**Thesis Project Portfolio**

# Ring Light: An Answer to a Usual Problem in an Unusual World

(Technical Report)

# The Social Construction of Appearance Enhancement Devices

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

**Ethan Staten**

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Department of Electrical and Computer Engineering

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(Technical Paper)

**The Social Construction of Appearance Enhancement Devices**

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Fall 2020

Technical Project Team Members:
Sophia Fasano
Charles Ferraro
Daniel Knorr
Ethan Staten

On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

Signature *Ethan Staten* Date 11/29/20
Ethan Staten

Approved _____ Date 12/02/2020
Harry Powell, Department of Electrical and Computer Engineering

Approved _____ Date _____
Travis Elliot, Department of Engineering and Society

## Introduction

According to some, physical appearance is everything. While this statement is somewhat hyperbolic, there has been historical precedents of humanity evaluating a person's character based off of a first impression, influenced mainly by that person's physical appearance. Furthermore, society has constructed several different forms of technology to enhance an individual's physical appearance for the sole purpose of positively influencing other peoples' perceptions of said individual. My technical project is my team's attempt to create another form of technology for this aforementioned purpose within the Covid-19 timeframe that is occurring as of this writing. What my STS research project will focus on is exploring what led to the development of appearance enhancement technologies, how specific technologies were made, and why these technologies are still utilized to this day.

## Technical Topic

In order to fulfill a Major Design Experience (MDE) requirement within the Electrical and Computer Engineering (ECE) department at the University of Virginia (UVA), both Electrical and Computer Engineers must take an MDE course. The student works with teammates to create a technical project that addresses an issue of the teams choosing while also testing the knowledge that these students have learned throughout their past three years of study within their major. The entire capstone project must be finalized and presented at the end of the fall semester, as the capstone course only lasts for a singular semester. Aside from teammate and advisor interactions, each individual team works on their project separately.

My team is creating a project called a "Ring Light". This device serves the purpose of facilitating optimal lighting for a person's head during online meetings. The Ring Light will be

mounted on a track that will be attached to a stand, which will be placed behind a laptop computer/desktop monitor. Furthermore, the device will be able to move horizontally on the track system. Rotation of the device is also planned on being implanted through IR beam receivers planted within the Ring Light itself. There will be two IR beam transmitters that will be attached to a set of headphones, one transmitter on each ear. The primary communication method between the headphones and Ring Light itself will be the Bluetooth communication standard. The primary deliverable of this project is a fully working and operational prototype of the entire system, shown through a recorded demonstration. My team will get to this final deliverable through the following process: development of the motor controller and track systems, development of the Bluetooth module, development of the IR transmitter/receiver modules, combining said modules on a custom printed circuit board, and extensive testing and troubleshooting to ensure correctness and compliance.

## STS Research Topic

*Framework Introduction*

The main focus of my STS research paper is investigating what led up to the current societal fixation on appearance enhancement. I will use the Social Construction of Technology (SCOT) framework as the instrument that drives my research into this topic. When further researching into my topic, SCOT will frame my questions and insights through the following questions: “How flexible are the interpretations of these technologies, along with their uses?”, “Is there any flexibility in how a single product can be designed/marketed?”, “What social groups are these products affecting/influencing? What groups are these products designed for?”, “How has society affected the technology developed over time?”, and “Through these previous

questions, what challenges occur from different designs and design methodologies that address the same issues within this research scope?"

*History and Meaning Behind Cosmetic Design*

One of the most widely utilized appearance enhancement devices around the world is makeup. Furthermore, makeup is one of the few such devices that has major historical precedent in the world. China, Egypt, Europe, Japan, Mongolia, and Persia are all examples of ancient nations that utilized makeup. Wigs, hair extensions, and general hair accessories also had their first appearance during ancient times, located primarily within Egypt for the earliest records. Some differences in these devices start to occur when one looks through the lens of SCOT where interpretation and design are the primary factors of evaluation. Each of the aforementioned locations either utilized or designed makeup and wigs in their own unique way. Kohl is one of the most widely known ancient makeup technologies, as it was an ancient form of eyeliner. China was known for their nail staining process to symbolize royalty, while Japan has culture within makeup itself through Geishas. Early Europe has history of nobles wearing wigs to appear strong to their subjects. Each of these applications are different in design yet serve the same purpose: elevating an individual's status in society.

Each individual appearance enhancement device created has their own unique reason for being created, being utilized, and being marketed. The primary high-level reason that encompasses the creation of the majority of appearance enhancement devices is the fact that these devices act as a response to the ideal created by society that physically attractive people have more individual and professional success in their life. This is not just a baseless statement: many different studies have been done to investigate what effects physical attractiveness has on

an individual. One particular study is created by Megumi Hosoda, in which her listing of some such effects each as prior research listed as well:

> For example, attractiveness has been shown to influence, among other variables, initial impressions (Eagly, Ashmore, Makhijani, & Longo, 1991; Feingold, 1992; Jackson, Hunter, & Hodge, 1995), date and mate selection decisions (e.g., Adams, 1977), helping behavior (e.g., Benson, Karabenick, & Lerner, 1976), teacher judgments of student intelligence and future academic potential (e.g., Ritts, Patterson, & Tubbs, 1992), voters' preferences for political candidates (e.g., Adams, 1977), and jurors' judgments in simulated trials (Mazzella & Feingold, 1994) (Hosoda 2003).

Another paper by Mark Snyder shows how an individual's perceptions about physical attractiveness can lead to a self-fulfilling prophecy:

> Individuals may have different styles of interaction for those whom they perceive to be physically attractive and for those whom they consider unattractive. These differences in interaction style may in turn elicit and nurture behaviors from the target person that are in accord with the stereotype. That is, the physically attractive may actually come to behave in a friendly, likable, sociable manner—not because they necessarily possess these dispositions, but because the behavior of others elicits and maintains behaviors taken to be manifestations of such traits (Snyder, 1977).

*Cosmetic Design in the Modern Age*

In order to understand why appearance enhancement devices are utilized to the scale that they are in present day; a brief analysis of recent societal belief changes need to be explained. For the majority of the time period that is composed of first utilization of appearance

enhancement devices to the early 20th century, such devices were utilized primarily by the elite and wealthy for the purpose of flaunting their status to the general public. The public either utilized lesser forms of appearance enhancement, or otherwise did not utilize them whatsoever. The idea that devices such as makeup or hair pieces could be utilized by average citizens were popularized by ballet, plays, and other in-person theater productions. People saw these productions and wanted to replicated the beauty shown on screen in their everyday life. This signifies the shift of appearance enhancement devices signifying classist elitism to signifying superior appearance. This shift was exponentially magnified during the rise of the Hollywood film industry. The same desire to emulate the beauty shown on screen pushed consumers to express a significant demand of makeup and hair accessories. To address this demand, companies soon formed to produce a supply of appearance enhancement devices that could supply such a demand from consumers.

In a brief timeframe from a holistic viewpoint, physical appearance evolved from being desirable to being marketable. Appearance altering was the product that was made, while the product that was sold was a message to the general public that utilization of these products would help garner success both in personal and professional lifestyles. The general public believed in such a message and heavily bought into the appearance enhancement devices that companies produced and sold. Now, an interesting interaction of SCOT comes into play. Through the lens of SCOT, appearance enhancement devices in the 1910-1950s timeframe are shown to influence the non-elite general public. An interesting twist that occurs after this point is that due to the fact that a singular category of products affected society a) for a lengthy time period and b) in such a profound way, one of the core tenets of SCOT become flipped in this case. The product (appearance enhancement devices) stops influencing social groups and instead the social groups

starts to influence the products made and sold. Society starts basing societal status and professional acumen primarily off of physical appearance. Wealth gained from employment can now be unofficially altered due to attractiveness being viewed as a higher worth than unattractiveness (Hamermesh, Biddle, 1994). As a result, technology is created based off of society's influence. As the timeline starts to approach modern day, external technological innovations in the electronics field starts to find usage in the cosmetics field. Lights specifically designed to provide optimal lighting in front of a camera start to be produced and sold, while new camera technologies start to present television and movie starts in more flattering manners. As social media and mobile technologies developed, image filtering was developed to help alter photographs to be more visually appealing to the general public. Some recent examples of image filtering technology available to almost everybody would social media applications like Snapchat and Instagram. Lastly, such a demand for great physical appearance is one of the core factors that influenced me and my capstone team in creating our technical project.

## Research Methodology

The primary research methodology utilized for my technical project with be experimental design prototyping with my teammates, Sophia Fasano, Charles Ferraro, and Daniel Knorr. Overall project scope and specifications will have guidance from Professor Harry Powell and Professor Adam Barnes. Specific technical components and Printed Circuit Board (PCB) designs will be acquired and sent out, respectively, from/to independent third-parties.

My research so far for my STS topic has consisted of studying general history and trends of appearance enhancement devices throughout the world. Future research will be comprised of seeking out more individual case studies of components of my research topic and seeking out more sources to reference in the main thesis.

## Conclusion

While testing technical and design acumen is a primary motivator for my team's capstone project, the team does aim to create a product that can have some impact in this new primarily virtual environment that we are facing currently. The overall goal for this capstone project is to create a device that our team can view ourselves utilizing in our virtual meeting environments. The STS research project will evaluate the history of cosmetic technology designs and determine what possible trends the future could hold for future technology development.

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