Tolga Aydın 27843 CS405 PROJECT 1

Project Report: CS405 - 3D Animations with ChatGPT

Overview

The CS405 project involves using ChatGPT in tasks related to 3D animations. Specifically, it covers the tasks of calculating the ModelView matrix for a cube, applying this transformation to the cube, and writing a method to animate the object. The project is divided into three tasks, each with specific requirements and objectives.

Task 1: Calculating ModelView Matrix with ChatGPT

Purpose: To calculate the ModelView matrix for a cube object using ChatGPT and apply this transformation.

Methodology:

The transformation-prompt.txt file was provided as input to ChatGPT.

ChatGPT's response in the form of a Float32Array object has been integrated into the getChatGPTModelViewMatrix() method in utils.js.

A screenshot of the cube was taken as proof of successful implementation.

A shareable link of the ChatGPT session has been created for documentation purposes.

Results:

The transformation of the cube has been successfully calculated and implemented, the screenshot and shareable chat link are available as proof.  
  
A screenshot of a computer

Description automatically generated

Link: https://chat.openai.com/share/8fa9c8ce-28be-4623-a294-dae6f5249c72

Task 2: Manual Transformation Matrix Generation

Purpose: To independently generate the transformation matrix made by ChatGPT in Task 1 by changing the getModelViewMatrix() method in the utils.js file.

Methodology:

The getModelViewMatrix() method has been adjusted to mimic the transformation matrix calculation that ChatGPT does in Task 1.

A screenshot of the newly produced cube was taken.

A comparison was made between the manually calculated modelViewMatrix and the version calculated by ChatGPT. Any differences that existed were analyzed and explained.

Results:

Manual calculation of ModelViewMatrix was completed and its output compared with ChatGPT's version. A screenshot is available as proof of completion of this task. The outputs are different since ChatGPT can’t make math perfectly and also make matrices multiplications in wrong order like scaling,rotation and translation or something else.

A screenshot of a computer

Description automatically generated

Task 3   
  
Task 3 was designed to animate the cube. Within the scope of this task, the aim was to animate the cube from its starting position to the target position calculated in Task 2 for a period of 10 seconds and then return to the starting position.

First Implementation

Originally, the getPeriodicMovement function was designed to allow the cube to move to and from the target position throughout the animation. In this version, animation progress was calculated in the range [0, 1] and inverted with the direction variable, allowing a return in the second half. However, it was realized that this approach did not fully reflect the animation flow.

Detection of Problems and Solution Process

It was observed that the animation did not exhibit the expected behavior. The way progression was calculated and the direction variable was implemented in the first and second half prevented the animation from providing a smooth transition. Additionally, not using the identity matrix as the starting matrix was also identified as a shortcoming.

Fixes and Final Implementation

The function has been modified to provide correct transitions in both halves of the animation. Progression was calculated linearly from the starting position to the target position in the first half of the animation, and from the target position to the starting position in the second half. With this approach, smooth interpolation was achieved in both halves, improving the fluidity and accuracy of the animation.

Conclusion

As a result of these corrections, the animation of the cube was completed successfully. In each 10-second cycle, the cube made a smooth transition to the target position and then smoothly returned to the starting position. This process ensured that Task 3 was completed successfully and the animation worked as expected.  
  
Here is the chat link: https://chat.openai.com/share/76bd37de-9612-4a8f-a782-344fdd86851a