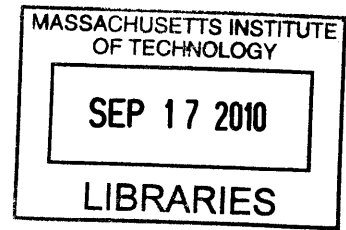


Prosthetic Space Created by Material Weave

By

Soohyun Chang



Submitted to the Department of Architecture

For the degree of

Bachelor of Science and Design

at the

Massachusetts Institute of Technology

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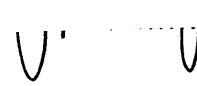
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1. Abstract

The thesis is based on physical interactivity between a user's physical body and the built environment. The relationship between body and architecture is challenged by the demands and desires for adaptability and interactivity, however material and construction methods of architecture have changed little to address these concerns. By allowing the user to become an instigator and an active controller for organizing space and program. Architectural elements are enabled with flexibility and mutability, in terms of its skin and program, which are activated by the user. The first investigation explores three joints within the body and documents, analyses and transforms these joints into an architectural abstraction. Then the concept of collapsed and interactive skin is applied to a design proposal for the façade for the Art Interactive Gallery. The façade engages pedestrians visually as well as physically. The final component of the thesis redefines the program of a fitting room as a physically transformable and socially interactive façade condition activated by the body's own movements. Throughout the research, the thesis has focused on the process of manipulating materials to create composite skin and structural conditions to further investigate the relationship between the body and architecture.

Thesis Supervisor: J. Meejin Yoon

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Prosthetic Space:

is a space and a program created by a user's bodily operations,
is also a design process where the built element gives rises to flexible skin condition and
adaptable program enabled by kinematics of structure

Chapter 2

Introduction

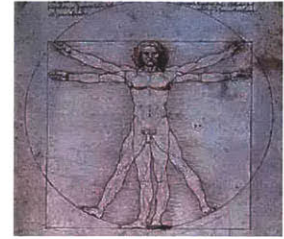
2-1. Background of Incorporated Spaces

In Latin, the word *incorporation* translates as “to bring within a body (*corpus*).”¹ If applied to architecture, the meaning of the term challenges conventional perception of human body as mere occupant in a space. Instead the body can be regarded as active controller of the space and inspiration of design processes. Previously the human body has provided mathematical, sociological, as well as aesthetic datum for designing spaces and objects in architecture since the ancient Greeks. The evolution of how the idea of human body incorporates into architecture can be categorized in three aspects. At first, the body represents the essence of mathematical proportion in nature. Second, the body becomes a source for deriving architectural forms. Third, and most provokingly, the body organs and their mechanism act as functional metaphor of a

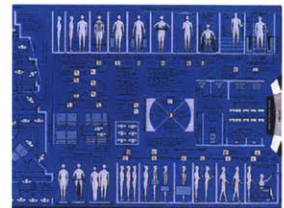
Early application of body's natural proportion to architectural philosophy dates back to Marcus 's Vitruvius in 25 BC. In one of his ten volumes *De Architectura*, he initiated a discussion of a human body relating to the geometrical properties. The Book III briefly describes the man's navel as the center of all limb extensions allowing the entire body to be inscribed in either a circle or a square. Then Leonardo Da Vinci's sketch of Vitruvius Man simplifies this description into a diagram where the circle, square, and a male body compose a geometrical balance together. In the sketch, a physical human body represents the beauty in accordance with geometrical symmetry and proportions. The sketch became the symbol for 17th century Renaissance architects and artist, who incorporated those body proportions into building tectonic. ²

During the late 20th century, a group of experiments sought from the human body a motivation for creating architectural form. Molded plywood experiments and production of the Fiberglass Chairs by Charles and Ray Eames (1941-1942) transfers the body's exact shape in negative space to the design of furniture. In the process of production, a person's sitting position is directly transferred to the surface of different materials, such as wood or fiberglass rendering imprints of those poses. On a more conceptual level, Greg Lynn applies the shape of woman's womb to organize programs of housing units in the project called Embryologic Houses.³ Differing from Ray and Charles Eames's tactile approach, the formal characteristics of womb are processed as diagrams then materialized into the shape of each living unit.

The most provocative incorporation in architecture was established by the architects of 1920s, who considered the human body as a functional metaphor for a building. Le Corbusier, with Amedee Ozenfant, pursued



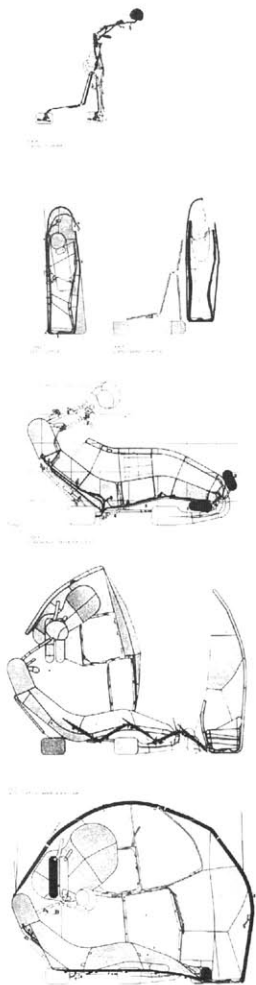
Vitruvius Man, Sketch by Leonardo Da Vinci to describe description from Marcus Vitruvius, *De Architectura*, Book III, Chapter 1, p 3



analysis of human body dimensions for required space dimensions. *Human Scale 7/8/9*



Greg Lynn's *Embriological Houses*, 2001



Michael Webb's *Cushicle*, 1966 in the *Archigram*

specific notion of “*object-types*, imagined as extensions of the human body or substituted organs.”⁴ Le Corbusier proclaimed “buildings as machines,” reflecting his endeavor to draw parallelism between the functions of organs, the mechanism of machines, and the organization of program in a building. Rising from this inspiring idea, Michael Webb introduced project *Cushicle* in 1966 in *Archigram* as a theoretical experimentation where specific boundary of body parts determines functional boundary of a tight nomadic lodging unit. A user carries the *Cushicle* on his back while traveling and inflates it while settled in a certain location. At any moment of the nomadic life, there is an inseparable intimacy between the *Cushicle* unit and the user’s body. The most outstanding aspect of *Cushicle*’s inventiveness is that the program or functionality adapts to the user’s different needs at different times facilitated by simple mechanism that imitates the bodily mechanism.

Based on the previous three aspects of how the human body interacts with architecture, the thesis suggests a new relation now based on the demands of interactivity, adaptability, and mutability in contemporary architecture.

2-2. Problem

The history of architecture is a story of juncture and disjuncture between the body and the built environment. The aforementioned three cases are moments in architectural history when a user, the human body, is inspiration for the design, as opposed to the entirety of a physical building dictates overall program. However, limited by method constructions and inflexible materials, the idea of incorporating the body to architecture has remained only at a metaphorical level and hardly materialized to a physical scale.

The issue of body-to-architecture emerges as the contemporary demand for adaptability

and interactivity increases. At the same time however, development of material and construction method of architecture tends to stay more conveniently with preexisting technology. However, if one obtains perceptions that the design of architectural space as a product of bodily operations and mechanism, then the ultimate solution for those demands can be realized much more easily. According to this new perception, user is considered an instigator and an active controller to organize space and program around him. Meanwhile built elements retain the characteristic of flexibility and mutability in a specifically predefined manner to be activated by the user. To connect the user and the built elements, at first boundary of operating spaces and secondly the quality of skin and thirdly the material incorporated should be the crucial design criteria.

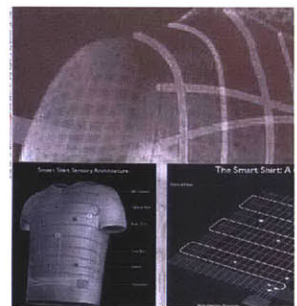
2.3. Prosthetic Space, the definition and application

The idea of prosthetics was chosen to prescribe this thesis because its purpose, process of production, and materials can be directly applied to architectural design. Compared to treating the body as a metaphorical tool, investigating prosthetics enables one to think in terms of the physical methodology and literal incorporation of body.

A prosthetics has several purposes. Usually prosthetic products are understood as *replacement* of an element that has been lost or injured whether it is a prosthetic arms, legs, or even skin. Recently prosthetics expanded its functions from the singular purpose of simple repair and replacement. It is now a method of *extending* normal body parts, mostly in an additive manner, such as in plastic surgeries of breast, lengthening leg bones, or adding a nose bone. This aspect of prosthetics emerged interestingly as a byproduct of desire from our visual culture. The desire of prosthetics can be further interpreted as *containment* in that these additive elements starts to completely cover and enclose the



performance of the artist, Stelarc, *The Third Hand*



Smart Shirt with fiberglass sensors woven in to detect health status



My Real Baby by IS Robotics

individual body. In this sense, armors and spacesuits likewise belong in the categories of prosthetics since they directly engage with the shape and operation of the body. Furthermore, research in robotics and cyborgs reached a point where their products are now considered next generation of human body⁵ but with better shape and functionality and - imaginatively- with better intelligence even. In this case, another purpose of prosthetics would be to *improve* the preexisting.

In this thesis, prosthetics is a combination of *containment* and *extension* that seeks for *improvement of preexisting*. The design of *prosthetic space* is therefore a product of extending the specific kinematics and functions of the entire body to create architectural space.

Prosthetic Space incorporates the human body in two aspects.

1. Programs of the architectural design are determined by adaptability and mutability of body mechanism, and structure is strengthened by that mechanism.
2. The condition of interface between private and public is based on the characteristics of human skin, which maintains its life by reacting and interacting to exterior stimuli.

Notes

¹ *Flesh*, Elizabeth Diller and Ricardo Scofidio

² <http://leonardodavinci.stanford.edu/submissions/clabaugh/history/leonardo.html>

³ *Contemporary Process in Architecture*, issue 2001

⁴ *Flesh*, Diller + Scofidio

⁵ *Mind Children*, Moravec, Hans P.

⁶ *Cyborg*, Marie O'Mahony

Chapter 3

Method and Design

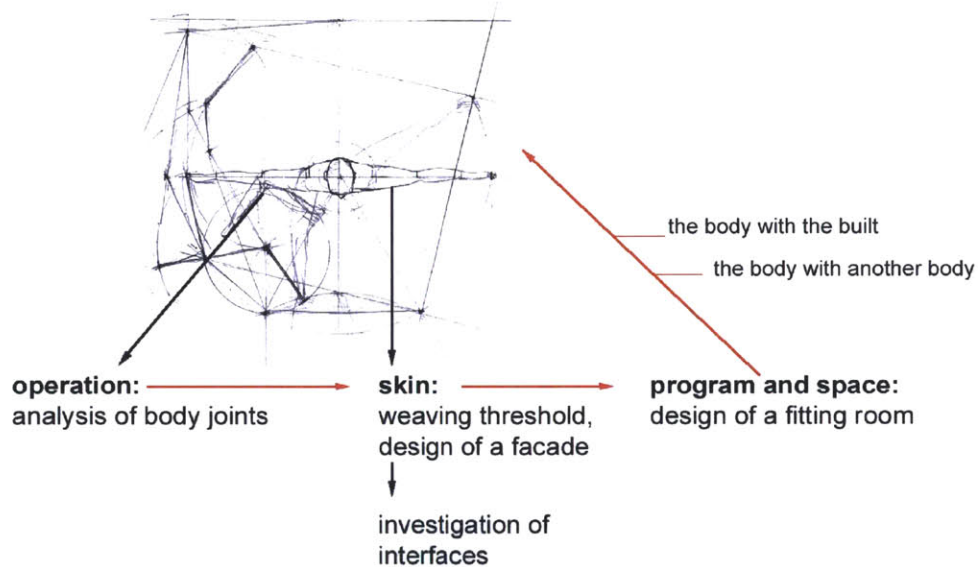


diagram 01. Structure of the method and design

3-0. Statement of argument and methodological issues

Design of a prosthetic space involves at first the investigation of physical human body itself. From that point, a certain aspect of the bodily operation can be abstracted into architectural language. The experiment starts with studying and analyzing three types of body joints (3-1). Abstraction of these joints develops to become the structural logic of a skin condition. By incorporating this logic kinematics into a condition of surface, the next chapter proposes a design for the façade for an art gallery (3-2). Then the next chapter further expands research on the interface condition inherent in conventional examples and draws diagrams and graphs of the interactivity level (3-3). At the end, the accumulated knowledge of the previous chapters materialize through a design of a fitting room that concludes the relationship between the body and the built as well as the body and another body in a prosthetic space. The diagram below describes non-linear structure of the following chapters. Black arrows represent analytical processes whereas the red arrows signify design processes.

3-1. Analysis of Body Joints

Since prosthetics is a derivation from a pre-existing body, it is essential to investigate the body itself to begin with. The first exercise analyzes body joints in order to understand them as a composite of the structural skeleton and elastic muscles, which produce precisely predefined movements. Three types of joints at elbow, shoulder, and hip, are chosen here because each of these joints perform distinct properties of operation. The elbow joint, for instance, combines hinging of upper and lower arm as well as rotating of lower arm pivoted at the elbow. Although these two movements occur at the same location of the bone junction, each mechanism remains independent of each other allowing a maximum number of possible poses.

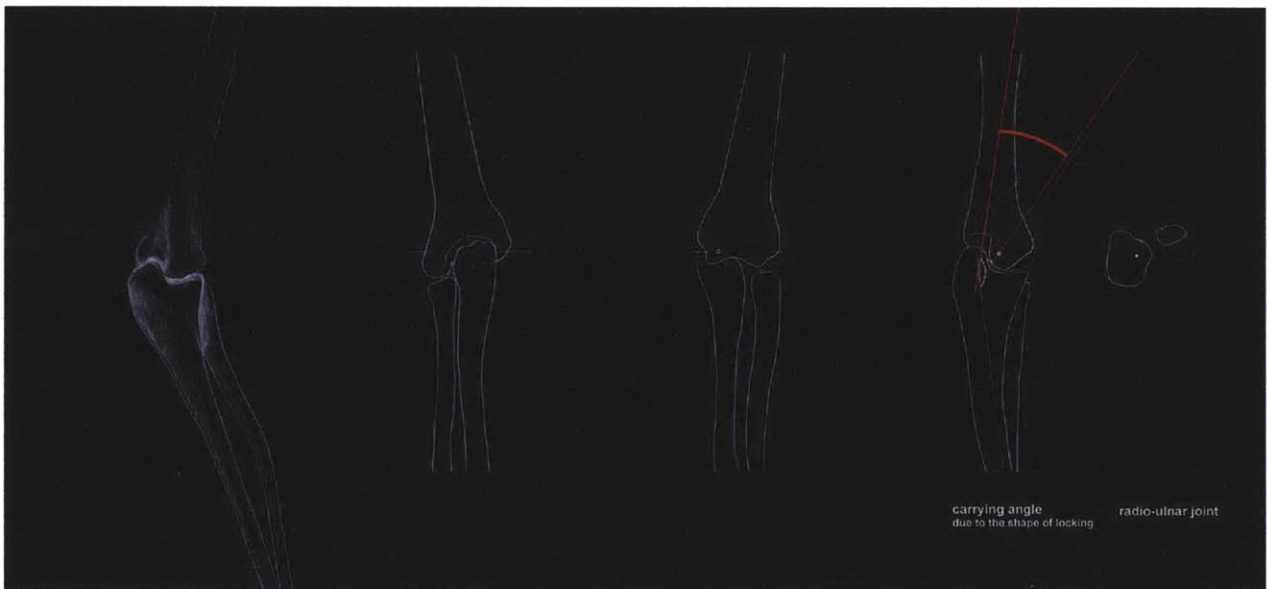


diagram 02. drawing of the elbow joint

The shoulder is another interesting joint in that its seemingly free movements are in fact composed of different phases that engage the shoulder blade and the upper arm bones in a different manner. The locations and shapes of shoulder blade creates a procedural lock at the clavicle (collar bone), where if one raises the arm 180 degrees, only the upper arm bone moves at the first 120 degrees and then the shoulder blade locks with the upper arm bone and moves together for the rest of 60 degree's rotation.

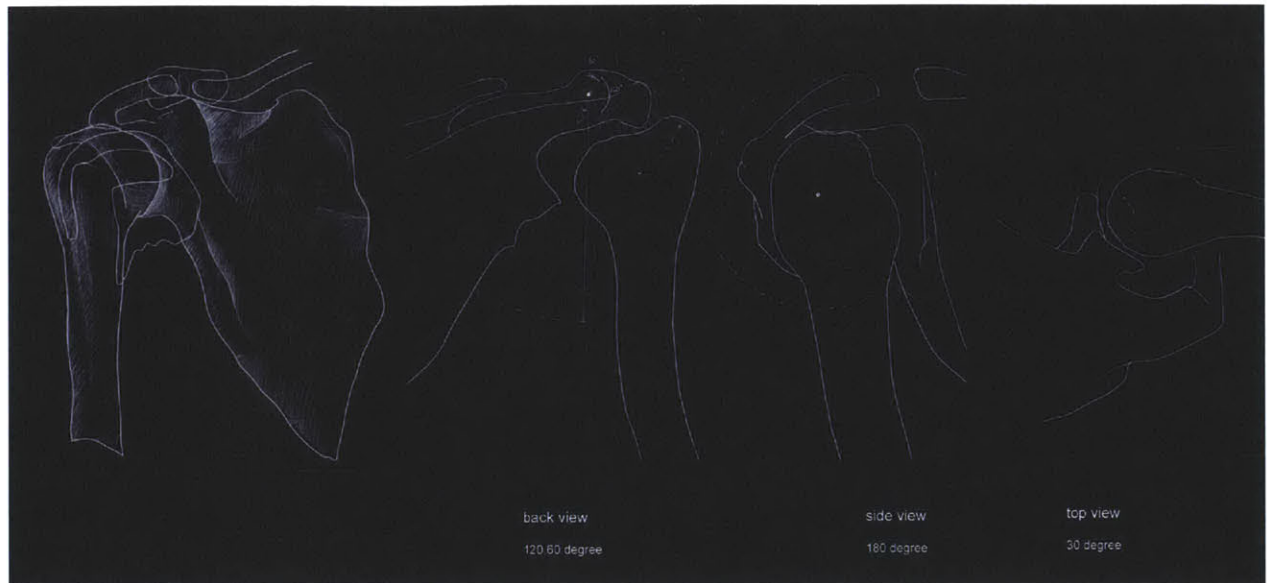


diagram 03. drawing of the shoulder joint

Lastly the hip joint connects two biggest skeletons of the body: the upper leg bone to the hipbone. The two parts are connected loosely, allowing most free rotations and hinging in all directions. The drawings describes movement of each joints from front or back, side, and top.

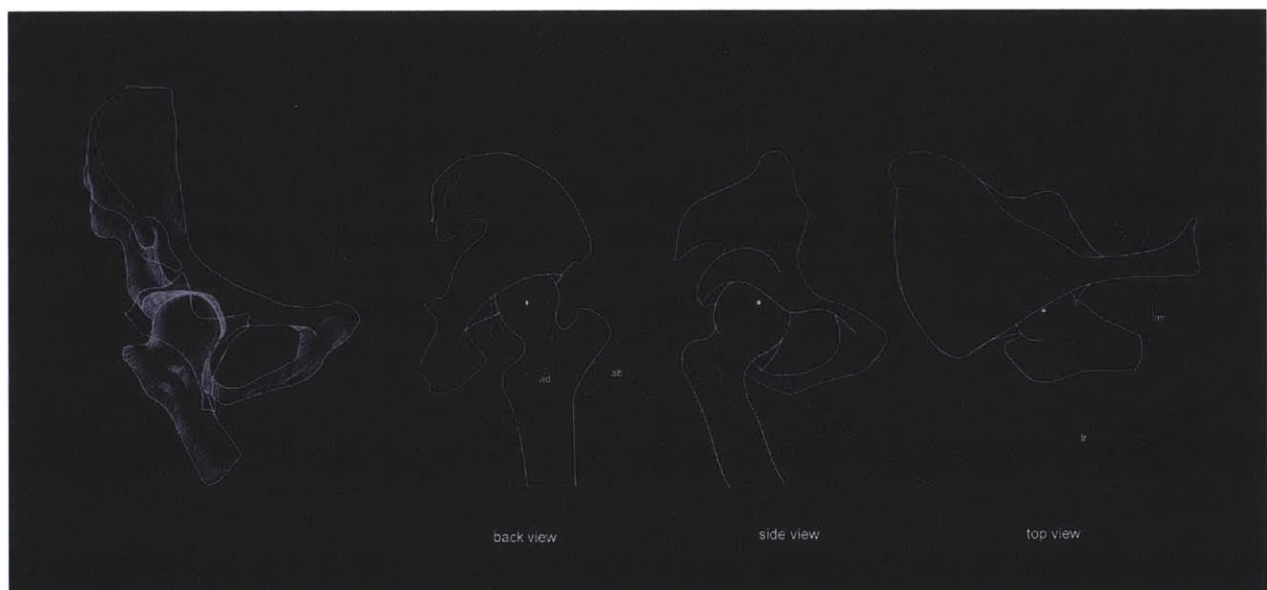


diagram 04. drawing of the hip joint

In the analysis of joints, it becomes evident that a joint does not only allow one action but enables multiple movements due to strategically located pivots and hinge points attached with different magnitude of elasticity. Based on this analysis, three types of representation of the joints are designed using one metal rod and one elastic band. The series of study attempts to simplify the mechanism and find out their essential characteristics. As shown here, the elbow 1 represents movement of two longitudinal planes that trespass each other. The intrusion between upper and lower arm elements produces constantly transforming in-between spaces.

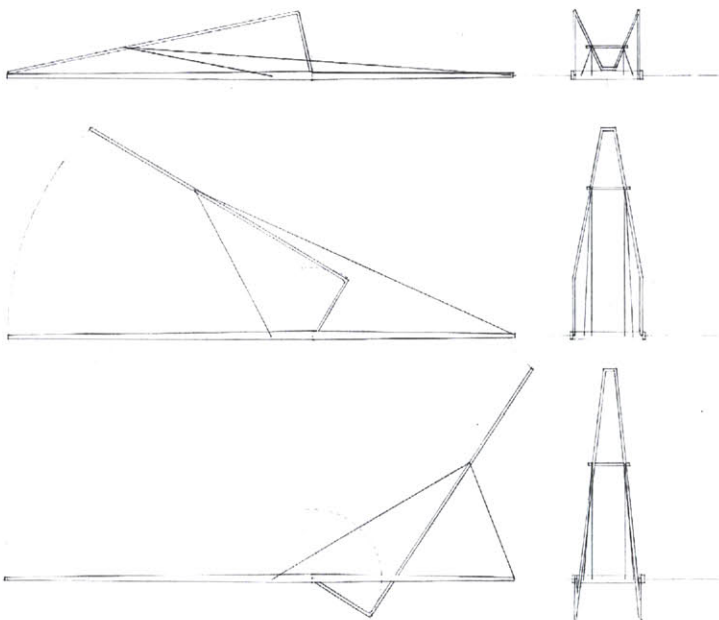
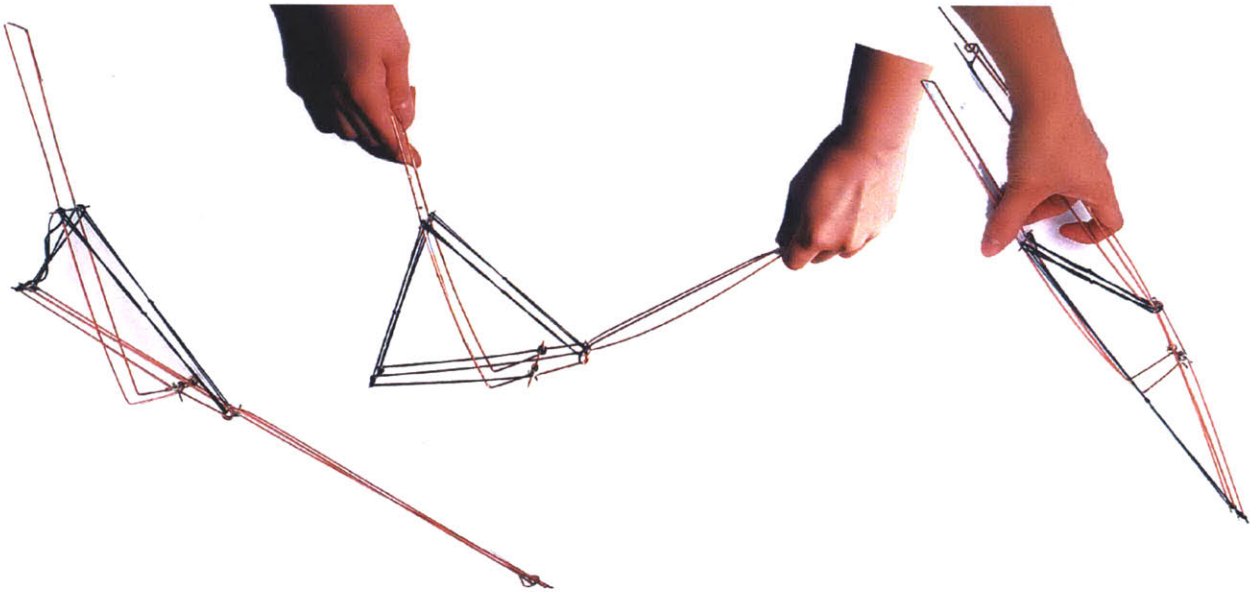


image 01: elbow joint interpretation 1 and its transformation

diagram 05: description of the elbow joint from top and front view

The shoulder 1 extracts the movement of raising an arm that involves two phases of mechanism, one involving no locking and the other involving locking with shoulder blade. At the first phase, elastic tension increases. Then at the second phase, the tension is released to give rotation of the bigger element. This diagrammatic model represents an idea of action and reaction. Increased elasticity between the shoulder blade and the upper arm element causes bigger rotation of the arm element to happen in the opposite direction. The following diagram illustrates movement of each phase restricted at the 60 and 120 degrees of angle.

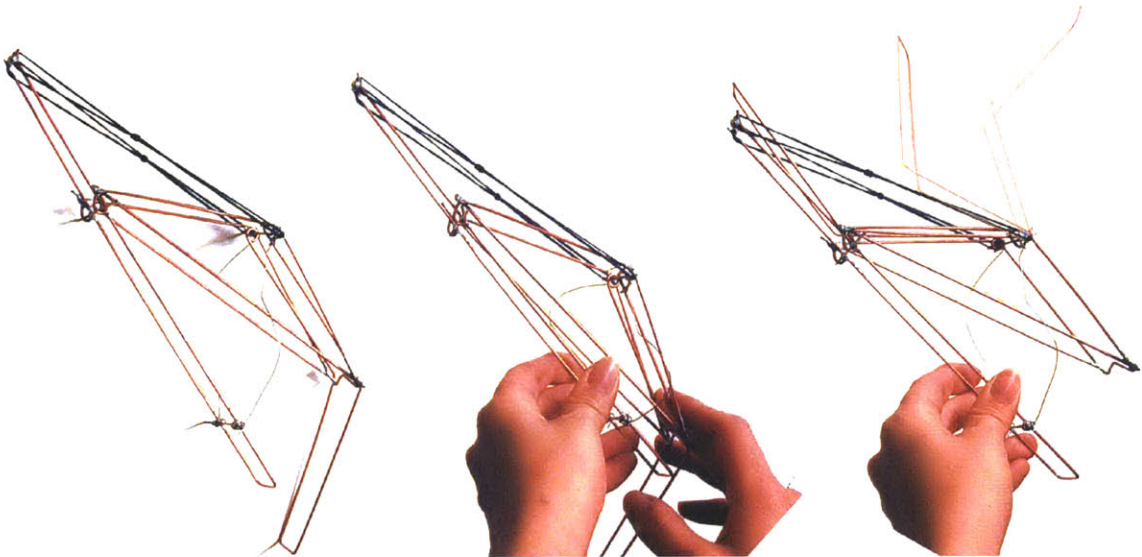
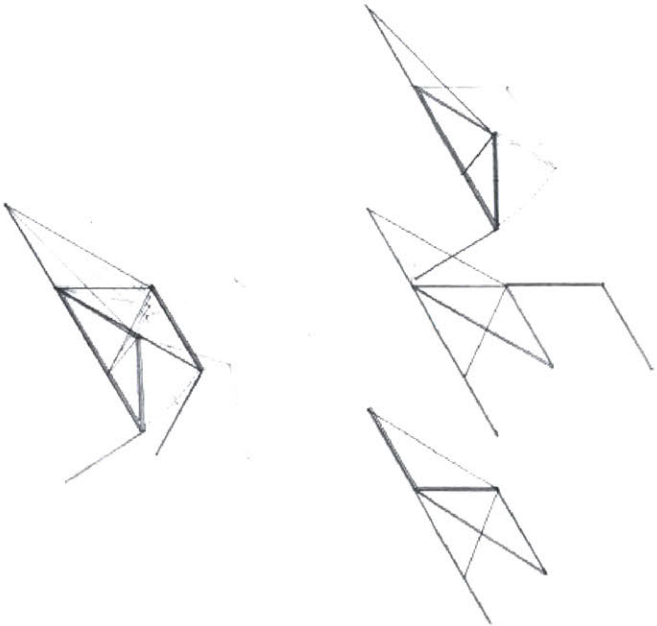


image 02: shoulder joint interpretation1 and its transformation

diagram 06: description of the shoulder joint from top and front view



The Hip 1 is the freest yet the simplest mechanism among the three joint analysis. It displays a concept of a boundary within which a completely free rotation and hinging occurs. Certain parts of the exterior boundary (the pelvis) are bent in to form a space for the leg bone to lock in so that manipulation. The locking allows the boundary to dictate the movement of the leg bone in a specific manner.

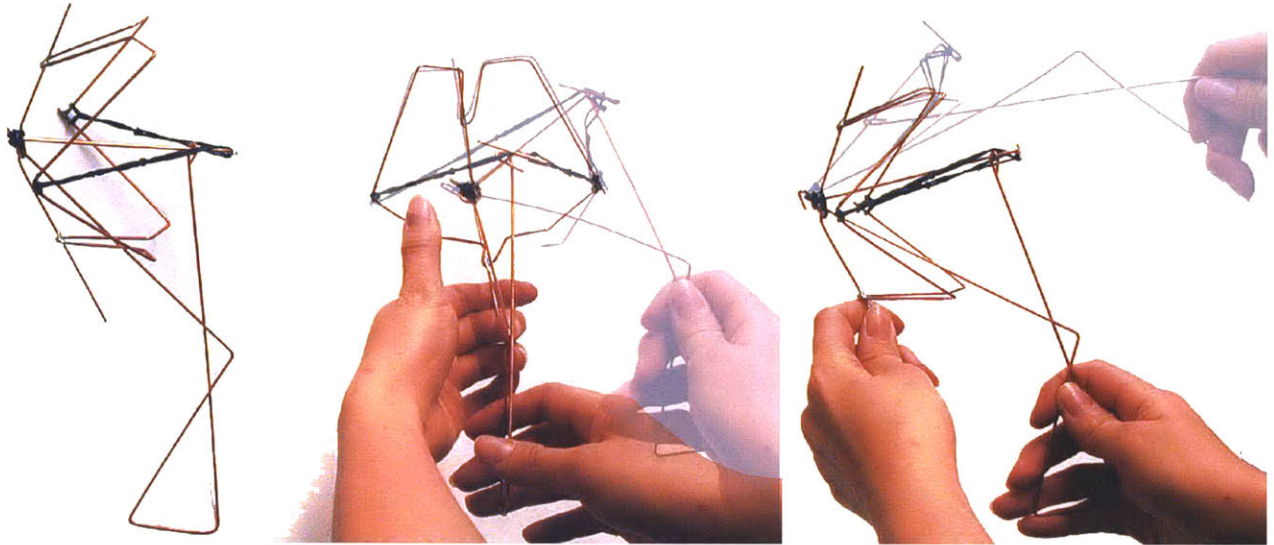
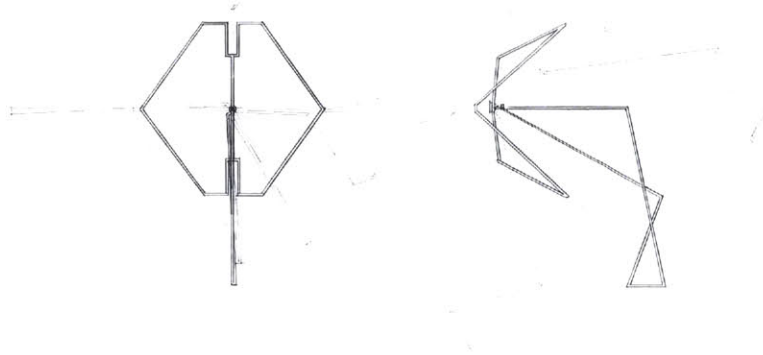


image 03: hip joint interpretation1 and its transformation

diagram 07: description of the hip joint from top and front view



The joints series codifies series of specificity of movements mechanized by concise and accurate location of elastic band and the rod. As a result, these joints define certain conditions of a space where the action causes a predetermined reaction by elasticity. Hip joint signifies the conceptual role of predefined boundary that dictates free movement. These interpretations of joints provide operational tectonic that will be applied to the following architectural applications.

3-2. Weaving Threshold: Composite Mechanism in the Scale of Façade

Intention of the façade

The competition for the Art Interactive Gallery, Cambridge, MA, sought for an idea to redesign its front façade. The intention of the façade is to promote works and projects that diminish the barrier between artists and the spectators, which is the ultimate aim of the Art Interactive Gallery itself. With the operation language obtained from the previous chapter's analysis of the body joints, my design of the façade tries to incorporate activity and reactivity inherent in a human body to an adaptable architecture construct in order to provoke physical and cultural interaction. In order to extend this intention to a larger public, this design proposes a *Weaving Threshold* for the façade of Art Interactive.

There are three issues to be considered in the façade. First is to intrigue the pedestrians and stimulate their inquisitiveness. Secondly the façade should provide rooms for engaging with public, visually as well as physically. Thirdly the exterior of the gallery should introduce details of the exhibits and direct the potential spectators to the correct entrance.

Weaving Threshold is an interactive façade that satisfies these visual and practical requirements. Its attraction lies in its fluidity and interactivity inspired by human skin. The entire façade is a light and flexible surface made out of elastic bands weaving in between steel cables. As one walks from the Prospect Street or Bishop Allen Street, he or she sees the glimpse of a

translucent screen of elastic bands that slightly warps (that are initially tied back to some places on existing wall to create this concave spaces.) The pedestrian is intrigued to touch the surface and realizes that it is as flexible and as dynamic as human skin. As he or she exerts more force on the surface, contrary to expectation, other parts of the façade start to bulge out or get pulled back to create even more warped condition because some elastic bands span across more than one unit of the steel cables.

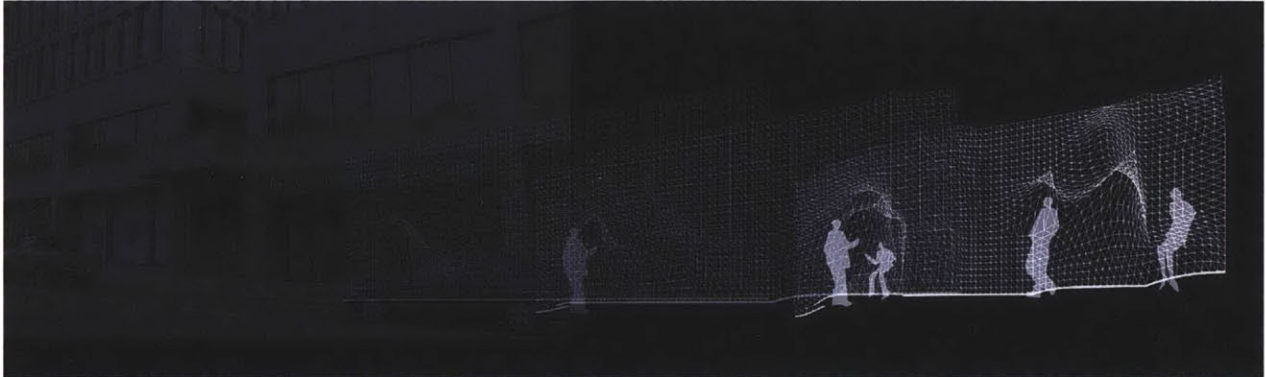


image 04: interactive skin of Art Interactive

User's touching and pushing on the surface changes the density and the concavity of the surface providing spaces to sit in, to lean against, to look through, or to even engage with other pedestrians.

Behind this screen of elastic elements, he or she finds images of art works displayed inside gallery, which are projected to this translucent surface. Following the grain of the façade, one is directed to the Bishop Allen side of the Gallery and finds brochures and publicity materials held in between several straps of the elastic bands. Also the 40 inch plasma screen dynamically displays gallery hours, exhibit contents, and even interviews with the artists. Finally he or she walks into the Gallery to fully enjoy the Art Interactive.



image 05: illustration of how facade physically interacts with the user's body

Construction Method

Construction process involves simply three materials: elastic bands, steel cables and aluminum rods. The steel cables span between the ground and the ceiling on the façade level. The locations of these steel cables in plan are predetermined by the grid of the windows of the existing building, designed by Jose Luis Sert. Once attached, the steel cables act as primary structure on which screens of elastic bands weave through as if cables are warp and the elastic bands are weft of a fabric. The elastic bands could be anything from colorful rubber bands to a simply customized clear plastic rubber, each in length of 25-100 inches. The best possibility for the customized bands is to pour resin on any elastic bands to resist the weathering. Each band horizontally span across the steel cables in all different lengths with about 1-2 inch gap between each other to propagate its contraction or stretch to other steel cables in further distances. Then a few tiebacks - also made out of elastic bands – holds some strands of the elastic bands to the concrete wall behind the façade surface. These create slight warps on the whole surface, inviting people to touch or inhabit. Lastly, some constraints are applied on the overall elastic surface by putting solid rods of different lengths behind/ between the elastic bands. This will maintain more accurate and intended movement of the surface.

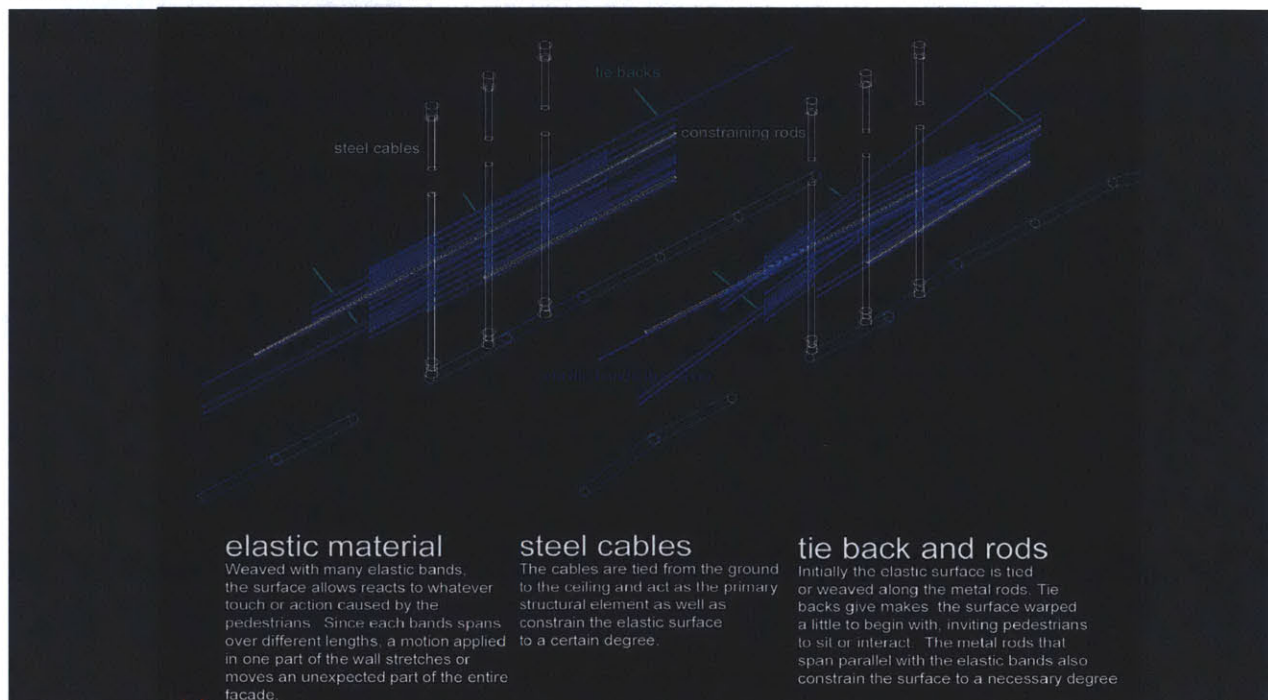


diagram 08: structural elements and logic to construct the facade

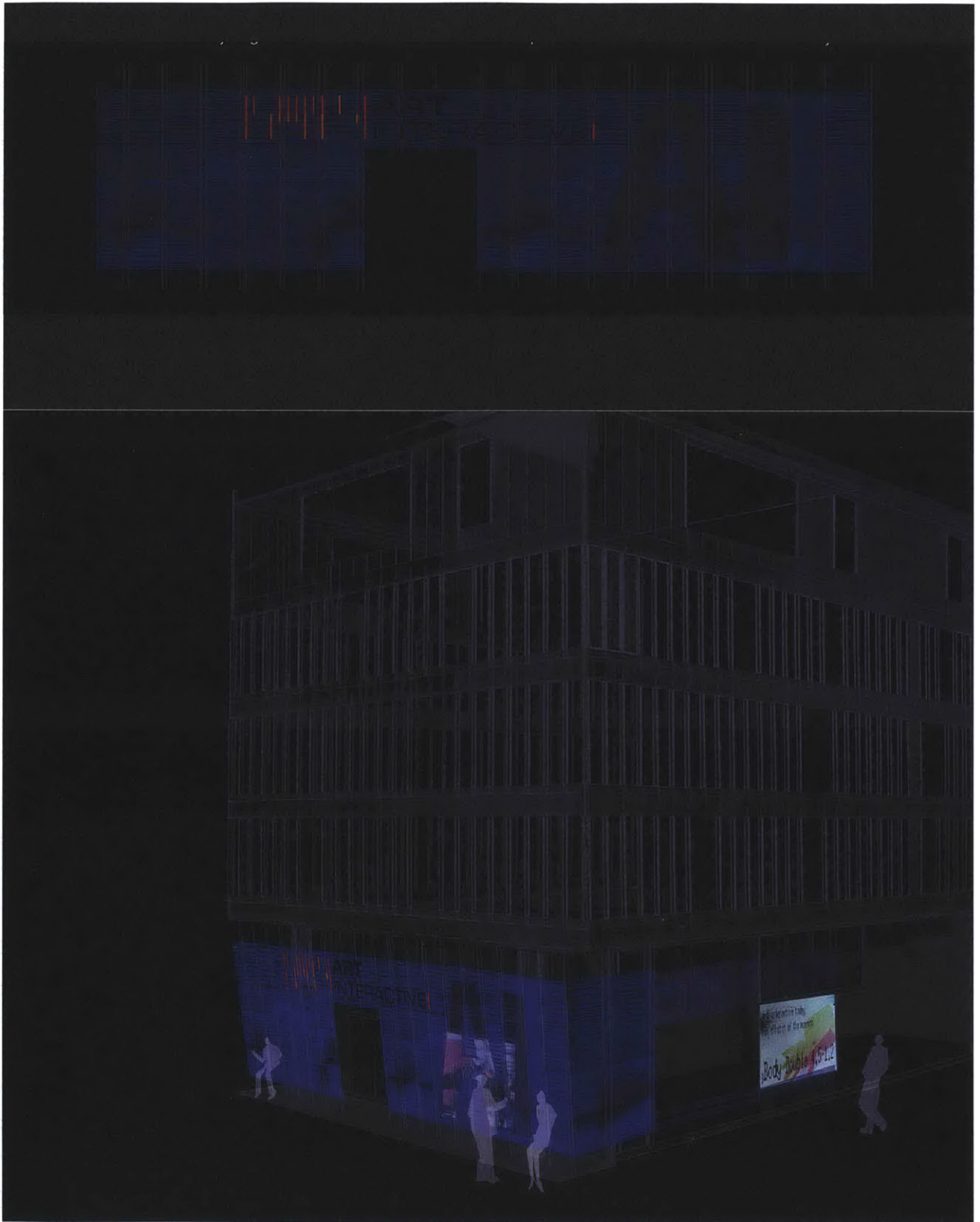


image 07: the final design of the facade, competition entry for the Art Interactive Gallery, April 2003
front and perspectiv view

3-3. Investigation of Other Interface Conditions

After designing the façade for the Art Interactive Gallery, it felt necessary to establish more conceptual foundation for how to define a interface. Interface is defined here as a physical or perceptual surface between two users or activities that dictates the relationship between them. For instance, the screen between confessing room compartments assigns the priest as one who listens and overlooks whereas the confessor remains anonymously subordinate to the priest. By selecting real examples and analyzing them according to one criterion – interactivity level - this chapter seeks for the most optimal factor for a interactive interface.

Interfaces can be more easily understood as the term “borders.” Borders exist in all public and private spaces and prescribes certain activity within it. As much as bathroom compartments cannot be thought without sectioning panels, many public activities in places like internet café, karaoke rooms, or even cabs require different types borders to sustain their self-existence. In our contemporary society especially, more personalized lifestyle encourages individuals to prioritize their privacy. Even when these individuals are fully exposed in a public place, invisible borders exist between them whether they are walking along on the street or facing each other in a subway a few feet away from the other. No one allows invasion of their own private spaces by others’ invisible territory. As cities grow, demand for public spaces and demand for privacy keeps increasing together, and more than often, one ends up in a conflict with the other.

This is where interfaces become critical. By scrutinizing main characteristics of each example of interface and its positive contribution to interactivity between two users, one can better reinvent a new typology of space that provokes the most optimal level of interactivity. The following diagrams list distinct natures of different types of interface. Then each interface is analyzed in term of its visual, audible, and tactile interactivity level within them on the following graphs.

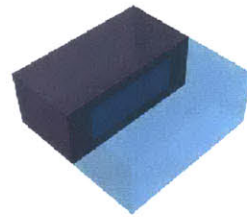
In all diagrams shown on the page the right, the interaction instigated by the interfaces engender a situation where one takes over the role of an actor while the other naturally becomes a reactor. Sometimes these roles flip as the condition of interface changes, yet the balance of action and reaction always remains. In a process of interaction, an interface may provoke invasion of one's privacy and cause a clear hierarchy to emerge between two users. For instance, in an interrogation room, the semi-reflective mirror between interrogators and a suspect allows only one user to have a full exposure to the situation of the other room, clearly giving visual and audible control to the interrogator. The slope of each interactivity graph measures the degree of hierarchy. Steeper slope means more dramatic hierarchy, and more than often that indicates lesser mutual interaction between them.

Another type of interface is the clear plastic barrier in a cab. This type of barrier diminishes hierarchy by minimizing the access between the two users simultaneously. The plastic barrier sustains safety and audible privacy for both passengers and a driver. At the same time, the small money exchange pocket allows the minimally necessary action and reaction between the two users.

In the example of the revolving door, constantly exchange mutual interaction without confronting each other directly. Users share one interaction, which is physical mechanism of rotating the door. While the pivotal column and several layers of glass completely disconnect users in different compartments of the revolving door, they unknowingly co-operate in moving the door with perfectly balanced speed.

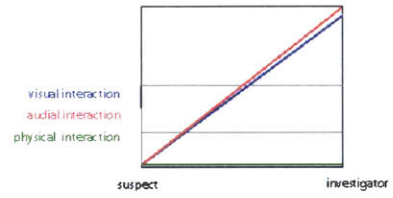
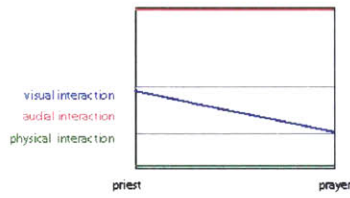
Interfaces, as seen so far, determine level of hierarchy in visual, audible, tactile, and even social interaction depending on the quality of surfaces and mechanisms. The two aspects – quality of the skin and the operation – explored by the study of interfaces can directly contribute to the final design.

If interface spaces can be located at the juncture of public and private realm, could they become borders that encourage dismantling of inadequate interactivity between people? The question may further investigate how an intimate individual activity, such as changing clothes or



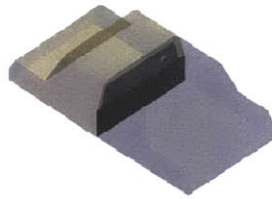
confession rm

interrogation rm



anonymity

analysis



revolving door

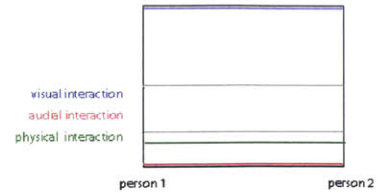
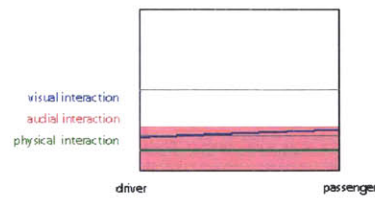


image 09: analysis of interface typology

entering a private compartment, starts to influence other users to engage in social culture. By strategically situating the private activity in the middle of a public audience, the final design proposes a possibility of how borders are reprogrammed to promote interaction as opposed function as mere blockage.

3-4. Alternative Design for a Fitting Room

If the border contains the characteristic of *controlled anonymity* and *mutual operation* between the users, then an interface could encourage interaction as seen in the cases of confession room and the revolving door in the previous chapter's analysis. The final design aims for a constructible surface prototype that provokes interactivity between the body and the architecture by incorporating accumulated knowledge of interface conditions and operational mechanisms. This chapter covers why fitting room is chosen as motivation for the final design and how its program can be redefined. Then the chapter will describe clear intention of the design in terms of the human body inside of the fitting room in relation to the mutable structures and another user outside his or her own boundary. Finally the final models and drawings will display the program and mechanism. The models in particular will demonstrate construction of the prototype based on elasticity of surface and operation of the user.

Program of fitting room allows diverse experimentation on the body-to-architecture relationships within a singular activity of changing clothes. In a conventional fitting room, a user undergoes simple process of undressing, fitting the clothes, and leaving unwanted clothes behind. Within this process, the body of the user simultaneously experiences claiming of a private space at first by closing the door, interaction and adaptation to new skin by fitting into different clothes. Then finally the body reaches a cultural "fitting-in" with newly acquired skin. If one relocates such intimate body activity at the interface between the public and private, the action of fitting starts to expand its conceptual territory. As the fitting room becomes the program of the façade, it is able to engage the process of fitting in many more different levels. First, the primary user starts to fit the body into clothing itself as well as its own private space. On the architectural level, the private space formed by the user starts to fit into the public realm where the façade resides. Emerging (or bulging out) of this private space on public realm then intrigues interaction between the primary user and another user on the street, producing an interaction

in the social context. In other words, the process of “fitting” and “changing” transcends its physical meaning to further imply cultural adaptation and social transformation at a conceptual level. Underlying idea behind fitting room as façade is to perceive a simple program of changing clothes as an implication for physical adaptability of the body and the built structure that intrigues social interaction. In a way this implication can be compared to how Superman changes into his uniform in a phone booth. He not only changes into a different clothes (physical change) but also changes out of his banal and nerdy status to a superhero, who saves the world (change of social status).

The final design’s intention is to redesign fitting room as a physically transformable and socially interactive façade intrigued by materials and language that closely relate to the body operations. As a result of this design, the general definition of program of fitting expands to *a controlled phenomenon dictated by the user’s body* as opposed to predetermined activity within a static boundary. Also the skin detail and its structural conditions facilitates interaction between building and the user as well as among users themselves.

Construction

The façade of fitting room is initially composed of two parallel surfaces. The exterior surface (blue line in the diagram) is relatively static but permeable as well to the interior surface (gray in the diagram). As the interior surface passes through the exterior layer, it starts to create a compartment composed of the interlocking of the two layers. Like a pimple on a human skin, the inhabitable space bulges out from the inner skin to the exterior. Other part of the exterior layer pushes into the interior layer behind it in order to perform a scar condition, where opening of the exterior layer gives access to the interior layer. In this case, the exterior layer’s density becomes sparse and that gives room for the interior layer to be exposed just like a scar of the skin.

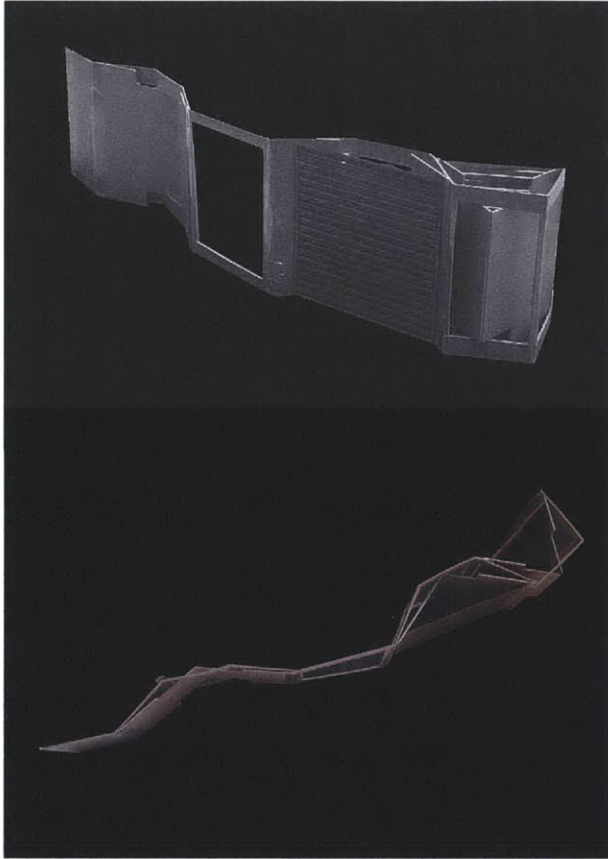


image 08: study model, chipboard, 1/4"=1' scale
investigates interaction between the one static and
one elastic surface

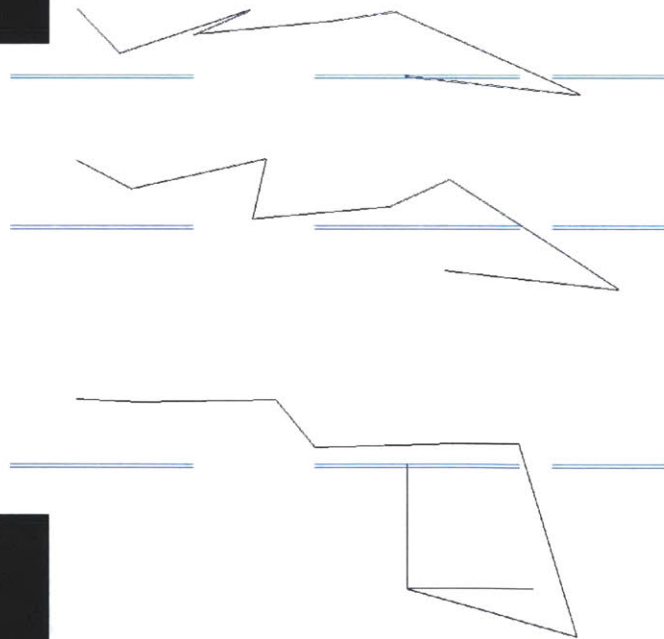


diagram 10: illustrates how the two layers passes
through or pulls away from each other to created
an accomodatable space for the fitting room

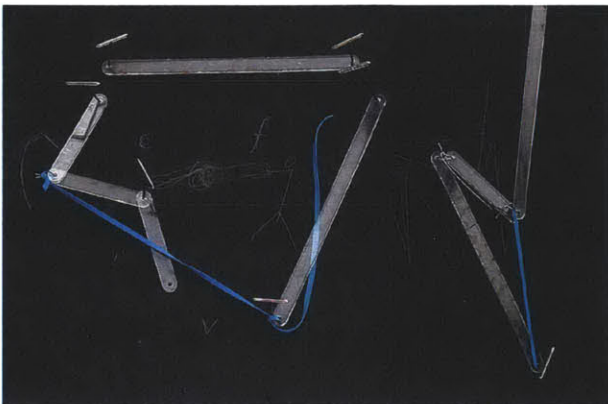


diagram 11: transformation of diagram 10 into
detailed furniture scale

Specific dimension of the resultant compartment and the scar condition originates from studying the author's own body proportions and the boundary of my limbs' operation. Following diagrams demonstrate how the modular body transforms initially flat space into a three dimensionally interactive territory enabled by architectural operations that mimic the body joints in mentioned chapter 3-1. The series of operation in plan includes the boundary determined by 1. elastic surface operation, 2. solid joint operation, and 3. human body movement.

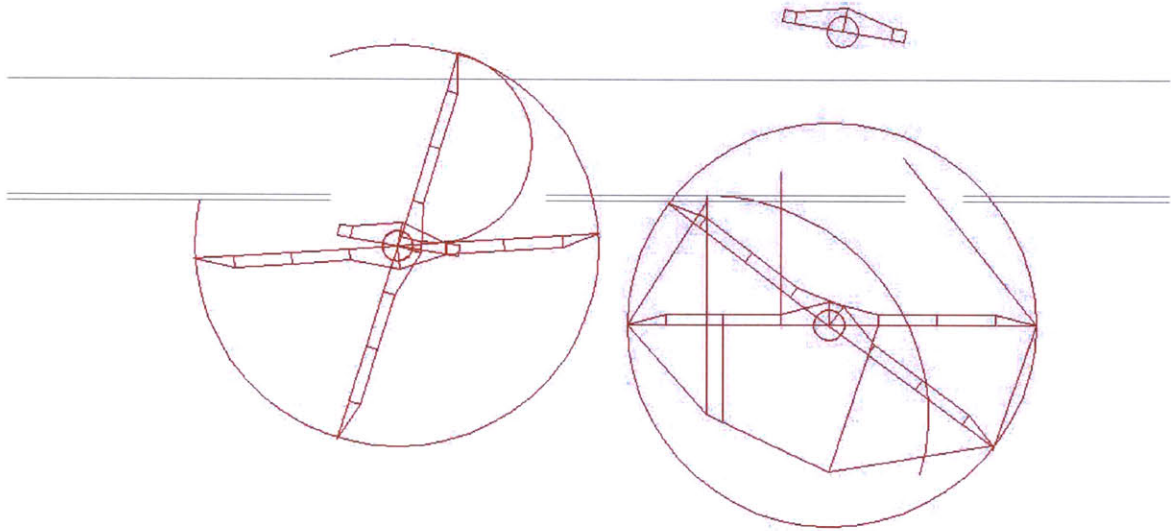


image 09: plan drawing of how the movement of the body predefines the boundary of flexible surface on plan

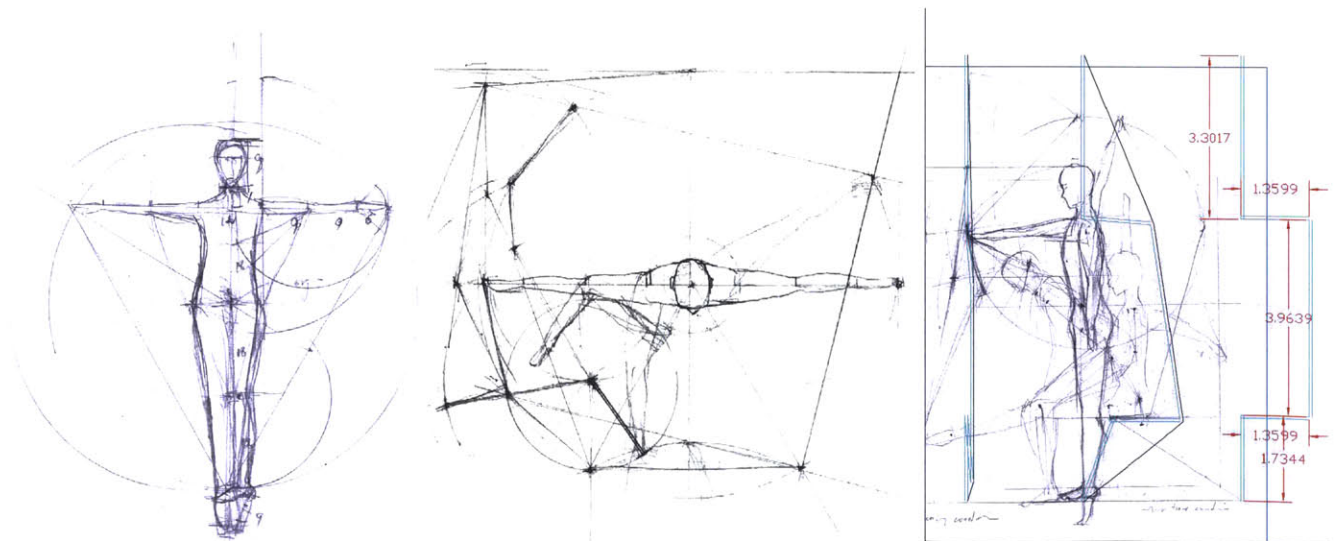


image 10,11, 12 : study of modular human body which determines the architectural dimensions

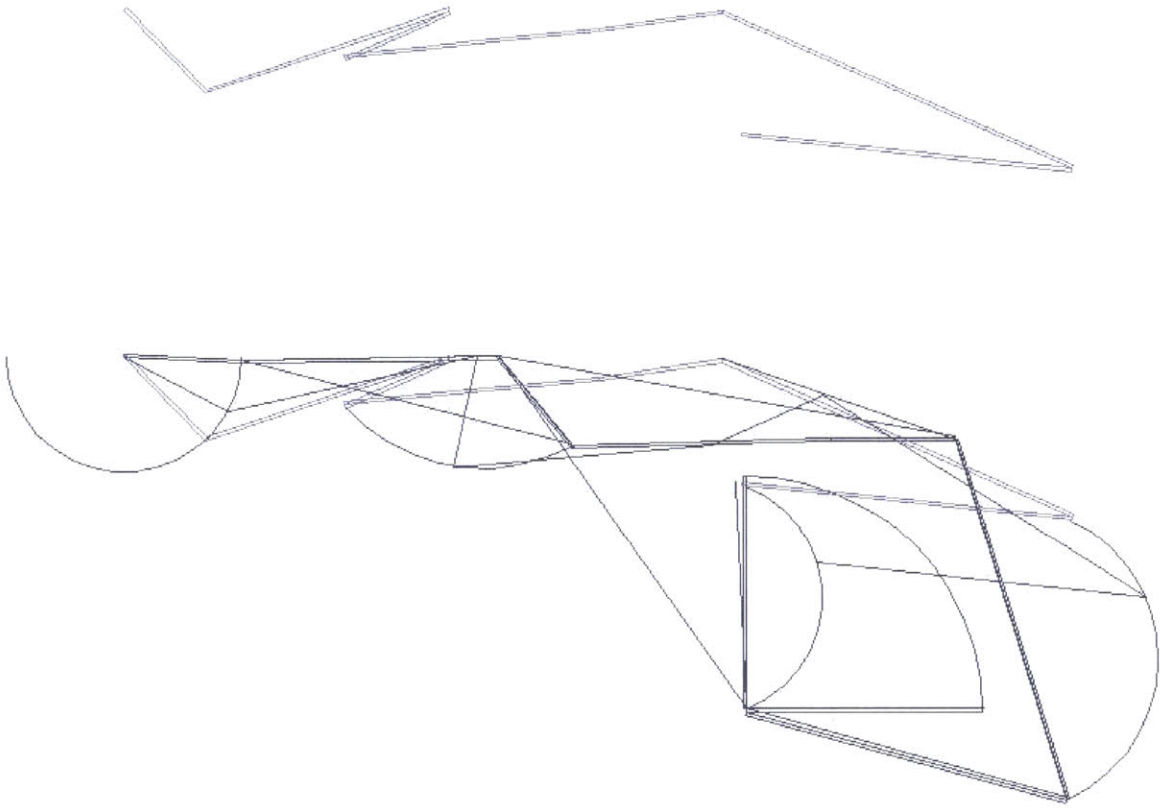


image 13: operation of the solid joints on plan

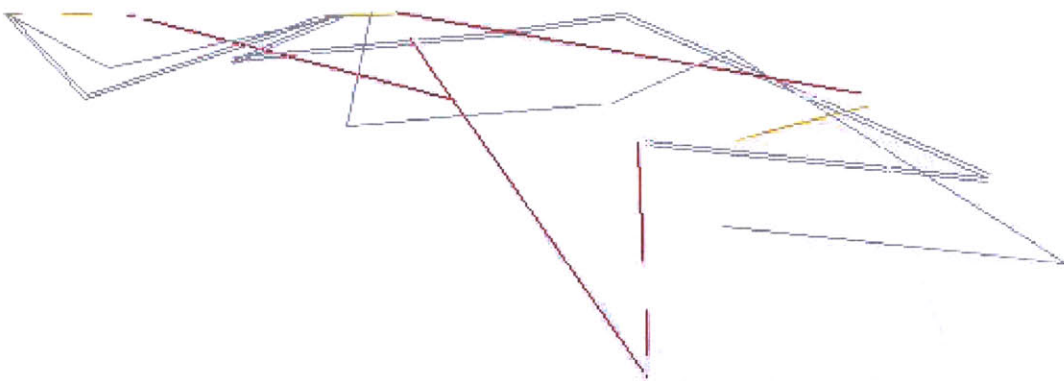


image 14: operation of the elastic surfaces on plan

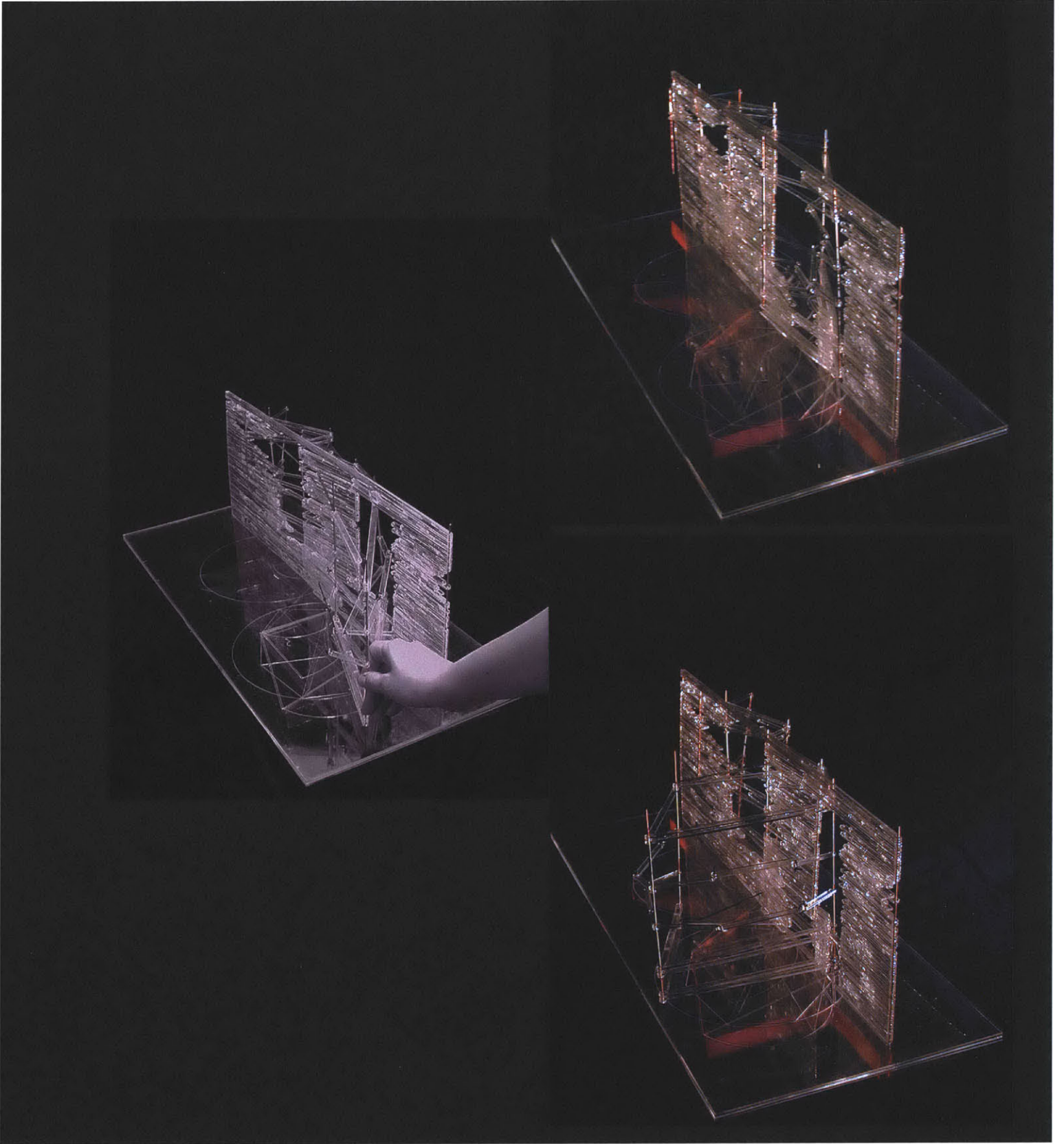


image 15: final model's transformation to created the fitting room in perspective

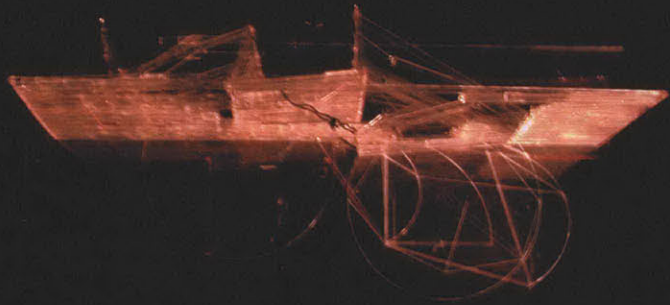


diagram 11: final model's transformation in plan

Particularly, the elastic surfaces derive from manipulation of skin-like materials, such as rubber, memory foam, and elastic band. In the beginning, the skin acts as a surface that changes open density according to physical push or pull.

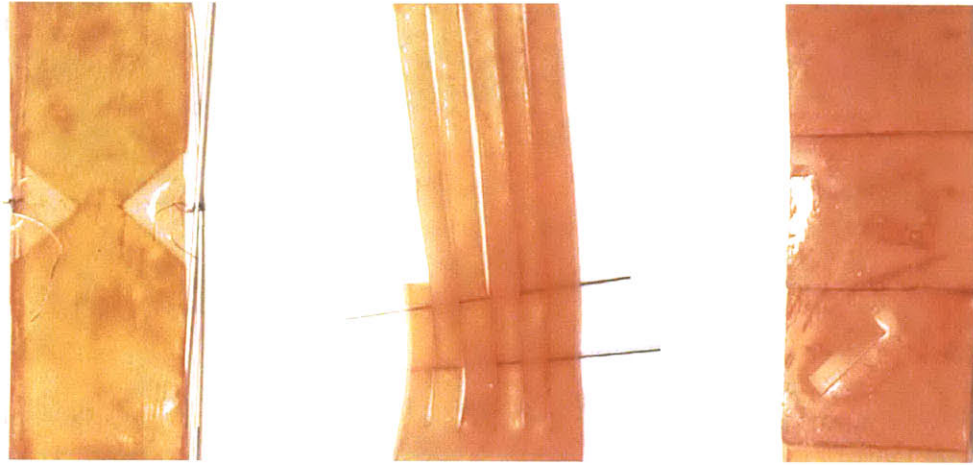


image 16: experimenting rubber as a mutable skin

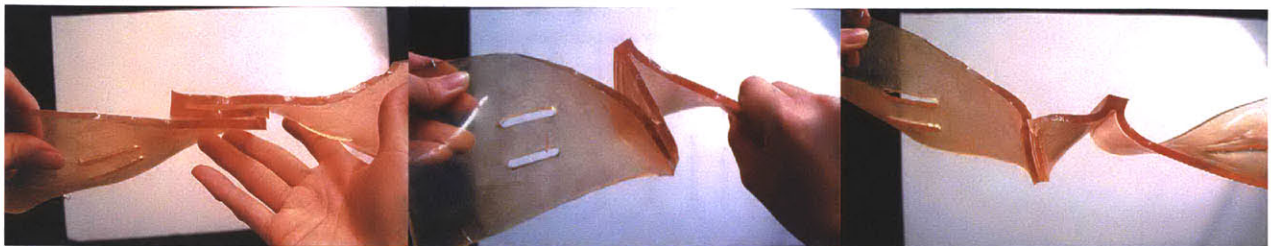
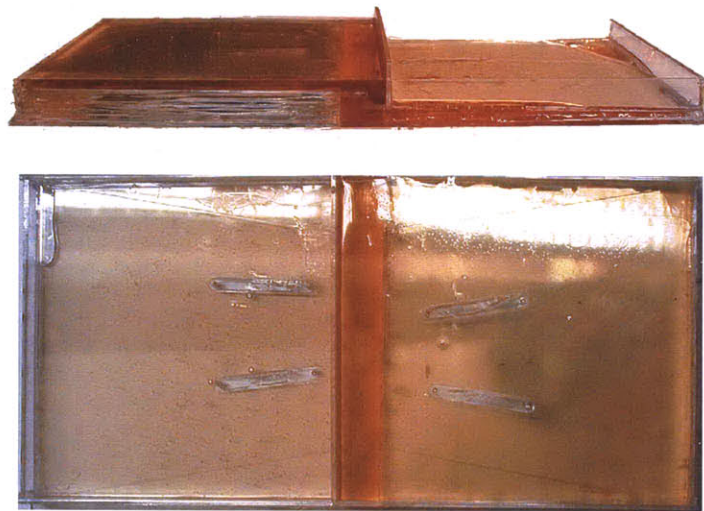


image 17: investigating a the prototype of the rubber skin, which retains elasticity because of the inherent fold created by the pouring of rubber

Afterwards it evolved into an operable mechanism that imitates the operation of the two layers in plan, using elasticity and transformability.

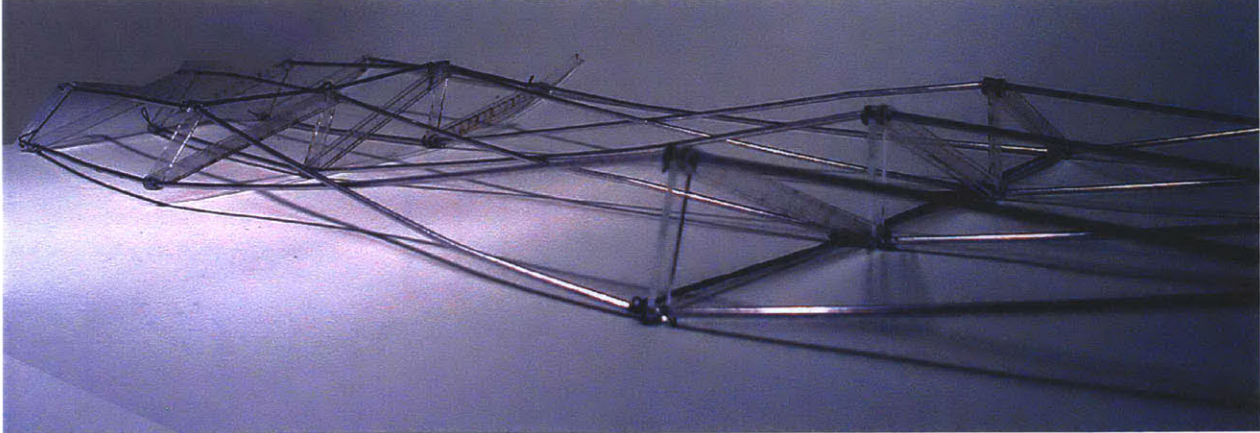


image 18: 3 dimensionality of the elastic skin for the final design

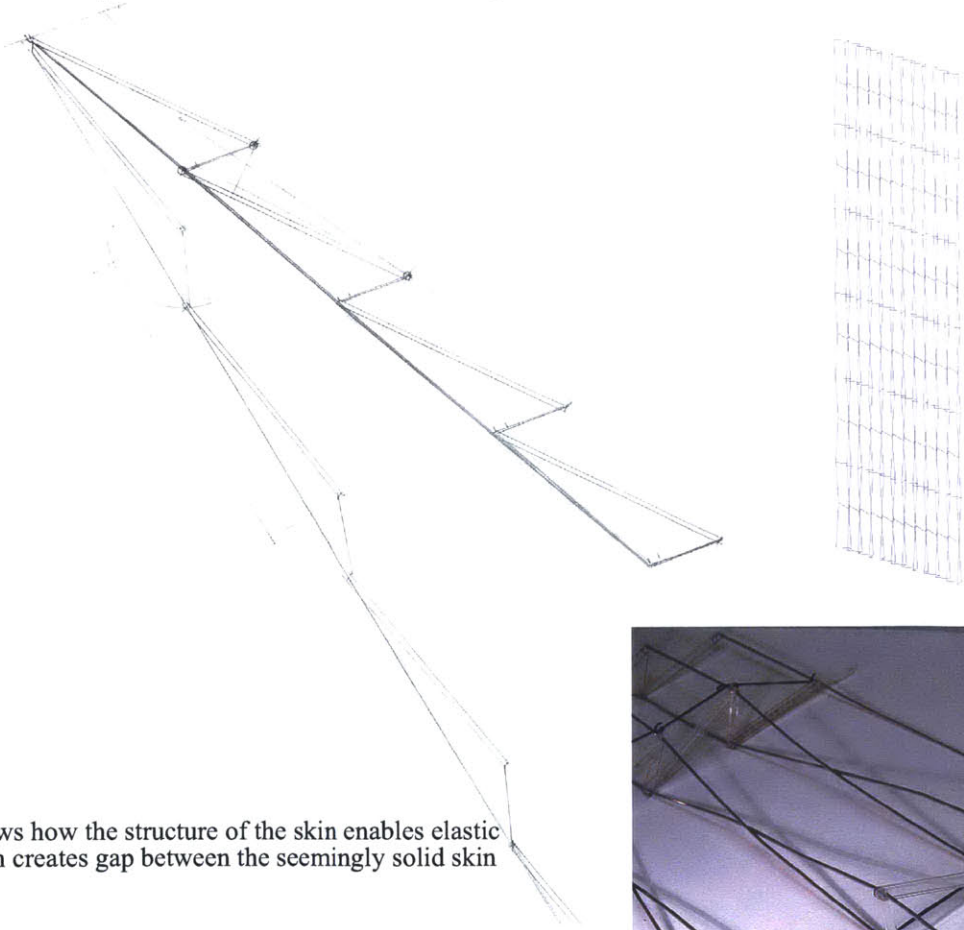
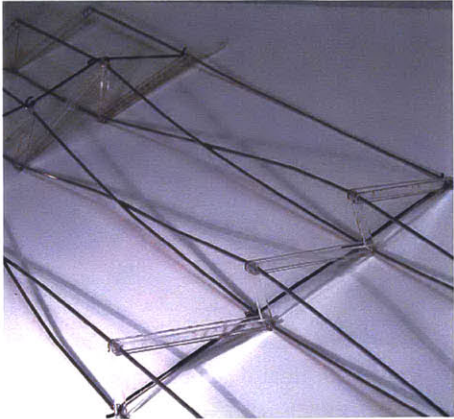


diagram 12: shows how the structure of the skin enables elastic stretching, which creates gap between the seemingly solid skin

image 19: details of how the structural elements are composed



The final design displays composite state of the solid and elastic operations intrigued by the physical interaction of the user within or outside the two surfaces.

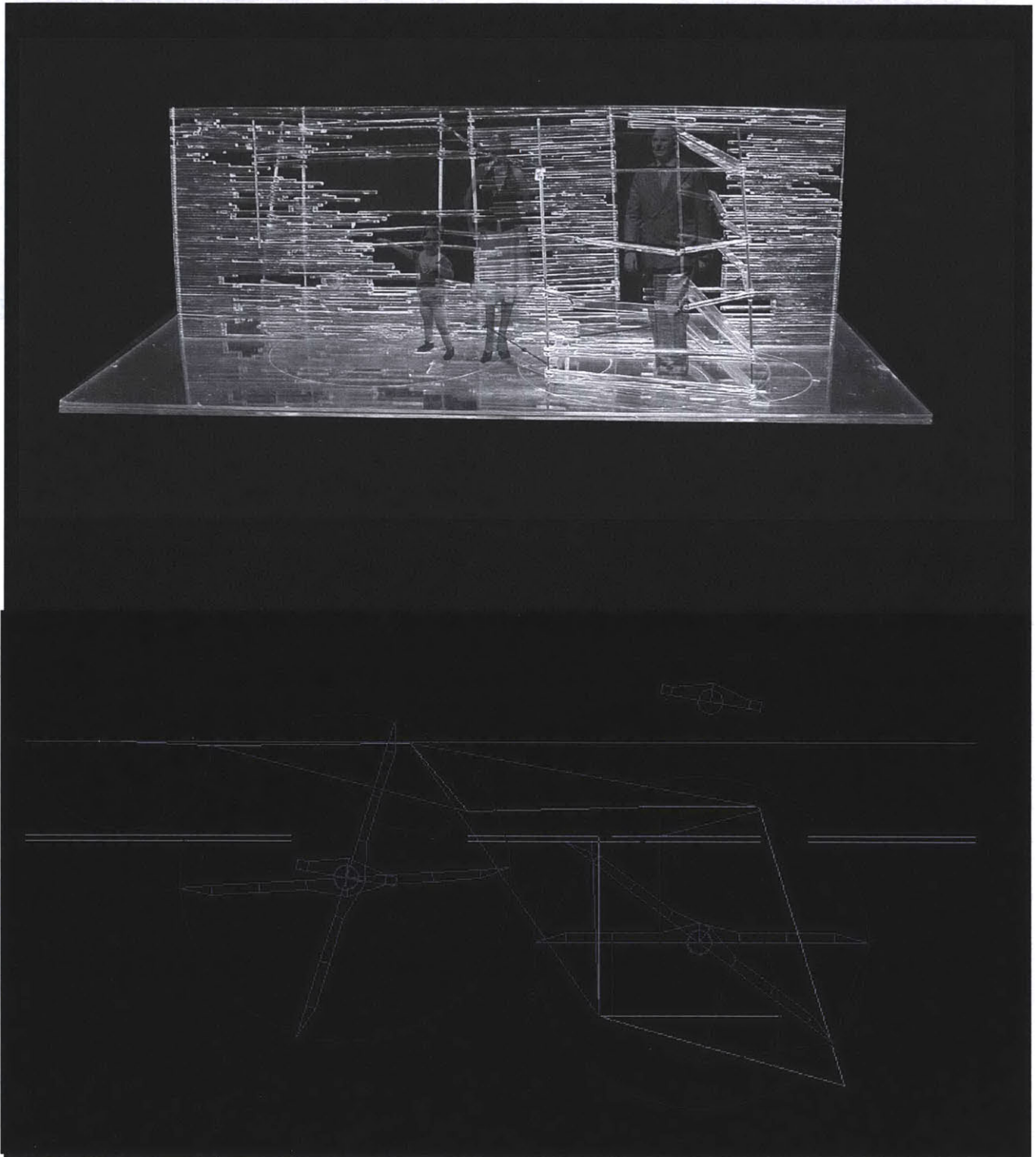


image 20: final design and plan of the fitting room

Chapter 4

Conclusion and Discussion

On one hand, the analysis of the body joints provides foundation for the architectural language of operation. On the other hand, design of *Weaving Threshold* as a façade explores possibility of architectural skin. Then the investigation of interfaces allows more depth to what one can rethink of a meaning of boundary and interaction. By combining the operation language, skin condition, as well as possibility of new interface, the thesis proposes a physical construct of a fitting room as a façade, in which architecture space is created by the user's body movement, and interaction between individuals are promoted by the structural skin. As the human body, the user, starts to physically and socially dictate the architectural space, the prototype of this prosthetic space suggests redefinition of the term program and skin as a result. An architectural program does not need to be perceived as a predefined activity within a visible boundary any longer. Instead, the program becomes a more of a phenomenon engendered by interactivity between the user and the built structure. Accordingly the term "wall" transforms into "possibilities of boundary" as opposed to immutable blockage. Imitating the human skin, the new notions of boundary interact physically with the user and perform customized functions. In this sense, the "skin" which incorporates more flexibility and interaction takes over the static term "wall" in the end. The product of all these is sense of indeterminacy of a personal space and interaction.

One might ask, how do these investigation of prosthetic space translate it a larger scale of issues? Would it be able to ever grow out of the scale of façade? The ideas of *phenomenological program* and *performative skin* must not be hindered as it is applied to the comprehensive building scale or entire urban scale. In fact, the contemporary urban condition, in which speed

of economic development changes the requirements of architectural spaces just as fast, always confronts the issue of adaptability and interactivity at a large scale. Likewise designers always have tried to solve those issues in an urban scale. However these issues will remain unresolved until one attacks the problem from the very intimate scale of a singular user. Only the adequate understanding of the body-to-architecture can begin to determine the design of overall detail, program and urban interaction, and in the end resolve the demand for physical adaptability and social interaction in architecture.

Chapter 5

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