

TEXTURE OF LIGHT

learning objectives and outcomes

OBJECTIVES

This project asks students to focus on one important space within an actual building or studio project to consider its texture, materiality and lighting as well as its organization and role within the larger context of the building. Specific attention should be placed on the exploration of light position and its relation to a variety of materials and textures. This is an experiment to study not only how light reveals form but also how it creates visual intrigue within a focal point of a space.

TASK ONE

- RESEARCH – collect a variety of found materials and explore their relevance to the built environment
- DEFINE – define the focus of your exploration to be applicable to a current studio project

TASK TWO

- CREATE – create a series of bas relief objects to test a variety of surface styles and textures
- IDENTIFY – identify how your bas relief explorations can be integrated into a design response
- CONCLUDE – display a 3 ft by 3 ft panel of your individual texture creations and study how each on responds to a variety of lighting stimuli

TASK THREE

- EXPLORE – a unique way to utilize what you have learned about light revealing material texture and form
- PLAY – calling upon the knowledge gained in the previous modules, explore and play with light as it reveals, enhances and creates texture
- CONCLUDE – display your creation and evidence of light investigation

EDUCATORS NOTE – The above project is broken into three distinct task options to allow for different levels of engagement with the problem. Two approaches are presented for Task Three: A texture and light study performed entirely in digital space and a digitally-fabricated physical texture study.

TASK ONE

texture collection

ASSIGNMENT

Find five to ten images of lighting effects, in relation to texture, in the built environment. These images should be predominantly of shadow and light and can be found in architectural periodicals or photographed from your surroundings. Create a collection of the imagery and a brief explanation for each selection. As this is a class exercise, discuss and share your findings with fellow students. This exercise is meant as an explorative prompt and should be engaged through public conversation and visual display.

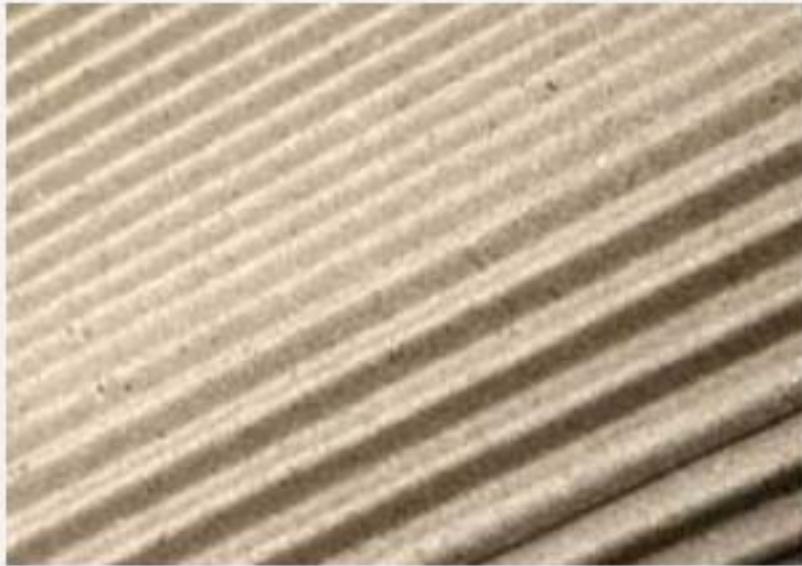


Image 1



Image 3



Image 2



Image 4



Image 5



Image 7



Image 6



Image 8

TASK TWO

texture creation

ASSIGNMENT

Taking into consideration your image selection from task one, this exercise will challenge you to develop your own textures from found objects. Collect a wide variety of objects and materials. When you have gathered a plethora of choices, begin to manipulate these materials—explore changing their properties, adding and subtracting to them, layering them, etc. Create a 3' by 3' square that represents your nine best material creations. Place these in different lighting conditions and photograph the results.

- How does light affect the various materials?
- What are the differences in how light reacts to material transparency, texture, finish, or size?
- What lighting effects are obtained by varying the adjacencies of materials?

Discuss your findings with the class. Identify how your bas relief explorations can be integrated into a design response.



TASK THREE

texture light play

ASSIGNMENT

Now that you have analyzed existing textures and created a sample set of your own, we are going to move into structured light play with texture. The study can be done completely in a digital environment, or use digital fabrication to produce a physical model to be used for light play. For the first approach, knowledge of any high end rendering program is necessary. this may include but is not limited to 3D Studio Max, Rhino, FormZ, bonzai3d, Sketchup with V ray plugin, Maya etc. the images portrayed in this example were created in bonzai3d.

This exercise will focus on the differences between lighting types and locations as it effects a textured wall. You will first need to construct a wall texture of your choice and apply it to one end of a windowless interior environment.

The rest of this assignment is based on your discovery through manipulation of lighting direction, intensity, color and any other factors you may wish to explore. In other words, play around with anything and everything that might effect how light reveals and interacts with your textured wall.

Explore multiple textures to gain an increased understanding of the importance and playfulness of light.

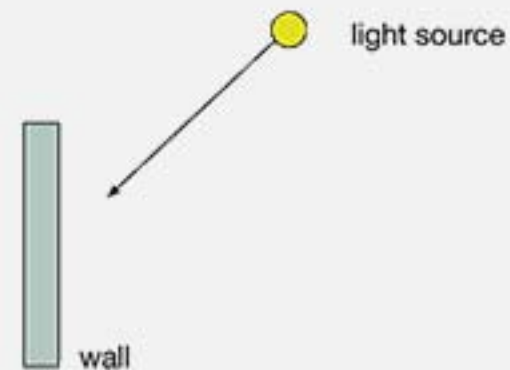
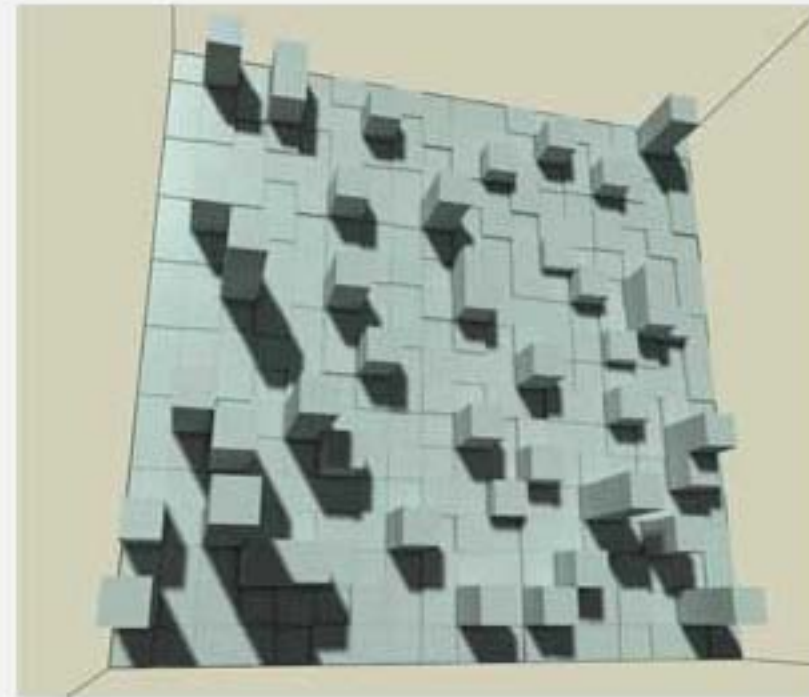
LIGHTING TYPE: SUNLIGHT

The first simulation depicts an interior environment lit only by an open skylight above. The roof was left off to gain an example of daylighting.

The surfaces are well defined with harsh shadow edges.

The various sides of the protrusions are a variety of shades, bringing visual interest, based on the sun's position relative to each side of the digital space.

There are few areas that begin to develop hotspots.



Elevation

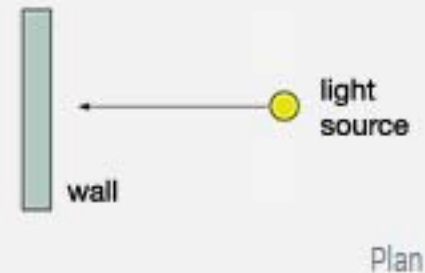
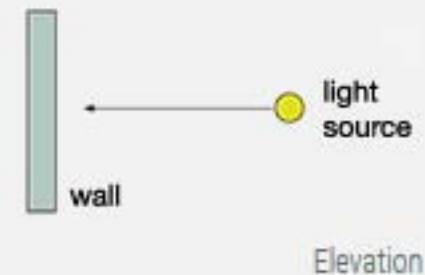
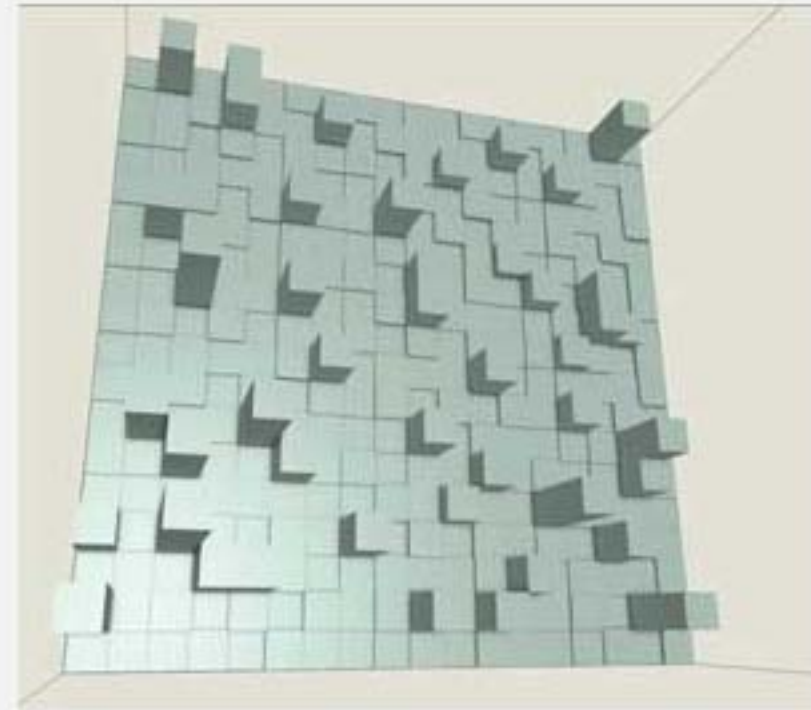
LIGHTING TYPE: DIRECT

The next iteration looks at what happens when an environment is completely isolated from natural daylight. To supplement the necessity for light, a direct, high intensity, light was introduced projecting perpendicular to the wall surface.

A softer surface is revealed but at the sacrifice of edge definition.

This option produces one hot spot as the light interacts with the perpendicular surface of the wall.

The bland nature of the wall in this lighting scheme begins to inform me that a direct lighting source is a less than optimal option for revealing a highly textured wall surface. It provides a constant lighting wash which would be nice for a painted surface but fails to bring life to a wall more interested in becoming an art piece.



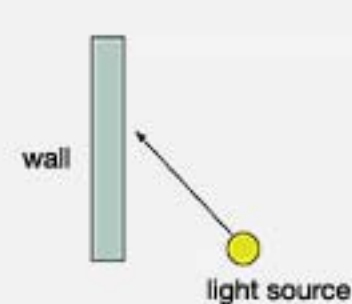
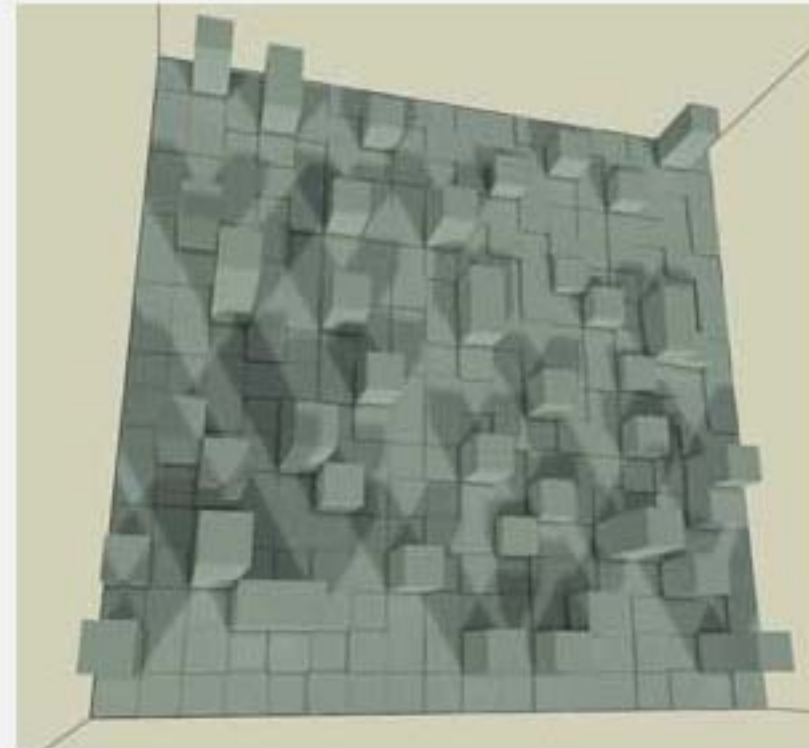
LIGHTING TYPE: UPLIGHTING ONLY

This iteration depicts the consequence of only lighting the object with electric uplighting sources

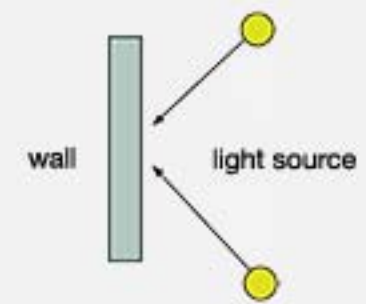
We begin to see similar levels of edge definition to the daylight study but without a general ambient glow.

The textured surface of the wall is easily perceived but the comfort level of the lighting scheme is lost in the relative darkness.

The introduction of a lighting source meant to globally illuminate the room would help offset the low lighting levels of the uplighting source.



Elevation



Plan

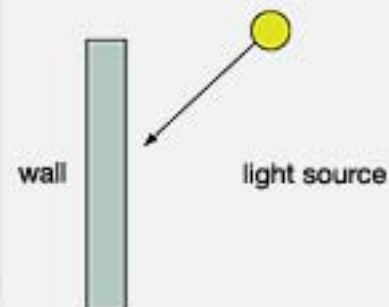
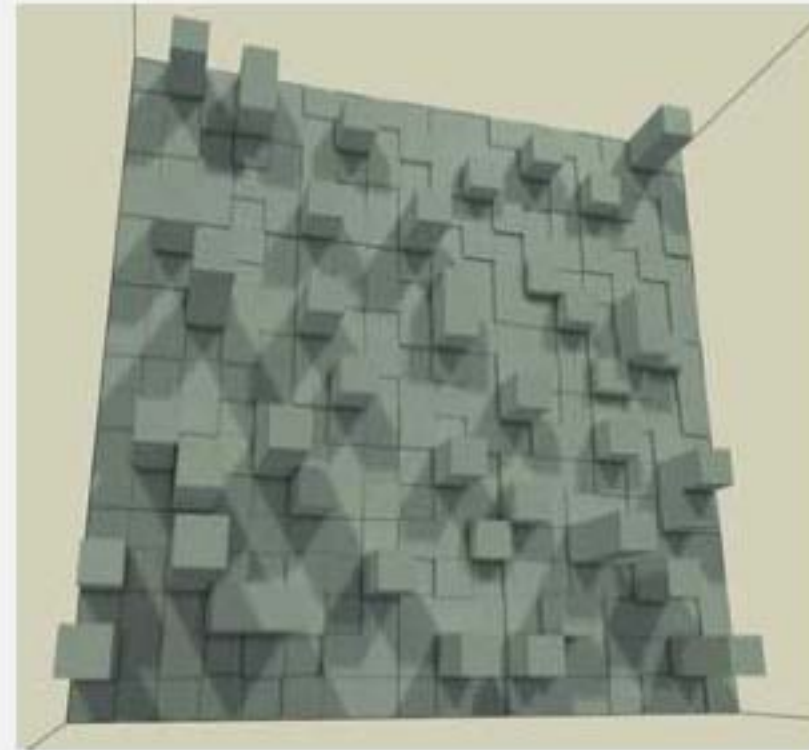
LIGHTING TYPE: DOWNLIGHTING ONLY

This iteration depicts the consequence of only lighting the object with electric lighting sources installed on the ceiling pointing downwards at a 45-degree angle to the wall.

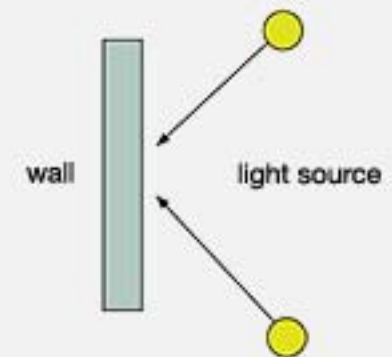
Again, we begin to see similar levels of edge definition to the daylight study but without a general ambient glow.

The textured surface of the wall is easily perceived but the comfort level of the lighting scheme is lost in the relative darkness.

The directionality of the shadows produces a different focus for the space as the viewer's eyes follow the direction of the shadows.



Elevation



Plan

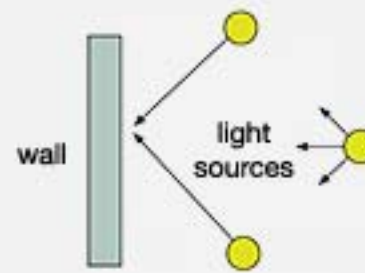
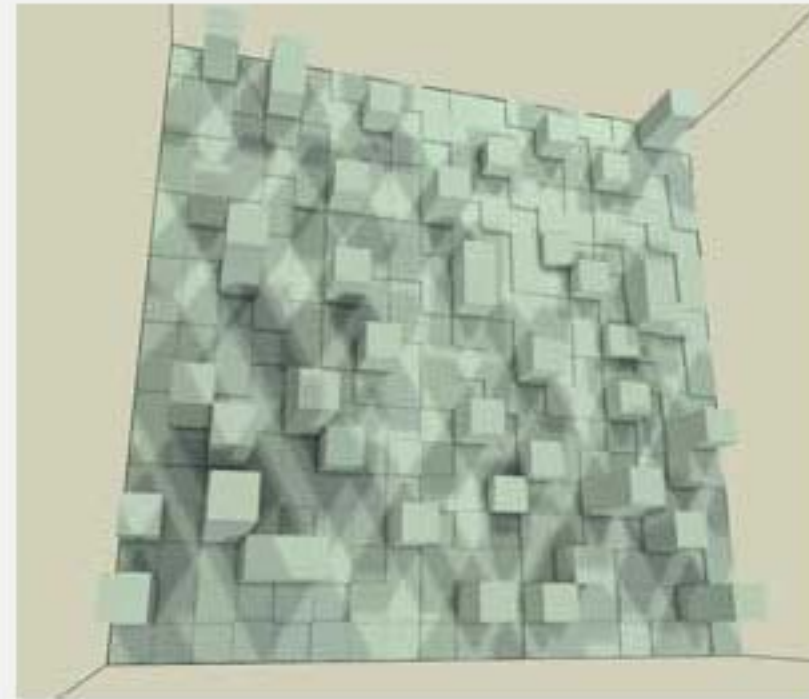
LIGHTING TYPE: COMBINATIONS UPLIGHTING, DOWNLIGHTING AND AMBIENT

This iteration depicts the consequence of lighting the wall with the previous up and downlighting schemes as well as a lighting source meant to globally illuminate the room.

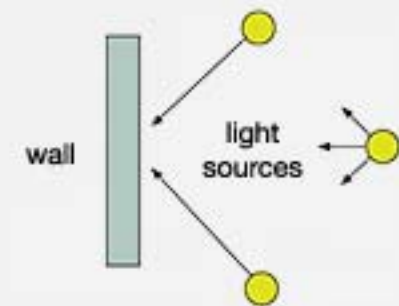
The texture of the wall is portrayed at a pleasing level of light due to the introduction of global, or ambient, illumination.

The up and downlighting sources produce an interesting shadow pattern that could be perceived both positively as a layer of texture or negatively as a layer that combats the true nature of the wall.

This scheme accomplishes many of the requirements necessary to light a textured wall. It utilizes 9 lights in total: 4 up, 4 down and one ambient oriented lighting source. We still see a great deal of heavy shadow lines that would conflict with an art object, but add a great deal of intrigue to a wall. If one wanted to reduce the shadowing, more lighting sources at lower intensities would need to be introduced.



Elevation

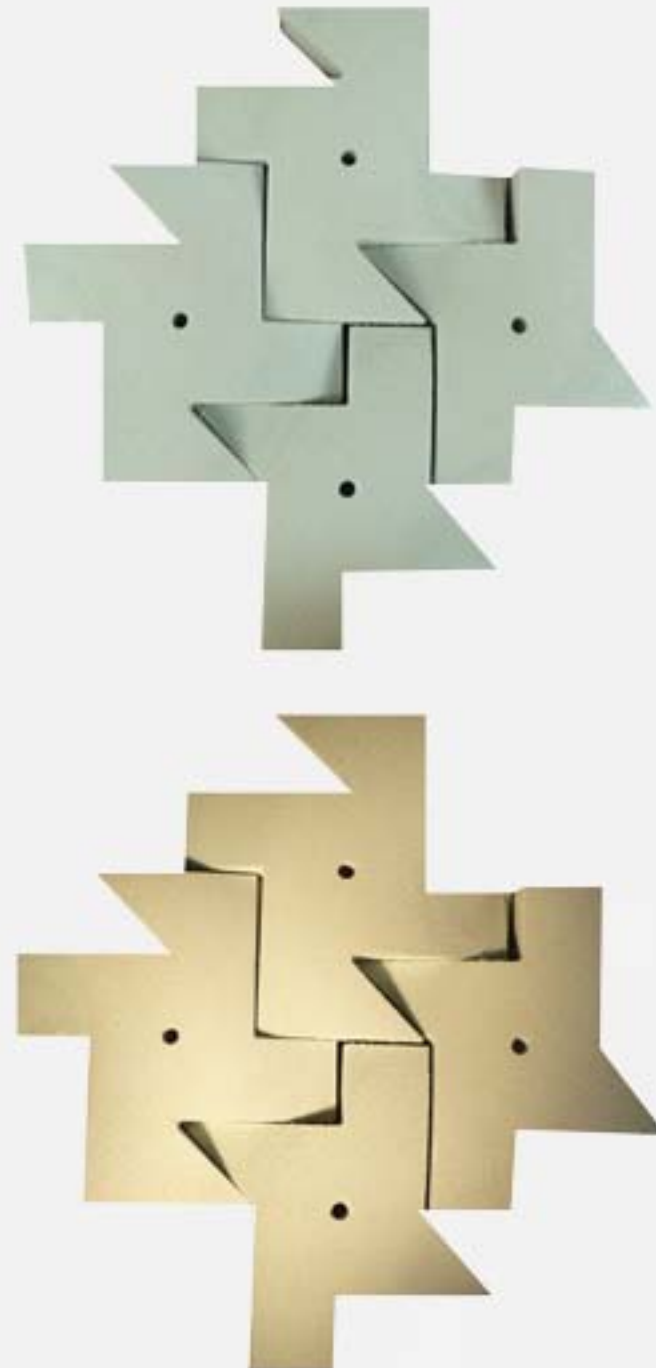


Plan

ASSIGNMENT

The study of light play on texture can also be applied to a wall art piece developed through digital CNC fabrication. The idea behind this piece is to create a single, wall mounted, art installation from a multitude of smaller units. The units would all have the same boundary constraints, except for a varying surface manipulation selected at random. The units would be fabricated using a variety of different wood species to add visual interest and enhance knowledge of material properties. This exploration will rely on the visual contrast created when light interacts with different wood grains, textures, colors and wave patterns. The boundary units were created through an M.C. Escher-like tile pattern so that the two tiles would link together to form the larger whole. The example test tile, in foam, is pictured below.

This example is meant to prompt your own exploration using materials and tools that you have access to and interest in. As such there will be little emphasis placed on step by step direction for this study.



ASSIGNMENT

The experiment uses six different wood types to investigate the differences in each when illuminated. Recalling the earlier Texture Collection and Creation studies, I hypothesize that the differences in the woods will bring an interesting visual contrast to the project and thus increase its aesthetic interest.



Wood 1



Wood 2



Wood 4



Wood 3



Wood 5

MATERIALITY

- By choosing to utilize wood as a constant material, the units display grain, color and surface variations as well as being capable of modification.
- All of these differences will catch and react to light uniquely, thus the project should demonstrate great variation and complexity.

TEXTURE

- Choosing 6 different wood types ensures that by grain alone the texture of the object will catch and play with light on a more varied basis.
- By utilizing a CNC router and digital modeling techniques, a random surface ripple was applied to all of the pieces, giving each piece unique textural geometry.

PATTERN

- Having been intrigued by the woven patterns of the previously selected material samples, I decided to create a tile pattern of interconnected pieces.
- Each piece carries with it a unique character that when linked to the entire family creates a scene of unified complexity.

SURFACE

- By utilizing digital technology and modern fabrication techniques, each unit of the art piece is unique. This offers an infinite number of surface design possibilities and consequently an infinite number of shade and shadow combinations.
- Having chosen 6 individual types of wood, not only does the geometric surface of each unit differ from one another but the individual grains and colors offer a secondary and tertiary level individuation when illuminated.



DIRECT LIGHTING: NO ANGLE

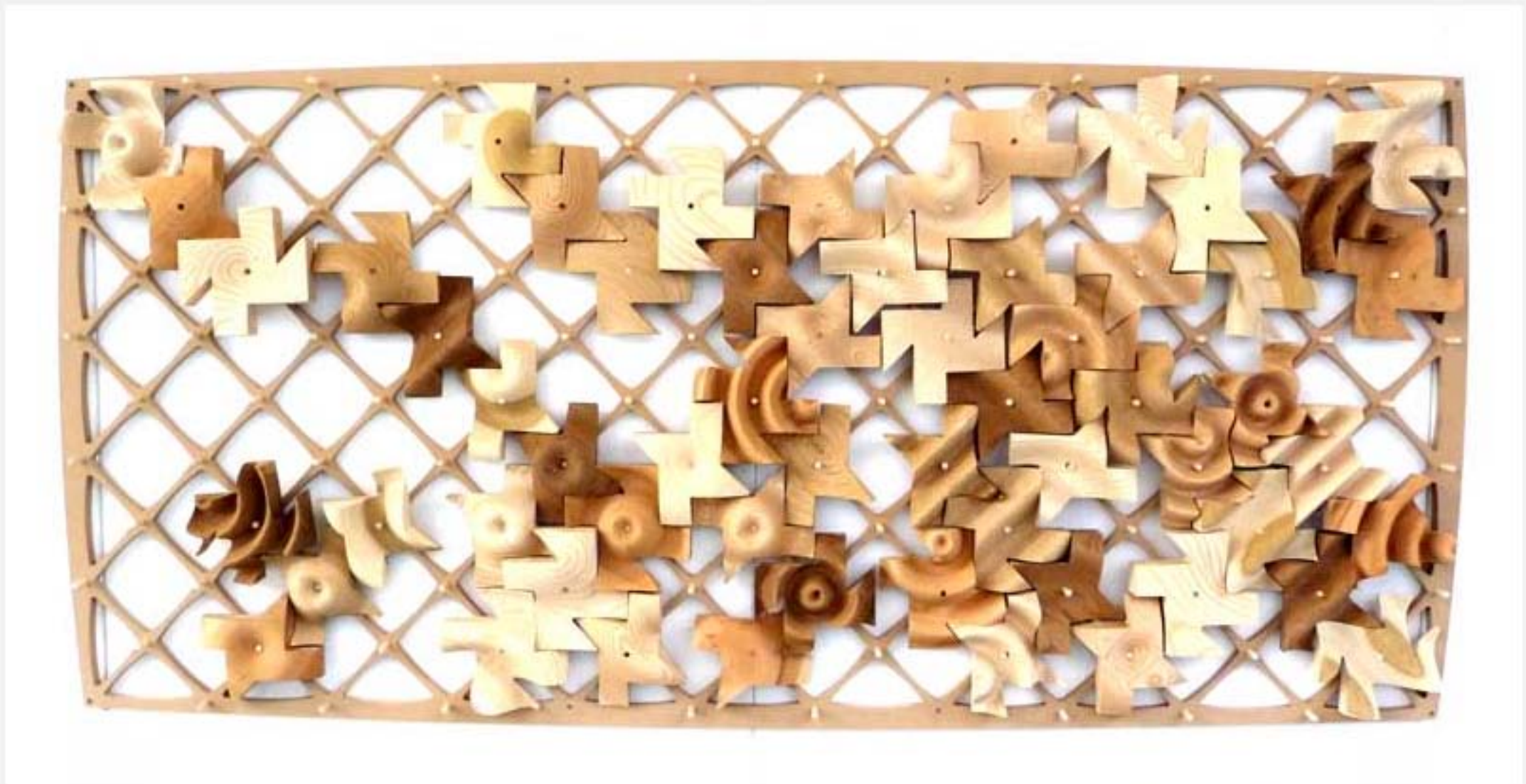
- Unlike the image above that had received the generally diffuse illumination of a daylight room, when crudely lit by a point source electric light, the wood tile units begin to show surface depth and change appearance.
- The light catches and produces hot spots that denote the rounded peaks.
- The lighter woods show greater contrast between the light flesh of the wood and the dark rings while the darker woods mask this differentiation more successfully.
- When the units stand alone they appear smooth and uniform, but when woven with one another there is a second level of shadow and play created.



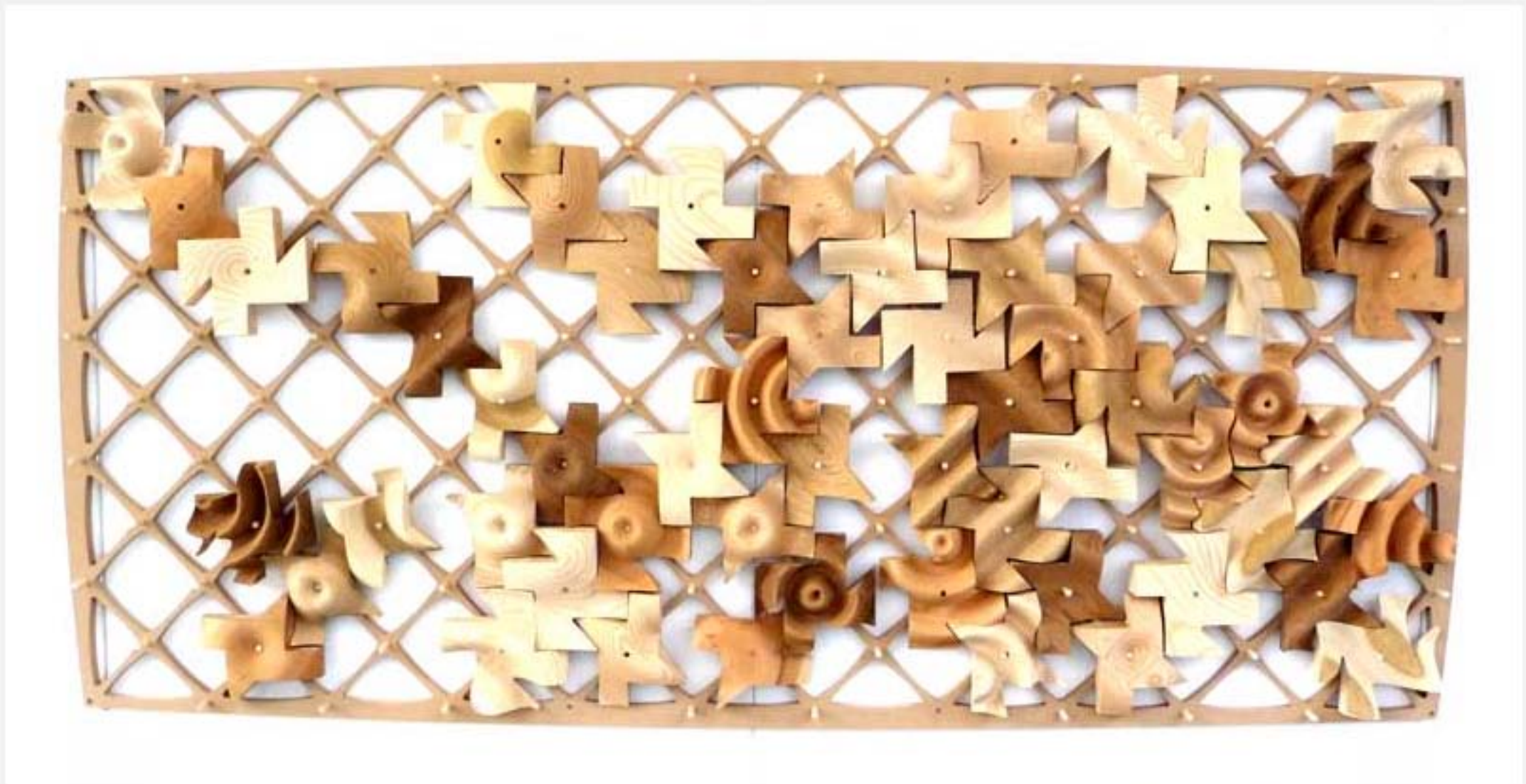
DIRECT LIGHTING: ANGLED

- Unlike the previous exploration that had a source perpendicular to the wall, now that the woven units are lit at an angle there is a tertiary level of character to the art piece.
- The surface manipulations are further accentuated as the deeper crevices move closer towards an absence of light and are in high contrast to the highly illuminated peaks.
- In addition, we now observe how the shadows project onto the surface of the wall behind. This invites the wall to play an equal part in the character of the piece.
- The light creates a golden tone to the wood variations.





Completed Piece With Generally Diffuse Daylighting



Completed Piece With Generally Diffuse Daylighting

CREDITS

Images in slide 1-13 excerpt from student project by J.B. Hamill.

J.B. Hamill adapted the Digitally-fabricated Physical Texture Study in Task Three from the "Ripples" project, an assignment developed jointly for second year design studio and graphics courses.

- Assignment Concept: Murali Paranandi.
- Implementation Studio faculty: Murali Paranandi, Jay Elliot, Louise LeCompte, and Nazaanin Khodadad.
- Graphics Media faculty: Brice Hamill.
- Shop Manager: Ted Wong.
- Shop Crew: Josh Carson (frame designer), Matt Scott, and Derek Gilley.
- Students: Members of the Miami University ARC 202 Architecture Studio, ARC 204 Interior Design Studio, and ARC 214 Graphics Media courses (Spring 2011).