Assignment 2

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1 Introduction

In this assignment, the expectation from us was adding swinging animations to our last assignment result. The animation has three steps. In the first step we were need to scale emoji and when pressed to 1 key it should return to scale point. In the second step we were need to implement an animation which is declared as "The emoji should not spin around its origin but should rotate [-45, 45]° to perform the swing animation." when pressed to 2 key. In the third step we were need to change the color while emoji swinging, the color of face which correspond to yellow should be darkest when angle come near to 45 and -45.

2 Experiment

2.1 Part 1

In the Part 1 there was a project given by teaching assistant which is create triangles, and the expectation was making triangles inside to transparent and fill the lines with colors. For the first expectation I change gl.drawArrays functions argument from "gl.TRIANGLES" to "gl.LINE_LOOP" which is satisfy the expectation. For the second expectation I did some changes on tetra and triangle functions which are in the gasket4.js file. While calling triangle function with passing integer as the take color, I pass an array for coloring multiple in tetra and in the triangle function takes colors index with correspond to correct color.

2.2 Part 2

In the Part 2, firstly I write a scale function which takes an integer and divide all the points stores as global to given value. After make the scaling I was need to create a render loop for clear scene and redraw every loop, for satisfy the

condition I add two new uniform variables to vertex shader, which are uAngle and uTransformationMatrix for the calculating gl_Position, I assign that to "uTransformationMatrix * vec4(cos(uAngle) * 0.6 + a_position.x, sin(uAngle) * 0.6 + a_position.y, a_position.z, 1.0);" and takes those variable to program as global variables which are uniformAngle and uniformTransformationMatrix. then I add the event listeners to document. Then I call getAngle function in the my render loop function if the global animation variable has true value and set the angle according to keep angle between -45 degree and 45 degree. After that I drawed the emoji with correspond angle. When user press the button 1 I reset the angle to initial state, and assign animation variable to false. For the color change I write a function which getYellowColor, the function return initial yellow if global color transfer variable is false. Otherwise it is calculate angles abs from start angle and dive 500 for red color, divide 5 for green color and blue color is always keep the initial value. In the render class I have a constructor method which is assign last frame as millisecond, calculate it by performance.run method in run method which is passing to the windows requestAnimationFrame method and in the run method deltaTime is calculated by current performance.run value mines last frame value and divide it to 1000.0 and the calculated deltaTime passing to the callback function which is given constructor and in the callback function new angle calculated according to deltaTime.

Table 1: Classes

Class Name	Attributes	Methods
Render	self, msLastFrame, callBack, run	constructor, start
ShaderUtil	No Attribute	start, initGL, domShaderSrc, createShader, createProgram, getLocations, initProgram, buffer, drawShape, clear, getConcatData, createYellowCircleArray, createBlackCircleArray, createColorArray, quadraticBezier, getCurvePositions, drawFace, getYellowColor, drawEyes, drawMask, drawMaskCorners, drawCurves, scaleDraw, scaleArray, scaleCurves, drawScene, onRender, getAngle, resetAngle, getTransformationMatrix, addEventListeners, parsePressedKey

Table 2: Methods in Render Class

Method Name	Input(s)	Output(s)	Info
constructor	callback		creates render object
start			runs the animation frame

3 Conclusion

As a conclusion part 2 in the assignment was so challenging, I had to search and learn how can I implement uniform animation and make rotation according to assignment paper. I learn those information and had an idea how its work, and also how create animation scenes implements one of the I learn in this assignment.

Table 3: Methods in Shader Class

Method Name	Input(s)	Output(s)	Info
start	canvasID, newScale		calls initGL, initProgram and starts the render
initGL	canvasID, newScale		gets gl and set scale and clear canvas
domShaderSrc	elmID		gets shader
createShader	src, type		compile shader
createProgram			attach shaders and link program
getLocations	program		gets uniform and attirib locations
initProgram	program		adds event listener and calls gl.useProgram
buffer	shape, shape_color		bind buffer and set buffer data and sub data
drawShape	shape, shape_buffer, shape_mode, vertex_number		draws the shape
clear			clear the canvas
getConcatData	radius, centers, j, i=0		gets circular data
createYellowCircleArray			creates yellow circle
createBlackCircleArray			creates black circle
createColorArray	color, loop		creates color array
quadraticBezier	p0, p1, p2, t		calculates quadratic bezier
getCurvePositions	p0, p1, p2		gets curve points
drawFace			draws face
getYellowColor			gets yellow color array according to angle on the animation
drawEyes			draws eyes
drawMask			draws mask
drawMaskCorners	buffer, loop		draws mask corners
drawCurves			draws mask curves
scaleDraw			what method does
scaleArray	array		calculates points by scale
scaleCurves			scales curves points
drawScene			draws uniforms and shapes
onRender	dt		cals getAngle if animation true
getAngle	dt		gets angle according to delta time
resetAngle			reset angle to initial state
getTransformationMatrix			calculates transformation matrix
addEventListeners	4		adds event listener for key pressing
parsePressedKey	key		calls process according to pressed key