

CS 4730: Computer Game Design

Game Loop and Affine Transforms

Overview

This semester, you and a team of peers will be building a game engine and a fully playable game. For this first assignment, you will get acquainted with the code base and add some simple drawing and transformation features. This will begin to get you comfortable with game programming.

Download the Code Base and Run the Project

On the course website, you will find a zip containing the starter code for the class. The code uses a graphics library called SDL2. You'll need to install this on your machine if it is not working out of the box. Once that is installed you should be able to 'cd' into the directory and type 'make' to build the project. Once that is complete, you can type './bin/myGame' to run the game. You should see a still image of a cartoon character in a window (not very interesting yet).

Understand the Code

Take a look at the provided code and understand the overall structure. The objects involved are summarized below:

AffineTransform: For now, this is an empty class. We will fill it in as part of this assignment (see below).

DisplayObject: Represents a single drawable entity in the game. Can be initialized with a path to an image file or with RGB values (for a colored rectangle). Contains methods for updating the object, and most importantly drawing the object.

Game: Runs the game loop. Sets a timer and calls update and draw depending on the assigned framerate. This object keeps the game loop running while the game runs and cleans everything up when the window is closed.

MyGame: A simple child class of game. Creates a DisplayObject (the character we see on screen) and calls its draw method every frame (in draw).

Main: Creates a MyGame object, calls start on it. Very simple file.

End Goal: Demo

The end goal for this assignment is to update the demo to provide the following features:

1. The arrow keys should move the character around the screen (up, down, left, right).
2. The Q and W keys should scale the character in and out from its pivot point, which is initially the upper left corner of the character image.
3. The I,J,K,L keys should move the characters pivot point. Note that the character sprite will move in the opposite direction to account for this pivot location change (that is normal)
4. The A and S keys should rotate the character clockwise and counter-clockwise respectively.
5. The Z and X keys should cause the character to fade in and out
6. The P key should cause the character to become invisible and visible

How to Begin

Here is a recommendation on how to approach this assignment:

1. Your transformations (scale, rotate, movement) MUST use AffineTransform. Thus, you should begin by implementing the AffineTransform class. Once this class is complete, you will be able to

apply transformations to the character by merely invoking the respective methods (scale, rotate, etc.) in the AT class.

2. To use your Affine Transform, update your DisplayObject::draw() method to invoke the proper methods. Then, you can multiply the four corners of your sprite by the Affine Transform to discover where the Sprite really needs to be drawn. **Note that rotation is very tricky in SDL2 because the drawing method forces you to pass in an axis-aligned rectangle with a rotation value separately. You'll need to take the four corners of your rotated rectangle and work out these values separately.*
3. Once that is complete, simply add code to your update method in MyGame to handle the keyboard controls and Sprite changes based on those keyboard presses.

Turn In

Zip up your entire project and submit it on Collab.