

Title	The effect of mediated live music performance through holograms on audience engagement and support intention
Sub Title	
Author	Akbar, Ramadhani Andi(Kishi, Hiroyuki) 岸, 博幸
Publisher	慶應義塾大学大学院メディアデザイン研究科
Publication year	2019
Jtitle	
JaLC DOI	
Abstract	
Notes	修士学位論文. 2019年度メディアデザイン学 第712号
Genre	Thesis or Dissertation
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO40001001-00002019-0712

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Master's Thesis
Academic Year 2019

The Effect of Mediated Live Music Performance
through Holograms on
Audience Engagement and Support Intention



Keio University
Graduate School of Media Design

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A Master's Thesis
submitted to Keio University Graduate School of Media Design
in partial fulfillment of the requirements for the degree of
Master of Media Design

Andi Ramadhani Akbar

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Abstract of Master's Thesis of Academic Year 2019

The Effect of Mediated Live Music Performance through
Holograms on
Audience Engagement and Support Intention

Category: Design

Summary

Live music performance has been an important events for an artists an its fans to connect and engage each other. However, live music performance has limitations as it requires cost, money, and time to participate in. Fortunately, recent technologies such as Video live stream and Hologram have started to become accepted as an alternative for artist to do music performance and engage their audience. While this is a decent alternatives, it did not come close to providing the feeling of engagement on the audience when they watch the performance live. In order to understand the advantages and disadvantages of using this new technology, this research design and propose a new way to enjoy live music performance by combining hologram and live streaming technology. This research tested the method of delivering live music performances both through video and hologram and have discovered results that a mediated live music performance through hologram technology can effectively engage the audience as well as increasing the audience intention to support the artist.

Keywords:

Music Industry, Mediated Live Performance, Hologram, Live Stream, Audience Engagement, Support intention

Keio University Graduate School of Media Design

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Chapter 1

Introduction

1.1. The beginning of music industry

Ever since the revolutionary invention of the phonograph that can record the sound of human voice in 1877 by Thomas Edison [1], it marked the beginning of what we know now as the music industry. In its early days, people have to visit concert halls to listen singers and musicians perform their music live on stage. Then come the gramophone made by Emile Berliner [1] that enables people to listen to music recordings by playing a vinyl record at home.

When the FM radio technology was invented in 1933, it became one of the medium of music distribution to fulfill the demand of people who wants to listen to music. Then, as cassette and Compact Disc (CD) technology was developed, people started to abandon vinyl recordings in favor a better and easier way to record and listen to music. Similarly, during the advent of television broadcast and the first music video aired on MTV on August 1st,1981 [2], it started to add visual elements into music enjoyment and changes the way people enjoy music. Moreover at the start of the internet revolution in early 2000's, music distribution method have started to shift again from a physical means of using Cassettes and CD's to using digital platform such as Napster and iTunes [3]. All of this are evidence that shows that the advances in technology will have an impact on the music industry.

1.2. The state of music industry in the internet era

As the world moves forward with the usage of internet technologies, music industry appears to be lagging behind. After the invention of Napster, iTunes and other various digital distribution platform in early 2000s, instead of embracing the internet technology and create new innovation, the music industry chose an aggressive approach and tries to stop the change into digital distribution from happening. CD sales which was peaked in 2001 has started to go on a decline following the change in customer preferences to download music from the internet. Revenues were dropping for various music label company and they blame it all on the internet for enabling the stealing of music through digital downloads and thus prevent the CD's from being sold.

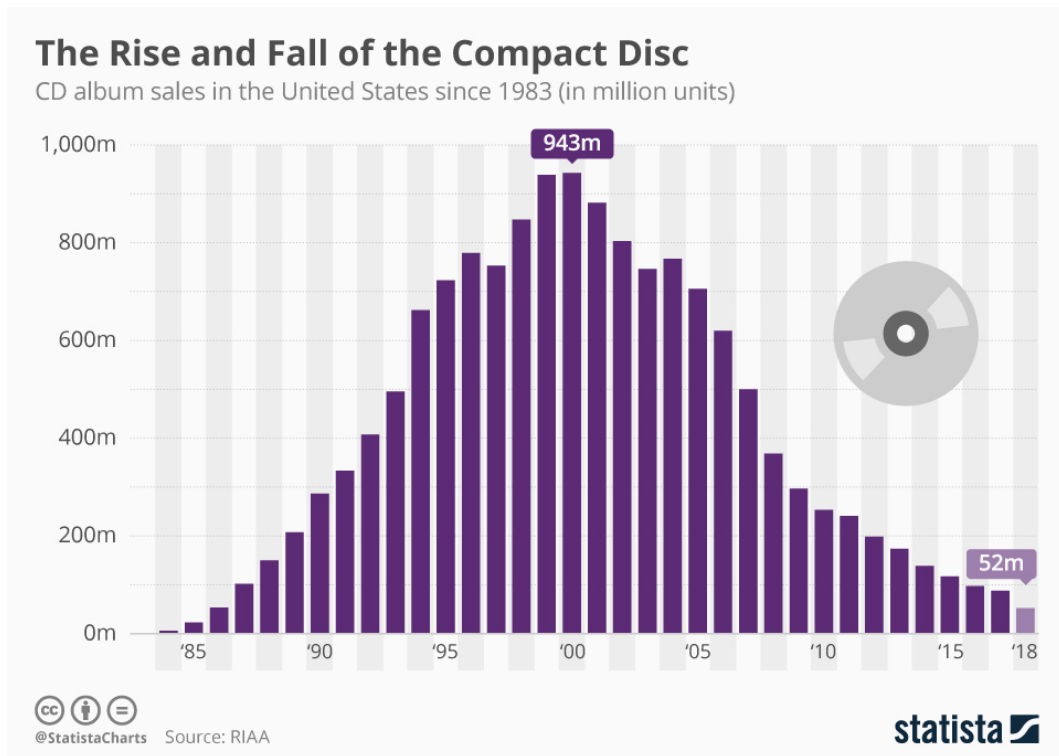


Figure 1.1 The history of CD sales

While music piracy from illegal download indeed have become prevalent among the music fans, it doesn't mean fans is not willing to spend money to support their favourite music artist to keep the industry going. It's just that music fans as consumer are smart and they will choose any other method to listen to music that is convenient for them while music label still try to force music fans to buy CD which is obvious at this point that CD's will become obsolete from there on as shown in Figure 2.1.

When iPod mini and a newer version of iTunes launched in 2004, music industry has started to follow the trend little by little. Digital distribution sales through internet platform such as iTunes is given rights by music labels to sell their music online and thus increase the purchase catalogue and increase the users convenience. YouTube who started to get traction also started to get rights to play various music videos on their platform during the time where music videos only showed on MTV. This shift into digital technologies in the music industry have developed the music industry into what it is today where digital distribution through online sales and music streaming have become the top revenue stream for the music industry.

This state of music industry have changed from resisting the change brought upon by the internet era into fully embracing the internet. It's effect is clearly shown by how the music industry market revenue have started growth after 10 years of decline. From here on out, the change in how music industry gain their revenue have been led by an huge increase in live performance revenue and music streaming revenue . However, as technology continues to evolve, so will the way music industry operates in accordance to the change.

1.3. 3 main problems of the music industry

In navigating the change within the music industry brought upon by internet technologies, there are 3 main issues that every player in the music industry is experiencing.

1.3.1 The money

These days, neither musicians nor music labels can gain revenue just by solely relying on selling CD's or their music. Market research data has shown that the

main generator for revenue in the music industry right now are *Live performance* and *Music Streaming* with the first providing the biggest contribution. Survey shows that music fans who never purchase recorded music will show their support to the musicians they love by going to their live shows.

Although it is a good way to create revenue and it's true—live music is where it's at these days financially for players in the music industry. However, there's one major major issue as *playing live money costs are high*. Going down to play your local venue for the 80th time is a not costly but that won't make a music career that can generate high revenue to sustain the industry. To really build an audience, a musicians has to go out on the road.

In the past, musicians were able to offset the cost of touring by selling recorded music. That CD you bought would help your musician travel to the next live show. Now that CD sales are all but gone, how can a musician pay for the cost of touring?

Although it is a tough position to be in, it is not insurmountable. These days, musicians are taking weekend warrior approaches to touring so they can work during the weekday and build an audience during the weekend. They are also sharing costs by heading out with other bands, looking for sponsors, and if they are lucky enough, signing deals with labels to help them meet the costs.

1.3.2 The Audience

Everyone promotes the idea of social media is able to help the broke musician from the marketing efforts of the major labels. While social media is a big deal for musicians and really well managed social media accounts can launch music careers. It has been done too many times and the competition to build an audience is very high.

The benefit of connecting with fans via social media is to become internet famous. That means that you build up a really strong social media following, that people are talking about you and you're not generating revenue from your music. The reality is that just because people are sharing your viral video does not mean that they are going to buy tickets to your shows. Nor does having 500,000 Facebook fans mean that you'll sell 500,000 concert tickets or that having 1,200 people accept your event invite means you'll have that kind of turnout.

It is important for musicians to remember that they cannot live by the internet alone and that managing social media promotion is much more than trying to get a lot of followers online. Musicians are battling the trap of becoming internet famous by pursuing offline promotion as well and by leveraging the audiences who actually attend the shows.

1.3.3 The music labels

Music label role in the music industry have changed a lot. Before the internet, a musicians career cannot be successful unless they sign a contract with a music label that will promote them as they own the distribution channel. These days, musicians can directly promote themselves without relying on a music label in order to grow their career. While it is a good thing that musicians can make a viable living making music without having to sign with a record label, however, that that doesn't make the work that labels do obsolete. It simply means that musicians can better select the people who do that work for you. In other words, musicians have much freedom to pick their own team, including managers, PR, agents, and more.

However, there are issue that up and coming musicians are going to run into with this new-found freedom. One is that when they're unknown, it's not always easy to attract attention from the team members they want. In fact, it's just as hard as getting record label attention ever was. The second is that these people want to be paid. For PR, musicians have to pay for music campaign before any results come in and they don't get a reduced rate if the campaign doesn't work. For other team members, they want a cut of your earnings.

One way around this issue is that musicians are giving their friends to build their own music business careers by taking on some of the work. The other option is to go completely DIY. Although that takes the musician away from the creative work of their music, it can be a good stop gap if they have enough time to devote to manage their own career until they can attract bigger attention.

Chapter 2

Related Works

2.1. Music Industry 3.0

Twenty two years ago, Kotler and Scheff (1997) recommended cultural managers to give performing arts a marketing orientation, where target audiences' needs and preferences are central to all decision making. In this day and age where digital technology have become more prevalent, putting music fans at the epicenter of marketing strategies has become very important. In that sense, the evolution of the way people consume music paired with recent technological advances have offered audiences new ways to participate in live music in a way that was never though before, such as including virtually attending music performance. Therefore, knowledge about music fans' reasons and motivations to attend live concerts will extend our understanding of music audiences, a key aspect of arts marketing (Pitts and Spencer, 2008; Colbert and St-James, 2014).

Understanding concert-goers' motivations to participate in live performances is increasingly important since attendance represents an essential and growing share of revenues for the music industry and performers alike (Harbi et al., 2014). For example, the Spanish music industry's incomes plummeted because of digital piracy, the economic crisis, and a cultural sales tax of nearly twice the European average. Still, revenues from live music concerts grew a steady 10

The open access to digital content and social networks has modified consumers' relation to music in general and live concert participation in particular. From a psychological standpoint, the digital revolution changed the importance traditionally given to at least two broadly recognized concert-attending motives (Trocchia et al., 2011; Kulczynski et al., 2016). For one, attending a concert to explore discover new artists has become almost irrelevant. Potential concert-goers are better informed than ever about touring bands, concerts dates, and selected venues.

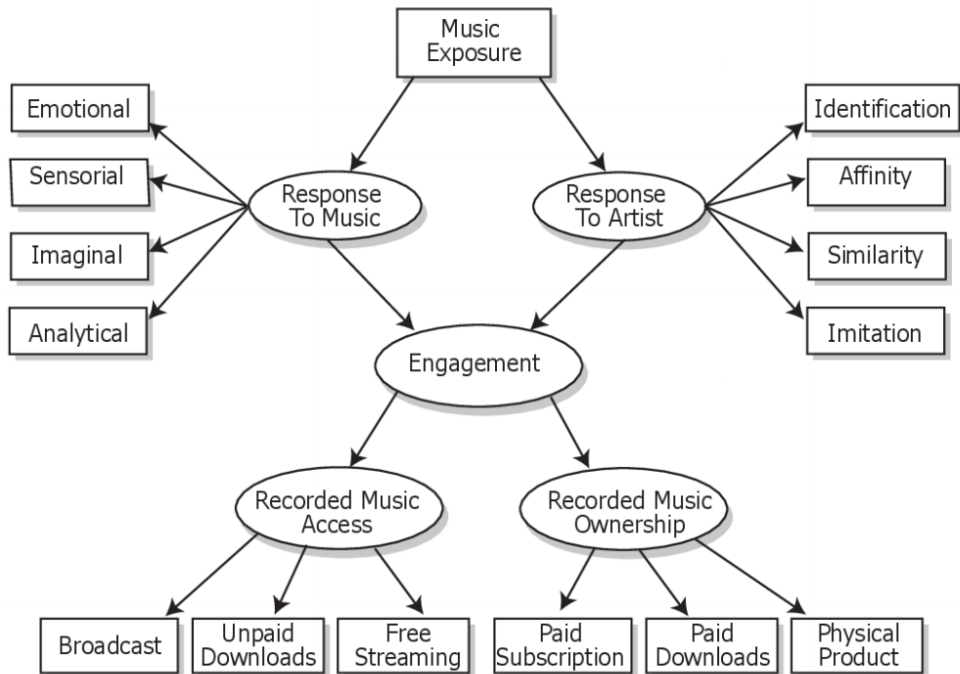
They rely on promotional information as well as expert opinions and word-of-mouth. By facilitating information and content, digital technologies encourage participants to try out new performers and reduces the inherent disappointment or financial risks of attending a concert (Burland and Pitts, 2010; Farrugia and Gobatto, 2010).

Holt (2010) argues that the value of music relates to factors beyond the music itself, and that “musical practices must be analyzed in the perspective of broader social and technological changes.” In that context, the music industry will keep moving away from ownership and access-based models toward a context-based model (Wikström, 2012). Because of recent advances in digital technologies, context-based models offer consumers the necessary tools to experience music rather than just listening to it. These innovations not only blur the boundary between production and consumption of music, but also between live and mediated performances.

Technological innovations also distort the frontier between live and mediated performances. Video-streaming platforms and other web-based applications offer users the possibility to attend “live” concerts online. The question of whether mediated artistic performances can procure a similar experience is causing much debate. On the one hand, some argue that digitally mediated concerts impede “the possibilities for the unexpected, iterative, and expansive experience” (Harper, 2015). In other words, even if digital mediation maintains the time dimension (now) of live performances, it ultimately loses its space dimension (here). In that sense, regardless of technological developments, live performances retain some elements of uniqueness that cannot be reproduced, such as being there (Holt, 2010; Harper, 2015).

Whether live or mediated, the concepts of presence, of being part of something unique and special with likeminded, is manifestly a key component of the experiential nature of concert-going (Brown and Knox, 2016). While greater engagement, participation, and involvement tends to improve customer experience (Ramsey White et al., 2009; Dobson, 2010; Chen et al., 2011; Kemp and White, 2013), such relationships in the virtual world remain largely unknown.

2.2. Artist-Fan Engagement Model



(Source: Sarita M. Stewart: The use of Artist-Fan engagement model as strategy tool [4])

Figure 2.1 Artist-Fan Engagement Model

The Artist-Fan Engagement Model as shown is a theoretical framework that was developed by Sarita [4] to help explain the relationship between music artists and their fans. The model proposes a theoretical framework, based upon hedonic consumption and parasocial interaction theory (PSI), to provide recommendations on how to best monetize this relationship between the two parties. In an industry where the music consumer has unprecedented access and prefers ongoing interaction with their favorite artists (Borden, 2009), it is important to identify how these relationships can be best leveraged.

Many musicians are already communicating directly with their fans through the use of various internet platforms such as Facebook, Instagram, Pinterest, Snapchat, Twitter, and Tumblr, among others. In one example, United States

media personality Conan O'Brien referred to this phenomenon as a "symbiotic relationship." As he notes, "It's not just driving people on social media networks to your television show... you want to get people on the TV getting emotionally involved in what you're doing on Facebook or Twitter" (Ingraham, 2012). In an era where the increased use of digital and social media interaction helps to develop an artist's brand, it is essential to consider how engagement can provide economic value to artists, whether through music access or ownership.

2.3. Live Streaming in the Music Business

According to Smith, Obrist and Wright (2013), live streaming has existed for the last 20 years or so on the Internet so it is not a new invention anymore. More recently, along with new web services and advanced bandwidth, it has become a medium for not only professionals but anyone who wants to live stream anything they want and have become a kind of Do-it-yourself platform of broadcasting.

Live streaming is easiest to understand through three elements: the concept of streaming, the live factor and the user perspective which in this case refer to the audience. First, the concept of streaming is one-way communication per se and defined in the literature through the technology that enables it. According to Rayburn and Hoch (2005), streaming allows consuming audio and video content over the Internet without downloading it to a computer. They describe that live stream resembles a television or radio broadcast. Second, as the name suggests, live streaming is streaming in realtime and the audience can watch as the event unfolds. Third, this realtime communication can be turned into interactive, two-way communication. Through various devices, such as desktop computers, laptops, tablets, or mobile phones, the viewer often has a possibility to interact with the live stream host, guests, or other viewers through for example a text chat, Twitter feed, voice, or webcam video (vLink Live 2015)

Live streaming can be used to share content between individual people, organizations, and corporate entities. Live streams range from small private events such as weddings and funerals to large public productions of music festivals and sports events. Musicians live stream intimate sessions to engage with their fans, live music venues and shows share their events online, DJs connect with fans and

peers through live streams, etc.

As described above, basically anything can be live streamed. The examples and opportunities are pretty much endless. Many service providers have embraced this potential and created services and platforms for content producers. Various live streaming service providers such as YouTube, Twitch, etc. have enabled many musicians to be able to live stream easily, even directly from their smartphone.

Live streaming service providers hope interactive features such as chat and social media sharing will keep the viewers watching the entire set (Bruno 2010). Interaction can also take place between the artist and the viewers during the show (CEO and one of the founders of a concert live streaming company 2015). Unfortunately, the current live streaming services are not supporting active viewer interaction beyond a chat functionality, Tamminen argues (2015b).

In terms of user participation, “the difference between watching those live events on TV and experiencing them online is that online you can have a participatory experience ” (McGarry 2013). The viewers can participate in the live stream by for example sending messages to the musicians to request songs and ask questions (Whitney 2008) or creating their own viewer experience by choosing the camera angles themselves (Music business entrepreneur 2015; Film festival producer 2015; Tamminen 2015a).

As described above, interaction and user participation are considered as effective ways to engage the viewer. Because an engaged viewer is regarded as a valuable viewer (Bruno 2010), it can be suggested that there is a need to find out what engages the viewer beyond the rather superficial current perceptions on interaction and user participation.

2.4. Hologram Technology in the Music Business

From the technological side it is noteworthy that the word “hologram ” does not accurately describe what is happening on stage. The image the audience sees is projected with a simple trick called “ Pepper’s Ghost ” , which became popular through magician shows in the 19th century. The trick is a plexiglass wall, or any other reflective surface, which is set up in a 45 degree angle towards the audience. The glass wall is transparent and can be made invisible with the help of correct

lighting. On the other side of the reflective surface, an object or person is placed which is then reflected in the glass wall, resulting in a ghostly image. This trick was used back in the days in haunted houses and is still being used right now in theme park rides such as *The Haunted Mansion* in *Disneyland*.

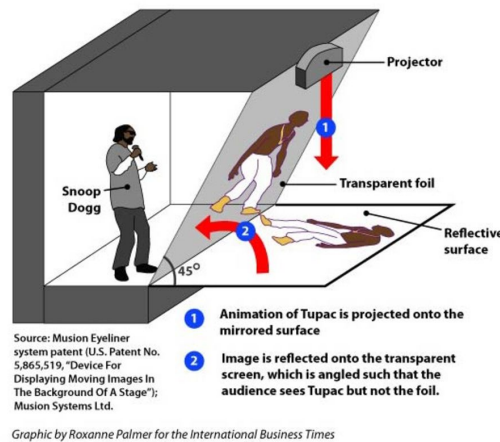


Figure 2.2 Tupac Hologram Setup at Coachella 2012

The first time that this technology was used in a live music performance was during a 2012 Coachella Music festival. A virtual Tupac Shakur took the stage with Snoop Dogg and Dr. Dre. It was the first time a hologram had been used in a live performance for such a huge American crowd, and the first time hologram technology was used to resurrect a singer who have passed away.

Since that performance, this technology have been used to resurrect artist who have passed away several times. From resurrecting the legendary pop star Michael Jackson in 2014 to bringing back the king of metal Ronny James Dio in 2017, this technology have garnered the attention of so many artists, fans, and players in the music Industry. This interplay between sound and image might be simple in structure, but it is scarily effective. If one does not know it better, the illusions can appear so real that they could be mistaken for the actual artist.

This innovation on how this technology is used have created new opportunity



Figure 2.3 Tupac Hologram Performance at Coachella 2012

for a new live music experience. However according to Auslander, hologram live performance lacks the feeling of "liveness" which is hard to replicate. Auslander explains that live performances contribute to the creation by authenticity through the judgment of the audiences. Live performances are events where the listener can confirm an artist's authenticity through the skills, sounds, movements, emotions, etc. he conveys (2008: 91). In the case of the Dio hologram all these skills, movements and emotions have been produced in the studio and are therefore not really coming from the artist, which explains why audiences perceive the hologram as less authentic.

How to make a hologram live performance looks and feel authentic so that the audience can enjoy is still up to debate. Therefore, this opens up the opportunity to better use this hologram technology in the current music industry. One thing for sure is that hologram technology have gained traction and started to gain popularity especially in the popular music scene.

Chapter 3

Design Proposal

3.1. Hologram+Live Streaming: The future of Live performance

As explained in the first chapter, music industry is facing an uncertain time for all parties involved such as musicians, fans, and music labels. Tough issues such as difficulties to generate revenue amidst the rising live performance cost, ever-changing audience preference due to advances in technologies, as well as uncertainty on how music label should do their business in the internet era have opened up opportunities for new model of entertainment.

Based on the explanation in the previous chapter, the recent music industry trend for the past couple of years has shown that Live Streaming and Hologram technology has started to gain popularity among the music fans. It is assumed that within a couple of years, this technology will become one of the main revenue generator for the music industry. While both technology have its benefits and limitations, the researcher believe that combining both technology is the key to providing an experience that are as entertaining and engaging when compared to attending a real concert.

The key lies in reducing logistic cost of hosting a live music concert for active musicians by having them perform through a live stream channel from a broadcasts studio and then mediate their performance through a hologram enabled stage so that even though they're not physically there, they can still perform and engage the audience as if they're there. By enabling realistic hologram projections to gives the feeling of presence and then use live stream platform to enable two-way communication, this research propose that this new type of live music performance will be able to come close to the feeling of being able to perform a live

music concert without actually doing one.

In this chapter, the researcher will describe how this hologram live stream setup is going to be build and how it is going to be tested to prove that even this way, the audience can feel enough authenticity so they are able to feel engage while attending this type of live music performance.

3.2. Designing the Hologram Live Stream Prototype

3.2.1 The Stage



Figure 3.1 The hologram live performance stage

As shown in Figure 3.1, The base for hologram projection stage is using mesh material that is hang from the ceiling and have a short throw projector that is connected to a computer to display the image on the mesh screen. By erasing all

other colors besides the artist body color of the live stream into black, it will only show the artist in the mesh which creates the hologram effect. In addition, Lights are added below the stage to create ambience.

For providing a good audio quality, two High-fidelity monitor speaker are connected directly from the computer that receives the display and is outputting a 24bit 192kilohertz audio quality that can be used to play the sound from the artist at a high volume similar to a real live performance without experiencing any crackling or degradation in noise.

Lastly, Webcam that is connected to the stage computer are placed in front of the stage to capture the audience image. Additional lights are shined into the audience so the artist can see the audience expression and movements from the Live Stream Broadcast Studio

3.2.2 The Live Stream Broadcast Studio

Green screen background and an HD camera is used to capture the performers image. a 24bit 192kilohertz high fidelity audio interface records the voice and guitar sounds to be projected into a digital audio workstation(DAW). Both the image and sound input then combined in Open Broadcast Software (OBS) ready to be streamed online. However, current internet technology that can provide high quality streaming is still limited by cost and availability. Therefore, the prototype is modified to emulate an optimal condition for a hologram live performance by connecting the output directly with an HDMI cable to the projector and the audio output is plugged directly into the speaker from the audio interface. This setup will produce a High Definition image output in 1080P as well as high fidelity audio output.

As shown on (Figure 3.2), there are 4 main equipment needed for this setup to work.(1) is the Green Screen that is setup on the back of the musician in order to enable alpha key effect which enables the background to be set into transparent color in the software. Any green screen with various size and key color will be able to be used but in this test the researcher used a 5 meters x 5 meters green screen that can cover the whole body of the musician.

(2) is a Laptop that can run the Open Broadcaster Software(OBS). Fortunately, this software can run both in Mac and Windows but due to convenient availability

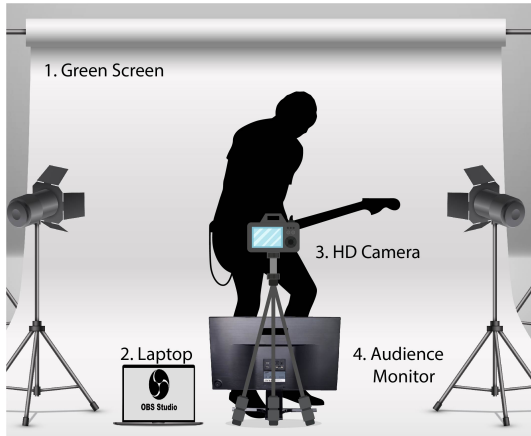


Figure 3.2 The Equipment



Figure 3.3 The Broadcast Room

the researcher decided to use a 13 inch MacBookAir.

Then, the laptop needs to be connected to (3) which is an HD camera that can capture image at FullHD 1080p resolution. A higher resolution would provide better quality however streaming higher quality video resolution such as 1400p or 4K will increase the needed bandwidth and causing the video delay to increase. Therefore, the researcher proposed 1080p resolution as the best setup that can provide the best video quality and lowest bandwidth requirement. A professional video camera would be the ideal equipment, however, due to convenient availability the researcher decides to use a Logitech 910 Webcam in this research.

Lastly, in order to display the situation of the audience in the stage for the musician to see and engage with, (4) is a monitor that is connected to the laptop which will act as an additional display. The laptop will run a video call application that will connect with another laptop at the stage to display the audience. In the video call, only the stage laptop will send an audio and video feed which will be directed to the OBS software for the musician to listen to while the audio and video feed of the broadcast laptop will be disabled in order to make sure that the only audio and video output is through the OBS software. There are various video call application that can be used. After testing several of them, the researcher have decided to use a software called "Skype" as it can provide the best image quality with the least delay.

3.3. Research Hypothesis

Being able to engage the audience in a live performance is an important in order for artist to gain fans and further their career. That is the reason why direct engagement between the audience and the fans during a live performance is still proven to be the best method to increase audience engagement. While recent technologies such as live streaming and hologram performance can also serve as a good alternative to mediate a live music performance, The researcher believe that combining live stream technologies and hologram projection technologies is the best alternative method to mediate a live music performance. It is believed that this proposed design can be better than both standard video live stream or hologram performance in terms of being able to provide the feeling of engagement in the audience. The goal and hypothesis of this research is to understand how much better as well as the advantages or disadvantages of a live music performance mediated through the proposed hologram live stream prototype compared to standard video live stream music performance. By understanding the affect of this technology on audience engagement and support intention of musician that uses this technology in their live performances, the researcher hope to be able to further solidify or improve the hologram live stream music performance design.

3.4. Comparing it with current live stream technology

In order to provide a comparison how hologram can improve the experience and engagement during a music performance live stream, a standard setup of using a projector connected to a laptop. Twitch.tv was chosen to host the stream server as it is the most widely available streaming platform that has the highest quality of 1080p video, good quality audio with 384kbps encoding compared to other streaming platform such as YouTube and Facebook. // To provide an accurate comparison, the video live stream setup will use the same equipment as the hologram live stream setup. The performer will sing the same song, do the same actions, and the audio will play back from the same speaker. However, as shown in figure 3.4, the only difference would the video output will be projected



Figure 3.4 Video Live Stream Stage

into a standard white screen which will not create a hologram effect.

Chapter 4

Implementation

4.1. Implementation scope

4.1.1 Genre selection

There are many music genre in the world that can use this technology. However, as mentioned in victoris(2017) that fans of some genre such as Rock have resistance to using hologram technology because the fan base put a high value on emphasis such as old school and authenticity. Therefore, Pop music is selected as the fan base have started to widely accept both live stream and hologram technology in recent years. Moreover, based on a research by an online agency, it has the most demographic followers compared to other genre (Statista, 2017). The song that is selected for this research is an original song that was arranged by the researcher who happens to be an indie musician. The song is a pop song that was based on the style of Bruno Mars with remixes and additional sounds that is both catchy and easy to listen.

4.2. Research Participant

As this research is revolved around the Pop music genre, the young demographic between the ages of 15-35 is selected in this research. The reason being that those age group are the most represented in the pop music fans demographic data research (Statista,2017). The participant is selected using Convenient Sampling who are mostly students at Keio University from the undergraduate as well as the graduate program. The participant are then screen by a questionnaire to make sure that they are within the demographic standard set in this research.

4.3. Research Methodology

4.3.1 Research flow

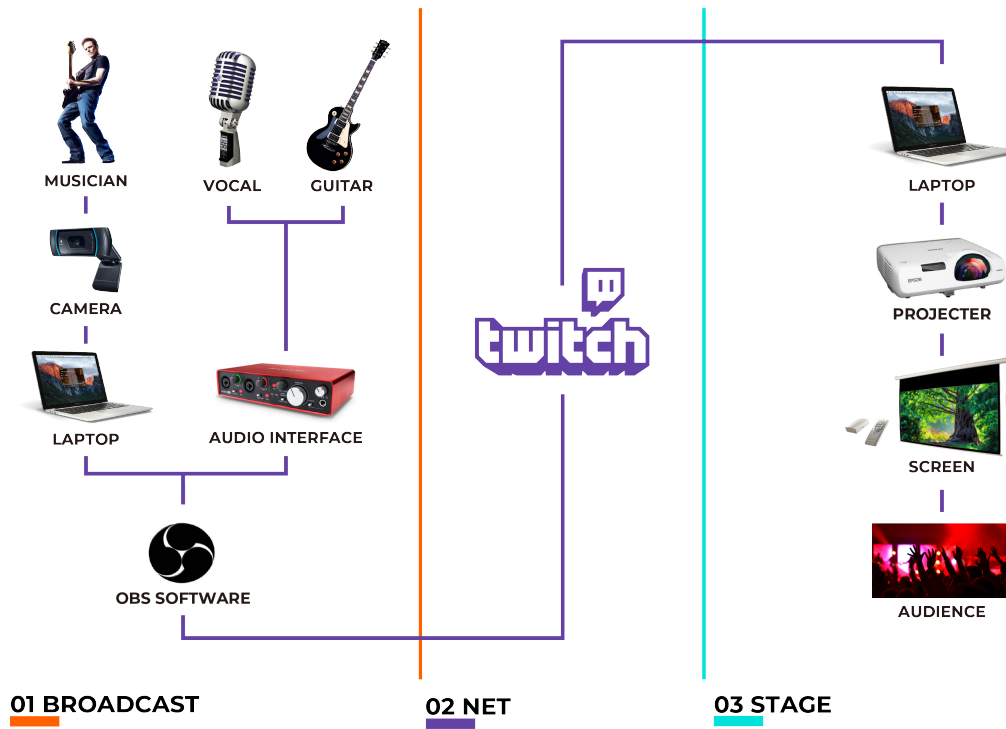
The research test consist of 6 parts that must be done sequentially by the research participant in order to confirm the results. Below are the steps that is done in the test:

4.3.2 Pretest questionnaire

Before the test starts, the participant is required to answer a Pretest questionnaire that was made based on previous research regarding audience engagement (Lordin, 2014). There are 3 main purposes for this questionnaire. The first one is to act as a screening question to determine their demographic such as gender, age, etc. The second one is to measure their experience with live music such as 'what kind of live music performance they've ever attended. The last one is to measure how to they express themselves when they feel engaged using the questionnaire model devised by Lordin, et. al.

4.3.3 Video Live Stream Performance engagement test

After answering the pretest questionnaire, the participant then asked to stand in front of a projector screen to watch a video of live music performance streamed through the internet or Video Live Stream. They are asked to stand in order to simulate a real life situation of watching a concert which are mostly watched by standing. Also, it is to make them easier to move should they feel engaged as it is one of the factor to measure their engagement. The reason for this setup is to gather data that represent the current live stream system where performer usually record themselves and then stream their performance on a popular streaming platform and then audience can watch their performance from a computer screen. The common issue with this setup is that there are time delays for interaction between the performer and the audience which hinders engagement. Moreover, watching a performance on screen does not give that feeling of presence that results in lower engagement.



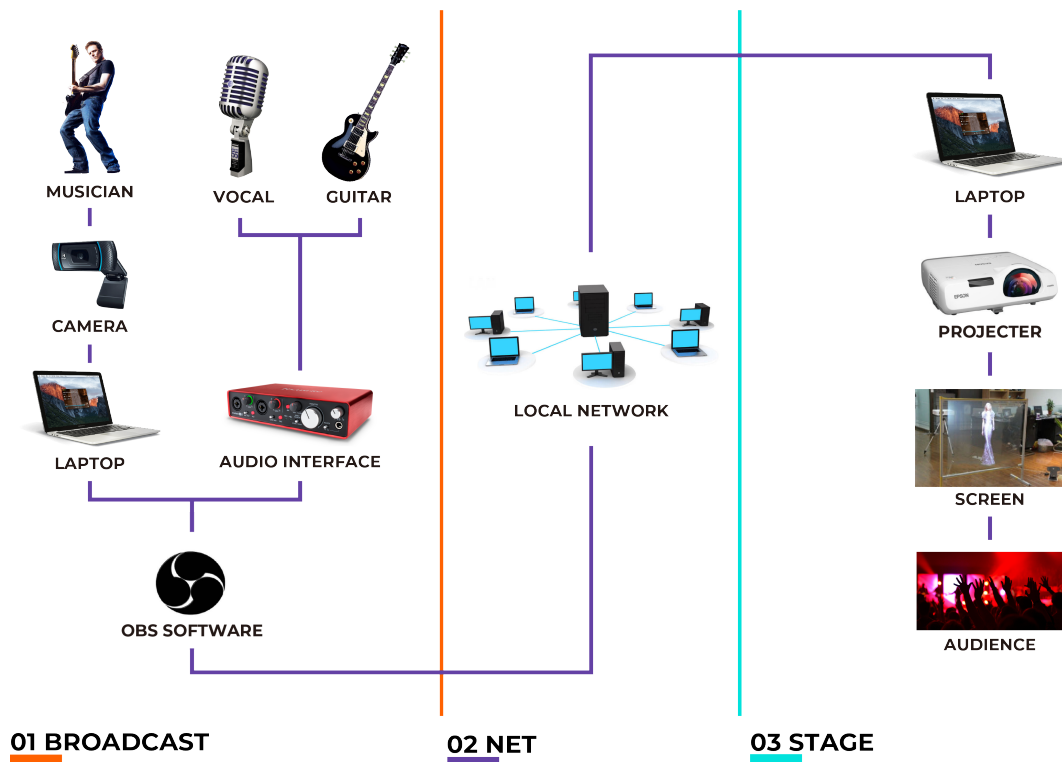
(Source: Master's Thesis of Andi)

Figure 4.1 Video Live Stream Setup

Figure 4.1 described the Video Live Stream system that is used in this research. The broadcast system is just as explained on Chapter 3 of this paper and will be the same throughout this test. The Twitch platform was selected after comparing it with other platform is it provides the best quality video with the lowest delay. For around 4 minutes, the audience were asked to watch the performance of the musician playing the selected song on a video that was streamed from the broadcast room into the projector screen.

4.3.4 Hologram Live Stream engagement test

After watching the video live stream, the audience then asked to watch the same performance again with the same content. However, this time they will watch the performance on the hologram system. The system will simulate the optimal condition of this system with less then 1 second delay as well as projecting the



(Source: Master's Thesis of Andi)

Figure 4.2 Hologram Live Stream Setup

best video and audio quality. Figure 4.2 describe the hologram live stream setup. Due to the nature of current commonly available network technology, Local area network connection was chosen to provide the lowest time delay between the musician and the audience to promote smooth interaction and increased engagement. Although the local network is limited by distance, with usage future technology such as private streaming server or 5G that is currently not available to be used by the researcher right now, the setup can be replicated with longer distances.

4.3.5 Post-test questionnaire

After the performance, the participant is required to answer a posttest questionnaire that was made based on previous research regarding audience engagement (Lordin, 2014). There are 3 main purposes for this questionnaire. The first one

to measure how engaged they were during both live music performance that was using different medium. The second one is to measure which engagement variable that mostly influenced during the hologram setup. Lastly it is to measure their interest about the artist that just performed and their intention to support the artist based on previous research regarding customer intention by Spears, 2004 [5].

4.3.6 Listening for feedback and comments

In the post questionnaire, the participants were encouraged to write feedback or comments regarding the performance. Moreover, after the test was done, the researcher will spend some time to talk with the participants and ask for feedback and comments. This is done in order to discover things that might missed by the researcher or new suggestions for further improvement of the hologram live stream prototype design.

4.3.7 Observation

During both performance, videos of the audience was then recorded, in order to observe the audience actions more closely. The video will be analyzed after the test in order to verify and discover the audience actions that might have been missed by the researcher.

Chapter 5

Evaluation

5.1. Participants profile Results

5.1.1 Demography

After promoting the testing schedule beforehand, 13 people showed up to participate in the test. The test was done in session 20 minutes session and each session there were around 3 to 4 test participants that were participating.

As shown on Figure 5.1. Based on the Pre questionnaire result, out of 13 Participants ($N=13$), there were 7 people (*53.8 percent*) within the 18 to 24 years old age bracket and there were 6 people (*46.2 percent*) within the 25 to 34 years old age bracket. Also there were 9 female participants (*69.2 percent*) and 4 male participants (*30.8 percent*)

All participants have attended a live music performance at least once in their lives. However, each participants experience with live music performance varies to some degree. Based on the questionnaire as shown in Figure 5.3, the kind of live music experience that most participants have experiences with are *Indoor Live Music Performance* with 92.3 percents of participants responded to have ever attended

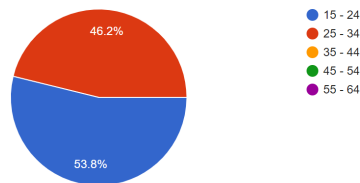


Figure 5.1 Participants Age

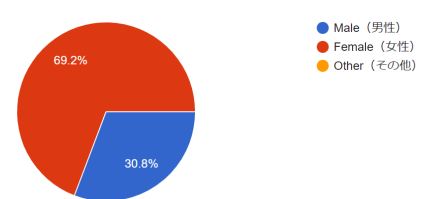


Figure 5.2 Participants Gender

it while *Restaurant/Bar with Live Music* shown to be least type of live music that the participants have ever experience with. In addition, within the last year, the participants watched *3.7 live music performance* on average.

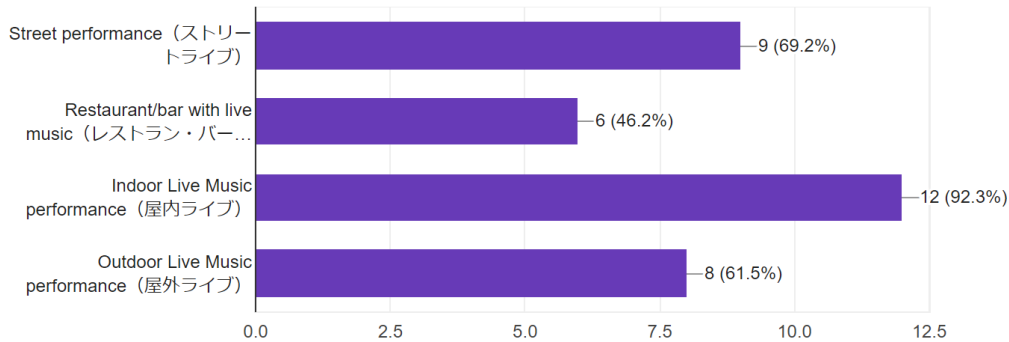


Figure 5.3 Participants Live Music Experience Category

5.2. Video Live Stream Engagement Test Results

5.2.1 Participants Experience with Video Live Stream

In order to make sure that the participants are aware of the live streaming platform, we asked the participants about their experience with current video live stream platform. *61.5 percent* of the participants have experience watching a music performance live stream mediated through an internet platform while the rest of them around *38.5 percent* never had any experience with it.

For those people who have experience watching a music performance live stream, they watch it *1.6 times* within last year on average. The platform that is used the most by the participants to watch a video live stream of a music performance is YouTube where all participants have experience in.

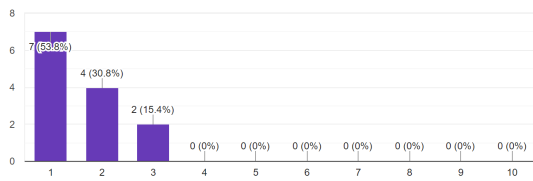


Figure 5.4 How often participants watch a video live stream

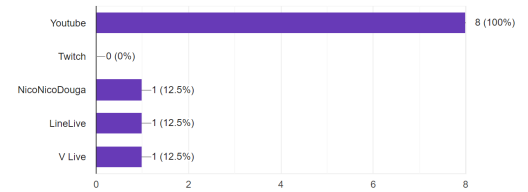


Figure 5.5 Where do participants often watch live stream

5.2.2 Video Live Stream Engagement

As explained during chapter 4 in this research paper, the participants we're asked to participate in a series of test where they were asked to watch the same Live Music performance of the same artist two times. However, the first performance will be mediated through a live video that is streamed on a screen while the second one will be streamed through a hologram stage that is proposed by in this research.



Figure 5.6 Video Live Stream Test

After answering the pre-questionnaire that verifies their experience as well as giving a brief explanation about the feeling of engagement, the participants was asked to watch the live music performance session. During each session, the participants spent the first 5 minutes to watch and listen to the music performance

that was mediated through the *Video Live Stream Setup* which was explained in chapter 4 of this research paper. Figure 5.7 shows the situation of the test.

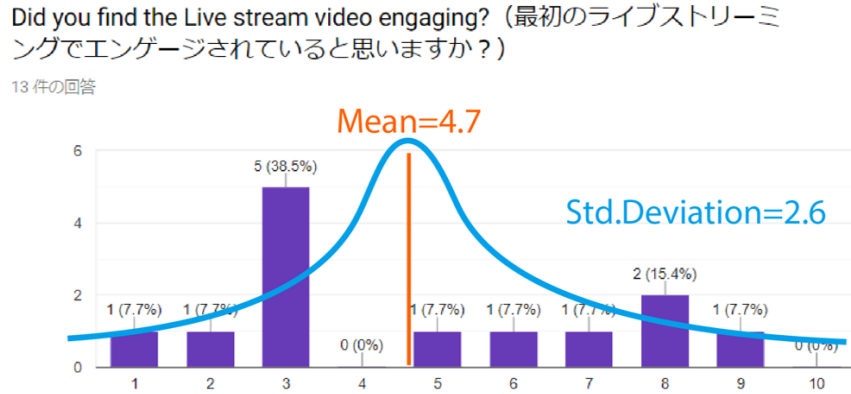


Figure 5.7 Post Test Video Live Stream Engagement

At the end of the test, the participants then asked to answer a post-test questionnaire. One of the questions was "Did you find the Live stream video engaging?" that was created in order to measure the average feeling of engagement from the viewpoint of participants. Figure 5.7 is the data results of the video live stream average feeling of engagement. Based on the questionnaire results, the mean of the data was (*Mean 4.69*) which shows that the video live stream performance was less than average in engagement. The score "3" is the most common answer a frequency of ($f=5$).

Table 5.1 Video Live Stream Engagement Actions

Average Value of Engagement during Video Live Stream			
Sing Along	5.32	Shout	5.20
Clap	6.42	Take Pictures	3.43
Move Body	6.27	Take Video	3.35
Dance	4.72	Use Phone Lights	3.31
Post on Social Media	3.25	Browsing on Phone	3.21

Table 5.1 shows the results of the questionnaire regarding their actions during

the live stream performances. These actions represents the most common actions that is done by the audience whenever they feel engaged that was discovered by Lordin's research. The questionnaire rated from 1 (Not at all) to 10 (Very much agree). The higher the average means that the actions was done very often during the performance. The higher the average means that they are more engaged. Similar with the results on previous research [6], actions such as *Clapping* and *Moving your body* ranks very high on the participants minds when they are expressing their feeling of engagement during a live music performances.

After watching the video live stream music performance, the participants were then asked to answer questionnaire regarding how engaged they feel during this *video live stream performance*. The question was asked on a *1 to 10 likert scale* ranging from *not engaged at all* into *very engaged*. Their video was also taken in order to verify whether their answer is in coherent with their actions.

5.2.3 Video Live Stream observation

Observation of the audience was also done in order to discover actions that might otherwise be missed by the researcher. A camera was placed facing the audience and recording their all their actions from the beginning of the test until the end of test. The researcher then review the video by playing it back. From the observation, there are 2 main results that the researcher has discovered. First, the actions that represents engagement was in fact in coherent with the questionnaire's results by watching the duration of those actions within the 5 minute show time frame. Actions such as Clapping and moving their body was maintained by most of the audience for a total of around 3 minutes during the performance and the frequency greatly increase especially when the song goes into the Chorus part. Secondly, there are a new actions that was discovered by the researcher that was common among the participants during the Live video stream test. The action is "Talking between the audience" is discovered to be done by most of the participants. The common point of this action is that they are often commenting on the performer's actions and expecting validation from other participants with questions such as "His dance is so funny, right?" or "He brought a guitar but when will he use it?". Moreover, the talking was often done during the verse part when the song is still building up tension. Based on the fact that they focusing

on the audience member to engage and interact, I believe that "Talking between the participants" is an action that decrease audience engagement when it is done often as it diverts the attention of the audience to something else besides the performer similar to "Browsing on Phone" action.

5.2.4 Video Live Stream Feedback and Comments

In the post questionnaire, the participants was given the opportunity to give feedback and comments regarding both performance. Moreover, the researcher also spend some time to talk with the participants after the test in order to listen to feedback and comments directly. Based on the comments and feedback that was received, there were 2 comments that was heard most often about the Video Live Stream. The comments were "the layout of the video was not very interesting" and "the performer looks to be too small in the video". The researcher believe that this comments is caused because there is a dissatisfaction with the video content itself that was geared towards the Hologram Live Stream. In the hologram live stream, in order to give the feeling of engagement, the performer was recorded from head to toe and displayed in a large screen in order to simulate the real size of a person which is believed to be an important factor to increase engagement in a live performance. However, in order to prevent discrepancy between the video live stream and hologram live stream, the same video content was used. Since this content was made in order to fit the large display size of the hologram live stream performance, when it is displayed in a standard video screen used during the Video Live Stream test, the performer looks small and wasn't able to be seen clearly. This feedback will be taken into consideration for future research design in order to further test the proper design of a video Live Stream performance.

5.3. Hologram Live Stream Engagement

5.3.1 Participants experience with Hologram Technology

As hologram technology that will be used in this test is not a mainstream technology that has been widely adapted yet, we've asked some questions to measure the participants familiarity with the hologram technology. *61.5 percent* of the

participant didn't have any experience with watching music performance that is mediated through hologram technology. For the *38.5 percent* of participants who have, figure 5.6 shows where did they experience hologram technology. Most of them have experience with the technology by experiencing it *During an exhibition* or *In a video on the internet* while the rest of the participants have never seen the hologram technology and they will see it for the first time in this test.

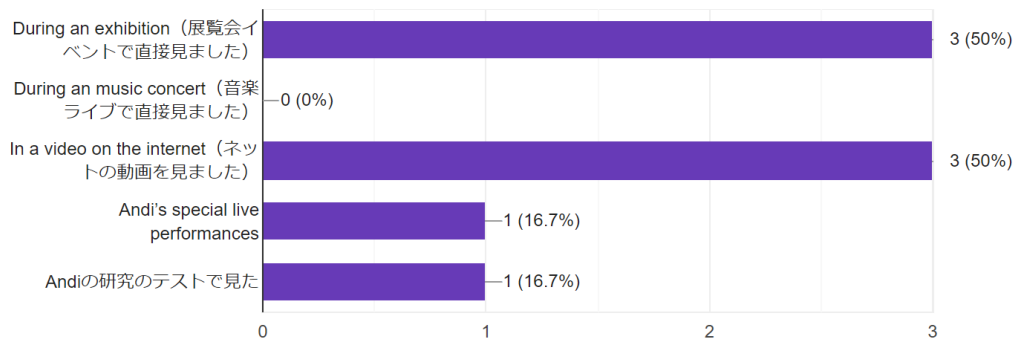


Figure 5.8 Where did you experience hologram?

5.3.2 Hologram Live Stream Engagement

After watching the video live stream performance, the participants then asked to divert their attention from the screen into the prototype Hologram Live Stream Stage which was explained on chapter 4 in this research paper. They will watch the same performer sing the same song for 5 minutes to prevent any disparities caused by a change in the performer or the song. The researcher made sure that the only differences would be the change from a video live stream mediated performance into a hologram technology live stream mediated performance. The proposed prototype was realistic enough for the participants to feel a sense of realism as well as having low enough time delay in order for the participants to be able to have quick communication with the performer.

After the watching the hologram performance, the participants were then asked to answer questionnaire regarding how engaged they feel during this *hologram live*



Figure 5.9 Hologram Live Stream Test

stream performance. The question was asked on a *1 to 10 likert scale* ranging from *not engaged at all* into *very engaged*. Their video was also taken in order to verify whether their answer is in coherent with their actions.

Figure 5.9 shows the engagement results data of the hologram live stream in detail. Based on the questionnaire results, the mean of the data was ($Mean=7.92$) which shows that the hologram live stream performance was highly engaging. Comparing the hologram live stream engagement results with the video live stream engagement results, we see a significant increase in engagement ($\Delta 3.23$).

Moreover, the participants were asked whether they did actions that were considered to be forms of expressing engagement a lot during the hologram live stream music performance. The question was measured using a *1 to 10 likert scale* ranging from *1:Not at all* to *10:Totally agree*.

Table 5.2 Hologram Live Stream Engagement

Average Value of Engagement Expressed			
Sing Along	5.54	Shout	5.46
Clap	7.77	Take Pictures	5.85
Move Body	7.69	Take Video	5.54
Dance	6.23	Use Phone Lights	3.38
Post on Social Media	4.85	Browsing on Phone	3.92

Did you find the Hologram Live performance engaging? (ホログラムパフォーマンスでエンゲージされていると思いますか?)

13件の回答

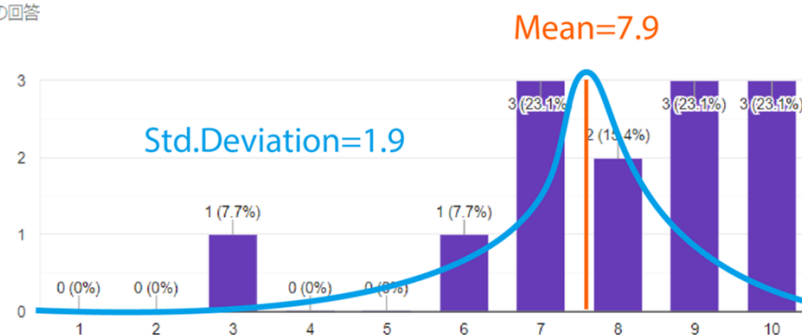


Figure 5.10 Post Test Hologram Live Stream Engagement

Table 5.2 shows the average value of engagement expression actions that was done by the participants during the hologram live stream performance. The results shows that *Clapping* (Mean:7.77) and *Move Body*(Mean:7.69) were the top actions that was done often by the participants during the tests. This numbers which were better on average compared to the engagement expression average value of the participant during the video live stream test shown in Table 5.1 means that they were more engaged during the hologram live stream performance. If they didn't feel engaged, they would not perform those engagement expressive actions and the number would be much lower. Videos of the hologram live stream performance was also taken and it clearly shows an increase of frequency in engagement expressive actions that was done by the participants.

5.3.3 Hologram Live Stream observation

Similar to the observation on the Video Live Stream test, an observation of the audience during the Hologram Live stream test was also done to discover addition findings in this research. From the observation, there are 3 main results that the researcher has discovered from the observation. First, the actions that represents engagement was clearly seen as to not only more frequent but also more intense. Actions such as moving their body and dancing shown to have higher intensity compared to the movement during the Video Live Stream test. Secondly, the action "Talking between the audience" that was discovered in the observation of the Video Live Stream was also discovered in the hologram live stream test. However, the frequency was very little compared to the Video Live Stream. Based on previous assumptions, this difference in frequency of this actions between the Video Live Stream and the Hologram Live Stream shows that "Talking between the audience" have a negative correlation with audience engagement. The more engaged the audience then the less the audience will talk between each other during a live performance.

5.3.4 Hologram Live Stream Feedback and Comments

In the post questionnaire, the participants was given the opportunity to give feedback and comments regarding both performance. Moreover, the researcher also spend some time to talk with the participants after the test in order to listen to feedback and comments directly. Based on the feedback from participants regarding the Hologram Live Stream, most of the feedback was positive. The most common positive feedback were "The performance was awesome!" and "It feels like there is a real person on stage". The researcher can safely assume that the Hologram Live Streaming performance was well designed and it was able to engage the audience.

5.4. Audience Support Intention

To measure the audience intention to support the music artist whose performance was mediated using hologram live stream prototype, we asked the participants

questionnaire based on previous research by Spears, et.al. [5] regarding customer intention.

I would like to know more about the artist after the hologram performance (ホログラムパフォーマンスの後に、アーティストについてもっと知りたくなりました)
13 responses

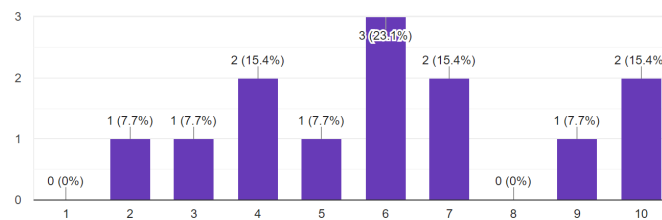


Figure 5.11 Audience Intention to look for information

Figure 5.11 shows the results of the questionnaire where the audience shows an above average intention to support the artist with a *mean value of (6.08)*. There were many deviation within the data with a *Standard Deviation of (2.53)*, however, the most common response is "6" with the highest response frequency of 3 participants. While their intention to look for information about the performing artist did not show a high score, their intention to be able to attend the artists direct live performance shows a very high value as shown on Figure 5.12.

I would like to attend the artist live performance directly after the hologram performance (ホログラムパフォーマンスの後に、直接アーティストのライブをみにいきたい)
13 responses

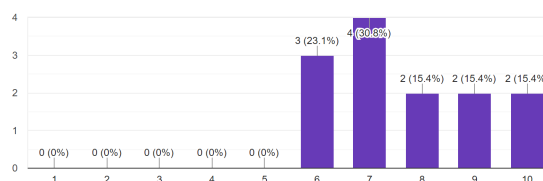


Figure 5.12 Intention to watch non-mediated live performance

With a *mean value of 7.69*, the hologram live performance surely increase their interest and intention to be able to watch the artist perform live without any

mediation. Moreover, when given information about a possible live performance schedule, *61.5 percent* of the participants showed an interest in attending the performance. In addition, as shown on Figure 5.14,

There is a live performance of the artist in Shibuya every weekend in June, will you come and watch the performance? (6月に毎週末にそのアーティストのライブがあります。みにいきますか?)
13 responses

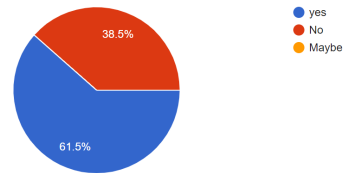


Figure 5.13 Intention to attend live performance

In Addition, the researcher also asked regarding the audience intention to spend money for the artist. This intention represented in the willingness to pay for live music ticket price. As shown on the results on Figure 5.14, *the audience is willing to spend from 3000 yen to less than 1000 yen* to watch direct live music performance of the artists. This data does not correspond to the intention to support, however, this would be a good reference for setting up ticket prices of live music performance.

During the event you will be asked to pay to attend, how much are you willing to pay? (ライブ参加するのはお金がかかりますので、どれくらいお金だせるそうですか?)
13 responses

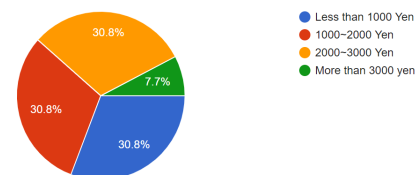


Figure 5.14 Audience Intention to pay for tickets

Chapter 6

Conclusion

6.1. Research Summary

By analyzing the pre-questionnaire and post-questionnaire as well as observing the audience video recordings and listening to their feedback, this research has come to several conclusions regarding the facts, advantages, and disadvantages of the hologram live stream video performance in regards to its effect on audience engagement and support intention

Based on the change in *mean score* of *Audience Engagement* discovered in the post questionnaire when watching the performance that was mediated through a hologram live stream compared to video live stream, the rise of engagement score to 7.92 from 4.69 ($\Delta 3.23$) shows that hologram live stream prototype that was designed is indeed provide better audience engagement compared to the video live stream. The actions that represent audience engagement also shows higher average and it is safe to assume that the proposed design have a positive impact on audience engagement.

To summarize it, this research proves that a live music performance mediated through a holographic live stream can gives a feeling of engagement similar to attending a real live music performance. While not exactly calculated, this method of live performance not only reduce the cost of holding a real live performance. It also reduce the burden of the musicians and audience as they don't have to be in the same location to be able to enjoy the performance. By having an effective results and eliminating the issues that comes with holding a real live music performance, the researcher hope that this kind of live music performance can be adopted by music industry players in order to further develop the future of music industry.

6.1.1 Advantages of Hologram Live Streaming Performance

As listened from feedback and comments, the advantages of hologram live streaming performance is its ability to provide the feeling of presence that makes the audience can feel that the performer is actually there on stage even though they are not. This advantage is possible because of two main factors. First, the large hologram display which can display the performer in a size that is similar to a real person. And second, the fluent interaction enabled by the camera that is placed in front of the stage so that the performer can respond to the audience actions and provide an engaging conversation.

6.1.2 Disadvantages of Hologram Live Streaming Performance

Even though it is better in providing feeling of engagement, the way to content was presented was not as easy to prepare compared doing a standard video live stream. The feedback from the audience discovered that the audience preferred a more standard way of video capture when watching a video live stream. The standard way of video capture is much easier to produce than hologram live stream content.

6.1.3 Observation results

In addition, the audience engagement expression actions by Lordin [6] can be improved as actions such as "Talking between the audience" is shown to have a correlation with audience engagement. The more often the audience talk between each other, the less engaged they will be with the performance. The research believes that further research should include this actions in their analysis.

6.2. Research Limitation

As music have a very wide and varying genre of music, this study only focuses on pop music genre. Whether or not a hologram live music performance can gives the

same feeling of engagement to the audience if the genre was more specific or niche such as Heavy Metal or Progressive Rock, or, if the music genre put emphasize on being classic and having authenticity such as Classic or Country music. Therefore the results of this research is limited by its genre.

Also, the way that this research is designed can be improved to reduce the results bias that can be caused by other factors. For example, the researcher realized that the questionnaire can be distributed in a better way. Instead of using one post-questionnaire after having the participants watch both performance through video and hologram, a separate questionnaire that is distributed after each performance should be better to gain an accurate data and analysis of each method. Moreover, the order in which the participants watch the performance can be changed in order to verify that order of the performance doesn't have any effect on the results because the test that was done last often have positive results compared to the previous. Moreover, the current issue in the music industry that was determined as the main background for this research which was *Cost, Audience, and Music Label* have not been researched thoroughly. This research mainly focus on the audience issue in trying to determine whether audience are able to accept a new type of mediation when enjoying a live music performance or not and it's real affects on their feeling engagement as well as their willingness to continue support the artist.

The issue of cost saving and creation of a new business model for music labels has not been addressed entirely and therefore has become the limitation of this research as well.

6.3. Suggestion for Future Research

As mentioned in the research limitation, the researcher suggest to perform another similar test or experimental hologram live performance using other music genre in order to gain a better understanding about this technology as well as its relationship with a music genre which represent the preference of the audience. Music genre such as Rock and RnB would be a great addition to this research as they are also in the front of using technologies in the music industry while also have a very large and strong fan base.

In addition, future research should also consider whether this technology can also solve other issues in the music industry such as cost and unclear business model. By precisely calculating those financial data when doing this kind of research, it would be very clear for the industry players to be able to start making decision and make proper investment in those technologies right now to be able to develop it further in the future.

Lastly, as technology keeps progressing and new technology will become available soon, there might be a new possibility for another engaging live music performance that is not hindered by the 3 main issues in the music industry. Technologies such as Augmented Reality or Mixed Reality seems to be a close match for this research as they are technologies that is similar to hologram in a way that it is a technology that can provide a feeling of presence while not actually being there.

To close this paper, the researcher hope that based on the data from this research, future research can be done for topics are related to the music industry as it is an industry that has started revitalize and have a high potential to become bigger than it was before.

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