

CS405 Computer Graphics Fall 23/24

Ahmet Burak Ekmekcioğlu

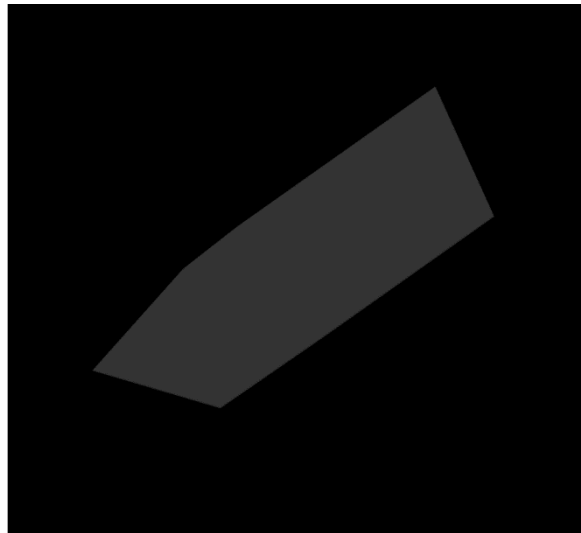
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1. Introduction

In this project, our goal is to animate a given 3D cube, with respect to a matrix called Model View Matrix. To this end, we are required to utilize ChatGPT for first a calculation of the aforementioned transformation matrix, then for modifying a function, namely `getPeriodicMovement` facilitating the animation of the cube. Moreover, the Model View Matrix is again manually calculated using the predefined functions providing translation, scale and rotation matrices for us. Latter calculation is used for the animation of the cube.

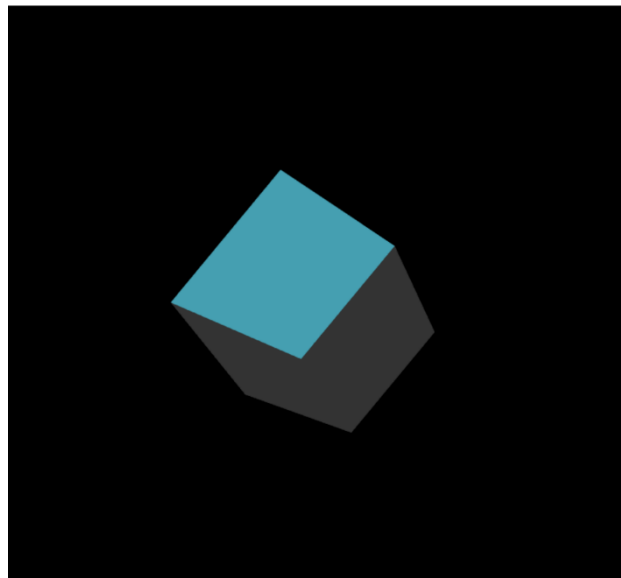
2. Methodology

As to our methodology in Task 1, we inquired ChatGPT that it should calculate a transformation matrix, given the criteria such that for any given matrix or point, the transformation matrix should translate it by 0.3 units on x-axis, -0.25 units on y-axis; scale it by 0.5 on x and y-axes; and rotate it by 30, 45 and 60 degrees with respect to x, y, and z axes, respectively. A screenshot of the cube, generated from the matrix ChatGPT provided is below:



The matrix is then pasted in `getChatGPTModelViewMatrix` function, to be able to be visualized in our HTML file. Additionally, the link to this chat is given at the end of this report.

In Task 2, we were to obtain the same matrix using the same transformation matrix, according to the same criteria. This is achieved manually in the `utils.js` file, by utilizing predefined functions such as `createRotationMatrix_XYZ`, `createTranslationMatrix`, and `createScaleMatrix`. In the `getModelViewMatrix` function, using the above functions, we multiplied the generated matrices to get the final matrix. Lastly, we compared this matrix to the one that ChatGPT generated. Prior to the calculation of this matrix, it was a possibility that these two matrices will neither be the same nor even similar due to floating point calculations. It turned out that this possibility became true such that two matrices are different from each other. This was due to ChatGPT's incapability of making such complex calculations. A screenshot of the cube transformed by the manually calculated Model View Matrix is below:



As to Task 3, we asked ChatGPT to write a function named `getPeriodicMovement`, which is in our HTML file responsible for the animation of the cube. As required, the animation had to continue forever, with intervals of 10 seconds, in the first 5 seconds of which the cube should move to the target position, as in Model View Matrix. In the last 5 seconds, it should animate back to the initial position. The modification that ChatGPT provided is first, it decides whether the animation is in the first 5 seconds or not, then interpolates between an identity matrix and our Model View Matrix to get the target matrix or vice versa, which creates an illusion of the cube moving.

3. Conclusion

In this project, we have successfully animated the given 3D cube object according to the Model View Matrix using ChatGPT, which facilitated the periodic movement of the cube by providing a function.

ChatGPT chat links:

Task 1: <https://chat.openai.com/share/1b34c0aa-66e7-4b9a-a711-34aebf5504fc>

Task 3: <https://chat.openai.com/share/7ed2feb6-fa2d-4e8f-aa1a-50e09aa5c504>