

Project Title: Blueprint 3D/Tony Stark Housing

Team Name: The Capstoners

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This project aims to bring modern technological advancements to the process of construction based on blueprints. Today, much of how buildings are constructed from blueprints is sloppy, and there are many errors that happen during the process. The architect may have made a mistake in his measurements or the customer decides after seeing the finished room that it isn't what he/she wanted after all. This project aims to fix this problem by creating a more in depth way of previewing a completed room than just its 2D top-down blueprint image. With a product like this in the market, the construction business would avoid costs associated with rebuilding features that were not well specified. Currently, while some 3D software exists for creating models of buildings, the information has to be input manually. This application is more intelligent as it will be able to generate the entire 3D model automatically by reading measurements on the blueprint, with some level of manual modification possible to correct misreadings.

Hopefully, as the application's use becomes more widespread, architects will become more familiarized with the way in which the application's algorithms detect 2D characteristics and map them to 3D. Once this happens, a more standard set of practices for writing blueprints will go into effect for the purpose of having plans that map most accurately to their 3D representations in the Blueprint 3D app.

Initially, we will need to set up a web application through which customers will be able to upload and view their blueprints. For this first step we intend to use a Javascript front end and a

PostgreSQL back end with Ruby on Rails as the web framework. The first milestone is to get a basic website up with a file uploading and viewing functionality. The next milestones will all be related to imaging analysis. To begin, it will be necessary to integrate a 3D engine into our server (this could perhaps be done on the client side instead to relieve computational workload from the server side). Intelligent algorithms for identifying characteristics of the 2D blueprint will need to be composed and then tested in the engine on various images to locate technological constraints. The required accuracy of the generated models essentially determines the scope of this project, and is currently more on the modest side: the application should be able to identify walls and read inch and foot measurements on the blueprint image and accurately construct a model based on that information. More stringent requirements like detection of doors, stairs, etc will be left for the end if there turns out to be more time.

The engine we plan to use is Unity 3D. It is a well established 3D environment engine with web capabilities. In addition, the use of the Unity engine will make possible potential integration with virtual reality hardware like the Oculus Rift for to-scale virtual traversal of 3D blueprints. For now integration with virtual reality hardware is beyond the scope of this project.

We can prototype our 3D generation algorithms in Unity and then upload working versions to the web app. From there, we will retest to confirm that the functionality has been maintained and then continue with testing for more accurate algorithms in Unity.

Platform and Technologies: PostgreSQL, Ruby on Rails, Javascript, Html, CSS, Unity3D

Process Model: We will use a version of Agile programming to oversee the development of the project. Due to the brevity of the project, it will be necessary to break the workload into small enough tasks to have weekly sprints. We will make use of pair (or more) programming initially to get less experienced group members up to speed with common web development practices.