

# 3D Effects Generation from a 2D image

Version <1.0>

## Minor Project

Group 2

### Software Requirements Specification

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Github repo: <https://github.com/TheIndianCoder/3d-photo-inpainting>

# Purpose:

This document aims to specify the requirements for the project, “3D effects generator from 2D image”

## Background

As part of PEC’s 202101 semester’s minor project course, this Software project is being developed. It’ll also be evaluated as the project for the Software Engineering and Web Technologies course.

This SRS document is part of the first evaluation of the SE course project. The project aims to generate 3D effects from a single 2D image.

## Scope

This document clarifies the requirements of the project. It aims to be of use to developers while developing the features. Project’s development cost is expected to be around 20 USD and the date of delivery is aimed to be 2020-11-01.

## System Overview

The developed product will enable the user to get 3D effects from an uploaded 2D image along with a mesh file of the generated 3D map from the single 2D image.

# General Description

This section aims to provide a high level picture of product functions and their importance.

## Product Perspectives

This section provides the various perspectives on the product.

### User Interfaces

User interfaces for the project should be intuitively designed to enable users to upload an image, choose the effects and download the required 3D effects.

## Software Interfaces

The interfaces needed for maintainers of this product should aim to display relevant information in a minimalistic way. If any Cloud services are used, proper IAM roles need to be created for efficient debugging.

## Communication Interfaces

Github is the preferred interface for product communication. All major user issues should translate into Github repo issues for proper tracking. For development management, FOSS style is to be used.

## Design Constraints

The current constraints on the project are related to the provisioning of hardware resources to implement and test a high-performance GPU cluster. At present, we have access to 125 hours per month of AWS's m4.xlarge machine. For better performance, a larger number of dedicated workstations would be beneficial.

In addition to that, currently the algorithm used for inference is the state of the art(3D Photography using Context-aware Layered Depth Inpainting). Improvements to this algorithm would improve the quality of the product, but will need significant changes to the code base.

## Specific Requirements:

This section records the specific product requirements.

### Functional Requirements

All functional requirements are listed below.

S.No.	Functional Requirement	Explanation
1	2D image upload	Users clicks on a button to upload a 2D image of their choice from their local machine.
2.	3D effects selection	Users select the effect(s) of their choice to apply to the image.

3.	3D effects download	Users get the downloadable link of the video of their chosen 3D effect(s).
4.	3D mesh download	Users get the downloadable link to the 3D mesh data of their 2D image in .ply format.
5.	Worldwide availability	The web tool must be deployed online.

## Interface Requirements

Front end user interface communicates with the back end via RESTful API. The backend server should be hosted on AWS. API communication happens via AWS's API Gateway solution. Machine Learning inference happens on the AWS Sagemaker host. Results are stored on S3 buckets. Amazon EKS containers host the docker images.

## Performance Requirements:

Time performance requirements:

S.No.	Task / Function	Time(seconds) upper limit
1.	Upload 2D image confirmation	2
2.	3D effects generation	15
3.	3D mesh generation	15
4.	Generate downloadable links	10
5.	Website loading time	4

## Product attributes:

### Reliability

S.no.	Metric	Goal
1.	Probability of failure-free operation	>80%

2.	Length of time of failure-free operation	>1 week
3.	Feature testing failure rate	<30%

### Availability

The product should be available all time except scheduled periods of maintenance time.

### Security:

All external communication of applications to be done in HTTPS. Specific IAM roles for self-contained job.

### Maintainability:

Python3 language is preferred for it high maintainability. AWS services being used come with their own maintainability guarantees.

### Data Integrity:

Data integrity is taken care of by AWS S3. Multiple backups across 3 regions of the world are taken automatically.

## Non Functional Requirements:

### 3D live rendering

This means live rendering of the generated 3D image on the website.

### User account and history

Users can login and access their past images and generated 3D effects.

### Social Media sharing

Users can share the generated content via major social media platforms.

## Licensing requirements

The product will be released under a GPL license and will be open-source.