

<Hair-For-Your-Face> Business Requirements Document

Version 1.0

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Revision History

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Section 1 Preface

1.1 Our Interests

Our initial interest in the idea of a virtual hairstyle recommendation stems from the innate issues that young people face when trying to select a hairstyle that works for them. By utilizing the emerging field of machine vision and augmented reality, we hope to create an application that can help anyone pick the hairstyle that's best for them.

1.2 Technological Innovation

Our product will utilize computer vision and machine learning to accurately detect face shapes and other significant physical features. The data collected will be used to make an informed recommendation to the user. Additionally, the product will incorporate augmented reality technology to superimpose the recommended haircut onto the user through the camera lens, rather than on a static image of the user. With this technology the user will be able to see the haircut from alternate angles.

1.2.1 Product Differentiation

Unlike our competitors, our product will consider multiple physical features in determining the best hairstyle for the user. The majority of competitors detect the user's face shape or present a hairstyle, but do not combine both of these features to recommend ideal hairstyles. In addition, our product strives for a higher degree of realism when displaying a recommended haircut with augmented reality. Competitors' products superimpose a flat image of hair onto the user's head. This often leads to the user having an unrealistic idea of what the hair would look like in real life. Our product will incorporate the new haircut naturally into the image to give a more accurate impression of what the haircut would look like.

Section 2 Appendix

Varys Mormont

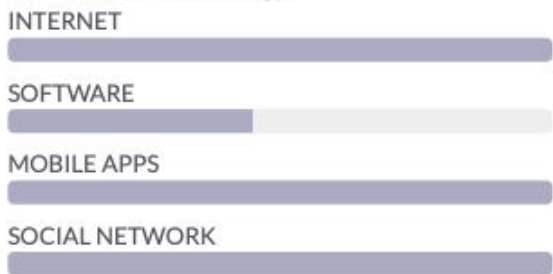
age: 39
residence: CA
education: MBA
occupation: Creative Director of Winner's Corp.
marital status: Married, 6 children



"I wish that there is an application that can recommend the hairstyles that would look fabulous on me with a click of button!"

As a creative director of the Manhattan's most famous ad agency, Winner's Corp., I spent most of my days meeting new clients and attending conferences while working with existing clients. Therefore, it's very important that I always maintain the most presentable looks.

Comfort With Technology



Needs

- I need the application to offer very good recommendation on hairstyles.

Values

- It's important to take care of yourself by taking care of your body and appearance.

Criteria For Success:

Self-confidence in dealing with my customers

Wants

- It would be great feature if I can turn to hairstyler chat box that understands my needs and offer consultation.

Fears

- I fear that if I am not on my best look, most notably my hairstyles, then it might negatively impact my confidence when I am interacting with my important clients at work.

Nidhi Agarwal

age: 26

residence: MA

education: MIT Graduate Student

occupation: Research in Quantum Computing

marital status: Dating



"I would love to look great on this memorable night. Where can I start with my hair?"

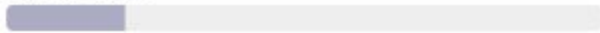
As an MIT graduate student who is very busy working on improving the quantum computers, I often do not have enough time to take care of my hair. Since Valentine's day is tomorrow, I was elated when my long-time boyfriend have suddenly asked me out for a dinner date in Paris and I could see it in his eyes that he is going to propose to me!

Comfort With Technology

INTERNET



SOFTWARE



MOBILE APPS



SOCIAL NETWORK



Criteria For Success:

Marry my long-time boyfriend who care a lot about me

Needs

- Since it's been a while that I get a proper hair over, I need to find a platform that can meet all my hair-styling needs.

Values

- To strive for balance between my busy academic life and taking care of my body.

Wants

- It would be great if I can virtually try on various looks before settling on the hairstyle that I like best.

Fears

- She fears that her current hairstyles is very bland and she wants to change it up to look more stunning.

Bryce Longe

age: Late 30's

residence: Washington, DC

education: Some College

occupation: Stay at Home Father

marital status: Single (Widowed) | 2 Children



I'd like a nice modern haircut that fits my face.

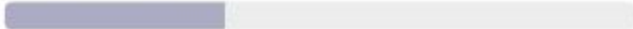
Bryce is a single stay at home Dad that picks up his kids up from school daily. His kids are old enough where he feels that he is able to begin dating again. Bryce would like a good haircut so he can meet potential partners and look good out and around town.

Comfort With Technology

INTERNET



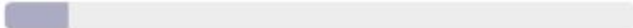
SOFTWARE



MOBILE APPS



SOCIAL NETWORK



Criteria For Success:

Meeting a new partner.

Needs

- A stylish haircut.

Values

- Family.
- Living a simple life.

Wants

- A life long partner.

Fears

- Getting a bad haircut.
- Being single for the remainder of his life.

Jane Close

age: 60+

residence: Long Beach, CA

education: Ph. D Psychology

occupation: CSULB President

marital status: Unknown

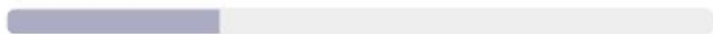


"As the president of CSULB, I have so many people getting in my hair everyday. My goal is to make sure my hair remains a safe space day in and day out."

Jane Close is an average woman who when outside of school likes to spend her day moving her cars around the CSULB parking lot.

Comfort With Technology

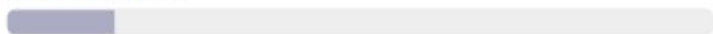
INTERNET



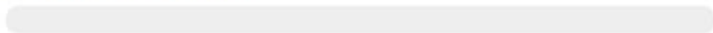
SOFTWARE



MOBILE APPS



SOCIAL NETWORK



Criteria For Success:

A new hairstyle that wows her students and coworkers.

Needs

- I need the app to recommend a hairstyle that frames my face well for all of my portraits

Values

- I value having no barriers when it comes to any and all applications. So I really hope this app is free.

Wants

- I want to be able to show off my hairstyle on all upcoming CSULB emails with a share feature.

Fears

- If my hair doesn't change I'm afraid I'll lose my job

Section 3 Strategy

Problem	Solution	Value Proposition	Unfair advantage	Customer segments
Customers often have difficulty in finding great hairstyles that are most suitable to them.	By utilizing powerful machine learning models that understand the customer's need based on their physical features, our application offers a personalized hairstyle recommendation.	The one app on your smartphone that offers you all the hairstyle guides that you need while it also learns to adapt to your changing tastes so that customers can discover the styles that they can incorporate. The customers can achieve the look that makes them truly stand out in the crowd.	Our application offers the most realistic augmented reality for customers to try on the desired hairstyles with the help of a powerful A.I virtual hairstylist that always keeps itself updated on the user's tastes and latest trend in hairstyles.	Our customer's age probably ranges from 18 to 40. Moreover, a crucial aspect of the modern professional world that is dominated by the service requires that people maintain their best look, which we provide partially by our hairstyles app. Furthermore, this could be equally valuable to those individuals who often want and need to change their hairstyles frequently such as models, artists, entertainers and so forth.
Customers feel unsure whenever they want to completely change their hairstyle to achieve a new look.	Customers can authentically experience and try on new looks that they want to achieve on our state-of-the-art augmented reality in real-time.			
Customers also feel that the hairstylists do not quite understand their expectations completely .	Our virtual hair stylist knows exactly what the customer wants based on the previous customer's feedback that it could talk to the barber or hairstylist on how to achieve the desired hairstyles.			

Section 4 SWOT Analysis

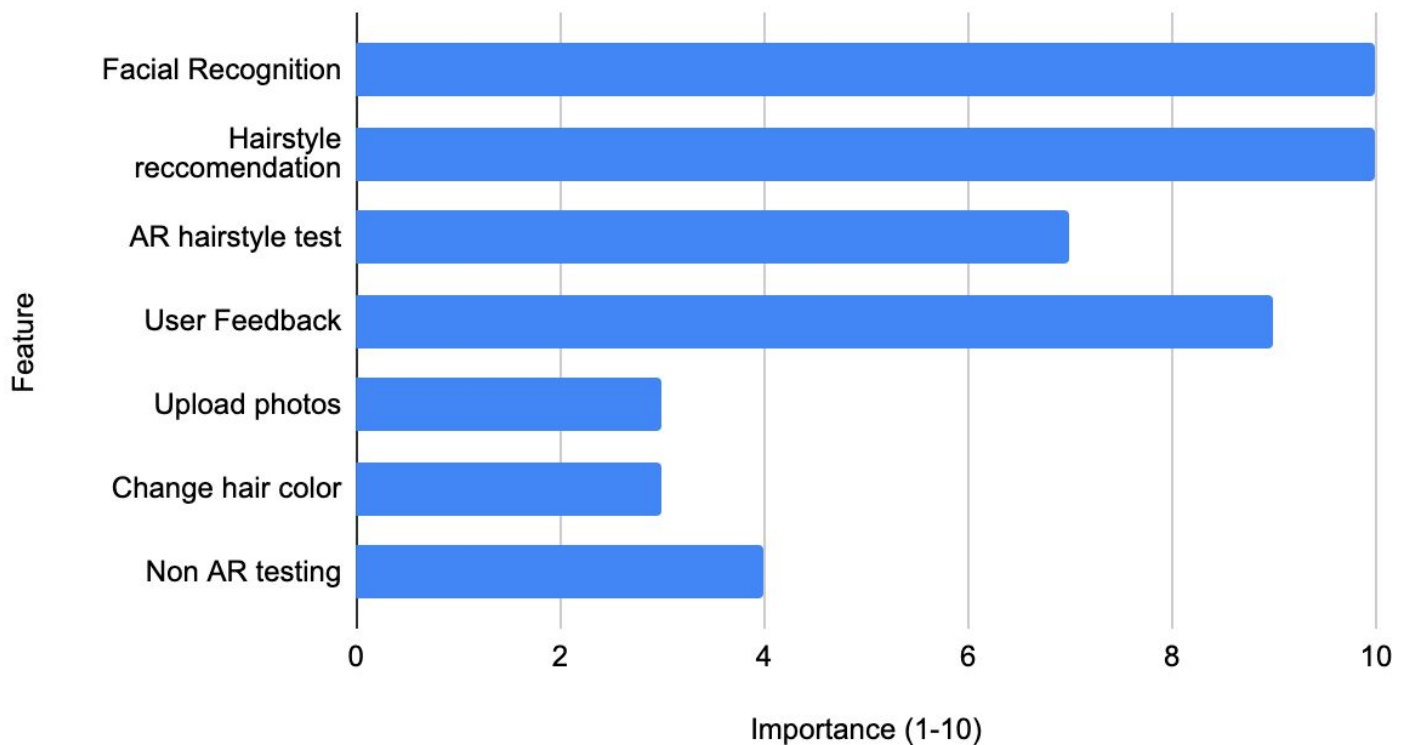
SWOT	
Strengths	Weakness
<ul style="list-style-type: none"> - Two team members have mobile experience, in both iOS and Android platforms. - Strong willingness to learn the frameworks requires to create a good product. - All of our team members are enthusiastic about building this project, we are in this together. 	<ul style="list-style-type: none"> - No team members with experience in machine vision. - First time working with an Agile development process and thus there is a lot for us to learn. - Properly annotating all of the data required to train the machine learning model may take a lot of our time.
Opportunities	Threats
<ul style="list-style-type: none"> - Most of the competitors models are limited to uploaded photos leaving space for our team to implement augmented reality capability. - Competitors User Interface's lack realism in the way the hair is applied to one's face. - Products mostly aimed at women, this excludes roughly 50% of the population, some of which are potential users. - UX/UI design in existing apps is lacking, leaving room for further improvement. 	<ul style="list-style-type: none"> - User retention may be a problem, the user ideally uses the app every time they get a haircut which may not be that often. - Not enough data available to properly train machine learning models to recognize face shape. - Hair is very complex users may not like the

Section 5 Market Segments

Market Segment Profile			
Geographic	Demographic	Behavioral	Psychographic
We are initially targeting the United States	All genders and race Ages 18-34	Anyone interested to find what haircut is best suited for them	Believe that their hair and appearance is an important part of life.
Size		Growth potential	
U.S Census data found that in July 2018 there were an estimated 76.2 million people age between 18-34	18-24: 30.5 million(9.3%) 25-34: 45.7 million(14.0%)	Haircut and styling services take up 45.5% of hair and nail services in 2017 according to Statista. Hair industry generated \$58 billion in sales, about a 7% increase in revenue from the previous year.	Glu Mobile's fashion game, which allows players to fashion the model with digitally rendered clothes and accessories, generated over \$53.4 million in sales in 2018. This illustrates to us that customers are willing to spend money on digital assets

Section 6 Primary Market Research

User feedback on desired features



The main draw of our application is the hairstyle recommendation. So naturally the two most desired and necessary features were the facial recognition capabilities, as well as the recommendation system. As part of making our machine learning model more accurate, user feedback to improve future recommendations was also a highly desired and useful feature. We learned that the implementation of changing hair color, uploading photos of yourself to use, and non Augmented reality testing of haircuts through the use of photos were not features we are going to prioritize.

Section 7 Secondary Market Research

7.1 Industry Research and Analysis

According to 2018 U.S Industry & Market Outlook by Barnes Reports that analyzed the hair, nail & skin care services industry, it illustrates that the hair, nail, and skin care industry is prospering overall over

the past five years as captured by the revenue and number of establishments in the following three figures.

*<https://www-marketresearch-com.csulb.idm.oclc.org/academic/Product/15664795>

5-YEAR TREND – ESTIMATED INDUSTRY SALES (\$MILLIONS)

Year	Employee Size of Establishment									Total Sales (\$Mill)
	1-4 Emps.	5-9 Emps.	10-19 Emps.	20-49 Emps.	50-99 Emps.	100-249 Emps.	250-499 Emps.	>500 Emps.	Non-Employer	
2015	9,446.7	7,927.3	9,554.1	8,179.0	1,991.1	899.2	244.4	163.6	10,698.7	49,104.1
2016	9,691.2	8,132.5	9,801.4	8,390.7	2,042.6	922.5	250.7	167.9	10,975.7	50,375.2
2017	9,992.4	8,385.2	10,106.0	8,651.5	2,106.1	951.2	258.5	173.1	11,316.8	51,940.8
2018	10,516.2	8,824.7	10,635.7	9,104.9	2,216.5	1,001.0	272.1	178.8	11,909.9	54,659.8
2019	11,166.5	9,370.4	11,293.4	9,668.0	2,353.6	1,062.9	288.9	185.2	12,646.5	58,035.4

Figure 7.1

Figure 7.1 above shows that consumers spending on hair, nail, and skin care services industry has been steadily rising in the past five years. In 2019 alone, the hair industry generated \$58 billion in sales, which is about 7% increase in revenue from the previous year.

5-YEAR TREND – ESTIMATED NUMBER OF ESTABLISHMENTS

Year	Employee Size of Establishment									Total Establishments
	1-4 Emps.	5-9 Emps.	10-19 Emps.	20-49 Emps.	50-99 Emps.	100-249 Emps.	250-499 Emps.	>500 Emps.	Non-Employer	
2015	67,510	21,554	10,330	3,341	370	62	5	1	325,481	428,654
2016	67,301	21,487	10,298	3,331	369	62	5	1	324,474	427,328
2017	67,476	21,543	10,325	3,339	370	62	5	1	325,319	428,441
2018	68,746	21,949	10,519	3,402	377	63	5	1	331,440	436,502
2019	70,489	22,505	10,786	3,488	386	65	5	1	339,842	447,568

Figure 7.2

Figure 7.2 above further illustrates the number of establishments in the industry is also increasing in the United States around 2% in 2019 and 2018. The rise in the number of establishments somewhat indicates that the demand in the industry is also soaring.

SUB-INDUSTRIES – 2018 ESTIMATED INDUSTRY SALES, ESTABLISHMENTS & EMPLOYMENT

Sub-Industries	Category*	Establish- ments	Sales (\$Millions)	Employ- ment
Barber shops	Major1	21,519	3,015.2	32,236
Barber college	Minor2	110	32.9	267
Barber shop selling wigs	Minor2	30	4.5	49
Hair stylist, men	Minor2	910	146.7	1,511
Beauty shops	Major1	282,798	33,348.2	570,982
Cosmetology and personal hygiene salons	Minor1	5,078	979.0	14,240
Cosmetologist	Minor2	5,216	486.1	8,202
Electrolysis and epilatory services	Minor2	3,851	347.1	5,244
Facial salons	Minor2	3,872	595.7	9,363
Manicurist, pedicurist	Minor2	57,579	6,054.1	102,430
Beauty schools	Minor1	1,346	403.9	5,539
Beauty culture school	Minor2	1,062	308.1	3,653
Cosmetology school	Minor2	948	269.6	3,629
Hair dressing school	Minor2	159	63.3	684
Hairdressers	Minor2	29,397	3,899.5	69,592
Unisex hair salons	Minor2	22,625	4,705.9	81,538

Figure 7.3

Figure 7.3 shows the industry further broken down by the sub-industries in 2018. It's interesting to note that over \$11.8 billion of sales come from hair-related services, where unisex hair salons captured more than \$4.7 billion of that share. Moreover, referring back to Figure 7.1 to get the total sales in 2018, it reveals that about 22% of the sales in hair, nail and skin industry was generated by the hair-related services alone.

7.2 Findings on Digital Fashion

Digital Fashion refers to the fashion that is only incorporated digitally such as in photos, videos, and virtual reality. This term covers more than hairstyles and includes clothing, accessories, cosmetics and more. Much of the effort in this new industry is centred around making digital fashion emotionally as satisfying as the real experience. As pointed out in the Vogue Business article, Glu Mobile's covet fashion game, which allows players to fashion the model with digitally rendered clothes and accessories, generated over \$53.4 million in sales in 2018. This illustrates to us that customers are willing to spend money on digital assets. In addition, it also indicates that we may be able to extend our application into other avenues within the fashion industry such as accessories and clothing.

Moreover, the application that we are building can have far more reach in today's and future markets as Wikipedia article indicates. Most importantly, the augmented reality tools, which are equipped with Artificial Intelligence systems, that we are aspiring to build could become an invaluable asset to the ecommerce industry which is rapidly growing. Product try-on features such as Sephora's 3D Augmented Reality Mirror, which can simulate cosmetics on the customer's face in real-time, demonstrates that these tools could become much more prevalent in the future. Hence, the fact that these tools are becoming popular shows that there are customers for the service that we are building.

In short, we can say that the application that we are building extends beyond the digital fashion as we design our application to provide hairstyling guides that the users can instantly apply in real life too.

*<https://www.voguebusiness.com/technology/digital-fashion-virtual-clothing-3d-design>

*https://en.wikipedia.org/wiki/Digital_fashion

7.2 Competitors

Name & URL	Description, Strength and Weakness
Thehairstyler https://www.thehairstyler.com/about	<p>According to the website thehairstyler, it's virtual hairstyling system “..that lets them upload their photo (or use a model's) and try endless combinations with 12,000 hairstyles and 50 hair colors to choose from. Some of the style categories include: Everyday Styles, Classic Styles, Salon Styles, Bridal/Formal, Celebrity and Men's Styles.”</p> <p><u>Strength:</u></p> <ul style="list-style-type: none"> • Established since 2000 • Have many affiliates <p><u>Weakness:</u></p> <ul style="list-style-type: none"> • Website only • Even though thehairstyler has a vast and fairly libraries of databases, there is a lack of support when it comes to choosing the right hairstyles. The user is ultimately presented with the paradox of choices.

<p>Digital Fashion - Face & Hair https://apps.apple.com/td/app/digital-fashion-face-hair/id1415303020</p>	<p>This iOS application allows users to try out hairstyles, beard, contact lenses, and tattoos when users upload their pictures.</p> <p><u>Strength:</u></p> <ul style="list-style-type: none"> • Clean user interface <p><u>Weakness:</u></p> <ul style="list-style-type: none"> • The application is expensive. It costs \$9.99 to purchase the app. • Very limited libraries of hairstyles and so forth. • Lacks user support
<p>Hairstyles For Your Face Shape https://apps.apple.com/us/app/hairstyles-for-your-face-shape/id1102371924#?platform=iphone</p>	<p>According to the App Store, “this app will help you to identify your face shape and check a lot of different hairstyles.”</p> <p><u>Strength:</u></p> <ul style="list-style-type: none"> • Offers good hairstyles suggestion based on face shape <p><u>Weakness:</u></p> <ul style="list-style-type: none"> • Only consider face shape, but not other physical features • The user interface lacks realism

