What is the broad focus of your research? What is it that your research project is about, and what will it contribute?

The goal of this research is to understand how youth envision the use of mixed reality eyewear for enhancing social co-located interactions situated in their own existing cultural identities. Further, this research seeks to add to the body of knowledge surrounding MR eyewear technologies by illuminating the interplay between Black and Latino youth values, attitudes, and lived experiences and the technological affordances of MR eyewear.

What were you specifically concerned with over the summer?

The focus over the summer was to (1)connect with key stakeholders to better understand the dynamics of the site to align on research goals and (2) perform the research sessions with the participants. It was difficult to run consistent sessions as planned because the site would either close or have other programming scheduled unexpectedly. This is a newer extension of the Homeboy Industries services and and leadership is still making adjustments to solidify their programming and curriculum, making scheduling unpredictable at times.

What did you do? This is partly about methods in general, but also about how you operationalized the summer plans, and partly about who you engaged with, although some of that might be under the prior question.

Over a three month period in the summer of 2022 a series of participatory design workshops were held with 15 students who identified as Latino/a or African American. All participants were students of the Homeboy Art Academy ages ranging from 15-24. The population and research context is high-risk urban youth. Youth here is defined as ages 15-24, consistent with the United Nations (n.d.) definition. The specific context for this study, Homeboy Industries, is a non-profit organization focused on gang affiliated, formerly incarcerated, or youth otherwise engaged in the justice system (located in the Boyle Heights neighborhood of Los Angeles, CA). The Homeboy Arts Academy is a part of the larger Homeboy Organization which includes the following social enterprises: Homeboy Bakery, Homeboy Silkscreen, Homeboy Electronic Recycling, Homegirl Cafe, and Homeboy Learning Works High School. In an effort to reduce burden on the site, multiple preliminary meetings were held with key stakeholders within the organization to discuss the research agenda and align activities to the organization's core approach (Pierre et. al., 2021). The fifteen students engaged in seven participatory design studies lasting one hour each session. The participatory design activities were organized into three phases: exploration, ideation, and prototyping. Because mixed reality devices are not totally available for consumer use (devices like the oculus quest 2 have mixed reality functionality but are only available for prototyping when the device is enabled in developer mode) the design activities were organized in this sequence to provide appropriate scaffolds for the participants. Scaffolding techniques included

adding media exploring relevant MR eyewear capabilities, current research, and African American influencers in the XR development space such as Idris Sandu. Implementing these scaffolds were a trade-off between potentially influencing participant designs and perceptions and readily conveying how MR devices work. Further, in each workshop participants were given worksheets in order to capture reflections, sentiments, and ideas in a tangible artifact for later analysis. A summary of the design activities can be found below.

#	Focus
1	Exploring social mixed & augmented reality applications
2-4	Design challenges as scenarios & ideation
5-6	Design challenges as scenarios & prototyping

What did you learn? What were the results of your summer work, if that's a valid way to think about it?

Participatory design workshops resulted in the following five prototypes:

Painting Academy Prototype:
Painting academy is an application that allows individuals to learn to draw and perform art together in shared spaces. The application is intended to allow users to either draw together or learn various art techniques from around the world with the added functionality of being able to build architectural models included as a form of art within the application. The main purpose of the application is (1) allow users to create art in non-restrictive manners, (2) learn to perform various art techniques from different cultures around the world, and (3) share the works with others in the same location via a gallery permitting others to experience the motivation and meaning behind each piece of work. This design emerged from the 'you are learning a new topic with someone' scenario. The design challenge encouraged students to think about how MR devices can be used to enhance a learning experience with a co-located partner on any topic of their choosing. Here enhancement means thinking beyond simple interactions and more about improving the quality or extent of how individuals may learn together.

Fresh Cut:
The barber experience is an application meant for individuals who want to learn how to perform and improve on barber techniques. The application allows a master barber to teach an apprentice

while minimizing the cost and need for an actual customer. The participants expressed the ability to also use the application on live customers while viewing 'templates' to better perform the hairstyle of choice. There is not only a practical use here by being able to teach another MR user to improve the techniques of a trade skill, but to also use the application with non-MR users to improve the outcome of a transactional social interaction. The use of a bodily enabler (the client in this case) as discussed in Dagan et. al., improves the quality and outcome of the social interaction in a practical sense (Dagan et. al., 2021). There seems to be an economic motivation for the design idea as expressed by the participants, being able to enhance the performance of the barber to not only learn and improve techniques but also to gain more clients. This design emerged from the 'you are learning a new topic with someone' scenario.

The Dead Homies Prototype:
The 'Dead Homies' prototype allows users to experience deceased loved ones in an intimate manner with another individual. Users of the application have the ability to see affective states in the form of color, while experiencing the deceased loved one in a virtual format. The system will also suggest resources to cope with emotional states provided to the users. This design emerged from the 'you want to feel emotionally supported' scenario. The design challenge required participants to think about an experience that allows one to express their feelings and emotions with another person. Participants were encouraged to think about what information would be shared between pairs and how this information could be interacted with. This design encourages both human-to-human and human-to-computer interaction in an embodied manner - an interaction type first coined by Dourish to represent the "interplay between the brain and the body and its influence on the sharing, creation and manipulation of meaningful interactions with technology" (Lee-Cultura & Giannakos 2020). Users experience the lived stories of the deceased loved one with a partner and can not only interact with each other but with the loved one through the use of AI. This experience is meant for individuals to gain deeper understandings of each other's personal histories and to make the invisible, in this case emotions, visible to formulate deeper connections with one another.

My Tattoos Prototype:
The "my tattoo" application scans the tattoos between two unknown individuals and displays the meaning behind the artwork to the other person. The main purpose of this application is to provide a mechanism for two people to know each other using tattoo artwork as a starting point for conversation while allowing individuals to share their tattoos via meaningful and non-judgmental approaches. A user can upload descriptions and link necessary background information (images, memes, or other forms of media) to a social profile on their phone to update the tattoo descriptions. This design emerged from the 'you are sharing your life story with someone' scenario and the design challenge encouraged participants to think about different methods to share their personal histories with both people they are familiar and not familiar with. This prototype idea takes advantage of a design attribute Dagan et.al. formulated while designing

for playful co-located interactions on mobile augmented reality devices called enablers - "a physical entity that triggers and is the focus of the AR experience" (Dagan et. al., 2022). The grounding of this experience in another human via tattoos, can enable more sophisticated interactions that extend the social experience in a purposeful way. A similar idea to the 'my tattoos' prototype explores real-time speech driven virtual elements and the use of embodiment in this design depicts how participants are seemingly providing intricate insights (Liao et. al., 2022).

"Where Are You From?" Prototype:

The "where are you from?" experience displays real time and contextual information via the MR eyewear devices. In participant descriptions of the prototype, the two important functionalities are (1) the literal interpretation of the app - providing a social profile on both the users such as name, age, and interest, and (2) the nuanced interpretation of providing gang affiliation of an unknown individual to support safety and security of the MR wearer. Although the latter idea might be a controversial use and may not necessarily positively enhance the co-located interaction, it brings up an interesting and important question of privacy and ethical use of the MR eyewear functionality also reflected in the literature (Hirskyj-Douglas, et. al, 2020,Nijholt, 2021, Nijholt, 2021a). More specifically, Nijholt and Hirskyj-Douglas pose the question: what information do the MR devices know about us? Although the second use of the 'where are you from' prototype is not focused on co-located social enhancement it reveals a design theme common in the literature. This design emerged from the 'you are interacting with someone in public and meeting them for the first time' scenario. The design challenge encouraged participants to explore 'what' and 'how' information is displayed and 'who' and 'what' can access this information to enable social enhancement of a newly formed interaction.
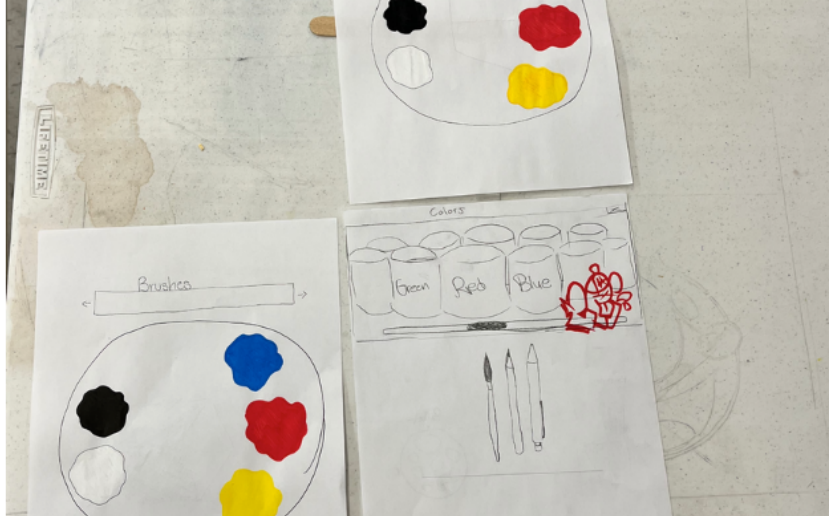
There were consistent adjustments being made to the design sessions, it was clear early on in the study that students needed more scaffolding to understand the abstract functionalities that MR devices provide. The first PD session was designed around exposing students to these functionalities by leveraging a colocated game, "Blocks" on mobile phones[]. It was also intentional to start each session with a video or a form of media that showcased the functionalities of MR devices and other scaffolds to elicit responses with the intent to shift focus to thinking about how these devices may enhance social interactions and away from building or improving on features. In some cases this proved fruitful but it was clear that not all students fully understood the design activities.
As a result, for the design challenge it was decided to provide students with scenarios loosely orientated towards the literature, in an attempt to not only gain deeper insights on enhancing collocated social interactions but to also place conceptual bounds so that the student can readily focus on how the technology may enhance interactions versus not taking too much time teaching about mixed reality. In the construction of these scenarios as a scaffolding technique, it was
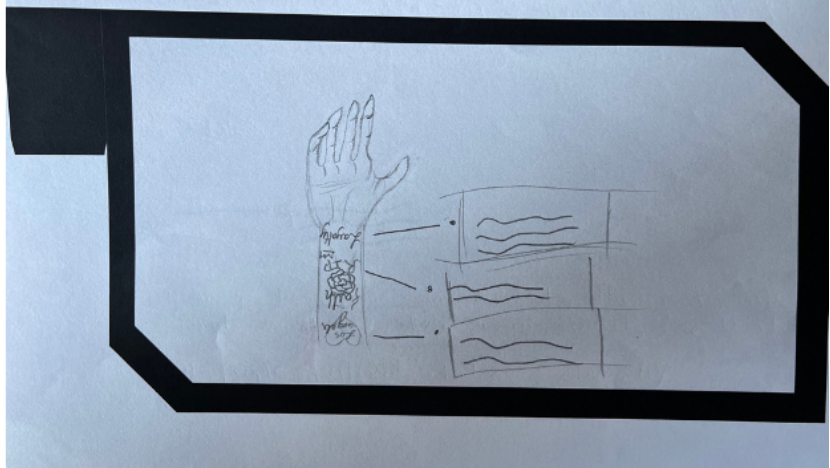
hoped that students would provide more complex ideas and artifacts on the social-technical interplay of MR devices between people in their designs. There was a trade off between helping students understand mixed reality to participate in the design challenges and influencing their designs via these scenarios. When students understood the design activities they provided deep insight on the subject. For instance, one student expressed a game idea that enabled family members to share memories with each other to build better bonds between them in the home, if for instance a mother and son were mad at each other. This particular idea explicitly focuses on how the technology may enhance the emotional connection between family members through the activity of experiencing memories together drawn from a lived experience. But when participants had difficulty with ideation, focus was directed towards building a simple experience and not necessarily thinking deeply about how the particular idea would enhance how two people interact.

Where does that leave us? What are the implications of your work? What is the impact on research conversations broadly, or on your own ongoing research?

Multiple layers of difficulties usually present themselves when working with this population, it is generally expected that these types of issues are a part of the territory. The students who are in the program come from backgrounds that are not the most stable, either broken homes, may be required to wear court ordered GPS tracking monitors, in alcohol or drug recovery, recently incarcerated or active gang members. The multi-faceted and intersectional nature of the issues these student populations are experiencing must be taken into consideration when conducting any type of activity within the center. Hands-on activities like prototyping and body storming usually work best in these types of settings for a few preseasons (1) anything that resembles school work will be swiftly rejected by this population. Many of the participants at the center have been labeled "at risk" and have been "tracked" within the school system producing negative experiences for these students. Rightfully, any activity that "feels" like school work will be looked down upon (2) many students may have undiagnosed learning needs i.e may have ADD , behavioral problems, or dyslexia, compounded by trauma they may have faced within the home or in their personal lives. Activities that are "hands on" allow these students to express themselves in alternative manners that may be more readily accessible to them. (3) the opportunity to explore their ideas in playful manners may be limited in their daily lives - again many of these students are facing multi-layered problems in their personal lives which denies opportunities to explore their ideas in manful and even playful manners. Research with this population is difficult but needed and provides deep insights on the socio-technical nature of technology that may often get overlooked in the HCI space. If our goal as an academic community is to create lasting and impactful tools and to study phenomena to have greater impact on society, then doing research that is difficult is a necessity.

1. Draw out your vision of the application from the perspective of one of the MR/AR eyewear wearer.

I applied to this grant on behalf of the center and was awarded multiple Oculus devices. This was separate from the research activities but I thought I would share with you!.