

# DEVELOPING AN INTERACTIVE MAP FOR DISSEMINATING DETAILED 3D MODELS OF BUILDINGS ON THE CALIFORNIA STATE UNIVERSITY, LONG BEACH CAMPUS

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## Introduction

Mapping technologies are developing toward interactive map and three dimensional forms that add perspective to 2D maps and improve visualization of reality. 3D maps provide university web visitors with a better understanding of campus environments. They can also touch visitors feelings so that they can imagine themselves being there. Figures 1 and 2 below show examples of universities that use interactive maps with 3D and video animation functionality to provide information about their campuses and also demonstrate their technical capabilities.

This project will describe the development of a web map that contains a 3D animation of a recently constructed building on the California University, Long Beach (CSULB) campus.

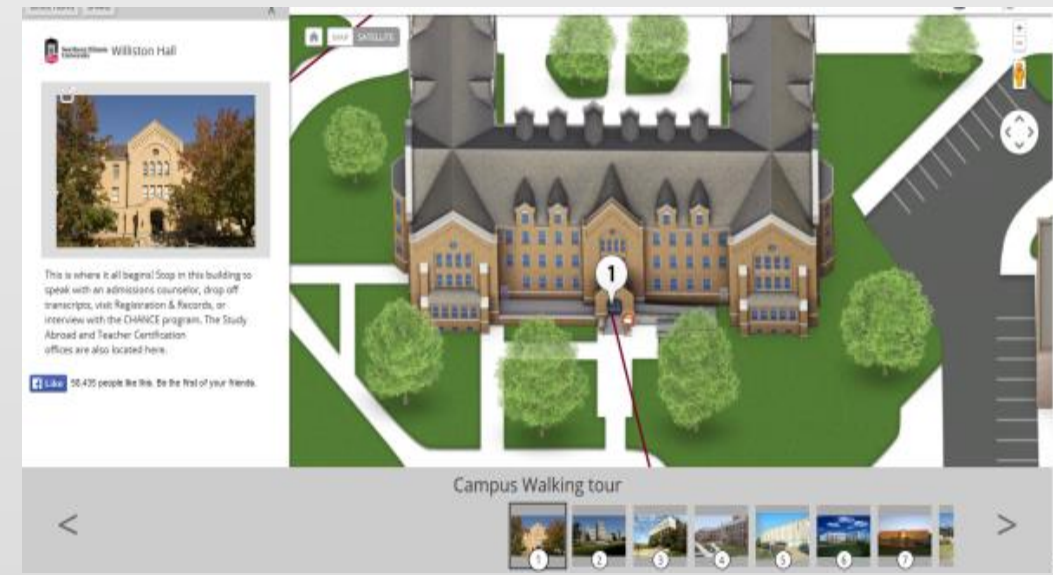


Figure 1. Example of Northern Illinois University campus interactive map

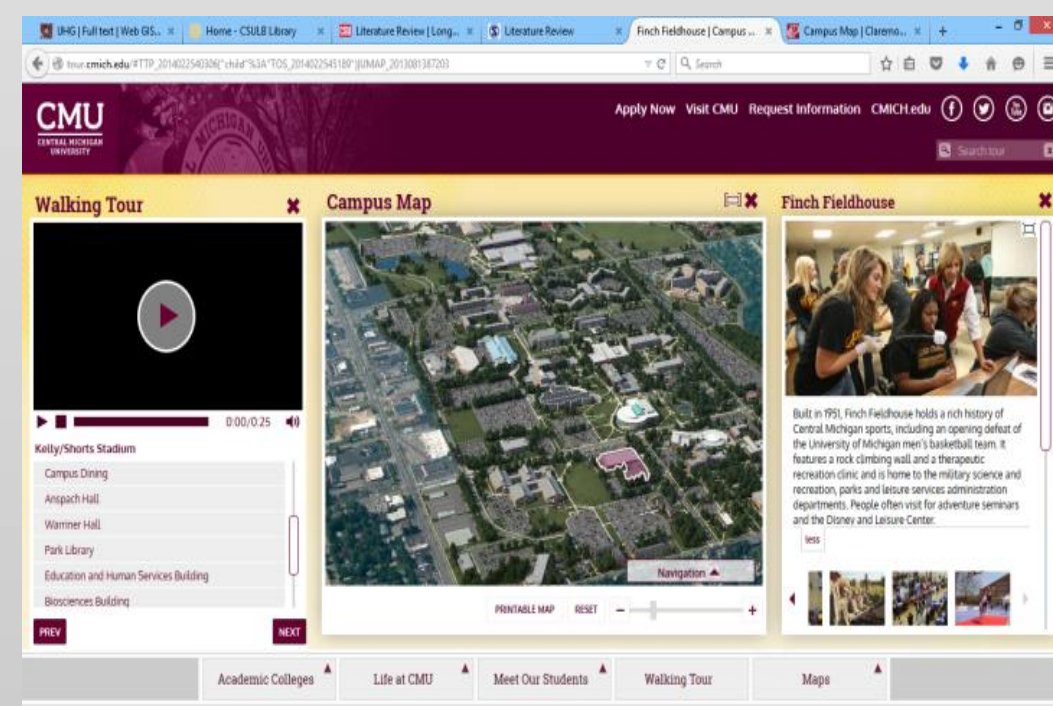


Figure 2. Example of Central Michigan University interactive map

## Data and Data Sources

Table 1 shows details of data and resources that were used for this project. The building floor plan data was provided by the CSULB Project Planning and Facilities Management (PPFM) department, and some data came from the Trimble SketchUp software. I also collected physical measurements of the Nursing building with a tape measure and took photos of the building as well to help with the modeling process.

Table 1. Data and resources to create 3D buildings and web map

Name of data	Content	Source
Nursing building floorplan	CAD data of Nursing Building	CSULB PPFM
Base map	CSULB campus web map	Professor Shensky
Measurement data & building photography	Measurement the height and width of windows, doors, and other objects to make it realistic size in 3D model	Paphichaya Chomkhanngoen
Aerial image	<a href="https://www.google.com/search?q=google-map&amp;ie=utf-8&amp;oe=utf-8">https://www.google.com/search?q=google-map&amp;ie=utf-8&amp;oe=utf-8</a>	Google maps
3D entourage Models	<a href="https://3dwarehouse.sketchup.com/">https://3dwarehouse.sketchup.com/</a>	SketchUp's 3D Warehouse

## Methodology

Trimble SketchUp Make software was used to create a 3D model to provide map users who are interested in the CSULB campus with detailed information about the campus environment, buildings, and its interiors. SketchUp Make comes with powerful tools that are simple to use.

I styled the 3D model to look realistic by using the Paint Bucket tool. The color and material type were edited using the selection mode to adjust for objects such as walls, glass, doors, and floor. Small objects were downloaded from the 3D warehouse to create a more realistic environment with plants, computers, toilets, tables, and chairs. An animation scene of the 3D model from different views was created in SketchUp. This was published as an MP4 video for later use in the interactive web map.

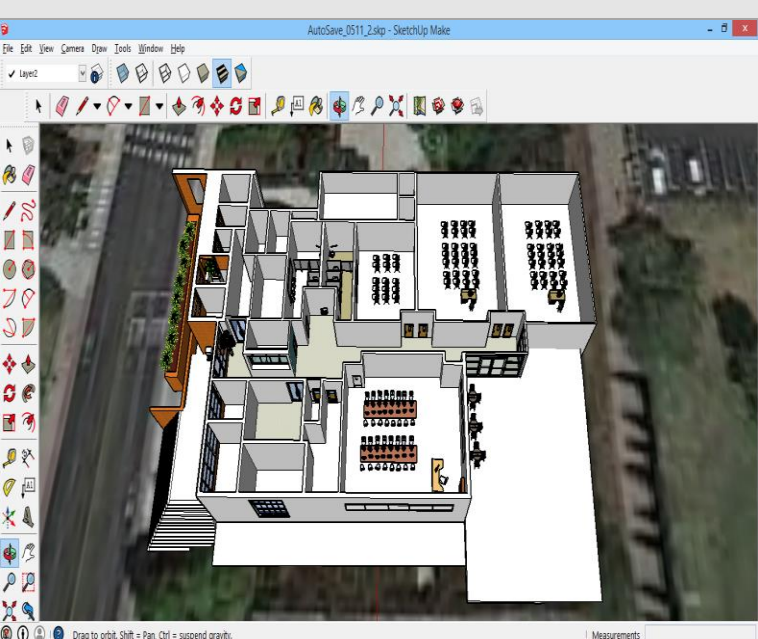


Figure 3. Building 3D model with realistic details

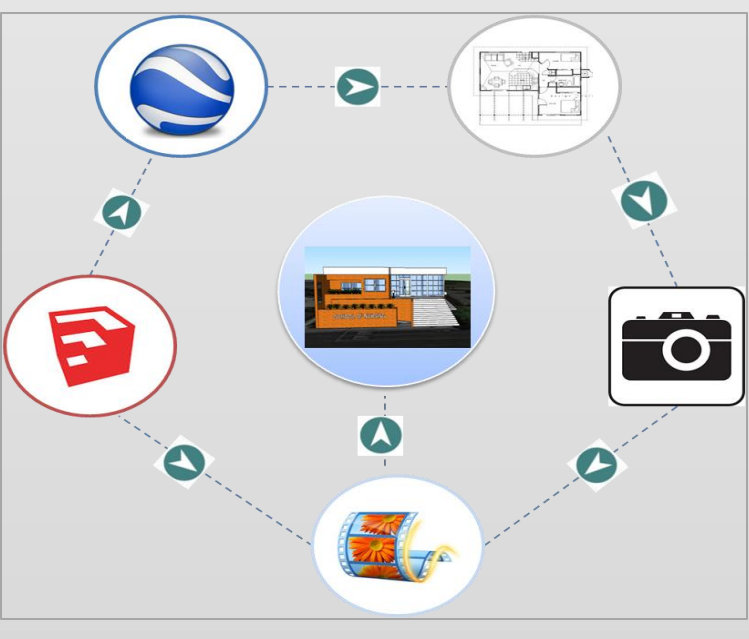


Figure 4. 3D modeling Methodology diagram

I then had to write HTML, CSS, and JavaScript code to display the map data in a web page and add interactivity that would make it possible to show the 3D model. I based the code for my map on an interactive map that I had created as part of a lab exercise in another course which already incorporated the CSULB campus basemap. The interactive map I created featuring the 3D building model allows users to click on hot spot buildings and view detailed 3D models with pictures and an animated movie. Figure 5 shows the methodology developed to create the interactive web map.

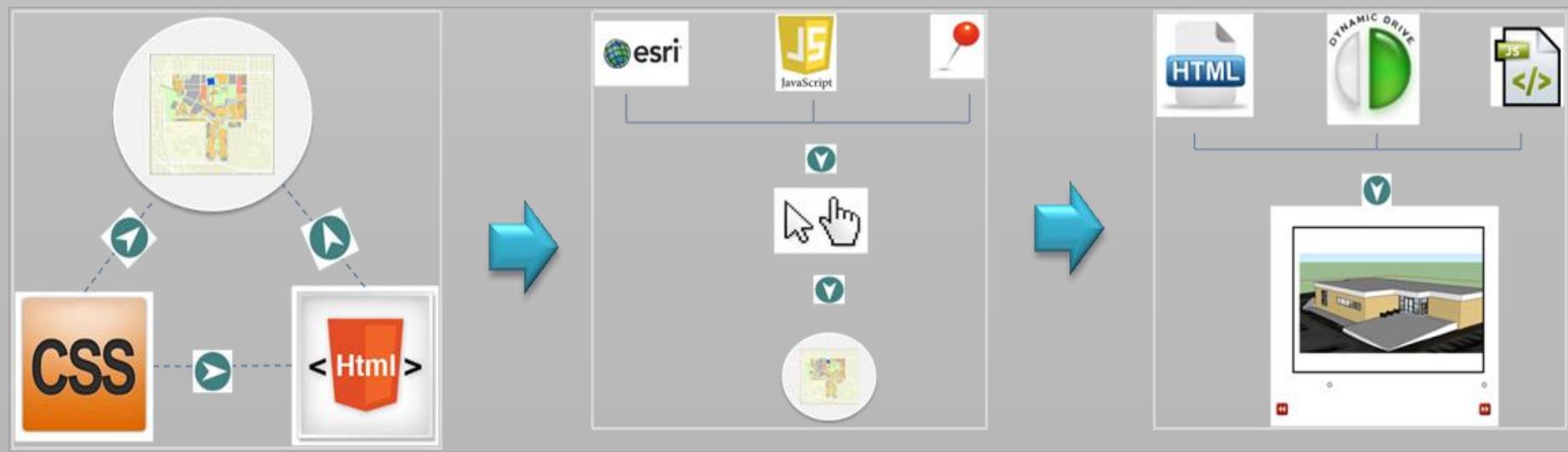
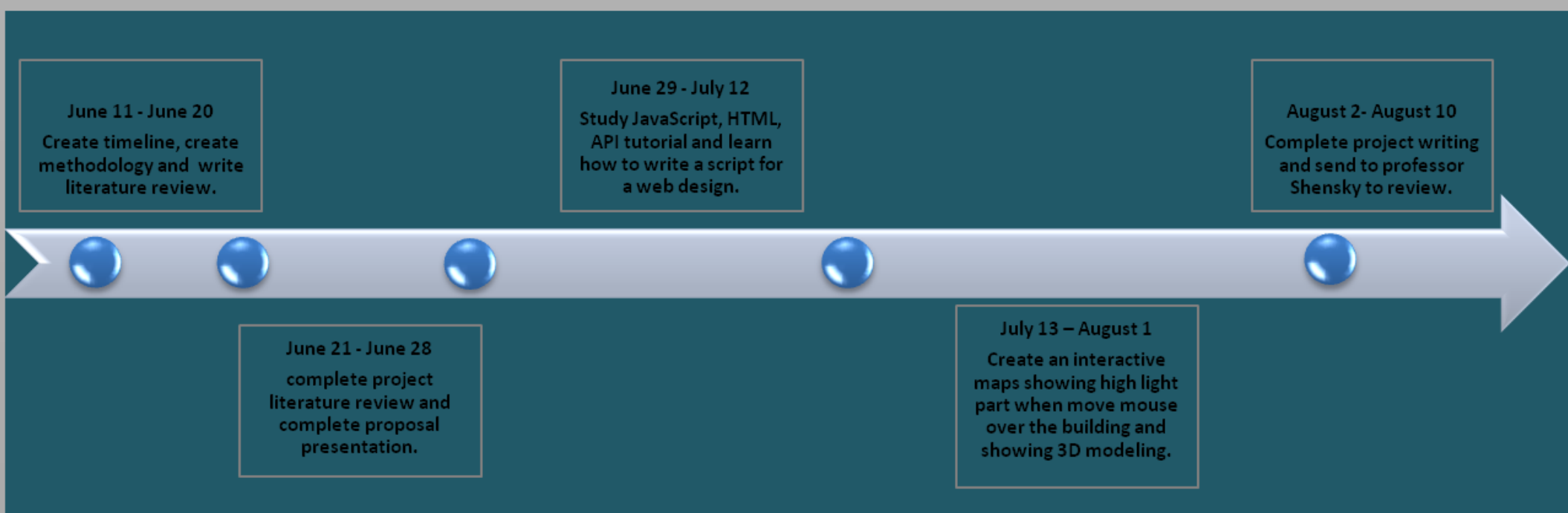


Figure 5. Interactive web map Methodology diagram

## Timeline



## Results

Result 1. The 3D model of California State University Long Beach (CSULB) showing exterior and interior of the Nursing Building. Figure A, B, C, D, and E show comparisons between real building and 3D modeling (figure 6).



Figure 6A-E. Comparisons between the nursing school building and the SketchUp 3D model

Result 2: The two different versions of the interactive maps that I completed (figure 7) shows the slideshow and video working in separate maps. Both completed web pages contain an interactive map of CSULB. When a user clicks on the active building, the pop up window will show up and play an animation showing exterior and interior of the building.

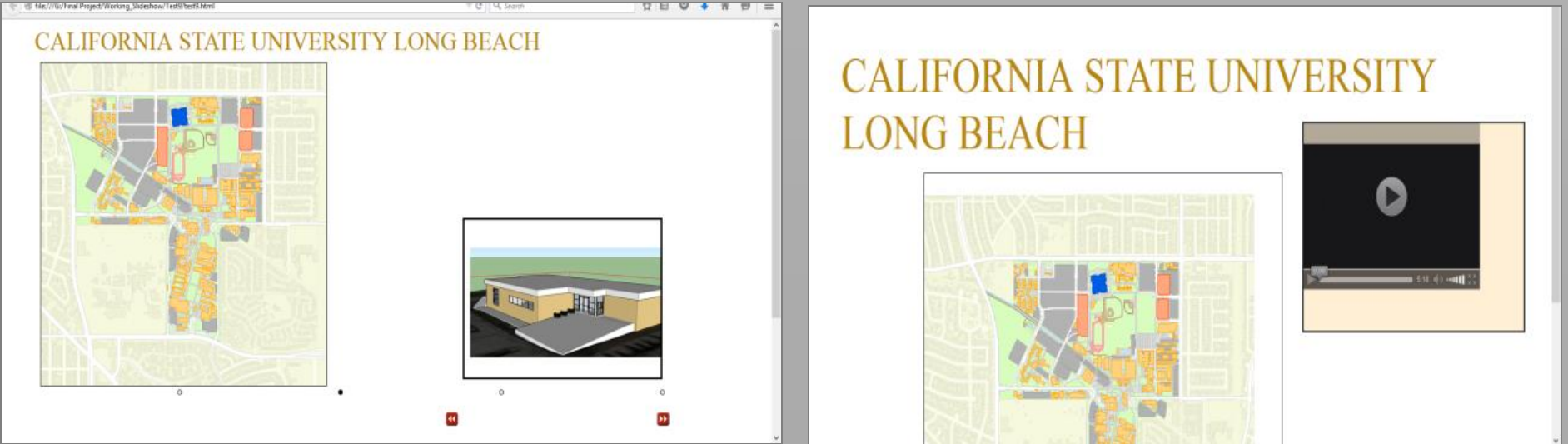


Figure 7. The two different versions of the interactive maps that I actually completed which show the slideshow and video working but only in separate maps.

## Discussion

I undertook this project with no previous experience with SketchUp and web design. I taught myself new skills in a limited amount of time. Although I successfully met the project goals, there were some limitations. This project used SketchUp Make, a free version of Trimble SketchUp, to create the 3D model. The data and resources were free of charge. The free version of SketchUp is limited compared with SketchUp Pro which provides full functionality (at a cost of \$700 per license and \$49 for student version). The difference between these versions are presented in figure 8. If I had used the Pro version, my 3D model result might have appeared much more impressive, realistic looking in details and it would look more professional.



Figure 8. SketchUp Pro result (left) (<http://sketchupupdate.blogspot.com>) SketchUp Make result (right)

I also had limited knowledge of web design language so I could not create more functions for the web site such as hot spot clickable on every buildings, change the base map to satellite image or allow users to search the map as show in figure 9, an example of interactive map from University of California Santa Barbara.

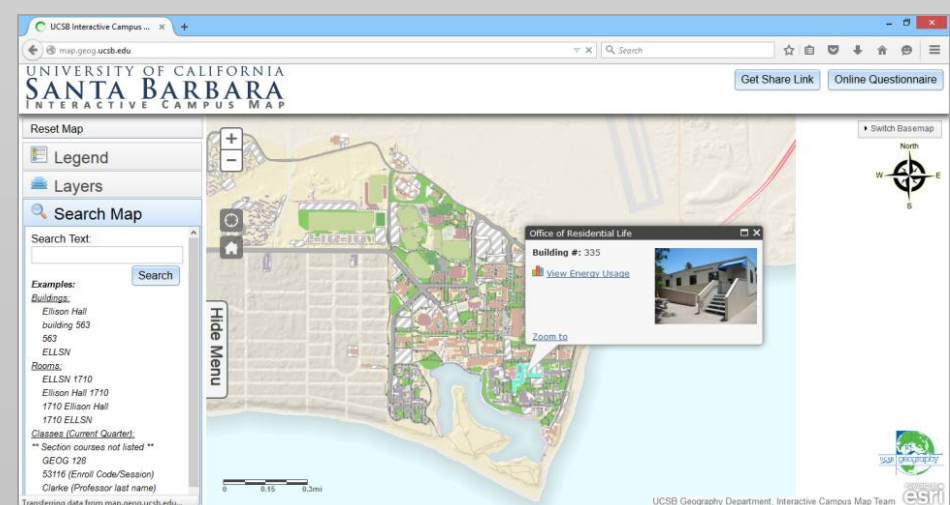


Figure 9. Example of University of California Santa Barbara interactive web map.

## Conclusion

This project met the goal of creating an interactive web map to present a 3D animation of a CSULB campus building. The outcome of the project is a web map that contains a CSULB campus map with clickable building to display a pop-up window of a 3D animation movie and a photo slideshow on the lower corner of the web page. Although I am satisfied with the result of the project, it could be further improved on to make a better looking, more efficient web map. The ideal final result of the project may have been completed if I had made the decision to do this project at the beginning of the MSGISci program. With additional time I might have been able to create a web map that would be very useful for the CSULB campus. Nevertheless, the prototype that I made shows that this methodology is effective and I have learned the basic knowledge necessary to create an interactive web map and a 3D model of a building. In the future, I would use this knowledge to create more products for work and for personal interest.

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