SETTING INTENTIONS: CONSIDERING RACIAL JUSTICE IMPLICATIONS OF FACIAL RECOGNITION TECHNOLOGY

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ABSTRACT

Sociological research has produced an array of literature on racial justice and systems of power. However, there is minimal research on its relationship with emerging technologies. This thesis brings attention to facial recognition technology’s (FRT) intersection with systems of race, power, and surveillance. Little research is reported on this specific technology’s relationship with these systems, and even more so, as it relates to public safety when both law enforcement agencies and consumers use it. This thesis research uses a mixed-method approach including survey analysis and a design workshop to understand how racial differences and experiences impact public attitudes and perception of facial recognition technology use for public safety. The results show that African Americans and White Americans share statistically significant differences in attitudes and perceptions of facial recognition technology use. This thesis paper also explores how the technology design process could be intentional about considering social justice implications and reveals what intersectionality as a lens for design looks like in the world.
The research and writing of this thesis is dedicated to Black people in America in all over the world who continue to live and thrive in a world that seeks to resist them. Thank you to my thesis advisors Dr. Barba and Dr. Owen who have helped me tremendously as well as my friends and family who have supported me.

With love,

Taylor
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INTRODUCTION

“Racism is a moral catastrophe, most graphically seen in the prison industrial complex and targeted police surveillance in black and brown ghettos rendered invisible in public discourse.”

(Cornel West, 2011)

“The animating force of the New Jim Code is that tech designers encode judgments into technical systems but claim that the racist results of their designs are entirely exterior to the encoding process. Racism thus becomes doubled – magnified and buried under layers of digital denial.”

(Ruha Benjamin, 2019)

Everyday Black Americans experience the psychological stress of institutionalized real-time surveillance. The racializing and policing of Black bodies has existed throughout American history from the physical and societal branding of Black people as slaves, to stop-and-frisk policing practices, and now to biometric and predictive policing technologies. (Browne, 2015)

The use of racial segregation and oppression of Black Americans has been a tactic for maintaining white superiority time and time again. (Benjamin, 2019) However, facial recognition technology (“FRT, “the technology”) is being marketed as a high-tech tool for security (FaceFirst, 2007) that can help mitigate this historical racial profiling in society and within the criminal justice system. The technology is increasingly being designed into products that can be used by consumers, private-owned businesses, and within government and law enforcement agencies (FaceFirst, 2019 & Google, 2018). Understanding that racial bias issues do exist within society and consequently the current criminal justice system, this paper explores how the
intersections of racial bias, systems of power, and surveillance practices impacts the design, use, and perception of facial recognition technology for public safety. In this thesis, facial recognition technology is defined as a computer software capable of identifying a person by comparing and analyzing parts of that person’s face. It is used in conjunction with surveillance cameras and law enforcement databases. (Garvie, 2019)

This research is grounded in literature from the fields of sociology, critical race theory, surveillance studies, and design studies. This research is not meant to cover all of the technical aspects of facial recognition technology, nor is it meant to provide recommendations on the policies of use of the technology. However, there will be a list of recommendations on how to increase diverse participation in the policy making and design of public-interest technologies such as facial recognition.

Racial Classification and the Policing of Public Spaces

When discussing the ways that Black people are policed and surveilled in everyday life and how that is amplified by facial recognition technology, it is important to understand how racial classification and discrimination is designed to promote white power.

Psychologist Frantz Fanon describes the relationship between racialization and power through his concept of epidermalization. The term represents the “making of the body as out of place, an attempt to deny its capacity for humanness” (Browne, 2009). Fanon (1952) suggests through epidermalization, that there is a development of institutional power given to white people as being the standard of what is “normal” in society while everything (and everyone) else is considered against it, thus casting out Black people and other people of color. There is a strong emphasis on the body being “out of place.” Furthermore, it suggests that there is a right place
and a wrong place of belonging for particular bodies and that those places of belonging are
determined by the skin color of an individual.

Fanon brings up an example of an interaction between a white person calling out a Black
person saying “Look, there’s a Negro!” This calling out can be imagined as a single action that
happens while walking down a street or any other typical public setting and represents a simple
way in which Black people are viewed and called out as something different than the rest. The
use of biometric technology such as facial recognition also practices this discriminating process
through its automated labeling of identities based on visual perception. However, the process in
how identities are labeled are unknown and hidden by algorithms in which those being identified
have no awareness of their subjectivity of this technology nor the power to correct its
misrepresentations.

Furthermore, Fanon’s *epidermalization* is an expansion of Hegel’s (1977) master-slave
dialectic which describes a relationship between two self-consciousnesses, each caught up in
needing to be “recognized” by the other. Through *Epidermalization*, racial classification
becomes a tool for White people to be recognized as masters (the social standard) while
everyone else becomes a slave (others or abnormal). This relationship of power becomes
threaded into society and social structures. America has an intimate relationship with upholding
this master-slave relationship through the literal enslavement of Black people. White supremacy
persists in what Althusser (1971) considers the repressive state apparatus, which contains
institutional powers such as law enforcement agencies and the justice system, as well as through
the ideological state apparatus, what can be understood as ideas transferred through the church,
the family, and education.
A history review would illustrate the ways in which the law has participated in this social classification system that has allowed for white supremacy to continue to thrive. The justice system has participated in the discrimination, abuse, and surveillance of Black people as active enforcers (through laws passed, federal investigation practices, higher rates of criminalization of Black Americans, etc.) and as passive partakers (through the neglect of injustices of Black people committed by citizens or policing agents, etc.).

More specifically, the law’s participation in racial classification can be illustrated through the legality of the transatlantic slave trade, the Black codes in the 1860s which were restrictive laws created for free Blacks that limited their wages, and segregation laws in the American South in the 1960s where it was legal to enforce separation among Blacks and whites in schools, on busses, restrooms, restaurants, public pools and more. These historical instances reinforce Fanon’s understanding of epidermalization as the Black body is seen and enforced as something unlike White bodies and thus should not be given the same access to spaces, materials, and human liberties as White people.

In terms of the surveillance of Black people, throughout the 1940s into the 1960s, the Federal Bureau of Investigation (FBI) under the leadership of J. Edgar Hoover, was found to be surveilling many prominent Black activists and artists who they labeled as Black Extremists. (Maxwell, 2017) This tracking of Black leaders followed them around in America and abroad as FBI agents intercepted phone calls, monitored individuals’ locations, tracked their interactions with others, and analyzed creative texts, speeches, and songs all for the sake of national security. (Maxwell, 2017)

Facial recognition technology is merely the latest advancement of this kind of institutionalized tracking and identification. As it has shown in the past, the ways in which the
law, national security, surveillance and racism intersect, there are potential threats to African Americans’ safety and privacy when identification-based tracking systems are being used on individuals whose political and social ideologies do not align with the governing ideology.

As technology is used for public safety, the negative impacts of structural racism extend beyond the hands of law enforcement officials and into those of everyday citizens. Harmful biases are also perpetuated within minority groups in a variety of contexts and illustrates the ways in which racial profiling of Black Americans is not only practiced by white people by also by other minorities. For example, the fatal shooting of 15-year-old Latasha Harlins in 1991 by a Korean store owner lit the match to the 1992 LA riots. (Cheung, 2015) In 2012, there was the killing of 17-year-old Trayvon Martin by neighborhood watchman George Zimmerman. (Botelho, 2012)

There is a fear of Black bodies due to this institutional racial profiling of Black people being tagged as aggressors. Police officers use the line “I feared for my life” (Pipkins, 2019) as a blame avoidance tactic for reasoning the firing of sometimes multiple fatal gunshots towards unarmed African Americans even when reports show the African American suspect did not pose a physical risk to the officer. (McLaughlin, 2014) They repeat it because the racist ideologies that African Americans are more aggressive than any other racial group is accepted by the jury and the judges who rule on these cases.

This narrative is further carried by citizens who practice every-day policing of unarmed Black people doing typically normal things in public settings. For example, in 2018 two black men in a Starbucks in Philadelphia were arrested after the police were called on them simply for occupying the space (Hanson) and in St. Louis, Missouri, a Black man was blocked from entering his own apartment building by a white woman who demanded proof of his residency.
(Gomez, 2018) During the time of the coronavirus outbreak, many African Americans feared the result of wearing a face mask into grocery stores as recommended by the Center for Disease Control and Prevention due to their concerns of being profiled as criminals (CDC, 2020). Two Black men reported they were kicked out of a Walmart in Illinois for wearing surgical masks to protect themselves from COVID-19 which is killing African Americans at significantly higher rates than other racial populations (Jan, 2020). These highlighted cases show that implicit racial bias severely affects who gets to feel safe and who does not. It further demonstrates the ways in which African Americans live under the constant state of white supervision which can be understood as a specific state of surveillance that is backed by anti-blackness at the institutional level and the citizen level. Through white supervision, white people and other minorities feel empowered by white supremacy to police public spaces and dictate where Black Americans are allowed to be and how they are allowed to act.

Facial recognition technology is said to be present in order to facilitate safety for everyone, but incidents of white supervision inform us of the way that surveillance and the law operates differently for Black people who are especially prone to more dangerous consequences and are often labeled as threats to other people’s safety.

If facial recognition technology is designed to alleviate concerns of racial bias in public safety regulation, how can the design process be intentional about examining the critical ways it intersects the complex relationship between racism and institutional power? With emerging technologies advancing as tools for policing and public safety, what principles does the design process have to consider the social and cultural contexts of the design and deployment of these law enforcing technologies?
Big-data policing (also known as predictive policing) is a new type of technique used by law enforcement which struggles with what Andrew Guthrie Ferguson describes as “Black Data” (2018) which involves intersecting issues of race, transparency, and constitutional law. Ferguson illuminates how predictive policing is challenged by the real-life racial discriminations in the world, the disproportionate punishment of people of color by the criminal justice system and the “black box” of the algorithm driving this new technological policing aid. This issue with “Black Data” is parallel to facial recognition technology because it operates through surveillance tracking and real-time identification. Ferguson proposes five principles as questions that are geared towards concerns of racial bias, error, and accountability of data-driven policing:

1. Can you identify the risks that your big data technology is trying to address?
2. Can you defend the inputs into the system (accuracy of data, soundness of methodology)?
3. Can you defend the outputs of the system (how they will impact policing practice and community relationships)?
4. Can you test the technology (offering accountability and some measure of transparency)?
5. Is police use of the technology respectful of the autonomy of the people it will impact?

(2017)

Although Ferguson’s questions may seem to be removed from the design process as they are not questions of functionality but rather suitability, what if these principles, posed as critical reminders of how the technology is interacting with the social world, are intentionally embedded into the design practice?
Racial Justice in the Technology Design Process

Scholars have found that during the design process, designers often default to designing for imagined users whose experiences reflect similarly to their own. (Oudshoorn, Rommes, & Stienstra, 2004 as cited in 2020, p. 77) With the population of white men in the high tech industry (68.5%) being disproportionately higher than any other racial group (EEOC, 2014), Costanza-Chock expands on how this phenomenon contributes to the neglect of the needs, values and experiences of those who do not fit within the dominant population:

This means that users are most often assumed to be members of the dominant and hence “unmarked” group: in the United States, this means (cis) male, white, heterosexual, “able-bodied,” literate, college educated, not a young child and not elderly, with broadband internet access, with a smartphone, and so on. Most technology product design ends up focused on this relatively small, but potentially highly profitable, subset of humanity.

There is conversation on the ways that facial recognition can be harmful to Black Americans. However, there is a general lack of research on what this specific group of people actually think about the use of this technology especially since it is serving as a public safety mechanism for criminal profiling and identification. Public policies around the use of this technology can be informed by the public’s perception and the needs of particular vulnerable populations. Part of the design process requires engagement with stakeholders. There should be a more defined approach to design that considers the impacts of multi-social identity oppressions, which critical theorist Kimberlé Crenshaw coins as intersectionality, on the design and deployment of public-interest technologies.

Taking this approach requires an intentional focus on the relationships between the technology, power, identity as part of the ideation and evaluative process. It is especially critical
to take this approach for technologies designed for the good of the public in which vulnerable populations are not offered the ability to opt-out yet are defaulted to bearing the full capacity of its risks.

This thesis contains four chapters including a review of current literature on the topic, a quantitative survey analysis and a design workshop analysis followed by a discussion intersectionality and representation and recommendations for considering racial justice in the design process.
CHAPTER ONE: LITERATURE REVIEW

This literature review will cover the design and use of facial recognition technology, how facial recognition technology and surveillance theory intersect with race, and current design practices that seek to bring in and value non-designers and marginalized people as contributors in the design process.

Facial Recognition Technology

Facial recognition technology can be found in a range of products from social media (Snapchat, 2016), to unlocking personal smartphones (Apple, 2017), and as doorbell security systems (Google, 2018). FaceFirst claims its facial recognition technology can be used to “secure access to locations, devices and data” (2019). There are many different companies and different functionalities of facial recognition technology, so this is not meant to cover every detail of the way the technology can be used. However, it’s development and deployment from a general standpoint as a tool for public safety can still be evaluated.

As a graduate student at the MIT Media Lab, Joy Boulamwini reported findings of higher rates of facial recognition inaccuracies on darker skin and more specifically on women with darker skin from companies such as Microsoft and IBM. (2018) However, men with lighter skin were reported to have the highest rates of accuracy. IBM (Puri, 2018) reported that the issue with the accuracy rates was not about the technology itself but more so that it was due to the lack of diverse images used in the training dataset. These findings illustrate the technical training aspects of FRT that can impact the accuracy of the machine’s outputs. Not only can this machine become inaccurate due to lack of diversity in the training data which results in a more flawed system when being used to identify African Americans who typically hold dark skin, Claire
Garvie and colleagues at the Georgetown University Law Center (2019) discovered that police departments were using these facial recognition systems to help in criminal investigations without the suspects knowledge and in some cases, agencies were found manipulating the images they put into the identification system when the images they had were not of high quality or even physically available.

For instance, the New York Police Department (NYPD) was found having used facial recognition technology to identify a theft caught on video at CVS. However, the available surveillance footage from the store was too pixelated and after running the footage through the FRT system, no results were populated. Yet, one detective from the Facial Identification Sections (FIS) suggested the suspect in the footage looked like the actor Woody Harrelson. The detective from FIS used an image of the actor found through a Google search and ran the photo through the system which then identified someone listed in the database. The FIS detective sent this real person’s information who was identified from the FRT system using the actor’s image to the local investigative team and that person was arrested for the theft case. (Garvie, 2019)

The technology’s information database is composed of photos taken from drivers’ licenses and police files. Currently, there are little to no policies and regulations around the type of photos that can be used, the quality, or where the images are taken from when doing a facial recognition technology search. Other forms of manipulation to what is considered “probe photos” (Garvie, 2019) include removing facial expressions, inserting eyes, creating portions of the face that may be missing or hard for the machine to recognize, as well as using sketches from eyewitness testimonies.

There is a general lack of regulations around the use of facial recognition technology.

Combining the influences of social biases coupled with the lack of diversity within the training
dataset before it even hits the hands of law enforcement agents and the misuse and editing of the
probe images that are inserted to identify a real person can lead to detrimental impacts to safety
and liberties of African Americans who already face higher rates in criminalization. These
findings lead to more critical understandings of the relationship between surveillance
technologies and its relationship with power and race.

Race, Surveillance, and Technology

Ruha Benjamin writes on how these technologies act as a “new Jim code” playing off of
the Jim Crow laws from the 1860s to 1965 which “mandated segregation nearly in every social
circumstance” (Jim Crow Laws, 2015). She further says that antiblack racism is present during
the fabrication of these surveillance technologies and, thus, the technologies themselves are not
promoting hyper surveillance but that institutional racism and anti-blackness allow for the
sustainment of this kind of harmful surveillance. (2019)

Benjamin (2019) says that biometric technologies create further opportunities to both
brand individuals and alter their behavior (Foucault, 1977). Social theorist Michel Foucault
(1977) addresses Bentham’s concept of the Panopticon which is described as a prison structure
that does not allow individuals to see outside of their cell, but the lighting and the structure of the
cells make the individual feel like they can be watched at any point because there is no way to
tell if a guard really is watching at one point over another. This is the major power in the
Panopticon because it operates no matter who is the “watch guard” and whether or not anyone is
physically there.

Browne examines this concept of Panopticism in everyday life through the lens of
Fanon’s epidermalization and presents the idea of digital epidermalization. She pulls from the
history of slavery by analyzing a passage from a French slave merchant, John Barbot, which describes how slaves were examined by a doctor and separated by those who passed the medical check and those who did not. Those who passed the medical exam were then branded with a hot iron specifically marked according to the nation in which they were now owned by while those who held diseases or defective limbs, eyes, and teeth, were rejected. Browne (2015) suggests this as an example of classifying, marking and rendering black bodies as commodities that could be determined as disposable which can be traced to current processes in the way facial recognition technology acts as authoritative figures in analyzing, measuring and categorizing the living body.

Browne takes Fanon’s theories of the “embodied effects and outcomes of surveillance” (2015) further in rethinking Bentham’s Panopticon by bringing attention to the perspective of the Black women slaves who were being held in captivity on Bentham’s (1789) ship Brooks. She links surveillance studies to black feminist scholarship by bringing attention to the roles of race and gender in theories of surveillance and power. Fanon’s ideas on colonialism and the imposition of race resemble Foucault’s individualism and specifically how “rather than the massive, binary division between one set of people and another, it called for multiple separations, individualizing distributions, an organization in depth of surveillance and control, an intensification and a ramification of power” (Foucault, 198). Examining technology, surveillance, and power through a lens of “intersectionality” (Crenshaw, 1989) is important as the technology has been shown to be less accurate on Black women. From a technical standpoint, Boulamwini calls for future studies on “intersectional error analysis of facial detection, identification, and verification” (2018). From a social standpoint, future studies may also look into how this technology could be re-imagined as a tool for liberating marginalized communities.
Re-imagining Technologies and the Design Process

Benjamin seeks to re-imagine the ways these technologies are being used to allow for the uncovering and investigation of discriminatory design practices. She compares two similar technologies that seek to set free Black people from jail. One is called “Appolition” which she notes, is a play on the world “abolition.” It is an application that was ideated on Twitter and built and supported through a community of individuals who sign up and have their daily change collected to put towards bail money. Her reflection on the point that abolitionist calls are often about re-envisioning systems, not always destroying them completely. (2019) The founder of the Appolition company expected 600 people to register for the app, but when 8,000 people registered, it became a top listed innovation company in 2018. (Benjamin, 2019) This particular application is highly relied on the contributions of others who use the app and agree to give their extra change from purchases to go towards bail bonds whereas another similar concept application known as the Promise App managed by rapper, Jay-Z, is critiqued for its capitalistic motivations. Benjamin says the Promise app is not about freeing individuals by paying towards their bail, but that it is instead an application that partners with law enforcement institutions to place monitoring technologies on individuals at a cheaper expense than it would be to keep them in jail. (2019) Benjamin is critical of this kind of technology because instead of truly freeing the individual, it further injects surveillance into their everyday lives.

Organizations like the Design Justice Network rethink the design process to consider and include people who are often marginalized. This placement of not only a critical race framework into the design process, but a further social justice approach into the design process invites a proactivity and value of necessity in designing ethical and socially aware technologies.
User-centered design (UCD) is a design process that seeks to consider users, tasks and environments in the development of technology. (Costanza-Chock, 2020) It is relative to the participatory design process which places emphasis on including the individuals who are meant to be using the technology in the design process. (Costanza-Chock, 2020) Although UCD is meant to be more inclusive of user needs and varying social contexts and some companies have developed design kits and strategies around designing for the most vulnerable people who may be using the technologies, Costanza-Chock points out that only some of the industry approaches and practitioners are asking questions about “how to do design work in ways that truly respond to, are led by, and ultimately benefit the communities most targeted by intersectional structural inequality” (2020). This is an important critique to understand as the user-centered design process is being widely used in the development of emerging technologies.

From a sociological standpoint, personal identity components such as race, gender, and sexuality play a significant role in human behavior. By neglecting the ways these specific groupings of humans act and react in the social world can be critical in identifying and alleviating potential harms and risks these technologies may cause.
CHAPTER TWO: PUBLIC AWARENESS, ATTITUDES, AND USE OF FACIAL RECOGNITION TECHNOLOGY FOR PUBLIC SAFETY

Although there is research on how African Americans have higher rates of incarceration and that “crime suppression targets communities of color,” (Ferguson, 2017) there is a lack of research on how these racial inequalities in the criminal justice system impacts the attitudes towards the use and awareness of facial recognition technology as a tool for security and public safety. This study uses a survey to evaluate African American awareness, use, and attitudes towards facial recognition technology. Facial recognition technology is defined in the survey as a computer software capable of identifying a person by comparing and analyzing parts of that person’s face. In order to understand how to design tools for public safety, it is important to understand the concerns of populations who are the most vulnerable to the harm of bias in the criminal justice system. The survey allows for the identification of the percentage of difference in attitudes and awareness of FRT for public safety.

Key Findings

- There is a strong positive relationship between African Americans' sense of safety and their distrust of law enforcement using FRT for public safety measures. 79% of African Americans believe law enforcement discriminates on the basis of race.
- Over half (51%) of respondents living in urban neighborhoods feel uncomfortable with installing facial recognition technology in their neighborhood.
- There was no statistical difference in responses among races on whether facial recognition technology use by law enforcement should be banned. There was an almost
equal split between responses of “yes FRT should be banned” and “no FRT should not be banned.”

- Facial Recognition Technology as a tool to mitigate racial bias concerns does not have a positive impact on African Americans' trust in law enforcement being unbiased in their use of technology to keep them safe.
- More than half (63%) of respondents believed that FRT has a racial bias.
- Over 75% of African American respondents believe that law enforcement discriminates on the basis of race.
- Over 75% of African American respondents have felt unsafe in public spaces because of their race.
- Majority (91%) of African American respondents said they felt others have acted suspicious of them in public spaces.
- Majority (93%) of African American respondents believe law enforcement has used technology to target racial minorities.
- Over half of (52%) respondents feel facial recognition technology use by law enforcement should be banned.
- There is a positive relationship between those who believe technology should be banned and those who believe law enforcement uses technology to target racial minorities.
- Engineers, policymakers and government and the companies that design facial recognition technology are responsible for correcting the technology’s racial bias.

**Methodology: Survey**

While qualitative data such as focus groups, interviews and observational research can provide insight on *why* people do things, it can only capture information from small groups of
individuals at a time. Quantitative data can be used to analyze how many people do, think, feel and have experienced certain things. A survey “is a set of questions that allows a large group of people to describe themselves, their interests, and their preferences in a structured way” (Kuniavsky, Goodman, Moed, 2012). Surveying a target vulnerable group for their unique values and lived experiences can be helpful in the design research process and leads with an equity-driven approach by acknowledging that there are some populations that are at a higher-risk to the negative impacts of the use and design of technology than others.

Participants for this study were recruited through ads on social media, Mechanical Turk, and through word of mouth. A snowball sampling approach was employed as people were asked to forward the survey to their personal networks. The survey was targeted towards adults over the age of 18 living in the United States and ran from February to March of 2020. The target audience was left broad in order to further break down demographic differences during the analysis. Because this study also evaluates racial bias and structural inequities, racial identity is often used as a comparison in the analysis. The survey data is from 211 respondents collected via Qualtrics survey software and analyzed using SPSS. My research question seeks to address current African American attitudes, experiences, levels of awareness and confidence in the use of FRT as an effective security measure compared to other racial communities.

**Results**

*Who Are the Participants?*

In total there were 211 participants. There are 58 participants who identified as male, 111 who identified as female, 1 who identified as non-binary and 40 missing. 87 participants (41.2%) self-identified as Black, 57 participants (27%) identified as White/Caucasian, 7 participants
(3.3%) identified as Asian American and 14 participants (6.6%) identified as Latino/Hispanic/Spanish origin. There were only 21 total respondents of the Asian American and Latinx/ Hispanic/Spanish origin populations. This was not a large enough sample for the crosstabs test to run accurately and they could not be grouped together as “not white or black because on some of the tests, the two racial groups showed somewhat different responses from each other. So, both of these populations were left out of the statistical tests. (Figure 1) The set of participants are also highly educated with 13.7% of participants having some college, 27.5% having bachelor’s degrees and 34.6% having graduate degrees. Participants live in 30 different states including 11% of participants living in Washington, D.C. The most frequent age of participants was 24 with the range spread from ages 22 to 69 years old. The following most frequent ages were 23, 25, 26, and 28 years old with between 10 and 15 responses for each age. 45 participants did not provide their age.
Are They Tech Savvy?

51% of participants define themselves as early adopters of new technology (someone who has the latest phone/gadgets). 94.8% of participants are aware of what FRT is and 72.6% of participants have interacted with the technology before as described as a computer software capable of identifying a person by comparing and analyzing parts of that person’s face. 52.6% shared that they were not aware of FRT being used at people’s homes, 53.1% shared they were not aware of FRT being used in schools, and 78.6% of people were not aware of FRT being used in job interviews. (Figure 2)
Facial Recognition Technology, Racial Bias and Public Safety

Participants were asked a series of questions regarding their attitudes towards the use of FRT for public safety by law enforcement and their experiences with racial bias and their sense of safety in public spaces. These questions were asked in order to gage an understanding of how race, FRT, and sense of safety are related. From this data, there is a strong positive relationship between African Americans' sense of safety and their distrust of law enforcement using FRT for public safety measures.

When participants were asked whether they believed law enforcement discriminates on the basis of race, 79% of African American respondents agreed that law enforcement discriminates on the basis of race compared to 55% of White respondents. The relationship is statistically significant based on Fisher’s exact test. Participants were also asked if they believed
FRT use by law enforcement should be banned. There was no statistical difference in responses among races with there being an almost equal split between responses of “yes FRT should be banned” and “no FRT should not be banned.”

However, there was a positive relationship between those who believe technology should be banned and those who believe law enforcement uses technology to target racial minorities. 58.4% of participants who said they believe facial recognition technology use by law enforcement should be banned (Figure 3) also agreed that law enforcement has used technology to target racial minorities (Figure 4) while 75% of participants who believe that FRT should not be banned also believe that law enforcement has not used technology to target racial minorities. African Americans (92.5%) believe that law enforcement has used technology to target racial minorities compared to 67.3% of Caucasians. (Figure 4) The relationships are statistically significant at $p<.01$. 
This relationship between race and trust of law enforcement in the use of technology echoes data on the distrust of law enforcement in general. Adding in Facial Recognition Technology as a tool to mitigate racial bias concerns does not seem to have a positive impact on African Americans' trust in law enforcement being unbiased in their use of technology to keep them safe.

Figure 3. Facial Recognition Technology Ban. Do you believe that law enforcement has used technology to target racial minorities? *Those who answered Yes. Fisher's exact test was statistically significant at $p<0.01$. 

- 58.40% FRT should not be banned
- 25% FRT should be banned

This relationship between race and trust of law enforcement in the use of technology echoes data on the distrust of law enforcement in general. Adding in Facial Recognition Technology as a tool to mitigate racial bias concerns does not seem to have a positive impact on African Americans' trust in law enforcement being unbiased in their use of technology to keep them safe.
There was also a significantly higher rate of African American respondents (65.9%) who reported having no confidence at all in law enforcement being unbiased in their use of FRT with very few (8%) reporting having a lot of confidence. However, 37% of white respondents reported having no confidence in law enforcement being unbiased in their use of FRT while 23% reported having a lot of confidence in law enforcement being unbiased when using FRT. (Figure 5) This illustrates a distinct difference in the level of trust towards law enforcement using this technology among races.

Figure 4. Target. Do you believe law enforcement has used technology to target racial minorities? Fisher’s exact test was statistically significant at $p<0.01$. 
Could this level of distrust in the use of FRT from law enforcement also impact the level of trust in the use of FRT in consumer-based products such as Google’s Hello? A crosstabs test shows that participants living in the suburbs felt more comfortable installing a facial recognition system at their front door to those living in an urban neighborhood. 53% of those living in urban neighborhoods said they would feel uncomfortable installing facial recognition at their door compared to the 38% of those living in the suburbs. (Figure 6)
There is a strong relationship between where someone lives and their level of comfortability with the use of this technology in their neighborhood. A crosstabs test finds that there are more African Americans living in urban neighborhoods (60.5%) compared to Caucasians (45.5%). However, African American’s (39.5%) level of discomfort on installing FRT in their neighborhood are lower than Caucasian (59.6%).

African Americans also reported feeling that people have acted suspicious of them while being in a public space because of their race at a much higher rate (than white respondents (21%). (Figure 7) African American’s also said they felt unsafe in public spaces because of their race at a substantially higher rate than Caucasians. These relationships are statistically significant at \( p < .01 \). (Figure 8)
This data allows better understanding of how a sense of safety plays a role in how surveillance practices and its harmful impacts on African Americans and potentially other racial minorities may not be alleviated with the increased use of facial recognition technology. Because African Americans have illustrated a sense of insecurity in public spaces due to feeling racially profiled by others, how can this technology perform in a way that alleviates this tension for African Americans? Is it possible?

Figure 7. Suspicious. Have you ever felt people acted suspicious of you while being in a public space because of your race? Fisher’s exact test was statistically significant at p<0.01.
Figure 8. Unsafe. Have you ever felt unsafe in a public space because of your race? *Those who answered Yes. Fisher’s exact test was statistically significant at p<0.01.

Who is Responsible for Bias in FRT? How Could It Be Fixed?

Participants who agreed that they felt FRT has a racial bias shared short answers about who they believed is responsible for the bias and how it could be potentially fixed. Many participants suggested that the engineers, companies that created the technology, and government were responsible for the racial bias. Some respondents mentioned that it was up to those using the technology such as the law enforcement agencies as the engineers had no power in the ways the technology is used. For those who suggested the government was responsible, they believed that private-owned companies could not be relied upon to govern themselves. Overall, there is shared agreement that it is the responsibility of many stakeholders to make sure the technology use is not biased in design and its use. Many participants agreed that there should be more implicit racial bias training but also mentioned the great challenge in the fact that the larger issue
was tackling racism in society which is a very difficult thing to do. Others mentioned the significance in having more diversity in engineering departments. Participants also suggested that there be more severe punishments and regulations around the unbiased use of the technology. Listed below are a few quotes from respondents.

Survey Question:

Some people believe there needs to be more policies in place to regulate the way the technology is being used and some people believe engineers designing the technology need to be working out how to make the technology less biased.

Who do you believe should be responsible for correcting this bias and why?

- I think it starts with the design. Engineers need to design these programs in a way that cuts down bias as much as possible. I do believe policy should be in place on how it's used, but the design should consider bias and program ways to limit it.
- Both government and developers, I think developers need to correct the inaccuracies of FRT for certain demographic groups so that it’s not disproportionately affecting people based on race, and the government needs to regulate who uses it and how.
- I think both policymakers and engineers have a role. No matter how technology is engineered the people using it ultimately have to be using it in an unbiased way as well.
- Law enforcement should have implicit bias training and cultural competency/sensitivity training in general, which should be mandated at either the state or federal policy levels. Tech companies should have standards of practice to determine accurate FT at all.

- Everyone in the design and deployment of the FRT system. Bias can enter at multiple points in the design of the system, training data, and deployment/implementation. These all require attention by those who have control over different aspects to work to correct bias. Until it is corrected, its use should be carefully constrained.

Survey Question:

What do you think can be done to correct it?

- Create more diverse task force, testing and researching effects before allowing use to police force, creating a FRT educational toolkit

- It's a systemic problem so it needs a systemic fix. There needs to be diverse engineering methods taught in the classroom to ensure that students have access to the resources to create inclusive technology. Law enforcement, as an institution, is built on racial bias so that's a little bit of a longer answer. But, on the surface level, law enforcement officers should be made aware of the bias results that facial recognition can produce. Therefore, law enforcement should not accept all results as 100% facts and proceed with caution.

- Incorporate ethics-by-design into the innovation process - limit its public use until biases and inequities can be addressed.
Ultimately, there needs to be a variety of approaches to making FRT less biased and involves the technological design process as well as the institutional design process of regulation and the hiring and training of diverse individuals. This goes to say that there cannot be a simple technological fix and that private companies, the government, and the people have to work together in checking and balancing how FRT is to be used for public safety measures. Furthermore, it brings to question how engineers can be active in mitigating racial bias in the technologies they develop and what are the current principles and practices that are not engaging with these critical social concerns and their impacts on the people who use them or are being subjects to its use.

**Limitations**

This is a pilot study that has strong promise that it should be carried out on a larger sample. For the next stage of research, gathering more insights from other minority populations would allow further understanding in how this technology is perceived in relation to racial profiling and surveillance concerns particularly noting that Hispanic people have been reported with having higher rates of confidence in law enforcement than Black people. (Morin & Stepler, 2016). This survey could also be advanced by following up with a set of interviews to provide deeper insight into why African Americans have a strong belief that law enforcement has used technology to target racial minorities and that facial recognition technology has a racial bias, yet there are split attitudes towards whether they believe the technology should be banned from use by law enforcement. The following design workshop analysis provides some insight into those considerations. However, the workshop was conducted before the analysis and was not informed by the survey data results.
CHAPTER THREE: DECIPHERING AFRICAN AMERICANS’ SENSE OF SAFETY AND CRITIQUES OF FRT

A codesign workshop is a user-centered design research method. It is similar to participatory action research and “considers communities to be co-researchers and co-designers, rather than solely research subjects or tests users” (Costanza-Chock, 11). Using this method allows for the interaction with African American stakeholders to discuss the use of facial recognition technology, analyze the concerns and conceptions around the sense of safety, and to visualize and critique the relationship between FRT and security by allowing the participants to develop their own scenario and context of use.

Key Findings

- Facial recognition technology should not be used by everyday consumers
- The process time within the criminal justice system should be innovated to match the technology being used
- There should be focus on regulating the user of this technology for unbiased use. Even if the technology is more accurate, it still may be harmful if the user is able to use it for harmful and discriminating purposes
- Facial recognition technology should not be installed in residential areas
- Homeowners should only be able to have access to surveillance cameras not facial recognition technology
Methodology: Design Workshop

This workshop involved a 2-hour session, with three parts: discussion, general discussion about social identities as it relates to conceptions of safety, awareness and understanding of the use of facial recognition technology, and specific experiences when participants felt safe and unsafe as it relates to their social identities; affinity diagramming of themes from the general discussion; a storyboarding exercise geared towards developing a new context of use for facial recognition followed by a discussion of the stories developed and a debriefing. The research question topics were aimed around: sense of safety, identity, perceptions of facial recognition technology, and critiques of facial recognition technology.

Participants in the design session were two college educated African Americans, one male and one female between the ages 24 and 27. These individuals did not work in the tech field and do not participate in research activities as part of their professional work or current education. Both participants completed the survey before participating in the codesign workshop.

The purpose of this workshop was to gain deeper insight on the levels of awareness of facial recognition technology, attitudes towards its use for public safety, how social identity impacts conceptions and experiences with safety in the world, and the critique of facial recognition technology through designing a new context of use for the technology. The survey study illustrates African Americans share some large feelings of concern around feeling safe in public spaces because of their race and towards the unbiased use of facial recognition technology by law enforcement. The three parts of this workshop was designed in order to pull out real instances and experiences that relate to African American’s concerns and to provide an opportunity for more in-depth critique and understanding of how African Americans are thinking.
about FRT through the development of their own scenario that incorporates public safety and FRT.

Participants were asked to sign-up for a free Miro account to allow for real-time collaboration and online notetaking. The workshop was originally planned to be conducted in-person but due to the COVID-19 outbreak, the workshop was completed online using Miro which allowed for real-time collaborative note taking, diagramming, and storyboarding using virtual sticky notes, text, and drawing tools.

**Results**

*Discussing Sense of Safety*

The discussion was formed around a series of questions and participants were asked to write down their thoughts and comments on the virtual sticky notes to be sorted in the second part of the workshop. The discussion lasted thirty minutes. Participants delayed using the Miro tool for the first part of the discussion but eventually began to join in as the moderator took the notes for them.

Participants were asked to provide specific examples of experiences that made them feel safe or unsafe. The female participant acknowledged feeling safe around other Black women and family. The male participant also mentioned feeling safe around family and places that are familiar to him. The male participant initially suggested that he does not feel unsafe anywhere in particular but is also used to feeling unsafe in general as a Black man. He also tends to feel safer in places he recognizes and places with a lot of people. The female participant mentioned she felt safe at home, at school, and in places that are well lit. She also mentioned an experience she had
washing her clothes in her apartment laundry room late at night and a man in the room staring at 
her making her uncomfortable.

The participants were then prompted with the question of how their social identity has 
ever played a role in making them feel unsafe. The male participant told a story about a time at 
work when one of his coworkers made gun signs with his hands that were “shooting” at him 
which was triggering a traumatic experience he had while protesting for Black student rights in 
college. He told a second story about an experience he had in college when he was shopping at a 
local Walmart when someone shouted out a racial slur to him. He tends to be on high alert at gas 
stations and has a general fear of being in positions of the unknown. He tends to combat this fear 
of unsafety by looking people in the eyes.

The female participant told a story about taking Ubers home late at night and how she 
tries to avoid it when she can. She mentioned that dating apps, older men, Ubers late at night, 
and people asking her personal questions makes her feel unsafe. She has changed some of her 
behavior because of these experiences causing her to always share her location when she takes 
an Uber ride, she no longer does her laundry late at night and instead does it in the morning and 
doesn’t do it as often because she doesn’t have the same amount of time as she does in the 
evening because she works during the day, and she tends to avoid walking through groups of 
men if she can.

This discussion formed the base for the second exercise which allowed for the sorting of 
thoughts and the advancement of the discussion through the addition of sticky notes. This sorting 
helped the participants better understand how their responses related to each other and to the 
overall topic.
Diagramming Facial Recognition Technology, Safety and Behavior

Affinity Diagramming was a tool used to help further the critical thinking around the questions being asked and to help ground the participants into synthesizing their thoughts for the storyboarding exercise that happens in the third part of the workshop. The affinity diagramming took an additional thirty minutes and consisted of the rearrangement of notes taken during the first discussion into groupings of themes.

These groupings created 9 different topic headers with three overarching themes: discussion of facial recognition technology, what makes participants feel safe, and what makes participants feel unsafe. The discussion of the third overarching theme of facial recognition technology benefited from this affinity diagramming as several new notes were added to the board during this part of the workshop. The notes found in the other two overarching themes remained the same. The following analysis will address the additional notes added to the facial recognition technology theme.

Figure 9. Affinity Diagram.
Awareness, Attitudes, and Critique

Participants broke up the facial recognition technology theme into four categories: thoughts and knowledge of FRT, ways FRT is used, context and scenarios of use, and critiques of FRT.

Participants showed a general knowledge of facial recognition technology based off of television shows, information from Twitter videos, and negative experiences with hand soap dispensers in public bathrooms. However, they felt that they didn’t know enough about how it’s used and aren’t sure how to feel about it.

They mentioned how FRT is used in airports, cameras, iPhones to unlock your phone and to collect and sort personal photos, video games such as NBA 2K which lets you design a character that looks like you, Animoji used on iPhones that lets you use and design interactive emojis that use your facial expressions, and Facebook’s photo identification system.

Participants agreed that it’s good to use in certain criminal investigations such as in finding rapists or kidnappers, as well as in social media apps, and to help get through airport lines faster. However, it is not appropriate to use facial recognition technology to target racial groups. There is also an assumption that there are regulations in place in how these technologies can be used within the criminal justice process and that they function as tools to aid in identifying criminal suspects quicker while also requiring other parts of the process such as the time it takes to get approved for search warrants and the response time for officers to be on the scene of a triggered facial recognition system to also be quicker.

The critique category had the highest number of notes listed under it. Participants mentioned concerns around privacy, that FRT could be used to target Black people, its reported inaccuracies and that the public doesn’t understand enough about how it works. When it came to
discussion around how the technology should be used, participants agreed that the government should not put FRT in residential areas and that citizens should not be able to use it, they should only be allowed to have video cameras and that law enforcement should only have access to FRT when it’s warranted. The participants also illustrate a lack of trust in government agencies’ willingness to help. There was a lot of discussion during this section but overall seemed to be an interest in its potential benefits but a lack of trust in its effectiveness due to lack of trust in the people using the technology and their level of understanding of how it works.

In the next part of the workshop, participants were asked to storyboard a scenario of use for FRT based on the previous conversation.

**Storyboarding**

![Storyboard image]

Figure 10. Storyboard.

In this part of the workshop, participants were given thirty-five minutes to create a scenario around the use of facial recognition technology for public safety informed by the previous discussion. Participants were allowed to use the draw tool on the Miro online
application or to write out their scenarios using text onto the virtual sticky notes. The participants were then asked to present their scenario followed by a discussion.

The first scenario was based on a kidnapping scene in which a young girl was kidnapped in broad daylight with no one around. The young girl had been kidnapped by a bank which had security cameras that used facial recognition technology. The police department contacted the bank for the footage but the time it took to have access to the footage was delayed due to business policies. The police were then able to run the images through their facial recognition database in which they found the kidnapper and was able to go to the suspects home to search for him. The police end up finding the kidnapper’s car, but the victim has already been harmed.

In the second scenario, a domestic abuse situation was explored. A man and a woman meet each other, and the man becomes aggressive. The woman files for a restraining order and has a facial recognition system installed in her building which is able to identify the man when he enters her building. As the man attempts to break into her apartment, the system alerts the police department, but the police take three hours to report to the scene. The victim still ends up harmed.

In both of these scenarios, the facial recognition technology worked well. It correctly identified the person and assisted in the criminal investigation. Yet, both victims were still harmed. It is interesting to see that in both scenarios there were delays in response times on the police departments side due to things such as the time it takes to get a warrant, the time it takes to respond to the scene, and the time it takes to physically locate a suspect even though the suspect has already been identified.
This design workshop brings up questions around the point of intervention for facial recognition systems and the challenges within the current criminal justice system that facilitates lack of efficiency in solving crimes.

**Discussion**

Understanding the ways in which the design process participates in the normalizing of whiteness and the neglect of marginalized people is critical if there is to be continuous improvement in the development of technologies for diverse users and contexts.

The question of facial recognition technology’s use as a tool for public safety is not one of how this technology is imposing new racial biases. Rather, it is a question of how this new technology is allowing the advancement of racial profiling, surveillance, and distrust of African Americans through its neutral conceptualization and its lack of attention to the needs of vulnerable populations. This workshop was created in order to understand the way African Americans think about safety and technology in a new way. Combining social science research methods with design research methods is an approach that can provide a robust set of data from different perspectives and this interdisciplinary research should be used more often.
CHAPTER FOUR: FINAL THOUGHTS

Setting Intentions: Racial Justice in Technology Design

IBM has said there isn’t a problem with their facial recognition technology itself, but more so the training data that is used to train the system. (Puri, 2018) Clare Garvie and her team of Georgetown researchers found that there are also issues with what is being put into the system in order to identify suspects in NYPD criminal investigations (2019). Boualamwini illustrates there are high rates of inaccuracies towards women with darker skin. When Ferguson lays out four (or five) questions to ask as a way of mitigating racial, political, and social biases, in between the questions of whether the inputs can be defended (principle 2) and whether the outputs can be defended (principle 3), there is a question of whether or not the algorithmic process that translates inputs into outputs can be defended itself. As many participants replied that it is also the responsibility of the engineers who are designing this technology, the importance of developing a more critical set of ethical considerations for designers and engineers is being brought onto the main stage. The Design Justice principles were created as a reminder of how important it is to be intentional through the design, research, and development process. Intersecting social justice and design research can help fill the gap in designing more equitable technologies. However, there must be intentions set in place throughout the design process as well as through the use and deployment of these systems.

Critical Design as Research

The arts have been a way to engage culture and social critique especially in the Black community through the development of the Black Arts Movement (BAM) in the 1960s by Amiri Baraka. The Black Arts Movement was focused on building a “black aesthetic” that did not rely
on the recognition and approval from white people within the arts. Through the intersections of poetry, music, and Black radicalism, the BAM stood next to the Black Power Movement in criticizing the normalization of whiteness and the devaluation of Blackness. Considering the surveillance practices of the FBI on artists like James Baldwin, Langston Hughes, (others), how can art and technology intersect as a form of critique and as a lense towards the design and practices of surveillance and biometric technologies?

*CLOSER - An Art Installation Design*

Figure 11. CLOSER.
CLOSED is an interactive art installation which takes the famous lines, “I, too, sing America” from Langston Hughes’s (1926) poem, “I, Too,” as its symbolic statement. The installation uses an Arduino board and is programmed to display text on an LCD screen. The LCD screen is connected to a distance sensor that is programmed to change the legibility of the text, “I, too, sing America” depending on the distance of the individual standing in front of the screen and the sensor.

Symbolically, CLOSER is made to represent how the use of bodily tracking technologies can and do have an impact on how people behave and how they view and understand the world.

The screen has three distances with the furthest reading a blank screen, the middle distance reading a jumbled version of the text and the closest distance reading the clear and full version of the text. The individual has to step closer to the screen in order to read the text clearly. This motion of moving backwards and forward parallels the ideas of the privilege walk (source) where an individual’s physical movement is in relation to their experience (in life or reading the text on the screen). African American artists and activists including Hughes were surveilled and monitored by the FBI in the 1940’s. (Maxwell, 2017) Langston Hughes’s poem portrays America’s inequality and dreams of a day when America is ashamed of oppressing it’s citizens of color. Individuals who are too far away from the struggle of recognition that African Americans face every day in America, which is illustrated through the lines of poetry on the installation’s screen, have levels of privilege that disable them from seeing and completely understanding that experience.

This project was designed as a means of participating in new innovative ways to express critical art works.
Intersectionality in Technology Design

Woodrow Winchester (2018) wrote a case study on wearable technology design for Black and African American women which highlighted the significance of human centered design through the lens of Afrofuturism. He suggests that “Afrofuturism helps to make visible how traditional HCD practices can be, while not necessarily intentionally, both culturally located and power laden” (2018). Speculative design and Afrofuturism are design lenses that can consider the relationship of race and space of the future of technology in a way that seeks to make visible social inequities of today that can presumably lead and change in the future according to new technology developments. Afrofuturism was coined by Mark Dery and is defined as “a literary and cultural aesthetic that uses the tools and tropes of science fiction, as well as references to African and non-Western mythology, as a means to confront and analyze the present-day issues faced by people of color” (Dery, 1994 in Winchester, 2018). Winchester finds that Afrofuturism as a design lens creates more opportunities for exploring environment and context while also engaging with underrepresented and marginalized groups. Winchester’s case study found that the accuracy of wrist-band fitness devices that use heart-rate monitors differ based on the color of skin of the user and that error rates are higher for users with darker skin. This type of technology shares a similar issue as facial recognition technology with its inaccuracies towards working effectively on the black body. The tracking and calculating feature of this technology combined with the unknown inaccuracies of the functions leads to behaviors misaligned with the goals of the user. Winchester further discusses how an Afrofuturism design lens provides a re-imagined narrative in the solution-space exploration. An organization like GirlTrek, which is said to “inspire black women to change their lives and communities by walking” uses inspiring words of affirmation to achieve behavior change that is reflected more by “feeling less anxious and having
more energy” (2018) versus body mass index and calories. Culture should also be considered when creating measures of success.

**Recommendations**

There are programs such as the Innovation Scholars Program and the Congressional Innovation Program that provide opportunities for government officials and technologists to work together in effort of innovating government digital services and developing technology policy. These are great programs, but there should be an intentional emphasis on recruiting diverse participants of these programs if they are to build a space for not only filling the need for innovative technology policy making, but also the need for diverse perspectives. Both the technology industry and government officials lack diverse populations, so it is critical that there is a specific emphasis placed on evaluating how these policies are enforced and experienced differently by vulnerable and marginalized communities. Here is a list of recommendations which can help facilitate an equity-centered approach to technology design and deployment:

- There should be a specific focus on programming that incorporates diversity and social justice and community members in affecting technology policy.
- There should be committees established that include stakeholders from the private business sector including product managers, engineers, researchers, and designers as well as officials from government and from the public.
- There should be a balance of powers set so that the public committee members hold an equal weight of the private interests.
● There should be more prominent diversity and sociology and ethics courses as part of computer science education.

● There should be diversity and inclusion program managers that help make sure that product teams are considering diversity concerns within the products and the teams.

● There should be a working set of principles of ethics and social justice that engineers must follow.

Conclusion

African Americans live in the world under racialized supervision at all times. This ongoing surveillance has an effect on their behavior and sense of personal safety. As technology designers, researchers, and engineers, there should be a shared sense of responsibility in making sure the technologies that are being built are not furthering social inequalities. If this technology is to be built to be helpful and to alleviate pain points and frustrations, there has to be set intentions on considering the roles that power and racism impact the users or subjects of these technologies differently.

This requires a commitment from all stakeholders engaged in order to be sure that the technologies that are governing public life are not increasing harm to vulnerable populations. Furthermore, there should be an emphasis placed on how these technologies can not only be free of harm, but how they can be designed as tools for liberation from already present social inequities in the world. It must be noted that this cannot simply be relied on by the technology. As these tools are designed by real people, engaging everyone as lived experience experts is necessary regardless of their official occupation or level of training and education. Technologies such as facial recognition provide opportunities for the increased protection of people, goods,
and property, but there should be more research and policymaking that seeks to work on how to make sure it is considering and amplifying institutional systems of power.


