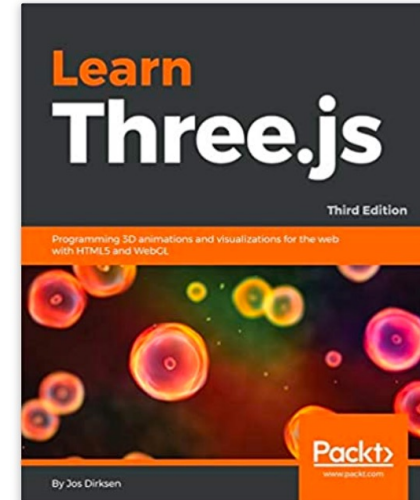


COMPUTER GRAPHICS



* Based heavily on CISC 3620 material by Prof. Michael Mandel

USER INTERACTION

Keyboard and GUI Controls

This course so far

- Introduction
 - Setting up the environment
 - Editor, Codepen, etc.
- Introduction to ***Javascript***
 - Programming fundamentals
 - Variables, functions, conditionals, loops, data structures
 - Object-oriented concepts: using objects, classes, methods

This course so far

- HTML5 ***Canvas 2D*** drawing
 - The HTML5 <canvas> element
 - Drawing rectangles
 - Drawing paths
 - Drawing arcs in paths
 - Setting properties of path segments
 - Transformations and saving and restoring state

This course so far

- API's:
 - OpenGL/WebGL, Three.js, and TW
 - the three APIs we'll use in this class
- Geometrical objects
 - Drawing using OpenGL and Three.js
- Creating a simple scene
 - using Three.js and TW

This course so far

- User Interaction
- Keyboard controls
- GUI controls

Topics for Today

- Exercises: Adjusting steeple height with keyboard and GUI controls

EXERCISES

Exercise: Keyboard Controls

- To implement a new keyboard control, you need to have:
 - one or more global variables, used by the scene modeling code
 - a callback function that modifies the global variable(s) and then rebuilds and redraws the scene
 - a binding of the callback function to a key
 - using `TW.setKeyboardCallback(key,function,docstring)` (call this function after `TW.mainInit()`)

Exercise: Adjusting the Height of the Steeple

- Start from [this pen](#). The important part is:
 - `var steepleHeight = 36; /* global variable to be controlled */`
 - `var steepleWidth = 6;`
 - `var steepleMesh;`
 - `//`
 - `function placeSteeple(steepleHeight, steepleWidth) {`
 - `var half = steepleWidth * 0.5;`
 - `var steepleGeom = createSteeple(steepleWidth, steepleHeight);`
`steepleMesh = TW.createMesh(steepleGeom);`
`steepleMesh.position.set(barnWidth*0.5, barnHeight+barnWidth*0.5-half, -half);`
 - `scene.add(steepleMesh);`
 - `}`

Exercise: Adjusting the Height of the Steeple

Implement

Implement a function to

- remove the current steeple
- increment the height
- create a new steeple and place it on the barn
- redraw the scene

Add

Add a keyboard callback to your code that allows you to grow the steeple by entering the '+' key

Add

Add a second keyboard callback that makes the steeple shorter when you enter '-'.

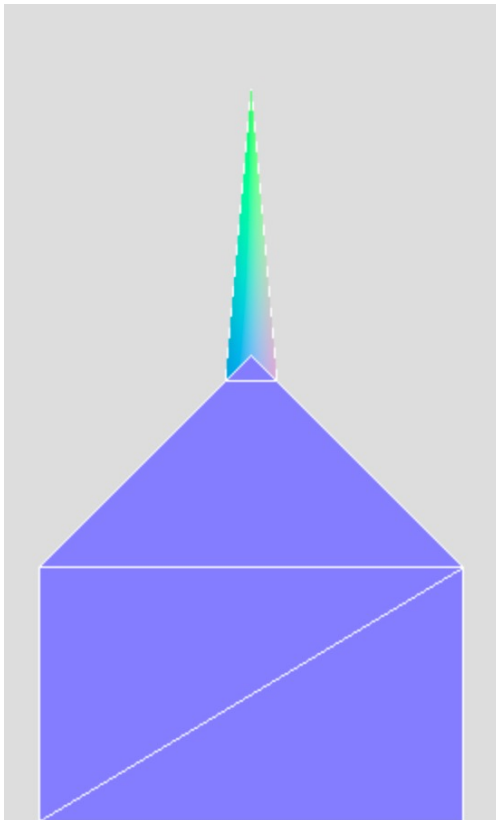
Exercise

- Your result may use a growSteeple function:
 - `function growSteeple() {`
 - `scene.remove(steepleMesh);`
 - `steepleHeight++;`
 - `placeSteeple(steepleHeight, steepleWidth);`
 - `TW.render();`
 - `}`

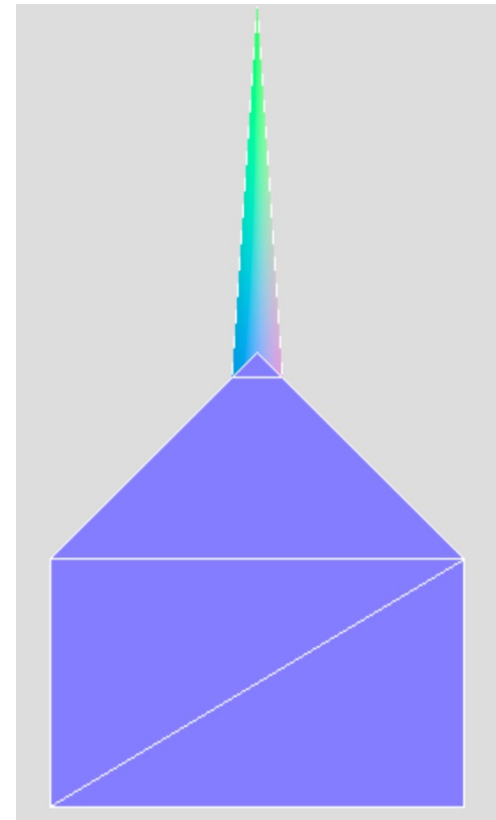
Exercise: Adjusting the Height of the Steeple

- Your result may look like this:

- Before



After steeple grows:



Exercise: GUI Controls

- To implement a new GUI control, you need to have
 - one or more global object variables
 - contain parameters to be controlled, with initial values
 - one or more callback functions that are called when the user modifies one of the parameters
 - The functions rebuild and redraw the scene
 - a new `dat.GUI` object
 - calls to the `add()` method and `onChange()` event handler
 - specify a global object variable, parameter, range of values for the slider, and callback function

Exercise: GUI Controls

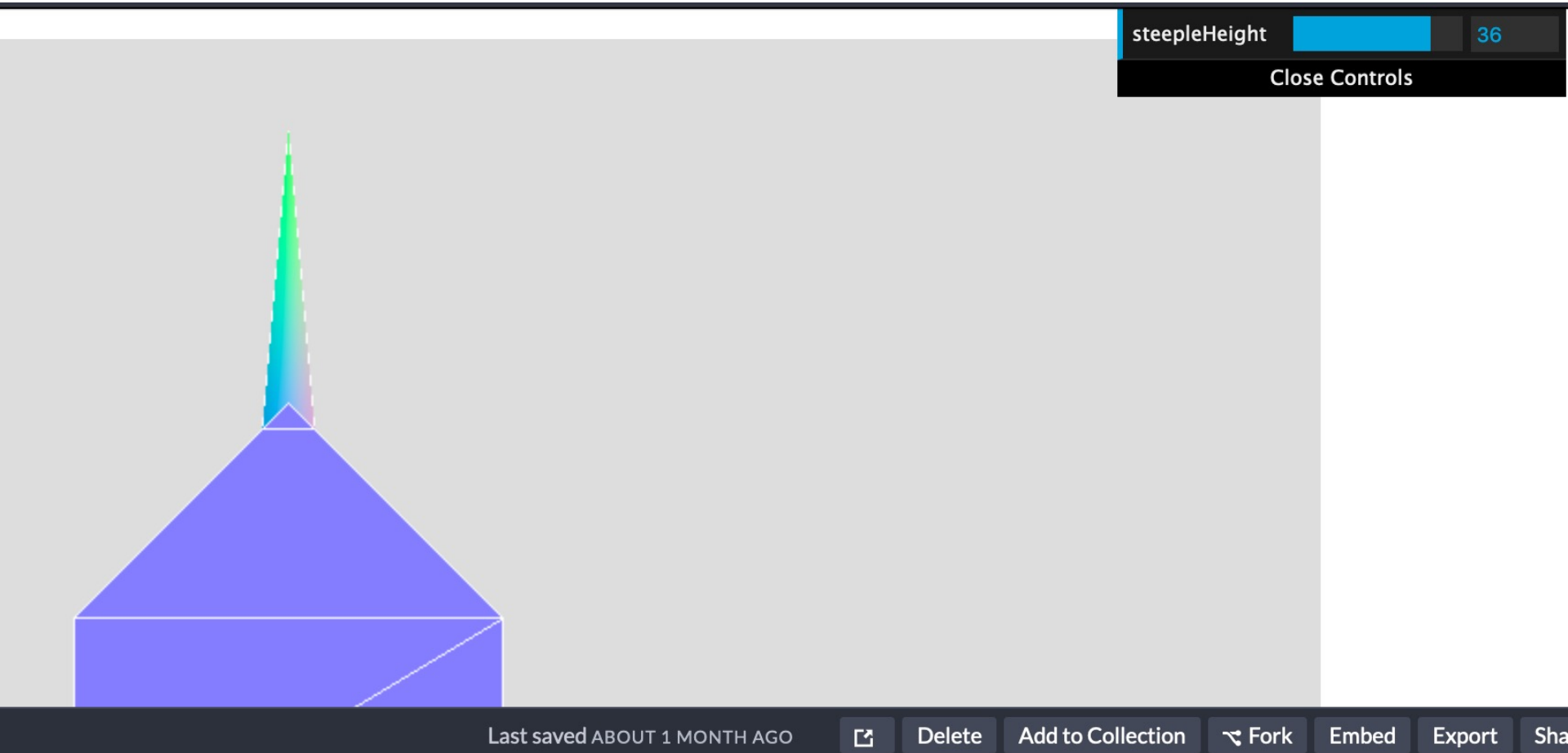
- Your solution may include the following code:
 - `var gui = new dat.GUI();`
 - `gui.add(sceneParams,'steepleHeight',20,40).onChange(redrawSteeple);`

Exercise: Adjusting the Steeple Height with a GUI

- Modify your code from the previous exercise to *use a GUI control instead of a keyboard control*
 - to adjust the height of the steeple

Exercise: Adjusting the Steeple Height with a GUI

- Your result may look like this:



Summary

- TW library provides usable keyboard controls functionality
- The dat.GUI library provides usable GUI controls
- The .position.set() function can be used to move objects on the screen
- The steeple can be adjusted with keyboard controls or GUI controls

Questions?

