in textile structures offers a great deal of potential for designers in the future. “Increased flexibility and mobility to generate energy are elements which speak for the integration of solar technology into textile surfaces. Developing new surfaces for energy generation through renewable energy sources is an environmentally friendly answer to humanity’s ever-growing energy need. [3]” The current development within solar technology points towards possibilities for printed solar cells onto textile structures. [4]

We have taken this as a base to develop a conceptual application for the future. This project has been based on a real street scenario, however it has been investigated on scale model.

Design Scenario
LAT.:37,23,LONG.:5,58. South of Spain. Seville. Calle Sierpes. It is summer and heat is trapped in the city. Hot, dusty air makes it, at times, nearly impossible to breathe and the sun is burning down on the ground. Horses, Feriar. Flamenco. Wide avenues and narrow streets. The river. Abanicos, the typical traditional fans, waving in the hands for a flow of air. Light - a lot of bright light. Laughter. People buzzing around. Shopping malls. The heart of Andalucía. The Calle Sierpes is covered with sun sails. What a relief. No burning sun on your head anymore creating a play of light- and shadows on the flow of people in the street. Life is pulsing in and out of the boutiques in one of the most popular shopping streets of the city.

Design Process
The starting point of the project has been to use Seville as a scenario to base our observations and explorations in.

A mood board has been created to define the atmosphere in the selected environment. Words and visuals described the
mood; happiness, ‘A sunny day’, alive, ‘lived in’, housing environment, traces of living, fragility, rhythm, movement, pulse, etc.

Based on the mood board, basic forms have been selected. Over 200 sails with forms/shapes/patterns have been created using laser cutting technology.

A simplified 3D model of a street section has been built, in which the sun sails have been displayed.

The sun laboratory at The Royal Danish Academy of Fine Arts, School of Architecture in Copenhagen has been used to investigate the sun sails in the 3D model under an artificial sun. The artificial sun creates light and shadow patterns in a street environment during a 24 hour sun path simulation. The main focus has been to observe the changes of the light and shadow patterns in the street environment, created using various sun sail patterns.

The design process and results have been documented, analysed and evaluated.

Thereupon more complex pattern compositions have been developed based on the newly defined design criteria created for this project.

At the second visit to the daylight laboratory in Copenhagen more complex pattern compositions have been tested. The light and shadow play during a 24 hour period from two pattern compositions have been made into animations.

The results have been documented, analysed and evaluated. The results have been formulated in the shape of animations, photos, graphic material and text.

**Exhibition**

The designer can no longer just develop a pattern composition on a 2D surface. The scenario shows that the challenge of the designer is to visualize the coexistence of a three dimensional pattern in space. What will this look like? To what extent can the design be predicted? Or will it be completely unpredictable?

Through experiments and observations we have tried to develop design dimensions, variables, required whilst working with this type of scenario.

Parts of our process and findings will be presented and highlighted in an installation based on eight objects:

The first object is an interactive 3D model of an abstract street. The street is equipped with sun sails and people. The audience can interact with the model. With the aid of a strong spotlight, it will possible to hold and subsequently twist the model in order to observe the moving light and shadow patterns in the street during a 24 hour period. The model can be set-up for any specific day in the year using a mounted sundial diagram.

The second and third objects are two animated films which show two different pattern compositions – one emphasizing a pattern along the street and the other a pattern across the street through a 24 hour sun path. The sun sails will create constantly moving light and shadow patterns in the street scenario.

The fourth to ninth objects are storyboards which contain: an introduction to the project, the main conceptual ideas, illustrated documentation of the design process and results, as well as instructions for how to interact with the model.

**References**


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