Chris Hansen
March 11, 2019
 Capstone Pre-Proposal

1.   Project Title
Digital Twin

2.   Project Goal
The goal of this capstone is to create a digital replica of a complex physical object. This object will be composed of varying components. The digital replica would be broken down into a set of instructions that demonstrate and guides a user through assembly of the object. This representation would be done online utilizing webgl to render 3d objects.

3.   Learning goals
I believe the technology exists to create a feasible highly curated environment for technical/vocational learning and intend to use these tools to investigate this. My goal is to investigate and implement the viability of technologies that could allow this to happen.

4.   Target Audience
The audience for this could be varied. For purposes of this project, the intended audience would be a curious individual who would like to endeavor on a project that they do not feel they have the knowledge of skill set for. Larger audiences could be educational institutions wanting to create online courses/instruction for technical/vocational skills or commercial industries providing training in an online environment

5.   Elevator Pitch
Take a Haynes technical manual and repurpose it for the digital age with it being curated similar to the lynda.com learning environment.

6.   Metrics
The digital twin of a piece of hardware would ideally have a commercial component, meaning users could order parts from it, click on a component and have part and price info of that component. I believe the success could be measured by how many people use the interactive instructional environment to order components represented. So the viability and success would be self-evident in its ability to generate revenue.

7.   Life beyond project beyond capstone
The capstone project would hope to partner with an existing company to build out a digital twin for a product of theirs or to build a prototype to display the opportunities utilizing this method of representation for hardware products of companies.. If this is successful, a larger partnership would be formed and ideally partnerships with other hardware companies could be formed using the success of this.

8. <u>Competition</u>
There are several companies providing online environments to represent physical objects. Most of these are tailored to specific industries of representation. Additionally, the environment i intend to create his highly curated toward a specific object/process as opposed to creating an online world i.e. second life.

Modelo.io - Architectural representation. Allows users to upload 3d models and annotate and share.
https://sketchfab.com/ - Allows users to upload 3d models to be bought and sold as objects
Unity3d - allows users to create interactive environments. Primarily used for the creation of games.
https://secondlife.com/ - A digital world where users can create avatars and navigate a digital environment. Once was used to house distance learning courses. Low resolution and more of a video gram environment
autodesk
https://viewer.autodesk.com/ - Autodesks online version allows the sharing of 3d CAD files. Objects can be annotated and shared.

The above companies and products share many similar attributes in utilizing webgl to render 3d objects. They are tailored to specific industries or niches. My project would differ in its application.

https://www.instructables.com/
Instructables contains a collection of 'how to' guides. This is useful, but limiting in its presentation of text and 2d static images. My project is an attempt to improve on this presentation by incorporating 3d environments.

9. <u>Technology requirements</u>
three.js
Tween.js
These JS libraries are used to render and animate in the browser.

content management system - used to organize content in a coherent and presentable manner. (assume the JS libraries above and be integrated into the CMS effectively.)

3d modeling program - used to organize, optimize and create 3d objects to render online.

10. <u>Design workflow</u>
Acquire 3d model, and annotate model
Using three.js and tween.js embed this model into a webpage and curate step by step different operations

11. <u>Workplan</u>

a. Identify a task to complete (tentatively assembling/building a 3d printer)
b. Acquire/generate 3d models of all components
c. Develop a curate presentation of the assembling of these in text format. A script
d. Embed objects into browser
e. Deploy for users

12. References
https://www.gartner.com/smarterwithgartner/prepare-for-the-impact-of-digital-twins/
Article on the relevancy of 'digital twins'. It discusses how these could impact and benefit industry and the need for more exploration in this arena of representation.

Gartner digital twins -
https://www.gartner.com/smarterwithgartner/how-digital-twins-simplify-the-iot/
https://www.gartner.com/smarterwithgartner/prepare-for-the-impact-of-digital-twins/
create immersive experience

https://www.etf.europa.eu/sites/default/files/m/DC024C02AA9B9384C12580280043A0B6_DOL%20in%20VET%20in%20Serbia.pdf