

CS 1766 Introduction to Computer Graphics

Spring 2021, Stephan Ohl

WebGL Lab 4

Transformations

2D transformations can be described by 3×3 matrices.

$$\mathbf{x} = \begin{bmatrix} sR & \mathbf{t} \\ \mathbf{0}^T & 1 \end{bmatrix} \mathbf{x} \quad \text{or} \quad \mathbf{x} = \begin{bmatrix} A & \mathbf{t} \\ \mathbf{0}^T & 1 \end{bmatrix} \mathbf{x} \quad \text{or} \quad \mathbf{x} = \begin{bmatrix} A & \mathbf{t} \\ \mathbf{v}^T & u \end{bmatrix} \mathbf{x}$$

For WebGL, we can also pack this 3×3 matrix into the 4×4 matrix that is used for 3D transformations:

$$\mathbf{x} = \begin{bmatrix} A & \mathbf{0} & \mathbf{t} \\ \mathbf{0}^T & 1 & 0 \\ \mathbf{v}^T & 0 & u \end{bmatrix} \mathbf{x}$$

We are going to make use of this to develop a small program that demonstrates transformations in 2D.

Task

The program contains the code to create a simple rotation. Modify the program such that the center of the house rotates around the origin at a certain pre-defined distance (e.g., 0.3) AND that the house rotates around itself at the same time. This motion is comparable to the motion of earth around the sun and around its own axis. Set up your overall transformation matrix in JavaScript.