

CS460 Intro page

Aniruth Timmanayanapeta,
Farhan Warsame,
Farhan.Warsame001@umb.edu
University of Massachusetts Boston



Figure 1: Add a nice wide figure here and replace this caption.

ABSTRACT

Implementation of new CS460 computer graphics course introduction page.

KEYWORDS

WebGL: Web graphic Library,
XTK: X Toolkit, open source graphics library,
CS: Computer Science,
OS Speech API: Operating System Speech Application
Programming Interface

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<https://CS460.org>

1 INTRODUCTION

This project implements a new CS460 computer graphics course introduction page. This is the page that the agenda of day is presented by the professor. This page is important because it displays everything that professor is going to cover in the class for that day with sounds, videos and animations of different types.

2 RELATED WORK

Some of the works that relate to this project are the current used introduction animations.

Generally, it is related to work of XTK [2] and Three.js [1] animations projects in Threejs website and in many other websites.

3 METHOD

In this project, we used one method in two different ways. The method is using HTML's canvas element.

First way is to use the XTK library to render geometric objects into canvas and build some geometries with animations, like movement and rotation on x, y or z direction and add audio.

The second way is using THREEJS library to build the second part

of the project. This part, we are going to use few different geometry shapes and add textures such as pictures from the class field trip that was uploaded by the professor.

And finally, there is another part which is going to use operating system API to read a text and speak. In this section, the intention is to give the professor an option of editing the days announcement to accommodate any additions or change of schedule, like switching lecture to another day that the professor feels to fit that day.

3.1 Implementation

When implementing any computer generated animations, 2D or 3D using HTML canvas and WebGL libraries, there is a procedure that is followed. Initialize the renderer, create the scene, set up the camera and lights and add all into scene and render to the canvas. This is exactly the way we are going to go by.

This the first part we are going to use the XTK libraries. This library is simpler than the most of other libraries we used. It takes few lines to create an object and render it to the page. Here is an example of a cube object with an image texture rendered to the page.

```
r = new X.renderer3D();
r.init();
// create a cube
cs460 = new X.cube();
// skin it..
cs460.texture.file = 'cs460.png';
r.add(cs460);
r.render();
```

After creating a cube object with an image texture, we set up a time interval of how long this object will show on the screen.

```
setTimeout(function() { cs460.visible = true; }, 800);

setTimeout(rotate_cs460, 2000);
setTimeout(zoom_into_cs460logo, 5000);
setTimeout(function() {
  pc.visible = true;
  mesh.visible = true;
}, 7000);
```

We have created two functions, rotate_cs460 and zoom_into_cs460logo that will do rotation and zooming.

In function rotate_cs460 We hide the image for about a second and and call rotate function to rotate the cube for two second and zoom-in to move to next section of animation.

We went through similar process creating the second part but using THREEJS library.

We uplaoded video and audio using javascript built in functionality.

```
var music = document.getElementById('music');
music.autoplay = true;
music.load();
```

3.2 Milestones

We structured the implementations as follows:

First, implement simple XTK box and add it to the canvas.

Second, creates another object using THREEJS library and render

that to the page as well.

Third, add text to speech part to the page,

Fouth, animations and time allocations structure implementation.

3.2.1 Milestone 1. scheduled in person meeting before brainstormed the way forward, goals on each step. We decided to first implement part1 and come back for another discussion.

3.2.2 Milestone 2. Discussed in discord and in person meeting on progress of the goals we setup and how to present project presentation.

3.2.3 Milestone 3. last meeting before submission to make sure everything was working properly. Add as many milestones as you like. This was in-person meeting.

3.3 Challenges

- Challenge 1:

The challenge we faced at first was the time interval setups. The class introduction takes about 35 seconds and we are expected to come up with solutions that takes about the same time because we think coming up longer solution would interfere with the time allocated for the lecture explanations. So deciding on which object animations to give more time and setting it was a challenge.

- Challenge 2:

Another obstacle was the speech to text addition to the page. We initially had the idea of putting the text input box at the end of animation to prompt after it finishes and fades away. And then we thought maybe letting the text input at the beginning would make give an option of declaring whats ahead for the day.

The implementation of the text-to-speech itself was simple that needs few lines of code, but incorporating with our project was a challenge that was causing a lot of errors.

4 RESULTS

The result we have is a working program that takes about the same time as the class introduction with animations and sound that we can be used for the class. The text to speech part is not included as it was causing more problems and decided to remove it.



Figure 2: An example image.

Table 1: Some example table

Device	Performance
iPhone	50 FPS
Android	50 FPS
Old Macbook	60 FPS

5 CONCLUSIONS

In this project, we have implemented two different libraries that we have learned in the course, XTK and Three.js. We have used common geometry shapes and designs and added animations, videos and audios. We have displayed the goal of the project in a manner

that we thought represents what is taught in the class. We have mentioned in the project what to expect when you take this class and how this can be great start for computer graphics if one would like that field.

REFERENCES

- [1] Ricardo Cabello et al. 2010. Three.js. URL: <https://github.com/mrdoob/three.js> (2010).
- [2] Daniel Haehn, Nicolas Rannou, Banu Ahtam, P. Ellen Grant, and Rudolph Pienaar. 2012. Neuroimaging in the Browser using the X Toolkit. *Frontiers in Neuroinformatics* (2012).