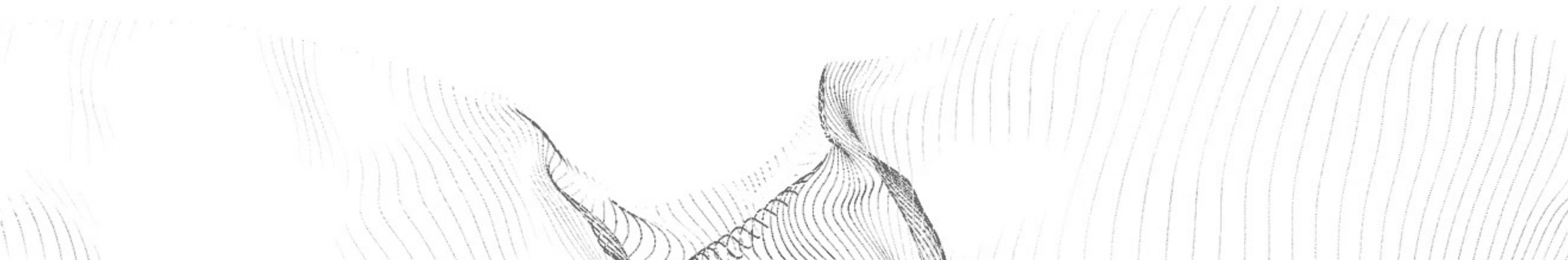


# WAVE ANATOMY

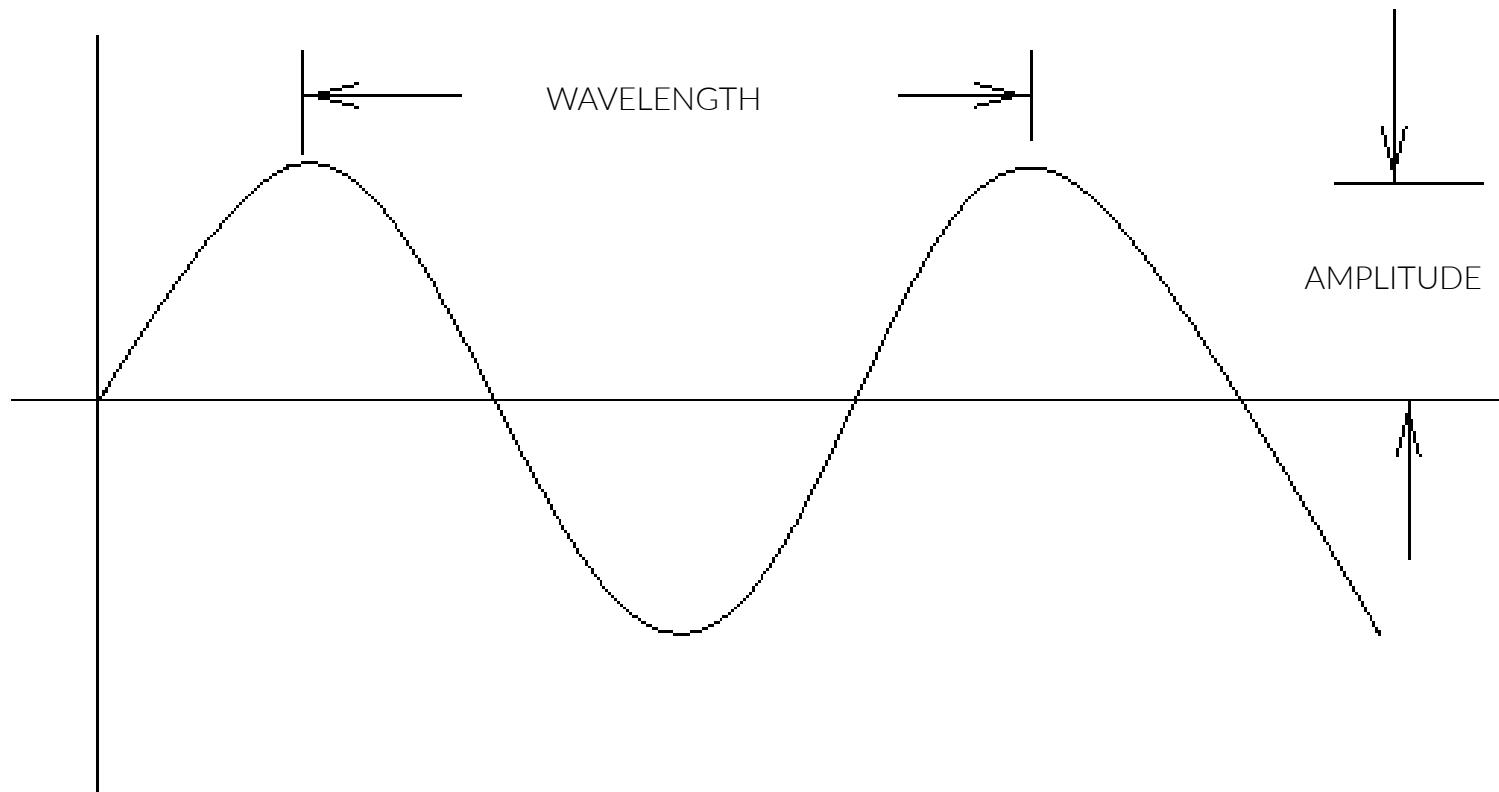
SEAN LE, NICOLAS OSBORN, DEREK WAN

an interactive art installation



# ASSOCIATION

SIO uses two wave tanks in the hydraulics lab to study the  
“laws governing water in motion.”

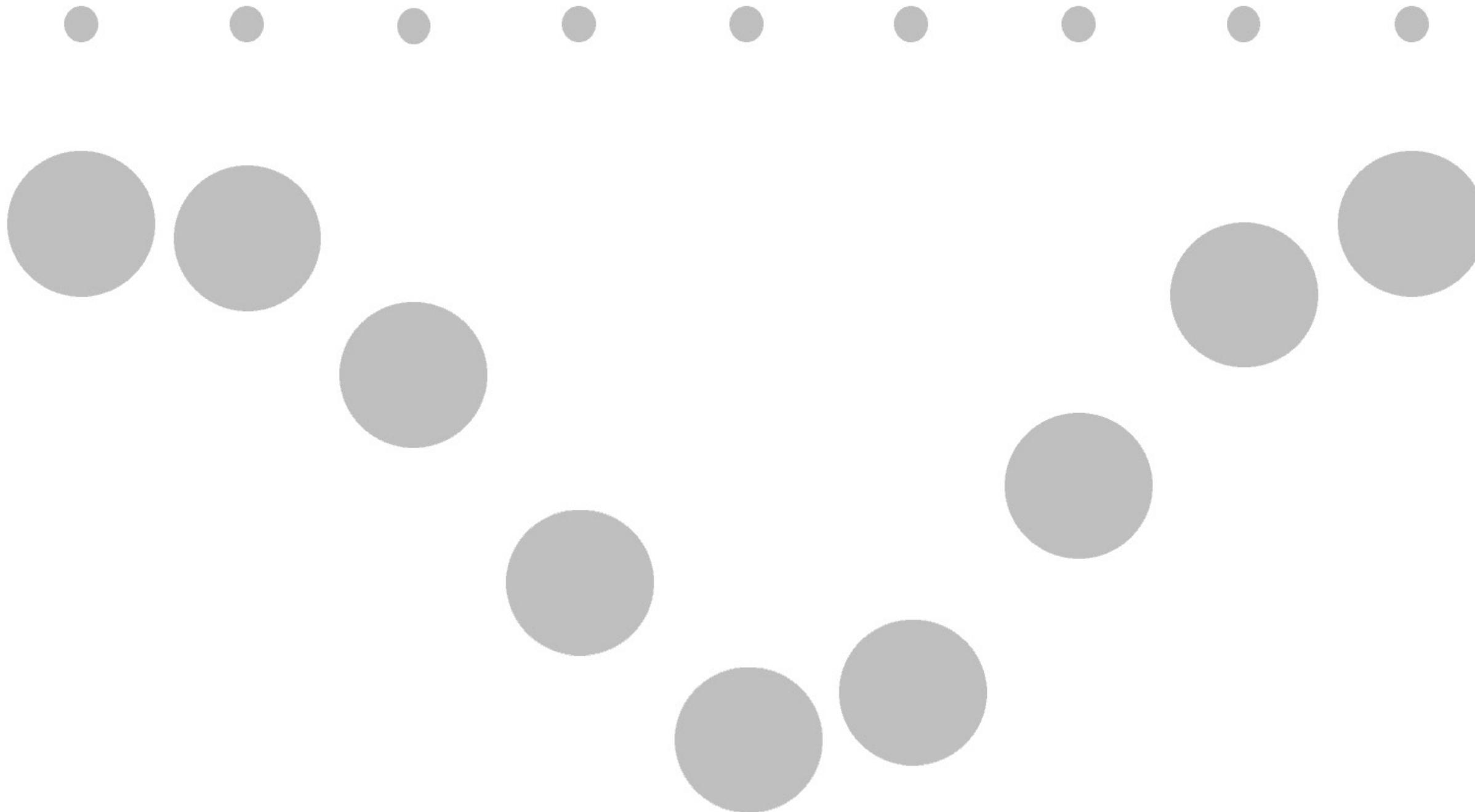


# PURPOSE

To allow patrons to view and experiment with the physical properties of wave dynamics in real time and to act as a kinetic art piece in underutilized areas in the aquarium.



# THE PROJECT



# LOCATION

Our team is focusing on transforming underutilized space throughout the aquarium to hold this feature.



# LOCATION



# LOCATION



# INTERFACE



# INTERFACE

The interface features a light gray rounded rectangle with a thin black border, resembling a smartphone. Inside, there's a solid blue rectangular area. At the top center of this blue area is a white icon of three wavy lines. Below it is a block of text about waves. At the bottom, there's another wavy line icon followed by a right-pointing arrow and the text "SLIDE TO MAKE WAVES!".

Have you ever been to the beach and played in the crashing waves? Did you ever return to that same beach and realize that the waves were bigger, smaller, or not even there? This change that you saw happened because the ocean is constantly moving! There are many factors that determine the size, speed, and even shape of a wave. In the ocean, wind is known as the wave maker. As wind from storms blows on the surface of the ocean, it pushes the water and creates a wave. These waves travel through the ocean until they get to the beach where the shallow sand makes it break. Waves come in all shapes and sizes! Some waves are tall, scientists call this the wave height, or amplitude. Some waves are fast! The time it takes between two waves to break is called the period. If you could freeze time and go down to the beach, you'd see the tops of multiple waves. The distance from the top, or crest, of one wave to another is called the wavelength.

Try making a wave! Play with the “Wavelength”, “Period”, and “Amplitude” sliders to create your own wave. What happens when the amplitude is big but the wavelength is small? What about a long wavelength and a fast period? Can you make only one wave appear? How about 5 waves at once?

SLIDE TO MAKE WAVES!

# INTERFACE

**TRY MAKING A WAVE!**

Play with the Wavelength, Period, and Amplitude sliders to create your own wave. What happens when the amplitude is big but the wavelength is small? What about a long wavelength and a fast period? Can you make only one wave appear? How about 5 waves at once?

The diagram shows a blue sine wave on a white background. Two horizontal dashed lines extend from the peaks and troughs of the wave. A grey bracket between these dashed lines is labeled "amplitude (wave height)". Below the wave, a grey bracket spanning two full cycles is labeled "wavelength". To the right of the wave, there is a vertical slider with a circular track and a rectangular slider bar, labeled "PERIOD".

# C O S T

## GRID (SPHERES)

Material	Price	Quantity	Total Price	Final Cost
Styrofoam/Wooden Spheres (Packs of 6 at 3" diameter)	\$5.00	17	\$85.00	\$1997.00-\$2172.00
Wooden Dowels (48" length)	\$3.00	20	\$60.00	
Invisible Thread (500 yard spool)	\$2.00	1	\$2.00	

## Frame

2" x 4" x 12'	\$5.00	2	\$10.00
2" x 6" x8' (cut into 4" lengths)	\$5.00	10	\$50.00
Misc.	\$50.00	1	\$50.00

## Electronics

#1207 Stepper Motor	\$12.00	20	\$240.00
User Interface (iPad 1st generation)	\$75.00	1	\$75.00
Computer (Raspberry Pi Zero/2.0)	\$5.00/\$40.00	5	\$25.00/\$200.00

# C O S T

## SINGLE ROW (SPHERES)

Material	Price	Quantity	Total Price	Final Cost
Styrofoam/Wooden Spheres (Packs of 6 at 3" diameter)	\$5.00	10	\$50.00	\$2551.40-\$2960.90
Cylinders (Metal, PVC, Wood, Styrofoam, 1' length)	\$3.00	60	\$180.00	
Wooden Dowels (7/16" x 36" cut into 6" length)	\$1.00	20	\$20.00	
Invisible Thread (500 yard spool)	\$2.00	1	\$2.00	

## Frame

Length Pieces 2" x 6" x 12' (cut to length)	\$7.00	4	\$28.00
Width Pieces 2" x 4" x10' (cut to 11 6" lengths)	\$4.00	1	\$4.00
Misc.	\$50.00	1	\$50.00

## Electronics

#1207 Stepper Motor	\$12.00	60	\$720.00
User Interface (iPad 1st generation)	\$75.00	1	\$75.00
Computer (Raspberry Pi Zero/2.0)	\$5.00/\$39.95	10	\$50.00/\$399.50

## Labor

Mounting	\$500.00	1	\$500.00
Assembly	\$300.00	1	\$300.00
Programming	\$500.00	1	\$500.00
Misc.	\$300.00	1	\$300.00

# C O S T

## LED DISPLAY

Material	Price	Quantity	Total Price	Final Cost
LED Display Panels	\$900.00	26	\$23,400.00	\$28,975.00
User Interface (iPad 1st Generation)	\$75.00	1	\$75.00	
Mounting Equipment	\$1000.00	1	\$1000.00	
Labor				
Mounting	\$3000.00	1	\$3000.00	
Programming	\$1000.00	1	\$1000.00	
Misc.	\$500.00	1	\$500.00	

# PROS & CONS

## Pros

### Analog

- Uses underutilized space
- Provides an aesthetic/interactive welcome
- Physical components can add to visitor curiosity, helping lead to longer interaction
- Materials are cheap and lightweight
- Wave particles are interchangeable
- Various modes of interactivity

### Digital

- Uses underutilized space
- Provides an exciting and aesthetically pleasing entrance
- Can be altered to present a variety of information
- Highly programmable
- Various modes of interactivity

## Cons

### Analog

- Can create crowding at the entrance
- Only allows single person interaction at a time
- Difficult viewing angle
- Difficult to access for maintenance

### Digital

- Permanent fixture
- Potential glare issue
- High need for electrical components
- Heavy/support issues

# CONVERTIBILITY

In terms of convertibility (time spent/cost of exhibit) of our exhibit has relative high convertibility compare to most of the exhibits as they usually cost about \$40K-\$50K, so assuming visitors spend 5 minutes on it, which is an overestimation, the convertibility ratio will be 0.000125. However, our convertibility ratio will be 0.0004, as it only cost at most \$5K and assuming visitor only spend 2 minutes on it.

Standard exhibit:  $5\text{min}/\$40000 = 0.000125$

Our exhibit:  $2\text{min}/\$5000 = 0.0004$

## CONCLUSION

- Exhibit uses underutilized space in the aquarium
- High convertibility
- Inexpensive
- Can help create a more attractive and immersive entrance

# UNDERWATER LIGHTING

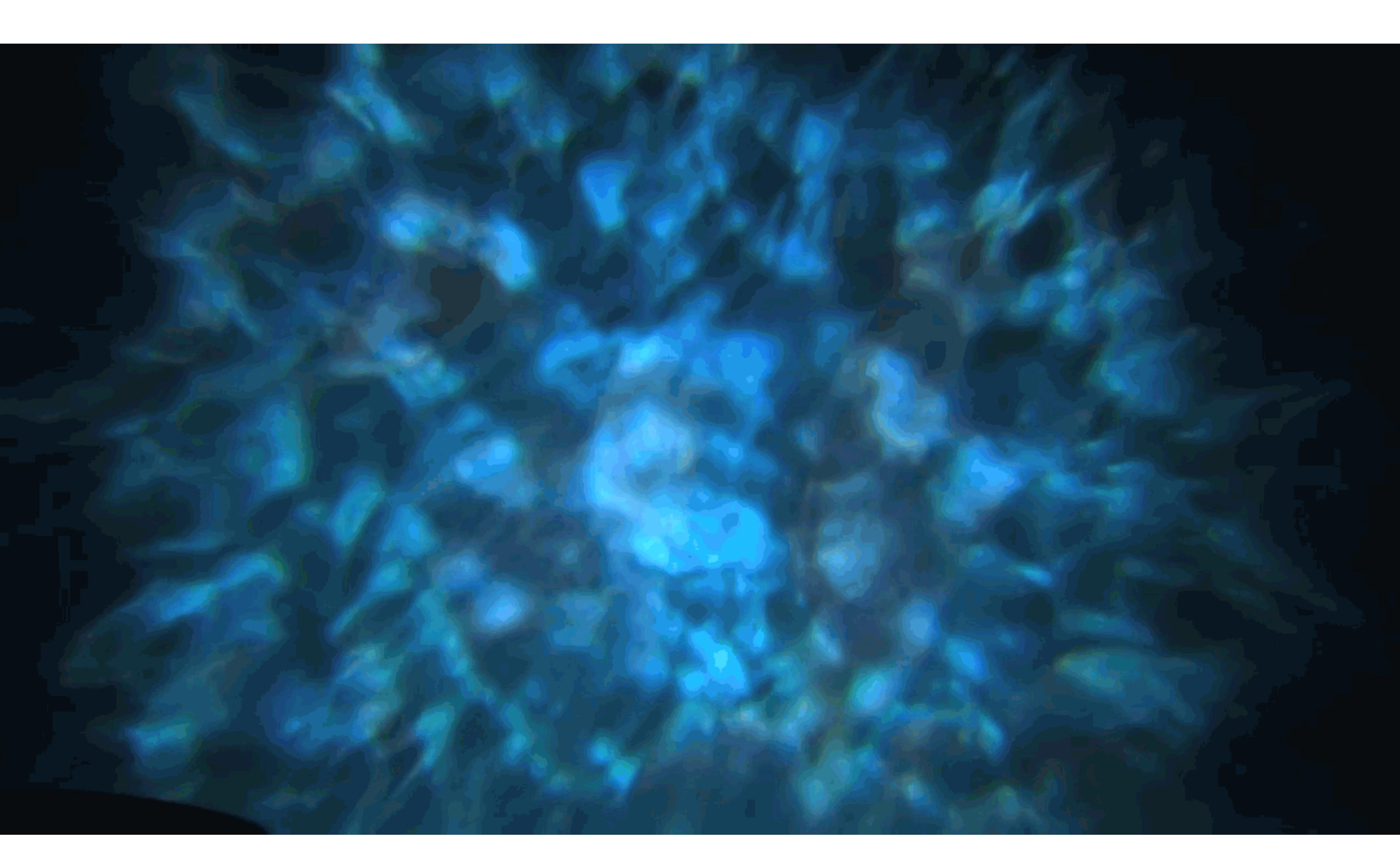
an underwater experience



# INTRODUCTION

Add lighting fixtures throughout the aquarium that creates a visual illusion of patrons being underwater. Lighting will help create a mellow and mysterious mood as visitors walk through the kelp tank.





# C O S T

## UNDERWATER LIGHTING DISPLAY

Material	Price	Quantity	Total Price	Final Cost
Rosco Analog Projector	\$3000.00	1	\$3000.00	\$3875.00
Effect Disc	\$75.00	1	\$75.00	
 Labor				
Mounting	\$500.00	1	\$500.00	
Misc.	\$300.00	1	\$300.00	

# LOCATION

