Forge VR Explorer Requirements

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Abstract

The Forge VR Explorer branches from an Autodesk prototype project called Vrok-It, which is a simple web-based 3D model viewer and mobile virtual reality (VR) explorer. The project will expand upon its ability to display uploaded 3D models in browser and in VR, and improve its accessibility. Conventionally, viewing 3D models in VR is a challenge if you have model files on many devices, or have a headset that only works in conjunction with a smartphone. The Forge VR Explorer aims to do this by utilizing a web-based software that uses the features of the Autodesk Forge API. The project will also be expanded with new ideas and stretch goals as the project is developed.

SYSTEMS AND SOFTWARE REQUIREMENTS SPECIFICATION (SSRS) FOR

Forge VR Explorer

Version 2.0

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FORGE VR EXPLORER SSRS

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1 INTRODUCTION

The system being developed is intended to be a place in which users with CAD files can go and easily view and explore those files in both a 3D viewer and optionally in VR. The user will also be able to move through the models depending on the model that they are currently viewing. This provides a solution to those who don't have access to an expensive CAD program or VR headset as it will be a free to use web application that is usable with inexpensive VR equipment such as Google cardboard. This app is aimed at people that would want to explore a 3D model without any experience with VR or a CAD program.

1.1 Scope

The scope of this project includes developing a new website hosting a web application. This software should allow for the upload of a 3D model file to be viewed in browser as well as in a VR environment. This project also aims to reduce barriers from uploading and viewing files by implementing different Forge APIs in order to improve the users overall experience while using the website.

1.2 DEFINITIONS, ACRONYMS, AND ABBREVIATIONS

CAD Computer Aided design is software used to design and view 3D models.

CAD file The type of files that can be uploaded to the website for viewing in the Forge viewer. We will narrow down what types of files can be used as we progress through the development process.

FORGE [**?**] A collection of API services provided by Autodesk that provide 3D modeling services and tools.

Forge Viewer This is one of the APIs in Forge. It displays 3D models from CAD files and also allows for user interaction.

Model Derivative API This is another API in Forge. It can generate SVF files that we can utilize in the application from other model filetypes.

VR Acronym for virtual reality, typically a peripheral device or smartphone

exploding model A model viewing functionality that separates components from their original locations in order to gain an alternate view of the model.

2 OVERALL DESCRIPTION

2.1 PRODUCT PERSPECTIVE

The product would be jump-started from the Vrok-It [**?**] platform that has already been created. We are to create a new site with some of these assets in order to provide a new experience focused on exploring a model in 3D.

2.2 PRODUCT FUNCTIONS

1) The user is able to choose a CAD model file locally or upload one from another cloud service.
2) Once a model is chosen or a file is uploaded the 3D models will be seen in the Forge viewer at the center of the website.
3) The user will have the ability to connect a smartphone device to the website through the use of a QR scanner.
4) Once the user has connected their a smartphone the model should be able to be viewed in VR with a the use of a VR headset such as Google Cardboard, if supported.
5) "Viewable" 3D models can be interacted with by the user in the Forge viewer in several different ways.
6) The user will be able to manipulate the model and observe in VR.

2.3 USER CHARACTERISTICS

When finished this product should be usable by anyone that has access to a CAD model file. If the user is wanting to use the VR portion of the website then they will need access to some sort of VR headset. If the user does have access to a VR headset they should not need any extra knowledge other than how to use the headset.

2.4 SYSTEM LEVEL (NON-FUNCTIONAL) REQUIREMENTS

2.4.1 Software Interfaces

- Interface between the computer and the website, for the uploading of models from a user's local machine into the website for viewing.
- Input will be any 3D model which is sent to the model derivative api to be converted to SVF, then to the Forge Viewer where it is displayed.
- Interface between the website and the device the user wishes to view the model on. Currently vrok.it uses a QR code to accomplish this-Input is the QR code scanned by the phone, output is the manipulatable model in an environment for viewing.

2.4.2 User Interfaces

- The main user interface will be the web application in which the user will be able to upload a model and then view it in the Forge viewer on the webpage.
- The user will be able interact and manipulate the model inside the viewer using an interface. This interface can rotate, move, show an exploded view of the model, and more.
- On a smartphone, the webpage loads a compact version of the main site.
- The viewer on the smartphone is fullscreen when connected, and will be manipulated the same way the webpage is currently manipulating the model.
- The user will be able to navigate through the model in VR using a VR headset.

3 SPECIFIC REQUIREMENTS

3.1 SYSTEM FEATURES

3.1.1 File Uploading

1) This will allow the user to be able to upload any models that they have access to the website.
2) Input The user will select a file from their computer that they would like to upload to the website.
   Output Finishing the upload process the model that was in the file should now be viewable on the website.
3) a) The user should be able to upload his/her file to the website using a standard pop-up window.
   b) The software must determine if the file is a reasonable size(<50MB), and is an accepted format.
   c) After the file is uploaded, it is then made available to the other components of the software to be used.
   d) Users should be notified if their file was unable to be uploaded.
   e) The uploaded file should be displayed in the list of usable models on the webpage.

3.1.2 Viewable Model

1) The user should be able to see the model that they have chosen or uploaded to the site in the Forge viewer. They should also be able to interact with that model in the Forge viewer.
2) Input The user will chose from the list of predefined models or upload their own model.
   Output The model will now be view able in the large model viewer and the user should be able to interact with that model.
3) The model must not be so large or detailed that the website can not render it.

4) The model should be displayed in full in the Forge viewer and should not be hard to interact with.

   a) The viewer will be displayed at the center of the webpage.
   b) Once the user has selected a model for viewing or uploaded their own model, it will be displayed in the viewer.
   c) This window must be interactive, and display the user's model correctly.
   d) The viewer should be warn the user if the model selected is too large.

3.1.3 Smartphone Connection

1) This will enable the users to connect their phone to the Vrok-It website. This is needed so that the user will be able to view their model in a VR environment through the use of their phone and a compatible VR headset.
2) Input The user will scan a QR code located on the main page of website with a QR scanning application on their phone.
   Output The model that is currently loaded into the Forge viewer on the website will now be displayed on the phone and ready to be viewed in VR.
3) The user must have a device that is capable of using a QR scanning application. The phone also has access to an Internet connection to be able to connect to the websites current session.
   If the user opts to view the model in VR, then a VR headset is also required for the user's device.
4) The phone should be connected to the website within a few seconds. This might vary depending on how good of an Internet connection the user currently has.
5) a) In order to provide VR functionality for an android device, the software must first establish a connection.
   b) Using a QR scanner, the android device will be linked to a mobile version of the viewer displayed in stereoscopic format.
   c) This requires a stable Internet connection in order to deliver the content to the device.

3.1.4 Forge Authentication

1) This is used to get authentication and authorization when using Forges other APIs. This provides security for the users using the APIs on the website.
2) The token will be created automatically every time a user accesses the website.
3) The user must be able to gain access to the website on a laptop or desktop.
4) a) During the loading of the web page the authentication API should generate a token For the user in case they want to use either the data management API or the model derivative API.

3.1.5 Data Management

1) Users that have files in A360 or in Fusion 360 should be able to gain access through those files from the website.
2) Input The user should be able to identify that they want to gain access to their files on either A360/Fusion360 or local.
   Output Using the Forge Data Management API the user should then have access to the connected account's files, and to then upload a file.
3) - The authentication API must have created a Token for the API to use.
   - Must have an account with either A360 or Fusion 360.
   - Must conform to API general use cases
4) - The files should load in a viewable format.
   - The files should only be visible if they are viewable if not the user should be notified that the file they were trying to upload was unable to be used.
5) a) A place where users can enter information to gain access to their outside files.
   b) This should be done through the use of the Forge Data Management API.
   c) Once the user has access to these accounts they should then be able to obtain the files they want to use and upload them to the Forge viewer.

3.1.6 Model Derivative

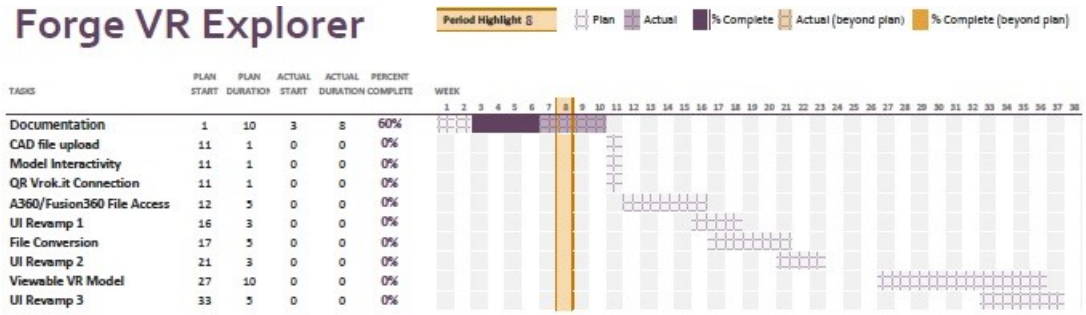
1) With the use of the Forge Model Derivative API any of the files that the user uploads will be converted into SVF files that are used by the model viewer
2) Input The user will upload a CAD drawing file that they want to convert to an SVF file.
   Output This should then return the correctly converted SVF file and it should now appear in the list of viewable models on the website. If the conversion fails the user should be notified of the failure.
3) - The authentication API must have created a Token for the model derivative API to use.
   - The user must have used the proper CAD files to be converted.
4) The program should clearly display the model in the list of viewable models.
5) a) The website will take the files that have been uploaded by the user and convert them to the appropriate file format.
   b) The website should notify the user if the file conversion has failed.

3.1.7 VR device support

1) View the model currently in the viewer in a VR environment using a VR headset such as Google cardboard. The user should also be able move through the model in VR. This could be extended to higher end VR devices later if time permits.
2) Input A functioning model uploaded to the project site and displayed in the viewer.
   Output A model displayed on the user's device that is ready to be viewed with a VR headset.
3) Depends heavily on hardware on the device that the user is using. Devices with low-end hardware will likely not be able to display models that are large or have a lot of detail very well.
4) The models need to be able to be manipulated by the viewer. If they are too large, the models will cause errors if they are modified within the viewer.

    a) The VR model viewer displayed on the Android device must be supported on Google Cardboard's lenses.
    b) The model must be tracked properly in the model viewer.
    c) The model displayed on the users devices should mimic any interaction that happens to the model on the webpage.
    d) The user should have the ability to navigate through the model.

4 GANTT CHART & SIGNATURES



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