

EECS 393: SOFTWARE ENGINEERING

Vision and Scope Document
for
Android 3D Photocopier App

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1 Business Requirements

1.1 Background, Business Opportunity, and Customer Needs

Modern technological advances has revolutionized material production through the use of 3d printer technology. Businesses across the globe use modeling software to design new parts and print a prototype for proof of concept testing or even for production of a product. On the personal level, individuals with access to a 3d printer will download designs for basic household objects such as combs or vases and materialize these items using their 3d printer.

However, to create an item using a 3d printer, a design, produced in expensive, complex modeling software is required. For a business, the price of this software is not a problem. However, the business must hire engineers that are experienced users of their software, or spend time and money to train novice engineers to professionally use the software. For individuals, the cost of such software and time to learn how to use it can pose a great challenge for them to bring their ideas into reality.

Recently, software has been developed for iPhones to capture an object using the camera and automatically create a design that can be used in a 3d printer. This has helped overcome some of the challenges described above as physical objects can be replicated so modeling software is unnecessary if the object already exists or a prototype can be constructed by hand. However, this software only works on iPhone and not on Android even though Android accounts for 81.5% of the smartphone market share.

1.2 Business Objectives and Success Criteria

BO-1: Inflate 3d model databases by 10% within 6 months of initial release

SC-1: Maintain a 4-star or greater rating on the Android App Store

SC-2: Achieve 500 total downloads of our software within four months of initial release

SC-3: Successfully 3D print a simple object from Android

1.3 Business Risks

RI-1: The producers of the iPhone app produce an Android version before or soon after initial release. (Probability = .5; Impact = 9)

RI-2: Manufacturers of aesthetic goods sue us for allowing mass replication or “physical pirating” of products. (Probability = .05; Impact = 3)

RI-3: Users of 3d printers view replication of existing items as irrelevant to their needs and would rather create what they don’t have. (Probability = .6; Impact = 9)

2 Vision of the Solution

2.1 Vision Statement

Users will be able to use an Android device to generate 3D models of objects that are present in the physical world. A user of the 3D Photocopier will be able to use these 3d models in a variety of circumstances including 3D printing them, or using them as assets in a variety of artistic mediums. This will allow for an entirely novel way of replicating anything we can find in reality.

2.2 Major Features

- FE-1: Generate 3D models using the ORB-SLAM algorithm
- FE-2: Smooths the obtained 3D model into a mesh
- FE-3: Stream video stream and 3D model from Android device to server and back
- FE-4: Edit 3D model from android device
- FE-5: convert model into a format that can be 3D printed
- FE-6: 3D print model from Android device
- FE-7: Recognize objects as separate entities and divide the models accordingly
- FE-8: Save 3D models for later usage
- FE-9: Search 3D model libraries for similar 3D models

2.3 Assumptions and Dependencies

- AS-1: user has an Android device with a camera that is connected to the Internet
- AS-2: user has access to a 3D printer

3 Scope and Limitations

3.1 Scope of Initial and Subsequent Releases

| Feature | Release 1 | Release 2 | Release 3 |
|---------|------------------------------------|------------------------------------|-------------------|
| FE-1 | Fully Implemented | Fully Implemented | Fully Implemented |
| FE-2 | Implemented if we have enough time | Fully Implemented | Fully Implemented |
| FE-3 | Fully Implemented | Fully Implemented | Fully Implemented |
| FE-4 | Not Implemented | Fully Implemented | Fully Implemented |
| FE-5 | Not Implemented | Fully Implemented | Fully Implemented |
| FE-6 | Not Implemented | Implemented if we have enough time | Fully Implemented |
| FE-7 | Not Implemented | Implemented if we have enough time | Fully Implemented |
| FE-8 | Implemented if we have enough time | Fully Implemented | Fully Implemented |
| FE-9 | Not Implemented | Not Implemented | Fully Implemented |

3.2 Limitations and Exclusions

LI-1: The varying processing power of android phones may cause older phones to slow down performance or even crash

LI-2: Some users mobile data plan wont be able to handle streaming video

LI-3: Maximum size limit of 50MB for APK files, plus up to two APK Expansion Files of size 2GB

EX-1: Very large objects wont be able to be scanned or printed

4 Business Context

4.1 Stakeholder Profiles

| Stakeholder | Major Value | Attitudes | Major Interests | Constraints |
|--------------------------|---|---|--|---|
| Individual Users | replicated materials, ability to “manipulate” environment | curiosity but might not find desire to use app | Ease of Use, Accuracy of Result | N/A |
| Engineering/Design Firms | easing requirements for new hires; allowing older engineers to 3D print designs without learning new software | unreceptive to switch to new system, might be more willing over time if popular | accuracy of model, flexibility of manipulation of design | need to commit resources to change current system |

4.2 Project Priorities

| Dimesion | Driver | Constraint | Degree of Freedom |
|----------|-------------------------|--|----------------------------------|
| Schedule | | Initial Release by end of semester | |
| Features | | Must implement FE-1,2,3,5,6 | |
| Quality | | must be able to print an object from phone | |
| Staff | 4 part-time programmers | | can add anyone who wants to help |
| Cost | | no budget | |

Individual Work Breakdown

The following people wrote the sections associated with their names.

Austin Hacker : Section 1

Callum Grant : Section 3.2 (some), Section 4.2

Josh Tang : Section 2, Section 3.1

Alex Campbell : Section 3.2 (most), Section 4.1