[1.]
P 3 /
Introduction Project 3

Following from the two projects investigating the research possibilities in developing a system that could display media content in a 3D matrix and applying this system in an architectural context, the next two projects investigated the effect and use of such a system. The developed LED stick, as part of the Spatial Dynamic Media System, does not create a surface - nothing has been designed yet. The exercise so far has focused on the initialisation of a platform where the design of a spatial movement could happen, as soon as the system received an injection of an electronic sensory-input. In Project 3, I provide a media content such as an electronic sensory-input to design a surface delivered through the 3D light point matrix. This will be only one option of many, thus Project 4 focused on the role of working as a curator for different media content where the research offers different tools (computer programmed codes) to translate media content into a surface movement.

The designed media content in Project 3 was tested in conference papers, competitions and art proposals. The designed media content was based on a call for a paper by the UNESCO Digital Arts Award 2005 hosted by ART CENTER NABI, a prestigious centre for new media art in Seoul, Republic of Korea, looking for young artists around the world to reflect on how urban spaces and city environments could be transformed into creative outlets cultivating artistic innovation and new forms of expression. The media content designed for a conference paper[i] had the media content displayed on the façade focused on the *"expression of cultural diversity"*. [ii] The term of cultural diversity should be altered to reflect common characteristics of humans rather than focusing on the common grounds of humans, instead on expressing the diversity, diversity of cultural background will be overlapped by common grounds such, as facial expressions. Facial expressions are a common ground of humans, even those from different cultural backgrounds. Even humans from differing cultural backgrounds have

[i] The paper has been written for the UNESCO Digital Arts Award 2005 which encourage artists to reflect on the theme of Urbanity and Creative Media

[ii] This quote has been taken from the organisers homepage www.nabi.or.kr/unesco_awards

characteristics common in all races, such as many facial expressions. These expressions could be translated into architectural expressions and thus humans could create, within their cultural diversity, an object derived from their common characteristics.
The conference paper included in Project 3 was submitted for the conference and it was subsequently translated into a designed object for a Design competition hosted by VIVOCITY in Singapore, October 2005. Here both the hardware - the LED Stick - was applied in a design proposal as well as the software - the designed media content - and tested as one design. My submission reached top 20 and participation in their exhibition demonstrated the value of the research to the organizers. Ultimately the main barrier to achieving a position in the top 3 was not having an off-the-shelf system which the organizers asked for as it was stated in a letter by the jury that, *"production cost is limited, therefore to review how design can be done within a budget".* [i]
With the problem of there not being an existing system available, the media content was tested as an art installation at the ISEA2006 Conference in San Diego, USA. The ISEA2006 Symposium is a Global Festival of Art on the Edge that was open to groups and individuals to submit proposals for exhibition of interactive artworks and projects reflecting the themes of the Pacific Rim. Here, instead of having a physical system, my media content should be displayed in a VR environment as an installation where the public could participate.

[1.2]
Design of media content

My proposal includes an examination of new kinds of public participation in urban environments. I intend to set up the proposed system, with movement and human expression being compared to conventional architectural 'expression', which will be considered together with how different cultural groups can be involved in this arrangement.
Henri Bergson discusses a relative movement when he talks about; *"…, the movement of an object in space. My perception of the motion will vary with the point of view, moving or stationary, from which I observe it. My expression of it will vary with the system of axes, or the points of reference, to which I relate it."* [1] He gives the

[i] The letter of the Organisers is attached in Chapter 6 Appendix – Appendix 4 Documents

example; *"when you raise your arm, you accomplish a movement of which you have, from within, a simple perception; but for me, watching it from the outside, your arm passes through one point, then through another, and between these two there will be still other points; so that, if I began to count, the operation would go on for ever."* [2] But instead of focusing on the metaphysical relations that have been the topic of Bergson's essay I want to concentrate on the perception of a movement from an outside view and how it can be read.

William F. Allman argues in his book about evolutionary psychology The Stone Age Present that humans are more competent in memorising and reading animated objects such as faces than in remembering unanimated objects or numbers. The ability to read and understand animated objects and read them in the same way through all cultures can be seen in the ability to universally interpret the movements of the human face such as smiling, frowning, or shock.

Communication between humans can be held verbally but at the same time non-verbally by miming and gestures. Non-verbal communications are generally easier to understand, will be similar in most cultures and will by read by all cultures in the same way. So will the movement of an arm, the example used by Bergson in explaining a movement perceived from the outside, be understood as a movement with a certain intention to express emotion. This non-verbal understanding has found its artistic expression in the performance art of a mime artist. Modern mime is a branch of theatre in which the performer usually uses no voice but instead performs using spatial and corporeal movement, full-body physical expressions, body language and gesture, often with little or no theatrical props. It is often, but not always, done in white face and the movements and expressions are heightened for greater effect.

As Allman states, *"Emotional cues are so important to human survival that a "universal grammar" has evolved in human facial expression. The human facial expressions that spring from feelings of grief, sadness, anger, disgust, surprise, fear, and happiness are universal among all human societies."* [3] Allman argues as well that:

> *"For the most people, the facial muscles involved in shaping the face when they are experiencing emotions are not under conscious control. Only 10 percent of us, for instance, can voluntarily pull the corners of the mouth down to make the protypically human "sad" face. The rest of us can make this face only while also moving the muscle near the chin,*

which is a giveaway for a phoney expression. Likewise, only 15 percent of people can voluntarily raise their eyebrows at the center of their forehead to duplicate the forlorn look of grief and distress." [4]

To allow humans an easier recognition of these facial expressions a study of the nature of beauty in human faces was undertaken. The conclusion Allman took from this study was that;

"The research suggests that the human brain has been sculpted by evolution to regard as most attractive those faces that are, ironically, most average. This preference may have evolved in our ancestors because, as representatives of the community at large, these average faces would be easier to read for subtle expressions of happiness or concern that serve as important social clues." [5]

Communication through mime has therefore been an important part in our daily life, but what is miming in a spatial sense?

When one moves one's face to express something the surface of one's face changes and therefore creates a changing surface. The surface face is alterable through parameters such as emotions that will be shown by different arrangements of the face so even if the faces look different the emotion or meaning will always be the same. These expressions can be digitalized and reproduced in a façade that allows the display of 3D images. As referred to above, each part of the face is responsible for expressing a certain kind of emotion – Allman refers to the mouth muscle being responsible for expressing sadness, while the chin muscle stays still. Each expression on each part of the face will be then located in a field of the façade, ideally in approximately the same location of its original location on the face.

The mimicry of the human face and expression via 3D imagery can be consolidated by the use of colours for expressing different emotions. Studies of the relation between colours and emotions have been done in chromatics, the study of the science of colour. It includes the perception of colour by the human eye, the origin of colour in materials, colour theory in art and colour psychology. With colour psychology as a field of study devoted to analyzing the effect of colour on human behaviour and feelings, it is shown that these effects differ as various cultures see colours differently. So colour alone, as seen in the D-Tower, bears the risk of being misunderstood in a cross-cultural

community. In addition a determined form designed by an architect still does not allow culturally diverse communities to express themselves in an architectural gesture. The D-tower was designed by an architect coming from one cultural group which could be used by people from different cultural groups, so even though the colour and the appearance express the emotions of the participants the architecture itself does not. So regardless of linguistic diversities and cultural differences, the façade or face – and here I want to highlight the linguistic similarity between these two words – could function as a 'friendly alien' to mediate between different groups within the community. This will be done through miming the same expressions as humans, but through its artificial nature stands between them and puts the focus onto the human behaviour by adopting human behaviour. It will strengthen the community relations and respect the linguistic diversity and the cultural knowledge of different languages by not having the need to use them, through communicating with non-verbal methods.

So far architecture has been determined mainly by the education and the cultural background of the architect. A design of a building mainly comprised the cultural and social background of the designer. An involvement of the beholder as a user did not exist. This involvement and identification with the building and its cultural context decreases when a diversity of cultures lives together. When, as happens in post modern cities, different cultures live together, a design made by a member of one cultural group can exclude members from the other groups.

A light-animated surface that is defined by the captured similar emotions – the participation of the beholder in a cross-cultural form of expression – ensures an exclusion of one or more cultures no longer occurs. It allows the beholder to reflect themself in the building so it leads to a negation of the design idea of the façade and therefore the author or architect vanishes behind his/her work and the beholder becomes the person in charge of designing the *"temporal events-within form"*, an expression used by Stephen Perrella when he talks about topological space as *"influenced by the inherent temporalities of animation software, augmented reality, computer-aided manufacture and informatics in general."* [6]

A façade that is a "temporal event-within form" can allow the beholder as a participant to be engaged in the design of the temporary appearance of the spatial relation they have with their environment, i.e. it allows creation through participation.

[2.] P3 / UNESCO Digital Arts Award Art Center NABI, Seoul South Korea

[2.1] Introduction

The media content explained in the previous Subchapter [1.2.] was used in a call for conference papers by UNESCO and Art Center NABI for the UNESCO Digital Arts Award 2005. The UNESCO Digital Arts Award, which forms a special category of the UNESCO Prize for the Promotion of the Arts dedicated to recognizing outstanding creative achievements by young artists in different fields of arts, aims at promoting cultural diversity and encouraging dialogue between cultures through innovative artistic ideas and forms, using new media and technology. The Award 2005 was organized in association with Art Center NABI, a prestigious centre for new media art in Seoul, Republic of Korea, founded on the basis of a non-profit centre in December 2000. Art Center NABI is engaged in research, education, production and exhibition of new work, with special emphasis on nurturing creativity through intercommunication between various experimental fields such as humanities, social sciences, pure and applied sciences, technology and art.

Both organisations wanted to encourage young emerging artists to reflect on the theme of 'Urbanity and Creative Media' and to send project proposals in the categories of digital art (including media installation, interactive art, wireless art, digital sound art and other forms of creative digital practices) that focus on the following topics of urbanization and the critical issues surrounding urbanity and new media: [7]

- Urban space as fluid interface, geographical canvas, social playground
- Transforming urban spaces into fostering dialogue
- Revitalization of urban spaces through active community engagement
- Mapping and networking in areas of conflict and post-conflict
- Imagining futuristic cities

[2.2] Submitted conference paper

The following text was submitted to the organizers at Art Center NABI:

SPATIAL DYNAMIC MEDIA SYSTEMS

My project proposal is an investigation into the perceptual boundaries between the virtual and physical world and how to break them. It asks how architecture can creatively adopt a fourth dimension, in this project a dimension provided through the use of digital technologies. The project draws from two examples of existing buildings / installations are used to demonstrate how movement and light colour have been used in architecture with the participation of the public. The first exemplar project is the physical movement of a full-size wall surface: 'Aegis Hyposurface' (dECOi Architects+ Deakin University / Mark Burry). The second project expresses a town's collective emotions through dynamic change in architecture via the use of colours: the D-tower (QS Serafijn & Lars Spuybroek/NOX).

SEARCH FOR AN INTERACTIVE 3D DYNAMIC SYSTEM

Three discreet considerations are required in order that such a system achieves its full potential.

Firstly how are forms received and can they be defined with the use of light? The illumination of the city gives the beholder a notion of space at night time, where they can locate the city and its buildings in relation to his own position - something one could not do if there had not been any light in forms and therefore the possibility to define space with the use of light.

Secondly, I want to investigate the potential existing media technologies beyond their typical application to architecture. Currently the typical application of arrays of lights (Times Square for example) can only offer the display of apparent 3D images and forms – but these '3D forms' are never actually 3D, they only become 3D when one 'moves' it with a computer mouse. The reason for this is the 2D nature of the display. Extended beyond their typical 2D application set to give an illusion of 3D is my proposed façade built with a 3D grid of lights each with X,Y,Z coordinates with point lights at each intersection of the grid. This façade will be erected by a number of 'sticks', attached in a 90 degree angle to the existing façade, and each of these sticks contains an array of LEDs in certain distances to each other along the stick. An equal resolution could be achieved in all three axes; images displayed in the X, Y, and Z planes and more importantly as 3D objects. Through their 'non-physical' existence, it can change its image and its spatial boundaries over time and therefore allow a strong relation between

time and space and create new concepts of space, time, and social relationships in an urban environment.

Thirdly, I want to investigate the potential existing media technologies beyond their typical application to architecture. These stations contain 3D face scanners that are open to the public. Face expression will be scanned in at these stations; collected and displayed on the facade.

A REDEFINITION OF 'PLACE'

Why do I want to do this? One of my core questions is to reconsider what new relationships are possible between place and media, and the consequences for interactive projects that result. 'Place' is a term that has a variety of meanings in a dictionary sense, but which is principally used as a noun to denote location, and primarily in the sense of what is actually within that location. By using 'place' in architecture, it defines 3D static objects that create the urban landscape and therefore notion of space and density. Media in a place on the other hand, is a two dimensional dynamic element mainly added on a 3D form, i.e. onto a building. This leads to the result that the 'user' of the place only being able to consume its surface/media appearance, without allowing participation. Can these two elements be combined to create a three dimensional dynamic element enabling participation by the city's inhabitants and if so, in what ways could people participate and play within the urban environment in the dynamic formation of cities?

THE SET UP OF FACE / FAÇADE

My proposal includes an examination of new kinds of public participation in urban environments. I intend to set up the proposed system, with movement and human expression being compared to conventional architectural 'expression', which will be considered together with how different cultural groups can be involved in this arrangement. Bergson discusses a relative movement when he talks about; "the movement of an object in space. My perception of the motion will vary with the point of view, moving or stationary, from which I observe it." [8] William F. Allman argues that communication between humans can be held verbally but at the same time non-verbally by miming and gestures. Non-verbal communications are generally easier to understand. This non-verbal understanding has found its artistic expression in the performance art of a mime artist. Allman states, "Emotional cues are so important to human survival

that a "universal grammar" has evolved in human facial expression. The human facial expression that spring from feelings […] is universal among all human societies." [9] Communication through mime has therefore been an important part in our daily life, but what is miming in a spatial sense? When one moves one's face to express something the surface of ones face changes and therefore creates a changing surface. These expressions can be digitised and reproduced in a façade that allows the display of 3D images. So far architecture has been determined mainly by the education and the cultural background of the architect. A light-animated surface that is defined by the captured similar emotions – the participation of the beholder in a cross-cultured form of expression – ensures an exclusion of one or more cultures no longer exists.

CONCLUSION

Through having a system that can display the time dimension within a spatial construct, the focus of the project will be the subject of interactivity. How this concept allows the participation of the public and its cultural-sociological meaning will be examined. This will be a far-reaching proposition of how the public will be included in the decision process of defining space, through expressing our innermost feelings through an architectural medium. Thus emotions of the individual have a platform and can be brought indirectly to the public, and in turn open up discussions about the state of the community through the state of the façade. An alliance of media and place in an urban context can be achieved and created, with the participation of its inhabitants, along with a new perception of how media and architecture can together shape and inform spatial relations.

[2.3]
Result

The paper was not accepted at the conference. Due to not getting any feedback by the organizers it is not possible to evaluate my research proposal for further participation in competitions or conferences. Nevertheless the original media content idea should now be applied in an actual project and be tested in a context by participating in a competition.

[3.] P3 / Design competition Vivocity, Singapore

[3.1] Introduction

The next test in applying the media content described in Subchapter [1.2.] was a design competition in Singapore organised by Mapletree Investments. Mapletree Investments is the developer of Vivocity, the shopping complex with approximately 1.5 million square feet of gross floor area and 1.1 million square feet of retail space built on the site of the exhibition halls of the former World Trade Centre, now the HarbourFront Centre in Singapore. The complex was designed by the Japanese architect Toyo Ito and was officially opened on1 December 2006.

Vivocity has taken part in Singapore's first biennale by lending itself as a site under its art and design program. The international student design contest Vivocity had the theme 'fluidity' to reflect the design of the building. Here the organizers asked entrants to create interactive street furniture. The theme of fluidity is an interest of the investigate Spatial Dynamic Media System of this research, where fluidity is not only suggested by a form but is made possible due to a visual zone where space can be shifted and altered in real-time.

[3.2] Design of art installation

The following pages were sent to the organizers as a contribution to the design competition. They represent a mixture between the paper submitted for the conference in Seoul, South Korea and illustrations and plans of how the system could be adopted as the fluid street furniture the competition brief required.

Some aspects of the text presented in the panels have been further developed and discussed in this research since the time of the competition in October 2005, but represent the material handed in to the organizers at that time.

The plans show, attached in Chapter 6 Appendix: Appendix 1 – Plans, a possible arrangement of LED sticks in plan and section, and also contain a first illustration of how the zone could look when visualised.

[3.3]
Result

The submitted design achieved a position in the top 20 of 365 submissions from various countries.[10] The organisers then asked for further developments to be made in a second stage of the competition where all 20 competitors had the chance to review their project.

The review included comments from the judges. One of the comments was more general, asking about the interactive relation between people/viewer and design *(see letter from Vivocity in Chapter 6 Appendix: Appendix 4 – Documents)*. The specific comments/queries from the judges in regards to my design, at that time called 'Light animated Hypersurface', were answered in a separate sheet and sent with the reviewed plans to the organizers.

In this second round the design could not achieve any further improvements and did not make it to the top three of the competition.

In feedback from the judges, one of the main reasons of not finishing in a higher position was highlighted by the judges' second 'special' comment in regards to production costs.

Due to not having an existing product/LED stick and only a very limited budget provided by the organisers to build the street furniture it was difficult to respond to this comment in a convincing way. All other responses in regards to the design considered the concerns of the organisers and provided them with a rational explanation as to how the design could be altered. The responses of the jury have been attached at Chapter 6 Appendix: Appendix 4 – Documents.

[4.] P3 / ISEA 2006 Conference San Diego, USA

[4.1] Introduction

Due to cost and realisation concerns of the organizers as a result of the last experiment when applying the system with a designed media content the next step will be applying the system without using the LED sticks. With this step the possibilities of applying the system without major cost for the further development of the LED stick should be investigated. Therefore the function of the LED stick will be taken over by a back projection and 3D glasses similar to the VR (virtual reality) centre located in Building 91 RMIT City Campus or the IMAX cinema. This step will reduce the costs for the hardware and works with existing products available on the market. This will be applied on the call for invitation by the ISEA 2006 Symposium and ZeroOne San Jose: A Global Festival of Art on the Edge, for groups and individuals to submit proposals for exhibition of interactive artworks and projects reflecting on the thematic of the Pacific Rim. The organizers seek proposals that address, but are not limited to, art works that emphasize radical and alternative responses to contemporary cultural conditions throughout the Pacific Rim. They want to encourage proposals specifically from emerging artists. Of particular interest are projects that focus on engagements and interaction strategies with Diaspora communities as well as works that enable new discourses, platforms and explorations.

As the Pacific Rim contains a cross cultured population, the competition appeared like a possible experiment field for the designed media content - a design that shifts authorship from mono-culture to cross cultured design and functions as a cultural-sociological focus point.

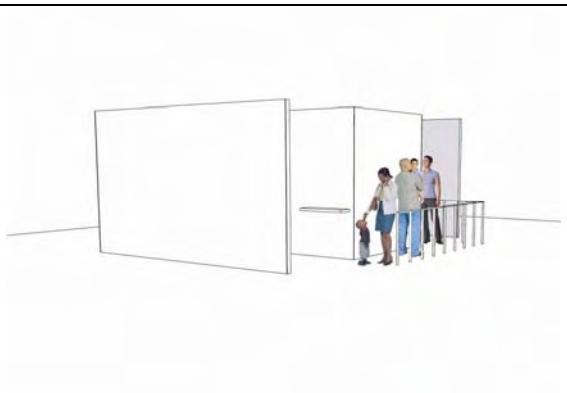
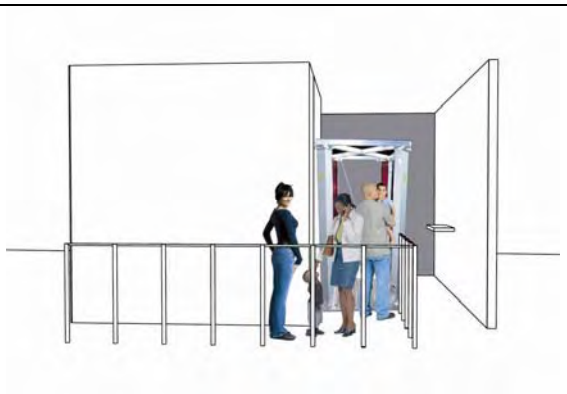
[4.2] Design of art Installation

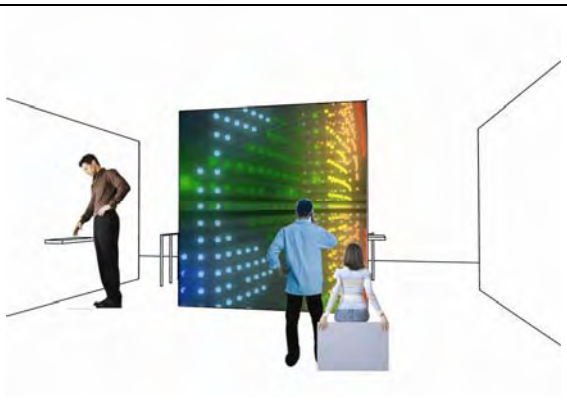
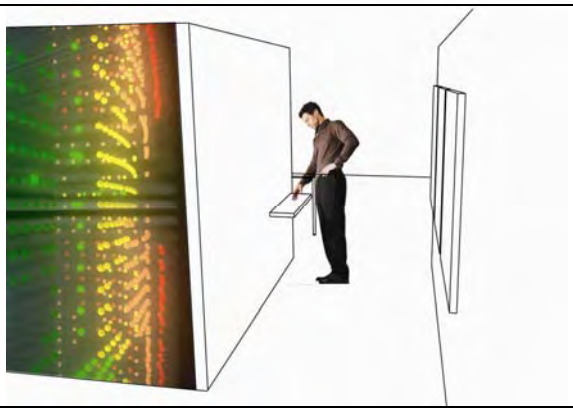
[4.2.1] Plans

The plans show, attached in Chapter 6 Appendix: Appendix 1 – Plans, the set up of the installation.

[4.2.2]
Description
Installation

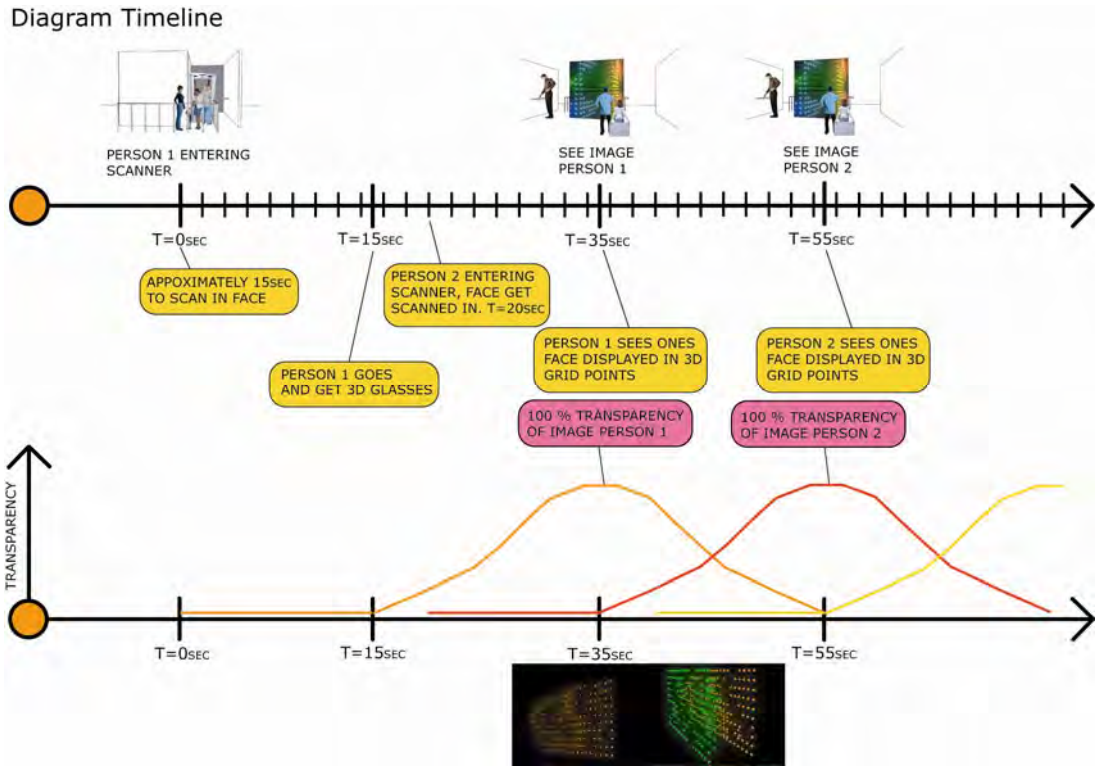
The Installations Hardware (3D bodyscanner, Computer and 3D Projector) will be located in one temporary room with the approximate size of 35 square metres. Following table is an explanation of how the installation will be used to give the organizers of the ISEA 2006 conference an idea of the narrative of the installation:

1. Getting to the installation Participants are asked to wait in line if they want to participate in the installation; people which choose not to participate can pass by them and view the installation without being scanned. *(see attached image on the right)*	
2. 3D head scanning Participants enter the 3D head scanner and getting their heads scanned in. This will take a few seconds, for further reference to the timeframe of the installation please have a look at the time line attached to this application. *(see attached image on the right)*	
3. Taking 3D glasses After being scanned in, each visitor can take 3D glasses and enter then the actual installation space. *(see attached image on the right)*	

4. Viewing the installation Viewers are able to see their on facial expression displayed by the mentioned array of light points, projected by the 3D projector. Their image will then after a certain time vanish and will be replaced by the next image produced with the head scan of the next person. *(see attached image on the right)*	
5. Information about the artwork After experiencing the installation the participants can get further background in technical aspects and other details of the installation. *(see attached image on the right)*	
6. Returning 3D glasses Participants are asked to return their 3D glasses to be used by the next participants. *(see attached image on the right)*	

[4.2.3]
Diagram timeline

The diagram below shows the timeline of the installation. When person 1 enters the installation through the 3d head scanner it will take approximately 15 seconds for the scanner to scan the head in. After this time frame the 3D head scanner is empty and ready to use for the next person. Person 1 will continue to pick up the provided 3D glasses, while Person 2 will enter the 3D head scanner. At time T=35 sec. Person 1 will see his/her face displayed as a 3D light point matrix based on the media content explained in Subchapter [1.2.]. Also after T=35 sec. the transparency of ones translation of a human expression into an architectural expression will be displayed with 100% transparency. In the time between T=35 sec. when person 1 sees one image /surface on full transparency to T=55 sec. when person 2 would see one image/surface of human / architectural expression in full transparency an overlapping of both images occurs.



Here two characteristics explained in the Chapter 4 [2.3] can be experienced. The first is a multilayered surface when at approximately T=45 sec. both images are visible and

will be overlapping each other. The second is a decay of a surface or image, e.g. the one of person 1 between time T= 15sec. till T= 55 sec. when the surface will have 0% transparency at time T= 15 sec. and 100% at T=35 sec. and then going back to 0% transparency at time T= 55 sec.

[4.2.3]

Technical description

The system contains three major items, the Hardware (3D bodyscanner, Computer and 3D Projector) and the Software that runs the system.

Firstly, with a 3D bodyscanner, e.g. the Vitrus ahead – 3D head scanner © *(see **Fig. 1**)*,

> *"three dimensional scanning is as easy as can be: a person stands in the center of the measuring portal and the laser light sources (which are not harmful for the eyes) are switched on. […] A few seconds later, the necessary data is collected. A so-called '3D point cloud with colour overlay' composed of several million 3D measuring points has been generated. A virtual duplicate of the person has been created with maximum precision. Due to its high resolution the 3D head scanner VITUS ahead is able to scan even delicate details of the face. The products generated with the scanned 3D data show an amazing similarity to the real object (see Image 2). The non-contact measurement is carried out by 8 triangulation cameras with a resolution of approx. 1 mm within less than 10 seconds. […] The data can be used for animations as well as for medical purposes."*[i]

Regarding information from the manufacturer, the first format of the so-called '3D point cloud' is an ASCII format that can be translated into different 3D modelling formats such as *.STL, *.OBJ, *.VRML. These are common file extensions for 3D model programs such as Rhino, 3DMax and others. The before mentioned programs are all able to work with scripts and are therefore able to take the data from the '3D point cloud', point by point with the exact coordinates for each point as a X,Y,Z value.

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[i] http://www.vitus.de/english/

Fig. 1: *Vitrus ahead – 3D head scanner*

Fig. 2: *3D model of scanned head*

Secondly, software called Open Scene Graphic will, in combination with a BATCH file, split the image into three to create the 3D effect, providing a format that can be displayed with a projector.

Thirdly, the hardware component 3D projector, here a projector like the InFocus™DepthQ™ 3D Video Projector, will be used for creating a 3D image. The InFocus™DepthQ™ 3D video projector is a lightweight single lens video projector capable of achieving true output frame rates of 120Hz. When used with a stereoscopic 3D image source and liquid crystal "3D" shutter glasses, InFocus™DepthQ™ will provide a stereo 3D experience *(see **Fig. 3**)*.

Fig. 3: *InFocus™DepthQ™, a projector which can be used for 3D projection*

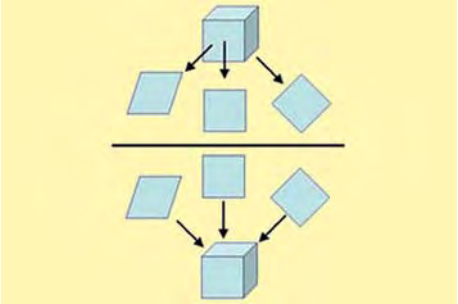

Fig. 4: *Principle of how a back projection works, the black line in the center is the projection plane*

The projector creates a 3D image by using a process called back projection. As its name implies, back projection is the inverse function of projection. When an n-dimensional object is projected, each projection is an n-1 dimensional sum of its density along with the projection axis. Therefore, a sphere would have circles as its projections. A cube, on the other hand, would produce squares, diamonds or other intermediate parallelograms *(see **Fig. 4** top)* depending on the direction of projection. The actual shape, of course, depends on the orientation from which the projection was made. The reverse function *(see **Fig. 4** bottom)* is called back projection and regenerates the original object.
Since a projection can be thought of as a "squishing" of the object, back projection is then the "smearing" of the projections back onto each other. The sum of the back-projected projections regenerates the original object. In the example above, a cube generated different parallelograms in projection. The image gets projected onto a transparent surface that functions as a medium in between the two projections.

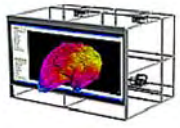

Fig. 5: *set up back projection with the projectors at the back and the projection plan in the front, the coloured image in the center represents the 3D projection*

For further information about the products see following two homepages:

www.vitronic.com - for the 3D Head scanner

http://www.depthq.com/ - for the 3D projector

[4.3]
Result

The art installation was not accepted by the organisers, and unfortunately this proposal as well as in the first paper written for the UNESCO Digital Art Award, no results were provided. Therefore a reflection and evaluation based on thoughts and feedback by others has not been possible.

Nevertheless the project should be reflected on to investigate weak points when realising the project.

The project contained two elements which were crucial for the success of the project. The hardware, in this case the back projector and the 3D head scanner, and the software that would recognise the emotion expressed and then translate these into an architectural expression.

When looking at the hardware, the back projector should not have been a problem due to being a wide spread technology easy to access and purchasable off the shelf at any media rental company. An organiser focused on the development of digital arts should have heard and be aware of this technology. The 3D head scanner is certainly a technology not as common as a projector, though despite this the submitted information should have been adequate to gain an understanding of the technology and how it would work. Also the spatial arrangement of the 3D head scanner and projector was explained and did not contain any difficulties. Financial constraints could have been one reason for the lack of success as the submitted financial proposal asked for high financial participation of the organizers.

But the main issue would have been when dealing with software issues. The software required for the project does not yet exist and the paper could probably not convince the organizers of the possibility of developing a software that would recognise 3D data of a head in regards to emotion. This software would then focus on certain parts of the face and then display/represent these parts in the form of a certain colour, as seen at D-tower project in Doetinchem, and form of the surface due to the spatial arrangement of muscles on a face. Here a research conducted by others was found that proved the existence of software that will capture emotions from a 2D image. The NewScientist.com news service published on 17 December 2005 the following article

that discussed the possibility of recognizing human emotions just by looking at photographs or videos:

> ***"Software decodes Mona Lisa's enigmatic smile***
>
> - *17 December 2005*
> - *NewScientist.com news service*
>
> *It's official: Leonardo da Vinci's Mona Lisa was 83 per cent happy, 9 per cent disgusted, 6 per cent fearful and 2 per cent angry.*
>
> *Nicu Sebe at the University of Amsterdam in the Netherlands tested emotion-recognition software on the famous enigmatic smile. His algorithm, developed with researchers at the Beckman Institute at the University of Illinois, Urbana-Champaign, examines key facial features such as the curvature of the lips and crinkles around the eyes, then scores each face with respect to six basic emotions. Sebe drew on a database of young female faces to derive an average "neutral" expression, which the software used as a standard to compare the painting against.*
>
> *Software capable of recognizing human emotions just by looking at photographs or videos could lead to PCs that adjust their response depending on the user's mood, as well as smarter surveillance systems."*[11]

This software could be used as a component when writing a code for software that could fulfill the required task of recognizing the emotion of a 3D scanned face. As the above mentioned publication was in mid December 2005 the proposal for the ISEA conference had already been submitted and the development could not be considered. As a conclusion of the result a need for developing appropriate software to deliver media content seems essential. This will be the main issue to be considered when working as a curator for different media contents where one, a designer or artist, would have expectations in having a tool provided that would deliver ones media content.

[5.] P3 / Conclusion of Project 3: Effect and use – providing a media content

[5.1] Introduction

The third project has shown three different experiments in how a designed media content could be applied to different tasks. Due to the nature of the designed media content all three experiments had a cross-culture focus and all three experiments were chosen because they allowed the possibility of using the media content.

With the first experiment, the entry to the UNESCO Digital Arts Award, a theoretical frame work was defined when submitting the conference paper. This paper was then used as the basis for translating the design from a theoretical stage to a practical application, using the idea and also the designed Spatial Dynamic Media System to create a host for the media content where the media content could be displayed.

This development then found an application in the second experiment, the entry for the Design competition Vivocity in Singapore. Not only could the media content be tested in this experiment, but also the system LED stick, through designing a box covered with the system and dealing with certain problems when using the LED sticks, and therefore having feedback on the design of the LED sticks. This has been a valuable experience for my research - seeing the designed media content as an opportunity to test the system again in light of the possibility of the design being installed and applied in a built environment.

The third experiment could then focus itself mainly towards the media content and not the system as such. Here, different characteristics of the spatial dynamic media system were applied in combination with the media content. This experiment also worked out most of the issues of realising an installation of the media content, by investigating all required hardware and to a certain extent the software. The software as a topic and its importance will be discussed further in the next chapter.

When evaluating Project 3 one conclusion can be made. It has been possible to design a space by a new form of design input. Even if it has been only one of many possible design options applicable for the system, the introduced media content of a relation between human and architectural expression has been possible only in its presented way when using a spatial dynamic media system. Other systems which work in a similar

field of shifting architecture towards an alloplastic, a concept introduced in the Chapter 3 [2.] would have been able to present the human expression only in either a spatial way, by altering space similar to movement of facial muscles, or by a change of colours to express emotions through the use of different colours. A transition from one human expression to another as explained in Chapter 4 Project 3 [4.2.4] *Diagram timeline* would also not have been possible.
The media content furthermore has included some of the particularities of the spatial dynamic media system, such as the decay function or a multilayered surface and could show here, with the design how the media content could be augmented through the system.

[5.2]
Step toward Project 4

The last of the three experiments, delivering an artwork for the ISEA conference 2006, has shown that one of the reasons why the applications has not been successful could be found in the lack of a provided and tested software. Having used mainly off the shelf hardware applications such as 3D head scanner and a back projector the software was the critical point where the realisation of the proposal failed.
When working as a curator for different media contents a lack of software will become an issue. Here certain considerations must be made as to what kind of media content could be provided by an artist or designer and what kind of creative input of a designer there could be.
These questions can be answered when working together with one artist or a group of designers through talking about their work and the requirements necessary to display their ideas with my researched system. Another option could be the provision of different softwares which would allow artists and designers to investigate the possibilities of a spatial dynamic media system.
Therefore different fields could be looked at, such as what input the system could receive to then transform this input into a spatial arrangement.
As a starting point a code should be developed that allows the display of any data collected by a sensor, such as temperature, wind speed, sound or other data. All these data have one thing in common, they all can be stored and analysed in a program.

Mostly the results will be captured and compared against each other, e.g. the temperature of a certain space or area over a period of time. A program able to process these data calculations is the Excel program provided by WINDOWS. The variety of data could be big, but they will ultimately provide all numbers which are fed into an Excel data sheet and from there be transformed with a code and then displayed in a three dimensional array.

Another code could look into the translation of images, pictures and movie clips into a spatial arrangement to investigate the possibilities of transforming the moving aspect of an object in a movie into a movement of a surface. Here for example a certain RGB value or black and white value could be connected to a spatial position in a third dimension, so the image becomes distorted not in a way that it would represent a three-dimensional image but a translation of the 2D image through a chosen parameter into a 3D form.

The above mentioned two examples should then offer the particularities of a spatial dynamic media system. They have been connected with media content in Subchapter [4.] in this project but should now be integrated as an option of the software. This collection of different codes should give my research the possibility to demonstrate what spaces could be delivered with the system.

[1] Bergson, Henri, *An introduction to Metaphysics*, (New York: The Liberal Arts Press, Second Edition, 1955), Page 21.

[2] Ibid., p. 23

[3] Allman, William F., *The stone age present, how evolution has shaped modern life – from sex, violence, and language to emotions, morals, and communities*, (New York: Simon & Schuster, 1994), p. 94.

[4] Ibid., pp. 94-95

[5] Ibid., pp. 116-117

[6] Giuseppa, Di Cristina (ed.), *Architecture and Science*, (Chichester: Wiley-Academy, 2001.

[7] http://www.nabi.or.kr/unesco_award, (accessed August 2005).

[8] Bergson, Henri, *An introduction to Metaphysics*, (New York: The Liberal Arts Press, Second Edition, 1955), p. 21.

[9] Allman, William F., *The stone age present, how evolution has shaped modern life – from sex, violence, and language to emotions, morals, and communities*, (New York: Simon & Schuster, 1994),, pp. 94-95

[10] Bao Ying, Ng. 'New retail space VivoCity to combine art, commerce', in: Channel NewsAsia, (28.3.2006), http://www.channelnewsasia.com/stories/singaporelocalnews/view/200318/1/.html, (accessed June 2006).

[11] http://www.newscientist.com/article.ns?id=mg18825305.200, (accessed January 2006).