# Computer Graphics Project:

# Aquatopia

## Group Members


- Htay Lwin ( 4KE- 1370 )
- Naing Soe Htut ( 4KE- 1302 )
- Yin Yin Kyaw ( 4KE - 1287 )
- Khin Kaung Nge ( 4KE - 1213 )

# Roles & responsibilities

## Htay Lwin

Fish animations & window optimization

## Naing Soe Htut

Environment & controlled movement

## Yin Yin Kyaw

Fish designs & environment animation

## Khin Kaung Nge

Fish designs & presentation preparation

## 01. ABOUT THE PROJECT

What the project's about

## 02. Project Goal

What we tried to achieve

## 03. Design Process

Which design choices put together an iconic look

## 04. Animation

How do they move?!

## 05. Further Capabilities

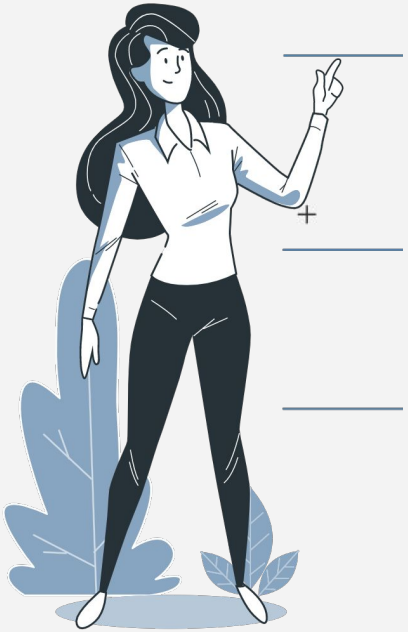
Optimizations and additional features

## 06. Conclusion

End?

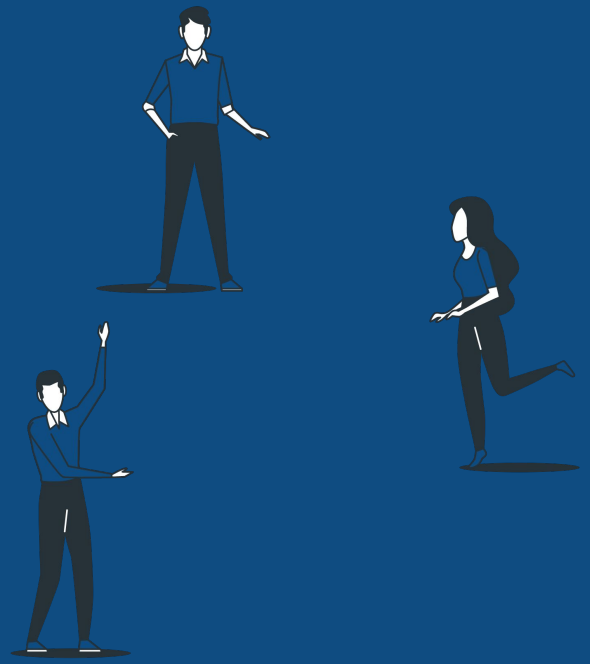
# 01
# About The Project

# Overview



- ★ Our project leverages the power of OpenGL within the C++ programming environment to simulate an aquatic environment.
- ★ The scene presented to the user is a dynamic aquarium featuring a shark, various fish, aquatic plants, and a stream of bubbles.
- ★ The visual presentation is enriched through a range of animations and movements designed to mimic the natural flow and the grace of an underwater ecosystem.

# 02
# Project Goal



# Project Goal

## Interactive Simulation Goal

- The aim of this project is to create an interactive, graphical simulation that effectively demonstrates the capabilities of OpenGL in rendering two-dimensional graphics with real-time interaction and animation.

- It achieves this by recreating an engaging underwater environment that responds to user inputs and window adjustments without losing graphical fidelity.

# Project Goal

## Advanced Features and Educational Value

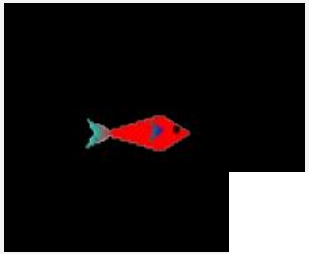
- It uses advanced Features: Utilizes phantom and sine wave movements, alongside orthographic projection for realistic simulation.
- The project seeks not only to entertain but also to provide an educational example of how two-dimensional graphics programming can simulate complex, real-world scenarios.

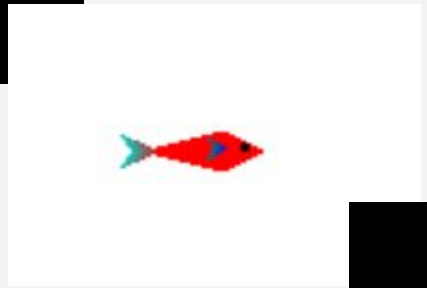
## Scalability and Consistent User Experience

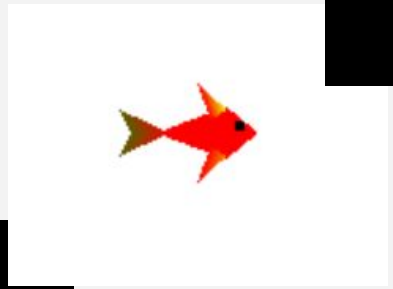
- Furthermore, the goal is to ensure scalability and adaptability of the graphics output, ensuring that users on different systems and with varying window sizes have a consistent visual experience.
- The project stands as a testament to the power of OpenGL in the world of computer graphics and serves as a foundation for further exploration into more complex three-dimensional graphics and animations.

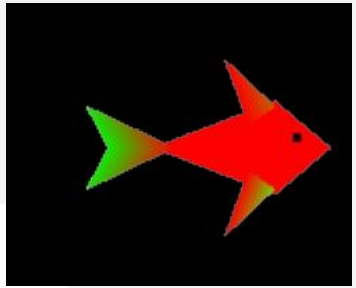
# 03 Design Process

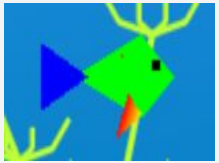
# Design Process

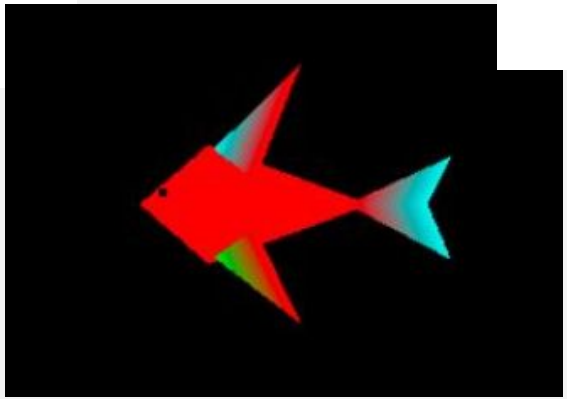


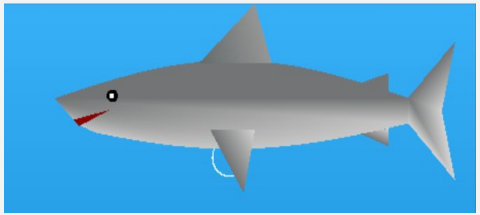












# Functions used for drawing fishes

**GL_POLYGON**

- For fish body

**GL_TRIANGLES**

- For fish fans

**GL_POINTS**

- For fish‘s eye

**GL_TRIANGLE_FAN**

- For shark

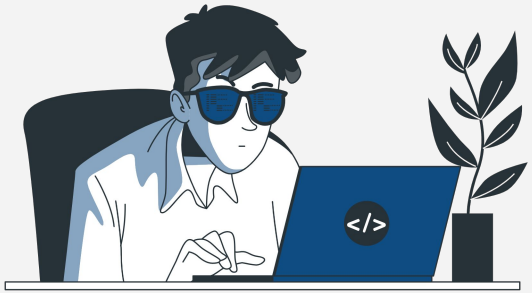
**glColor3ub();**

- Direct control over individual color components using unsigned byte values (range 0-255)

**glScalef(x,y,z);**

- For scaling sample fish

# 04 Animation




## Fish Animation

- ★ Normal Movement
- ★ Phantom Movement
- ★ Sine Wave Movement
- ★ Controlled Movement

## Bubble Animation

# Fish Animation

## Normal Movement

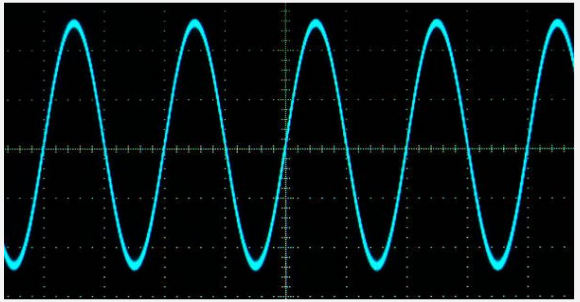
- Shark and Green Fish
- glTranslatef(GLfloat x, GLfloat y, GLfloat z);

## Phantom Movement

- Gold Fish
- Just normal move and emphasizes in color changing

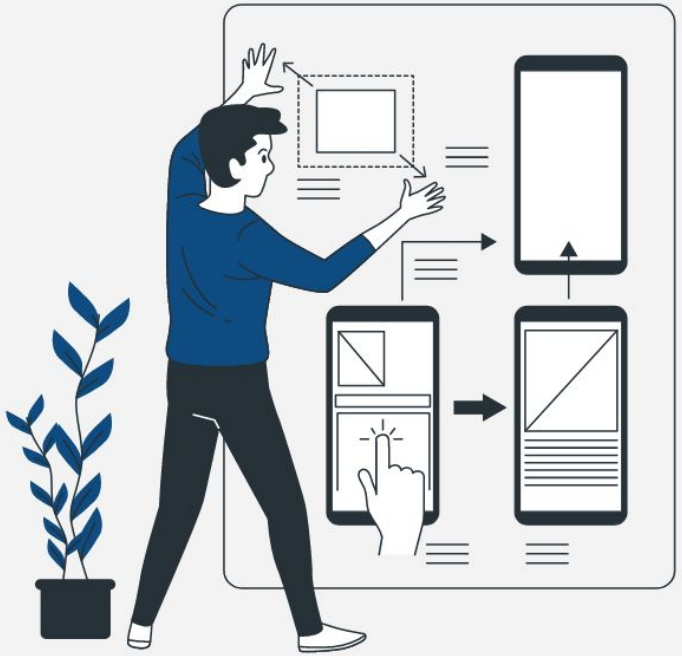
## Sine Wave Movement

- Small Fish Group
- GLfloat newY = initial_y[i] + sin (frequency * initial_x[i] + animateTime) * amplitude;
- initial_x[i] += translateX[i];



# 05
# Further Capabilities

These are additional features!



## Reshape( ) Function

- **gluOrtho2D (left, right, bottom, top);**
- Orthographic projection
- Parallel lines remaining parallel after transformation
- Projection is adjusted to maintain the aspect ratio
- Prevents distortion of the objects being rendered
- Appear as intended regardless of the window's size and shape

## Intro Window

- To show the texts:
  - **glutBitmapCharacter( );**
  - **GLUT_BITMAP_TIMES_ROMAN_24**
  - **GLUT_BITMAP_HELVETICA_18**
- To change to animation window:
  - glutKeyboardFunc(keyboard);

# Interactive element

## Movement

Fish moves to position of mouse clicked


## Translation

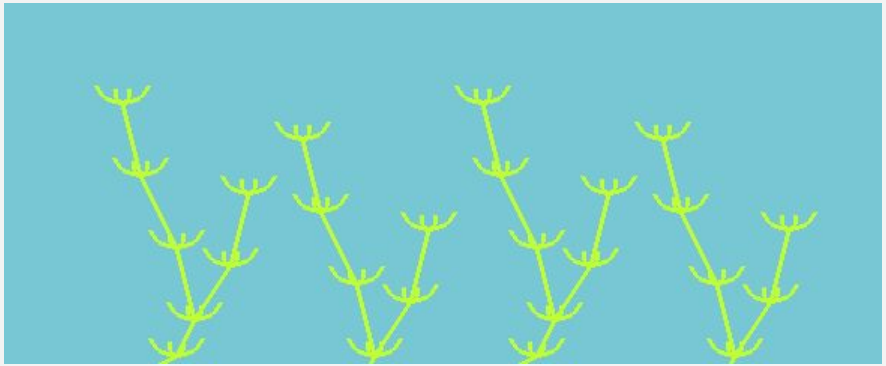
Flip fish based on direction

## Locating

Capture mouse position and convert to range of [-1,1]

# Environment

- Simple design choice
- GL_LINE_STRIP
- Left & right stems



# 06
# Conclusion

- Showcases the power of real-time rendering and simulation.
- Brought to life a vibrant underwater world filled with dynamic creatures and immersive environments
- Not only demonstrates the capabilities of OpenGL also highlights the endless possibilities for creative expression and interactive experiences in computer graphics.

# THANKS!

Do you have any questions?

**CREDITS**: This presentation template was created by **Slidesgo**, including icons by **Flaticon**, infographics & images by **Freepik,** and illustrations by **Storyset**