Senior Project Proposal

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# Senior Project Topic

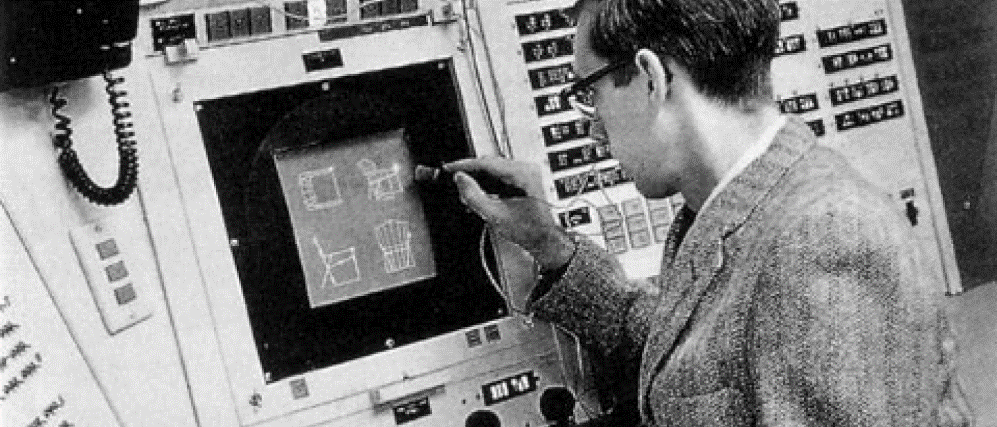
**3D Modeling – Home/Apartment Design:** Design a home using 3D modelling.

# Brief Description of Project

The purpose of this Home/Apartment 3D modeling design software is to allow people to visualize how and where they would place furniture and other elements to their new homes. This software would consider the dimensions of an area and allow for individuals to add 3D models to the space by giving them preset models as well as allowing them to incorporate custom elements using user inputted dimensions. The user will also be presented suggestions from popular web pages to find objects that can closely resemble their 3D modeled design. Ideally the user will be able to take elements from other sites (such as IKEA, Amazon, Furniture Websites, Etc.) and incorporate them into their design layout whilst the program displays an accurate representation of said elements. The software is used through a web browser using C++, Java and Java3D, OpenGL, and 3DS Max software which is commonly used by both graphics and CAD programs (Baker).

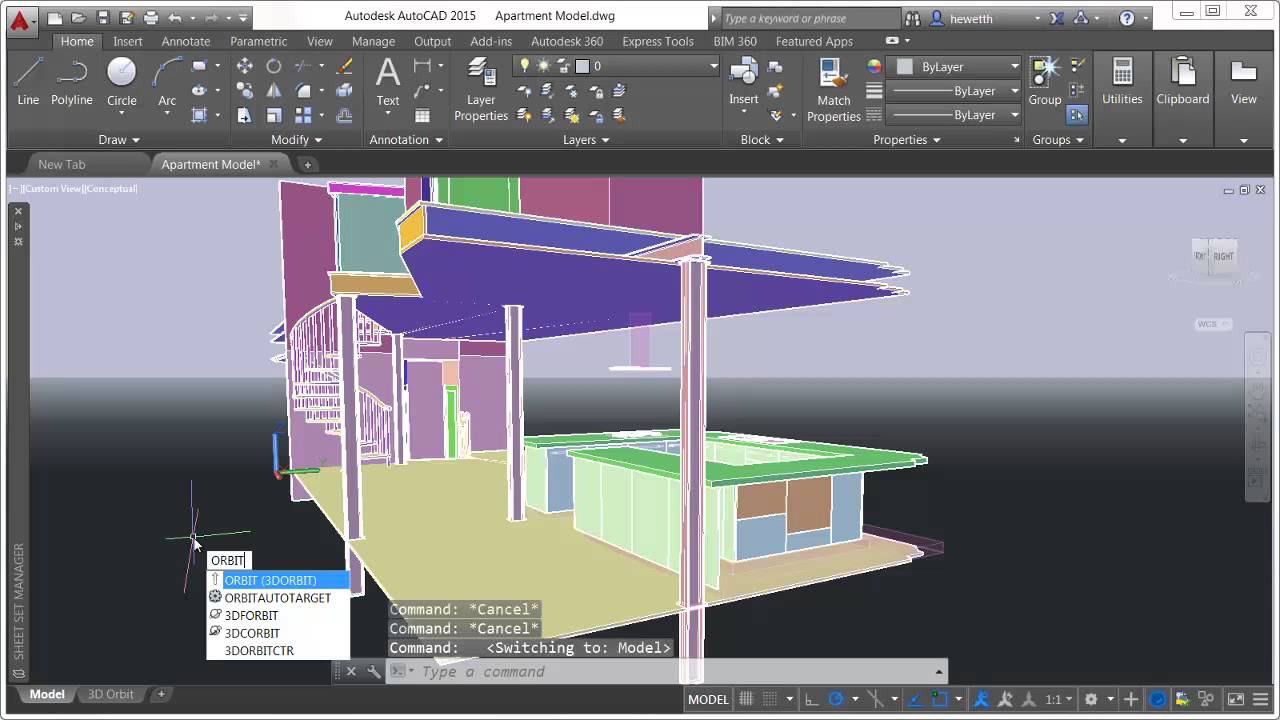
# Previous Work

This implementation of 3D modeling software is meant to take into account many factors of the space needing design. For example, if you were to look into a new apartment for lease and have access to a floor plan, you would be able to import this floor plan or custom model the floor plan using the software. You would then be able to import elements using preset models provided within the software or elements found from other sources online. The origins of 3D modeling can be traced all the way back to the 1960s with the development of Sketchpad, designed by an American engineer Ivan Sutherland (Ekaran, 2021). Being one of the first graphical interfaces, Sketchpad became the to-go program for computer visualization and software user interfaces. Development of modeling software such as CAD was heavily influenced by the creation of Sketchpad.



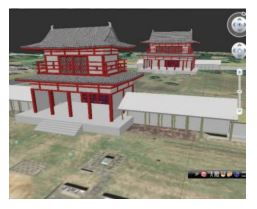
*Figure 1 – A demo use of Ivan Sutherland’s Sketchpad during the 1960s*

As technology advanced, the desire for an improved computer graphics software skyrocketed. With IBM’s launch in 1981, CAD became a mainstay in many industries across the world such as the aerospace, automotive, and other engineering sectors (Ekaran, 2021). However, 3D modeling wouldn’t gain traction until the 1990s. CAD’s popularity as a software was at an all-time high and prices were dropping, making it easier for other companies to gain accessibility to such software. Free software such as Blender popularized 3D modeling across all demographics. In the latter half of the 1990s, 3D printing emerged as a new manufacturing technology which pushed the needle forward even more.



*Figure 2 – AutoCAD 2015 demo screenshot showing enhancements in 3D Orbit.*

Naturally, applications of 3D modeling technology have been frequently used, especially when visualizing. In a report published through Nagoya University in Japan, 3D scanning has been used to emulate ancient models of Japanese ruins and artifacts for the preservation of history (Zhou, Zhou, Kobashi & Sugihara, 2016). The authors made a proposal to reconstruct models of historic monuments to provide historical context for students and researchers. This would also allow for the development of virtual tours which is a factor we’d like to implement to our own 3D modeling software. With the adoption of VR (virtual reality) technology, this becomes even more of a plausible reality.



*Figures 3 & 4 – Google Earth application of Taga Castle (left) and 3DCG restoration model (right)*

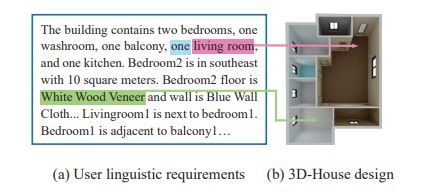
The method implored by the authors uses a Python program including the GIS module (ArcGIS) which gathers coordinates of a structure’s polygons’ vertices and attributes (Zhou, Zhou, Kobashi & Sugihara, 2016). By developing a CG module using MaxScript (built-in scripting language for 3DS Max) to receive the data from the GIS module, the data can then be used to create the 3D models. In Figure 3 we can see the 3D model of Taga Castle which they created and placed on Google Earth. Integration of this 3D modeling technique could also be paired with AR (Augmented Reality). AR has already been seen on many fronts when considering other industries such as automotive and home design. Amazon uses AR within their Amazon Home program to allow for individuals to decorate their own home using items they find off Amazon.

![A person holding a phone

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confidence](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAYABgAAD/4RDaRXhpZgAATU0AKgAAAAgABAE7AAIAAAAFAAAISodpAAQAAAABAAAIUJydAAEAAAAKAAAQyOocAAcAAAgMAAAAPgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAExpYW0AAAAFkAMAAgAAABQAABCekAQAAgAAABQAABCykpEAAgAAAAMwNwAAkpIAAgAAAAMwNwAA6hwABwAACAwAAAiSAAAAABzqAAAACAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA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*Figure 5 – Amazon rolls out AR shopping feature.*

The main purpose of our proposed 3D modeling software is for ease of home design. In an article published by the IEEE, a group of authors proposed a House Plan Generative Model that predicts the layout of rooms and essentially creates a 3D model house using data (Chen, Wu, Tang, Wang & Tan, 2020). This follows similar logic to our plan to allow the most visually accurate representation of the space being modeled. This article highlights the use of deep learning and text-to-image to create an accurately portrayed floor plan with a focus on the “correctness of size, direction, and connection of different blocks (Chen, Wu, Tang, Wang & Tan, 2020).” This particular train of thought takes into account a description and uses text-to-image technology to generate a home plan. When considering our software, this needs to be taken into consideration as well to allow for users to input text options for various elements (floor material, wall color, etc). Another focus that this article takes into consideration is the need for datasets to further increase the texture/element database to propose ideas for unseen elements.



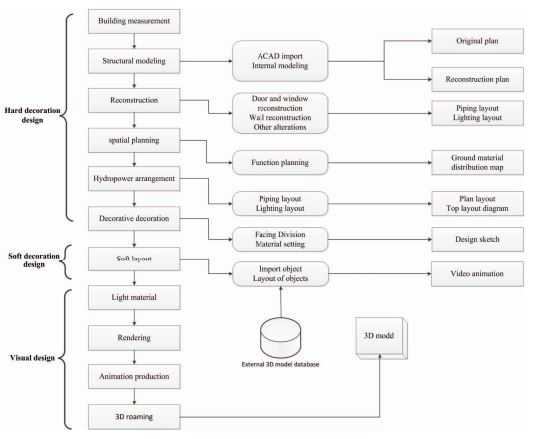
*Figure 6 – 3D house model using House Plan Generative Model.*

The proposed method for the House Plan Generative Model is as follows:

1. Text representation block
2. Graph conditioned layout prediction network
3. Floor plan post-processing
4. Language conditioned texture
5. 3D scene generation and rendering

To sum up their research, an emphasis on the effectiveness of their method was imperative. They were able to prove their method is superior to many competitors by using qualitative and quantitative evaluations, ablation study, and human study (Chen, Wu, Tang, Wang & Tan, 2020). By applying machine learning to their algorithms, they were able to further visualize their plan which is hopefully the direction our proposed plan will take.

As spoken about previously, the idea of VR technology has the potential to improve on this proposed project even more. Many apartment web pages include “virtual tours” which allow people to immerse themselves within the space to a degree. The idea behind our 3D modeling software is to provide improved immersion and customization to these spaces. Jixia Li, the author of the following referenced article, proposed a “novel interior design framework based on virtual reality technology” (Li, 2017). By making use of 3D modeling and display, Li proposed that this can be used for architectural design. However, this elaborate method references many techniques such as human-computer interaction, artificial intelligence, computer (3D) graphics, and so on. The framework proposed by Li follows a workflow (as displayed below) that allows for hard decoration design, soft decoration design, and visual design.



*Figure 7 – Flowchart of Interior Design*

By divvying up the design categories, Li proposed to prioritize spatial and size constraints in “hard” decorative design whilst “soft” decorative design does not require an entirely accurate model of information (Li, 2017). Visual design simply highlights the rendering of the necessary 3D model. To build the simple style, VRML is used whilst the complex shapes are generated by the 3DS Max software, similar to the previous journal referenced. There is overlap in our idea and Li’s idea in the sense that a 2D image will be used to create a 3D image by image rendering and synthesis and experimentation is imperative to propose the framework.

# Tentative Project Outline

The software will be available to use through a web browser (accessibility web page to be determined). The languages intended for use are as follows:

* HTML
* JavaScript
* CSS
* Java3D
* C++
* 3DS MAX

However, implementation of the software will likely not reach full fruition considering the scale of the project within the time frame. The software should be able to run seamlessly through web browsers such as Mozilla Firefox, Google Chrome, and Safari. Optimization will also prove to be a challenge considering the number of factors necessary.

## Online Promotion

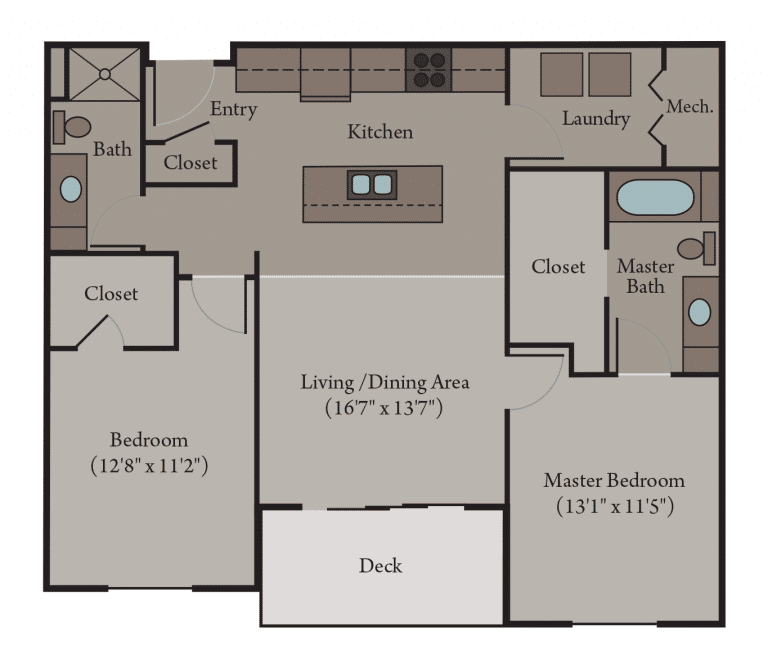
To promote the software, the funded advertising will be geared towards interior design web pages. By pushing forward the idea of “freedom of customization”, this software has the potential to garner a following on social media platforms, namely platforms that have extensive interior design ideas (Pinterest, TikTok, etc.).

## Software Accessibility

The software will be a simple webpage that will be free to use for guests and logged-in users alike. By allowing users to log in, they will be able to save their floor plans and rendered ideas. Ideally the software should be able to export their personalized floor plan. Other quality of life features may require a membership if the individual so wishes. However, a membership or a purchase of any kind will not be necessary for basic functionality.

## 3D Modeling – Starting Your Design

Initially the user will be prompted to import a floor plan or develop their own floor plan from scratch by listing dimensions. This is important considering the visual machine learning algorithm might not always be able to recreate a 3D model using the 2D image given. This is dependent on the image provided and a plethora of other factors. An example of a 2D floor plan that can be imported is as follows:



*Figure 8 – Example of a 2D floor plan*

Once the floor plan is imported, the rooms and environments should be automatically rendered and displayed. However, if the user manually creates each room, they will follow a similar 2D template to make the interaction simpler as opposed to moving straight into a 3D model. This classifies as the “hard” decorative design that was spoken to earlier in Jixia Li’s proposed plan. Soft elements such as lamps, couches, tables, and so on will be presented in a menu as preset items. However, the ability to import elements from other websites will also be an option. The software will render these elements to scale and allow you to import them into your environment. Once an element is imported from an external source, however, the software will fix the dimensions of the item. However, preset items can be scaled or skewed as the user sees fit. All elements will be capable of being moved within a certain range. If items overlap or coincide, a red glow will indicate that this action is not possible. Items such as rugs or wall ornaments will operate as expected. Also, the user can label what the imported elements are under a simple classification. Exiting the software is as simple as closing the browser. The user will be prompted to save their designs once changes have been made to the environment.

### Modeling Process

In the aforementioned paragraph, we’ve stated many of the capabilities of the software and how to incorporate soft elements into the design environment. The “hard” elements will be spoken about in this modeling process as well as the operations available to the user.

### Expected Workflow (Hard Design Elements)

* User accesses website (log-in/sign-up link in upper right corner)
* User is prompted to import a floor plan/house plan or build from scratch
* If imported, software will take floor plan and create a 3D environment by using the dimensions listed, as well as providing removable/editable soft elements in niche areas (bathrooms, kitchens, laundry rooms, etc.)
* If user chooses to build from scratch, a 2D model will be presented allowing the user to define what kind of floor plan/house plan they are designing (1 bed apartment, 2 story home, etc.)
* The user will then be able to define a square footage of their desire and insert elements such as living/dining area, master bedroom, and kitchen whilst providing set dimensions
* Quick note: users will be prompted to select texture/color for the flooring and ceiling element
* Once this process is done, the user can then render out a 3D model of their space

### Soft Element Operations and Editing

Once the 2D image has been rendered into a 3D model, the user can then begin to incorporate soft elements into their space as well as edit preset elements that may exist within the space:

* Pick up and place objects (appropriate placement indicated by green glow)
* The ability to rotate elements
* Changing the material of soft elements such as countertops and appliances
* Delete an unwanted element
* Skew or edit dimensions of preset element (does not apply to imported element)
* Import element from external web source (Amazon, IKEA, etc.)
* Allow for undo on added element
* Allow for redo on unadded element

### Saving Design

In order to save the design, the 3D visualization can be converted to folder of screenshotted images. However, for better access users can create an account where their designs can be stored and accessed later. Also, users can email their design to a registered email address for easier access.

# Tentative Project Timeline

This timeline is based off a full semester or 15-week period. The project is meant to be fully functioning, however, all features mentioned previously may not be implemented in this version.

#### Week 1

* Create server
* Design database and find usable datasets
* Design the homepage
* Layout online promotion
* Create a user login form

#### Week 2

* Be able to import a 2D image
* Be able to create 2D environment
* Be able to scale dimensions of rooms
* Be able to add room elements

#### Week 3

* Refine how 2D environments are implemented
* Refine borders between rooms
* Begin creating preset elements

#### Week 4

* Seamlessly integrate imported 2D image
* Be able to recreate an accurate floor plan using “from scratch” feature
* Incorporate preset soft elements to imported images

#### Week 5

* Begin process on converting 2D image to a 3D model
* Ensure that scaling works properly
* Become savvy with 3DS Max software and Java3D

#### Week 6

* Continue optimizing performance
* 2D hard elements should be seen within the 3D model (ceiling/floor with texture/color)
* Soft elements should be refined and made sure to fit scale

#### Week 7

* Create library of preset elements that can be added or removed
* Implement operations to allow changes of environment
* Allow for user to import elements from other web pages

#### Week 8

* Refine editing process for preset elements and imported elements
* Quality check the 3D model to make sure the scale and accuracy is concise
* Begin test cases on web page

#### Week 9

* Keep experimenting with test cases and different layouts
* Check online features with user login
* Create promotional objectives

#### Weeks 10, 11, 12, and 13

* Fix bugs
* Keep checking test cases

#### Weeks 14 and 15

* Promote web page software

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ChatGPT:

There are already several 3D modeling software programs available that allow users to create 3D models from 2D floorplans. Some popular options include SketchUp, AutoCAD, and Blender. These programs typically provide tools for creating and editing 3D shapes, adding textures and materials, and rendering the final model in photorealistic detail.

To create a 3D model from a 2D floorplan, the user would first need to import the floorplan into the software. This can typically be done by importing an image file of the floorplan, or by manually drawing the outline of the floorplan using the software's drawing tools.

Once the floorplan is imported, the user can then begin to add 3D elements to the model, such as walls, doors, windows, and furniture. The software will automatically generate the 3D geometry of these objects based on the 2D outlines and dimensions provided in the floorplan.

The user can then add textures and materials to the model, such as carpeting, wallpaper, and wood finishes, to make the model look more realistic. Finally, the user can use the software's rendering tools to create a photorealistic image of the 3D model, which can be viewed from any angle or perspective.

Overall, creating a 3D model from a 2D floorplan is a complex process that requires a specialized 3D modeling software program. However, with the right tools and a bit of practice, anyone can create a realistic and detailed 3D model of a floorplan.