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Abstract

This paper aims to discuss to what extent telematic performances within the framework of the "Beyond Time and Space - London Tokyo Online 2023" initiative serve as a comparative paradigm to physical live performances, particularly in the domains of technical exigencies, artistic expression, and audience engagement.

Central to this study is the "Beyond Time and Space - London Tokyo Online 2023" event, a simultaneous, interactive electronic live music performance connecting physical venues in London and Tokyo. Through JackTrip and Open Broadcaster Software (OBS), this event aspired to explore the applicability and limitations of telematic technology in live electronic music performance and its implications.

The study was conducted by the curator of the event, which adopts a multi-faceted methodology to examine the impact of telematic performances through three different performing formats, which are the "Bridging Live Set," the "Telematic B2B," and the "Overlapping Live Set." Primary research involved a focus group of six performing artists, evenly distributed between Tokyo and London. Observational research conducted at the London venue focused on audience dynamics and ambiance, complemented by comprehensive interviews with two attendees. The research methodology is based on Kansei engineering,[2] which focuses on the qualitative meaning and value that a product or environment provides to the user. This approach is crucial in creative industries, where sensory aspects are highly valued. Achieving this value depends on three factors: the ability of current technological frameworks to replicate the liveness of live performances, the interactive engagement between artists and the significance of their collaborations, and the exploration of audience interaction and experience in telematic performances. This paper also uses the League of Automatic Music Composers, a group of experimental electronic musicians in the San Francisco Bay Area from 1978 to 1983, as a case study.

This paper highlights a significant paradox in telematic performances, particularly in the context of Electronic Dance Music (EDM). While the rapid transmission of MIDI data in EDM minimizes latency, enhancing the smoothness of sound delivery compared to traditional live sets, it also diminishes the audience's ability to identify the source of sound and the performing artist. This lack of perceptible latency leads to a reduced sense of immersion and liveness. To address this paradox, visual solutions are necessary. This emphasizes the importance of integrating audio and visual technologies to serve as a

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[2] P. Lévy, "Beyond Kansei Engineering: The Emancipation of Kansei Design," *International Journal of Design* 7, no. 2 (2013).

performing instrument rather than just technical tools, enhancing the overall performance experience for both artists and audiences.

This study also identified two major challenges with telematic communication in electronic music live performances. First, audiences found it difficult to distinguish which artist was performing which part of the music, especially in the Telematic B2B sets which featured rhythm-based house music. Secondly, telematic communication failed to provide the sense of interaction present in traditional live performances. Despite live broadcasts, the audience in two locations felt distant from each other's experiences. This lack of interaction may stem from not just spatial and temporal differences, but also from differing nightclub cultures between Tokyo and London.

1 Introduction

Beyond Time and Space (BTaS) is a long-term project consisting of a main event and two sub-events in the independent electronic underground music field. All aim to create a place for independent electronic music communities in the creative industry to collaborate globally in an innovative, affordable, and sustainable way. This paper will only discuss the main event, "Beyond Time and Space - London Tokyo Online 2023", which was a transnational, simultaneous, interactive live music performance in separate physical venues bridging the geographical gap between London and Tokyo. This event was held on August 25, 2023 in London from 3:30 pm to 7:00 pm and in Tokyo from 11:30 pm to 3:00 am.

"Beyond Time and Space - London Tokyo Online 2023" leverages multiple digital tools to connect artists and audiences globally, eliminating the costs typically associated with global music events such as transportation and accommodation fees. This allows artists to perform with each other, at the respectively same time, interactively, and freely in a two-way collaboration, as if they were performing in the same time zone, in the same space. The entire scene of each venue is captured on video and reflected on each other's site via projectors, and streamed online via YouTube. This provides audiences with an experience as if they were participating in the same event across borders. This particular type of performance is explained as Telematic Presence in performing art academic research, which refers to the experience of feeling present or connected with others through the use of technology, particularly when physical proximity is not an option.[3]

In the wake of the global pandemic, the importance of maintaining social connections became even more evident as people faced isolation and social distancing measures. As a response to this challenge, telematic presence gained prominence, enabling individuals to interact, work together, and share moments in near-real time, no matter where they are located. This paper aims to explore the applicability and limitations of telematic technology in live electronic music performance and its implications.

[3] Annie Abrahams, "Trapped to reveal on webcam mediated communication and collaboration," *Journal for Artistic Research* 3 (2011).

2 Background

2.1 Traditional Electronic Music Live Performance

The uniqueness of live performance is a multi-faceted phenomenon that transcends mere auditory experience.[4] Live performances are not just about the music; they are about the entire experience that envelops the audience, from the anticipation of buying a ticket to the physical journey to the venue, and the collective waiting for the show to begin. Each performance is a unique blend of the artist's music, the venue's attributes, and the audience's collective energy. This uniqueness is further amplified by the venue itself, which becomes a part of the attendees' memory and emotional connection to the event. Whether it is the smell of the venue, the texture of the crowd, or even the challenges like smelly toilets and muddy fields, these elements become rites of passage that deepen the audience's affiliation to their 'tribe.'

Particularly, in the EDM scene, the traditional roles of performer and audience are "completely erased and redefined."[5] The artist becomes a channeller of the dance floor's energy, and the audience "truly becomes the performance." This dynamic is facilitated by the technological mediation between machine sound and human movement, effectively blurring the lines between the DJ and the audience. In the concept of transductive mediation, both the DJ and the audience serve as mediators in the sound-movement relation.[6] In EDM, performance is not about localized agency but about the effective mediation between recorded sounds and collective movements. The DJ and the dance floor, machine sounds, and human movements "insistently perform their shared reality."

Most importantly, the emotional dimension of music is not merely an ancillary aspect but a core feature that significantly influences audience engagement and community formation. Thompson offers a comprehensive exploration of the psychological dimensions of music, including its impact on emotion.[7] He begins with a "culturally sensitive reflection on the role of music in our emotional lives" and proceeds to discuss theories of music and emotion in a thorough yet accessible manner. Thompson addresses empirical studies that explore "intersubjective agreement, emotional responding, compositional and expressive signalling, musical properties, and universality." Music serves as a powerful emotional catalyst, capable of evoking a wide range of feelings, from joy and euphoria to sadness and nostalgia. The emotional impact of music is not merely a byproduct of its auditory characteristics but is deeply intertwined with the psychological and cultural contexts in which it is experienced. The concept of

[4] R. Kronenberg, "Designing Places for Making Memories: Immersive Audience Experiences for Live Music Performance," *Architectural Design* 91 (2021): 98-103.
[5] P. P. Ferreira, "When Sound Meets Movement: Performance in Electronic Dance Music," *Leonardo Music Journal* 18 (2008): 17–20.
[6] ibid., 48–52.
[7] W.F. Thompson, *Music, thought, and feeling: understanding the psychology of music* (New York: Oxford University Press, 2015).

"intersubjective agreement" suggests that music can evoke similar emotional responses across different individuals, thereby serving as a unifying force that fosters community engagement.

This is particularly relevant in the realm of dance music, where the collective experience of emotion on the dance floor can lead to a heightened sense of community and belonging. One example that illustrates this statement is the phenomenon of club culture in EDM events. In clubs and music festivals around the world, attendees often experience a profound sense of connection and belonging while dancing to the music. This collective experience of emotion is amplified by factors such as the pulsating beats, immersive lighting effects, and the shared enthusiasm of the crowd.

For instance, consider a scenario at a techno music festival where a DJ is playing a set that builds up to a climactic moment. As the music reaches its peak, the crowd responds with cheers, applause, and synchronized movements. In this moment, individual attendees become part of a larger collective, united by their shared love for the music and the communal energy of the dance floor.

Moreover, this sense of community extends beyond the physical space of the dance floor. Attendees often form lasting connections and friendships with fellow music enthusiasts, bonding over their shared experiences and memories from these events. This sense of belonging and camaraderie is a fundamental aspect of club culture and demonstrates how the collective experience of emotion in dance music can foster a profound sense of community among attendees.

2.2 Telematic Performance

Telematic performances have evolved as a unique subfield within the broader spectrum of performance arts, leveraging network technologies to create meaningful connections between geographically dispersed performers and audiences. Originating from a diverse array of disciplines and themes, these performances often find themselves categorized under "contemporary experimental performance", a term that encapsulates their innovative nature.[8] Over the years, telematic performances have experimented with various forms of audience interaction, allowing spectators to take on roles as diverse as performers, builders, and team players, thereby democratizing the artistic experience.[9] The concept of "Alone Together," which explores the dual nature of technology, has also found resonance in the realm of telematic performances, adding a layer of psychological depth to these experiences.[10] Interestingly, despite their futuristic appeal, many telematic performances employ low-tech, domestic telecommunication technologies, thereby making the art form more accessible. As we continue to explore the potential of telematic performances, it becomes increasingly clear that they offer a rich tapestry of opportunities for artistic expression, audience engagement, and social commentary.

In contrast, traditional live performances, while rich in their immediacy and physicality, are inherently limited by geographical and logistical constraints. The experience of being in the same room

[8] Günter Berghaus, *Avant Garde Performance: Live Events and Electronic Technologies* (Basingstoke: Palgrave MacMillan, 2005).
[9] Erik Geelhoed, "User requirements in immersive mediated performance spaces," paper presented at the Remote Encounters Conference, April 12, 2013, Cardiff.
[10] Elena Pérez, "The impact of digital media in contemporary theatre and performance: a study across multimedia theatre, telematic performance and pervasive performance," (PhD diss., Norwegian University of Science and Technology, 2014).

with artists, feeling the vibrations of the music, and sharing that moment with a community of listeners is unparalleled. However, it is an experience often confined to specific locations and audiences. Traditional live performances on a global scale require a significant investment in terms of venue arrangements, travel, and time, limiting their reach and inclusivity.

PwC forecasts that combined live music and cultural events are poised to surpass 2019's $66.6bn mark in 2024.[11] This revenue encompasses ticket sales, sponsorships, merchandise, and other related income. The costs associated with organizing a global music event can vary widely depending on factors such as the size of the event, the number of artists performing, the venue, production costs, marketing, and travel expenses.

For small independent artists in the EDM scene, traveling around the world to perform poses several challenges. Firstly, international travel can be prohibitively expensive, especially when considering costs such as flights, accommodation, and visas. These costs can quickly add up and may exceed the budget of independent artists, making it financially unsustainable for them to tour globally. Secondly, logistical challenges such as booking shows, coordinating travel arrangements, and managing equipment can be daunting for independent artists who may not have access to the same level of resources and support as more established acts. Additionally, the time and effort required to organize and execute a global tour can be overwhelming for artists who are also responsible for their own promotion, management, and creative work.

Telematic technology offers a potential solution to these challenges by allowing artists to perform remotely without the need for physical travel. By leveraging high-quality audio and video streaming technology, artists can deliver live performances to audiences around the world from the comfort of their own studios or local venues. This not only reduces the financial burden of travel but also eliminates many of the logistical challenges associated with touring. Furthermore, telematic performances can provide opportunities for artists to reach new audiences and collaborate with other artists globally, expanding their reach and impact in the EDM scene. Overall, telematic technology has the potential to democratize access to global audiences for small independent artists in the EDM scene, offering a viable alternative to traditional touring models.

Telematic music is not merely a technological advancement; it is a cultural and emotional shift. As Pitcher, an artist and researcher, points out, telematic music initially seemed to lack the emotional and intimate connection that traditional music settings offer.[12] However, over time, he realized that telematic performances could indeed foster deep emotional and musical connections, albeit in a different form. While the medium may lack the physicality of traditional settings, it compensates by offering a unique form of intimacy—one that transcends geographical boundaries and allows for a different kind of emotional and artistic exchange.

Furthermore, telematic performances offer a unique set of technical challenges and opportunities. As technology has evolved, so has the complexity and capability of telematic performances.

[11] "Global Telecom and Entertainment & Media Outlook 2023–2027," Pricewaterhousecoopers.
[12] J. Pitcher, "Telematic Music: Six perspectives," Leonardo Music Journal, 19 (2009): 95–96.

From the early days of video telephone bridges to the current use of high-speed internet transmissions, each technological leap has brought with it new possibilities for artistic expression. For instance, latency, or the delay in transmission, has been creatively incorporated into the structure of improvisations, turning a technical limitation into an artistic tool. This adaptability and innovation in the face of technical challenges are something traditional live performances seldom have to contend with, but they add an extra layer of complexity and opportunity to telematic performances.

While traditional live performances offer an irreplaceable sense of immediacy and physical presence, telematic performances introduce a new paradigm that expands the scope of what is possible in the realm of live music. They allow for a level of global collaboration, inclusivity, and technological innovation that is difficult to achieve in traditional settings. As projects like "Beyond Time and Space - London Tokyo Online 2023" continue to push the boundaries of what is possible, they challenge us to rethink our definitions of presence, community, and artistic expression in the digital age.

2.3 Technology Used in Beyond Time and Space - London Tokyo Online 2023

To facilitate the telematic performances connecting London and Tokyo, two pivotal technologies were employed: JackTrip for audio and Open Broadcaster Software (OBS) for visuals. JackTrip, a seminal technology in the domain of networked music performance, served as the backbone for online musical collaborations requiring bi-directional and n-directional (multiple directional) performances over wide area networks (WANs).[13] Developed by Chris Chafe and Stanford University's SoundWIRE group, JackTrip is engineered to minimize audio latency while maximizing audio quality. One important aspect of telematic performances is their ability to send audio without compressing it, which helps avoid delays caused by compressing the audio data. Open Broadcaster Software (OBS) is a useful tool in academic settings because it works on different types of computers and offers many features not found in regular video-call apps. OBS lets users design their screen layouts and add different types of media, making online communication more interactive and interesting.

In this project, a synergistic integration of JackTrip and OBS was employed. JackTrip bridged the auditory gap between the two cities, facilitating simultaneous, high-fidelity audio exchanges, while OBS captured and projected the visual elements, including the dance floors of both venues. This confluence of technologies provided a multi-sensory experience that approximated traditional live performances, yet was augmented by the capabilities of telematic presence.

[13] J.P. Cáceras and C. Chafe, " JackTrip/SoundWIRE Meets Server Farm," *Computer Music Journal* 34, no. 3 (Fall 2010): 29–34.

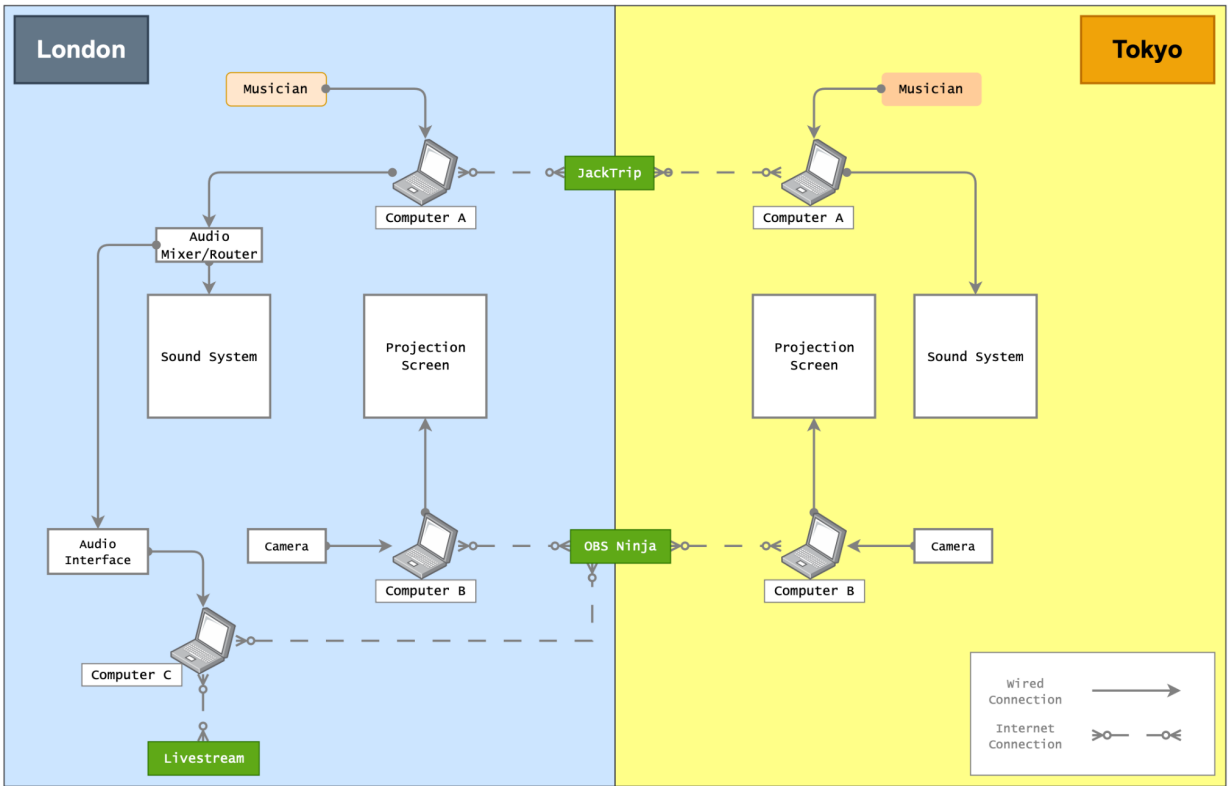

Figure 2.2.1: Technical rider for Beyond Time and Space - London Tokyo Online 2023 event

2.4 Three Different Designs of Performances in Beyond Time and Space - London Tokyo Online 2023

To explore the potentialities of telematic presence within the realm of EDM, this study conceptualized three distinct performance formats (see Figure 2.4.1): the "Bridging Live Set," the "Telematic B2B," and the "Overlapping Live Set." Each format entails a one-hour collaborative session between artists located in Tokyo and London. Each part of the performance simulates different genres in EDM.

The Bridging Live Set was structured as a sixty-minute performance, divided equally between Tokyo-based artist Ryuuta Takaki and London-based artist Sajge, in an alternative, downtempo style. The transition at the midpoint is not a mere handover but an intricate interplay where both artists blend each other's musical elements, thereby transferring creative control.

The Telematic B2B set adapts a traditional EDM setup for remote collaboration, introducing a host of complexities. In the context of EDM, "B2B" signifies a back-to-back performance involving two or more DJs sharing the decks in a rotational manner.[14] In the telematic B2B format, limitations include latency issues that disrupt simultaneous interaction, the absence of physical cues for communication, challenges

[14] B. Bennett, "How to DJ back-to-back (B2B): LSA, RSS," 2023.

in BPM synchronization, and limitations in reading audience reactions. Network reliability remains a critical factor, necessitating meticulous planning and robust technical infrastructure. [Perhaps a more positive sentence addressing the affordances of TB2B? This section was played by Kotsu in Tokyo and Stella Z in London, adopting a house, dance music style.

The Overlapping Live Set diverges from the Bridging Live Set by initiating a simultaneous 60-minute performance from both locations. This session was presented in a typical electronic music live style. Unique to this format is the incorporation of a violin in the London-based performance by Raven Bush, alongside the conventional synthesizers and controllers, adding a novel layer to the electronic soundscape by Sakura Tsuruta in Tokyo.

Figure 2.4.1: Flyer of the Beyond Time and Space - London Tokyo Online 2023 event.

3 Methodology

3.1 Research Subjects

This study employed a multi-pronged approach to gather insights. The primary subjects comprised a focus group of six performing artists, evenly split between Tokyo and London. Additionally, observational research was conducted at the London venue, concentrating on audience dynamics and the

overall ambiance. To delve deeper into individual experiences, two comprehensive interviews were carried out with attendees from the London venue.

3.2 Research Methods

The research methodology draws upon the principles of Kansei engineering, a discipline that explores the qualitative meaning and worth that a product or environment offers to the user. In Kansei engineering, value is understood as the synthesis of sensory qualities that shape the user's unified perception and subjective impression of their environment. This approach is important for creative industries, where the appeal and sensory aspects of products or experiences are highly valued. Achieving this value depends on three main factors:

1. The capability of existing technological frameworks to emulate the "liveness" intrinsic to conventional live performances.

2. The degree to which individual artists can engage interactively with each other, and the meaning of the collaborative performances.

3. The extent to which audience interaction and experience can be explored in telematic performance.

To holistically address these dimensions, the study adopted a mixed-method approach. This encompassed participant observation by the author who is also the curator of BTaS; a post-event focus group discussion involving the six aforementioned artists (Sajge, Stella Z and Raven Bush on the London side, Ryuuta Takaki, Kotsu and Sakura Tsuruta on the Tokyo side); and in-depth interviews with two attendees from the London venue, selected for their profound knowledge and experience in organizing live music events and the creative industry.

4 Findings

4.1 The Impact of Latency

In the realm of telematic performances, latency emerges as a formidable challenge that significantly impacts the "liveness" intrinsic to conventional live performances. The issue of latency is not merely a technical hurdle but a critical factor that can influence the very essence of a musical performance. This is especially true in EDM live performances, where the rhythmic elements, such as the kick drum, hi-hats, and bassline, form the foundation of the music and are essential for creating the driving, danceable groove that defines the genre.

Figure 4.1.1: An iPhone is placed beside the DJ deck in the Tokyo venue. Another one is placed in the London venue. The iPhones are connected via ZOOM for the DJs to check the other's deck, so they can gather information of the other side visually.

In EDM, specifically in a B2B DJ set, where the timing and rhythm are paramount, even slight delays can result in a noticeable degradation of the music's impact and energy. We could see the impact of latency was much more obvious in the Telematic B2B set than in the other two performances. For example, in the other two live sets, artists in both locations did not necessarily need an extra device to see the other artist's Digital Audio Workstation (DAW) to check and follow their music. Unlike DJ sets, electronic live music is more flexible in terms of syncing in BPM, so some slight deviation in beats was not significantly noticeable. Sometimes, the deviation could even add another artistic layer to the performance. In contrast, during the rehearsals with the DJs, we realized that they could not perfectly synchronize with each aurally, due to the latency. We found this approach was effective after the event. We had to prepare two external iPhones to show the other player's DJ deck via ZOOM, so they could check each other's BPM and song progress in their own timing visually (see Figure 4.1.1).

Owing to the inherent characteristics of EDM performances, the genre exhibits unique compatibility with telematic presence, particularly when contrasted with traditional acoustic live performances. In EDM settings, the instruments employed—most notably, MIDI controllers and synthesizers—operate within a digital framework that facilitates the direct control and transmission of sound data. The fast transmission of MIDI data gives EDM an advantage in low-latency approaches. These instruments interface seamlessly with technologies like JackTrip, enabling the simultaneous exchange of

high-fidelity audio data over wide area networks. Furthermore, this entire process occurs within a singular network architecture, thereby streamlining the flow of audio data from the instruments to JackTrip and subsequently to the venue's sound system. This integrated network structure minimizes the latency issues often associated with telematic performances, making EDM an especially conducive genre for exploring the potential of telematic presence.

In addition, the post-event interviews conducted with attendees yielded unexpected results regarding their perception of liveness and latency in the telematic performance. Contrary to expectations, one interviewee proposed using separate speakers for sound sources originating from Tokyo and London to enhance the auditory experience. This suggestion was accompanied by praise for the DJs' adept blending of music. These findings underscore the significance of spatial audio configurations in augmenting the perception of liveness and mitigating the impact of latency. Spatial audio, which involves the placement and movement of sound sources in a three-dimensional space, plays a crucial role in creating a realistic and immersive auditory environment. If distinct speakers correspond to each location, the audience can perceive the music as emanating from specific directions, enhancing the sense of presence and realism. Additionally, skillful blending of music by the DJs can help mask the effects of latency, ensuring a smoother and more coherent auditory experience.

Another interviewee pointed out the difficulty in differentiating the sound from each city, suggesting that the performance blended almost too well. This raises the question of whether the seamless blending of audio, while technically impressive, may actually detract from the audience's ability to engage fully with the performance. The challenge lies in striking a balance between technical proficiency and artistic expression, ensuring that the technology serves to enhance, rather than obscure, the unique contributions of each performer. Therefore, it seems not enough to use only musical approaches to distinguish the artists and their performances. Some visual signs to point out the location and the playing artist on the screens might be helpful and worth trying in future events.

Observational data further corroborates the complexity of emulating liveness in telematic performances. While the audience seemed to enjoy the music immersively, indicating that audio latency was not a significant issue, the visuals presented a different challenge. A server overload issue at the Tokyo venue led to the loss of their visuals, causing confusion among the audience, particularly those who had just arrived at the London venue. This incident underscores the importance of synchronizing audio and visual elements simultaneously to create a cohesive sensory experience. The absence of one can disrupt the engagement of the audience and detract from the sense of liveness that is so crucial to the success of any performance.

The intricate dynamics between technology and musical innovation, particularly in the realm of telematic systems, should not merely be viewed as technological tools but as new types of musical instruments or instrument extensions that bring unique affordances to the table. The concept of affordances here is pivotal; it refers to the unique opportunities and capabilities that telematic systems offer, which can be optimized from a musical perspective.

On the other hand, latency poses a significant paradox in maintaining the liveness crucial to EDM's rhythmic elements. Due to the operating essence of EDM, the rapid transmission of MIDI data gives EDM an edge in minimizing latency. This makes the performances much smoother compared to traditional live sets in terms of sound delivery. However, because of the less noticeable latency, it is hard for the audience to identify where the sound is coming from and who is the artist playing it. This led to the problem of the lack of immersive experience and the feeling of liveness. To overcome the paradox, visual solutions seem necessary. This emphasizes the need to balance technical proficiency by blending both audio and visual technology to eventually serve the artists and the audience as a performing instrument, rather than a merely technical tool.

4.2 The Beauty of the Unknown

In the realm of telematic performances, the concept of unpredictability and surprise takes on a heightened significance, serving as both a challenge and an opportunity for artistic innovation. FirstName Boutwell provides a compelling framework for understanding these dynamics, particularly emphasizing the role of physical bricolage and assemblage in shaping the musical experience. The aesthetic underpinning this form of telematic performance is one that embraces the "lively and unpredictable response of these systems."[15]

The League of Automatic Music Composers, a group of experimental electronic musicians in the San Francisco Bay Area from 1978 to 1983, is an illuminating case study. They were known for their pioneering use of microcomputers in live performances and for creating networks of interacting computers to generate unique and unpredictable music. Their work was influenced by the cultural atmosphere of Northern California in the 1970s, which emphasized communal ideologies, technical innovation, and a hands-on approach to building a new culture.

This approach to telematic performance presents as a root in a sculptural musical practice, where each artist's "station" serves as a unique assemblage of sound-making equipment, microcomputers, and other electronic circuitry. These stations are not merely passive conduits for pre-planned sequences; they are active participants in a networked, collaborative endeavor. The microcomputers in the setup of the League of Automatic Music Composers are not repositories of the music but act as dynamic components that control other analog or digital sound-making devices. The focus is on creating a physical bricolage that can respond simultaneously to inputs from other stations, thereby generating a form of music that is emergent rather than predetermined.

Boutwell further elucidates that any musical form that arises does so "mysteriously, out of the interactions and mutual influence of the separate stations." This highlights the role of surprise as an integral part of the artistic process. In a telematic performance, the unpredictability is not a bug but a feature, encouraging an active response to surprise in the playing. This is particularly relevant when

[15] Brett Boutwell, "The League of Automatic Music Composers, 1978–1983. With John Bischoff, Jim Horton, Tim Perkis, David Behrman, Paul DeMarinis, and Rich Gold. New World Records 80671-2, 2007," *Journal of the Society for American Music* 3, no. 2 (2009): 263–64.

considering the global scope of such performances, where artists are separated by vast geographical distances yet connected through intricate networks. The element of surprise serves to bridge these distances, creating a shared musical space that is both ephemeral and intensely real.

Moreover, Boutwell emphasis on physical bricolage and assemblage resonates with broader trends in contemporary art and performance studies, where the materiality of the artistic process is increasingly recognized as a vital aspect of meaning-making. In the context of telematic performances, this materiality is not confined to a single location but is distributed across multiple sites, each contributing its own unique set of affordances and constraints to the overall assemblage. This multi-sited materiality serves to amplify the unpredictability and surprise inherent in the performance, as each station can potentially introduce new elements that disrupt or enhance the existing musical form.

In the case of BTaS, the degree to which individual artists can engage interactively with each other becomes a focal point for understanding the meaning of collaborative performances. The focus group results and observational data provide a rich empirical layer to the theoretical framework discussed earlier, particularly emphasizing the role of unpredictability, surprise, and physical bricolage in shaping the musical experience.

The focus group results offer a compelling narrative of the artists' experiences. For instance, the Telematic B2B DJs highlighted the "part of unsureness" as a source of excitement, echoing Boutwell's emphasis on unpredictability as an integral part of the artistic process. One DJ even described feeling the atmosphere in Tokyo, suggesting that the telematic setup succeeded in "recreating a shared space that has no tangible things but only a united heart." This sentiment resonates with Boutwell's discussion on the emergence of musical form "out of the interactions and mutual influence of the separate stations." Similarly, artists involved in the Overlapping Live Set and Bridging Live Set performances spoke about the emotional impact and sense of adventure that characterized their experiences. The violin sound from the Tokyo venue moved one artist to tears, while another described the impromptu and spontaneous interaction as "sacred." These comments underscore Boutwell's emphasis on physical bricolage and assemblage as a form of "sculptural musical practice" that allows for simultaneous, emergent forms of collaboration.

The observational data further enriches this discussion. For example, during the Telematic B2B performance, the DJs were constantly checking up on each other, both musically and visually, indicating a high level of interactive engagement. Similarly, the Overlapping Live Set performance demonstrated strong confidence and trust between artists, reinforcing the emphasis on the role of surprise and unpredictability in fostering meaningful artistic interactions. In the Bridging Live Set performance, the Tokyo artist's initial lack of confidence transformed into an "epic experience" once the collaboration unfolded successfully. This aligns with one of the audience's feedback: "The possibility that things might not work is what gives the event a real edge." It also resonates with the focus group's comments on the "sense of adventure and risk" as a defining feature of these telematic performances.

The focus group results and observational data offer a nuanced understanding of the role of unpredictability, surprise, and physical bricolage in telematic performances. By shifting the focus away

from control and towards collaboration and emergence, it provides a roadmap for future explorations in this exciting and rapidly evolving field, highlighting the degree to which individual artists can engage interactively with each other and the profound meaning that such collaborative performances can hold. The unpredictability and surprise are not mere byproducts of the technological framework but are actively cultivated qualities that contribute to the richness and complexity of telematic performances.

4.3 A New Landscape in Audience Experience

In the realm of telematic performances, the concept of audience interaction takes on a nuanced complexity, transcending traditional paradigms of engagement between the performer and the audience. Drawing upon Abrahams's work in telematic performance, it becomes evident that audience interaction in telematic settings is not merely a technological extension of traditional live performances but a reconfiguration of the social contract that governs the relationship between the audience and the performer.[16] This reconfiguration is politically, ideologically, and philosophically motivated, challenging established norms and expectations of audience engagement.

In a telematic performance, the audience's experience is mediated through digital interfaces, which can both augment and constrain the modes of interaction available. The digital medium introduces a layer of abstraction, altering the immediacy and intimacy traditionally associated with live performances. However, this abstraction is not necessarily a limitation; it can also serve as a catalyst for new forms of engagement. For instance, the use of chat rooms or interactive digital elements can foster a sense of community among remote audiences, thereby creating a social space that extends beyond geographical boundaries. This was evident on the dance floor in the case of BTaS by the London side audience waving hands towards the capturing cameras to greet the Tokyo side.

Moreover, the telematic medium allows for a redefinition of what constitutes interaction in a performance setting. Interaction in this context is a renegotiation of the contractual relationship between the art and the receiver. This renegotiation can manifest in various ways, from the audience's ability to influence the performance in real-time through digital inputs to the creation of shared virtual spaces where the boundaries between the performer and the audience become porous. Such interactive elements not only enhance the audience's agency but also contribute to a more immersive and emotionally resonant experience.

In this renegotiated landscape, interaction takes on new dimensions, from simultaneous digital inputs from the audience to the creation of shared virtual spaces that blur the boundaries between the performer and the audience. Traditional live performances in EDM have been characterized by a symbiotic relationship between the DJ and the audience, encapsulated by the term "transductive mediation."[17] In this setting, the DJ serves as a mediator in a dynamic system that includes machine sounds and human movements. The emotional landscape crafted by the DJ becomes an integral part of the overall performance experience, significantly influencing audience engagement and community formation.

[16] Abrahams, "Trapped to reveal on webcam mediated communication and collaboration," *Journal for Artistic Research* 3 (2011).
[17] Ferreira, "When Sound Meets Movement," 17–20.

Musical elements are carefully selected to evoke specific emotional states, whether it's a melancholic melody inducing nostalgia or a high-energy beat elevating the crowd's spirits.

However, the question of liveness in telematic performances presents a challenge. In the EDM live scene, the collective experience of emotion on the dance floor plays a crucial role in fostering a heightened sense of community and belonging. Telematic technology, while offering new possibilities for global collaboration and innovation, faces challenges in replicating this immersive experience. The physicality and immediacy of traditional live performances contribute significantly to the sense of unity among dancers, as they synchronize movements and reactions to the music. This shared experience creates a bond among attendees, transcending individual differences and fostering a sense of belonging to a larger collective. As Kronenberg states, the uniqueness of live performance is not merely a product of the music or the artist but is a complex interplay of various elements that include the venue, the audience, and even the societal and emotional contexts in which these performances are embedded.[18] It is a holistic experience that engages multiple senses and emotions, creates memories that are both individual and collective, and, in many cases, becomes a defining part of our personal and cultural identity.

In contrast, telematic performances, despite their ability to connect geographically distant audiences, often struggle to recreate this sense of unity and shared emotional experience. The technological mediation introduces delays and disruptions that can hinder the synchronization of movements and responses, diluting the communal aspect of the experience. Additionally, the cultural and social contexts of different audiences can influence their engagement with the performance, further complicating the establishment of a cohesive collective experience. The absence of physical proximity between the artist and the audience could potentially dilute this sense of liveness. These challenges can impact the fluidity of interaction and, consequently, the quality of the audience's experience.

Yet, even these challenges can be incorporated into the performance as elements of unpredictability and surprise, adding a layer of complexity to the engagement of the audience. The emotional impact of music is deeply intertwined with psychological and cultural contexts. While the digital medium may lack the physical immediacy of a traditional live setting, it compensates by offering unique opportunities for simultaneous engagement across geographical distances. Moments of humor, applause, or emotional resonance can be shared instantaneously between continents, establishing a new form of liveness that is constructed through digital interaction. Therefore, the experience of liveness in telematic performances could be redefined through the lens of emotional engagement facilitated by technological mediation.

One of the audience members who attended the event in London commented that they realized the performing space was not limited to a stage. Telematic performances offer a frameless space that makes international collaborations more accessible, providing a platform for cross-cultural musical and emotional experiences. The "intersubjective agreement" could take on an innovative and inclusive

[18] Kronenberg, "Designing Places for Making Memories," 98–103.

meaning in this context, as audiences from separate geographic locations and diverse cultural backgrounds find common emotional ground through music and performances.[19]

Based on the comments from the focus group, we realized that telematic performances fundamentally redefine the landscape of audience interaction and experience in live music performances. These performances offer new avenues for audience engagement but also present unique challenges that stem from the digital medium. This medium serves as both a tool and a context, shaping the ways audiences interact with the performance and with each other. This reconfiguration of audience interaction is not just a byproduct of technological advancements. Instead, it is a complex, multi-faceted phenomenon that reflects broader shifts in societal understanding of art, engagement, community, and culture. The digital medium can both augment and constrain modes of interaction, introducing a layer of abstraction that alters the immediacy and intimacy traditionally associated with live performances. However, this abstraction can also serve as a catalyst for new forms of engagement, such as interactive digital inputs and the creation of shared virtual spaces.

Telematic settings have the potential to redefine the traditional relationship between performers and audiences, presenting both challenges and opportunities for engagement in the EDM scene. Digital interfaces could mediate audience experiences, impacting the immediacy and intimacy of live performances. The use of chat rooms and other interactive elements to create a sense of community among remote audiences might be a solution to address the lack of shared experience. While telematic technology has the potential to bridge geographical divides and facilitate global collaboration in the realm of EDM, its limitations in replicating the communal and emotional aspects of traditional EDM live performances highlight the need for further exploration and innovation in this field.

5 Conclusion

This paper has provided a comprehensive analysis of the “Beyond Time and Space - London Tokyo Online 2023” event, a pioneering initiative in the realm of telematic performances within the independent electronic underground music community. The study has explored the innovative use of digital technologies at the event, such as JackTrip for audio and Open Broadcaster Software (OBS) for visuals, to facilitate simultaneous, interactive performances between artists and audiences located in disparate geographical locations. The paper has delved into the complexities and opportunities presented by telematic performances, particularly in the domains of technical exigencies, artistic expression, and audience engagement.

The paradoxical nature of latency presents a crucial challenge in maintaining the liveness crucial to EDM’s rhythmic elements. While the rapid transmission of MIDI data in EDM minimizes latency, making performances smoother in terms of sound delivery compared to traditional live sets, it also makes it difficult for the audience to identify the source of sound and the performing artist. This lack of immersive

[19] W.F. Thompson, *Music, thought, and feeling: Understanding the psychology of music*. New York: Oxford University Press, 2015.

experience and the feeling of liveness can be addressed through visual solutions. This finding underscores the importance of balancing technical proficiency by integrating audio and visual technology to enhance the overall performance experience. By viewing technology as a performing instrument rather than just a technical tool, artists and audiences can create more engaging and immersive telematic performances in the future.

Another key contribution of this paper is its nuanced understanding of the role of unpredictability, surprise, and physical bricolage in telematic performances. These elements are not mere byproducts of the technological framework but are actively cultivated qualities that contribute to the richness and complexity of telematic performances. The focus group results and observational data corroborate this, emphasizing the emotional impact and sense of adventure that characterize artists' experiences in telematic settings.

Furthermore, the paper offers a unique perspective on audience engagement in telematic performances in the EDM scene. It posits that these performances fundamentally redefine the landscape of audience interaction, transcending traditional paradigms to introduce new complexities and opportunities. The digital medium serves as both an instrument and a context, shaping the ways audiences interact with the performance and with each other. This reconfiguration is not merely a technological extension but reflects broader shifts in societal understanding of art, engagement, community, and culture.

The study acknowledges the challenges posed by the lack of liveness in telematic performances, particularly the absence of physical proximity between the artist and the audience. However, it suggests that even these challenges can be turned into elements of unpredictability and surprise, adding complexity to audience engagement. The emotional impact of music, deeply intertwined with psychological and cultural contexts, can be leveraged to establish a new form of liveness that is socially constructed through digital interaction.

The "Beyond Time and Space - London Tokyo Online 2023" event serves as a comparative paradigm that challenges and expands our understanding of live performances in the digital age. By shifting the focus away from control and towards collaboration and emergence, it provides a roadmap for future explorations in this exciting and rapidly evolving field. The paper underscores the profound meaning that such collaborative performances can hold, highlighting the degree to which individual artists can engage interactively with each other. As we move forward in this digital era, telematic performances offer a compelling model for how technology can be harnessed to foster global artistic collaborations, enrich audience experiences, and redefine the very essence of live music performances.

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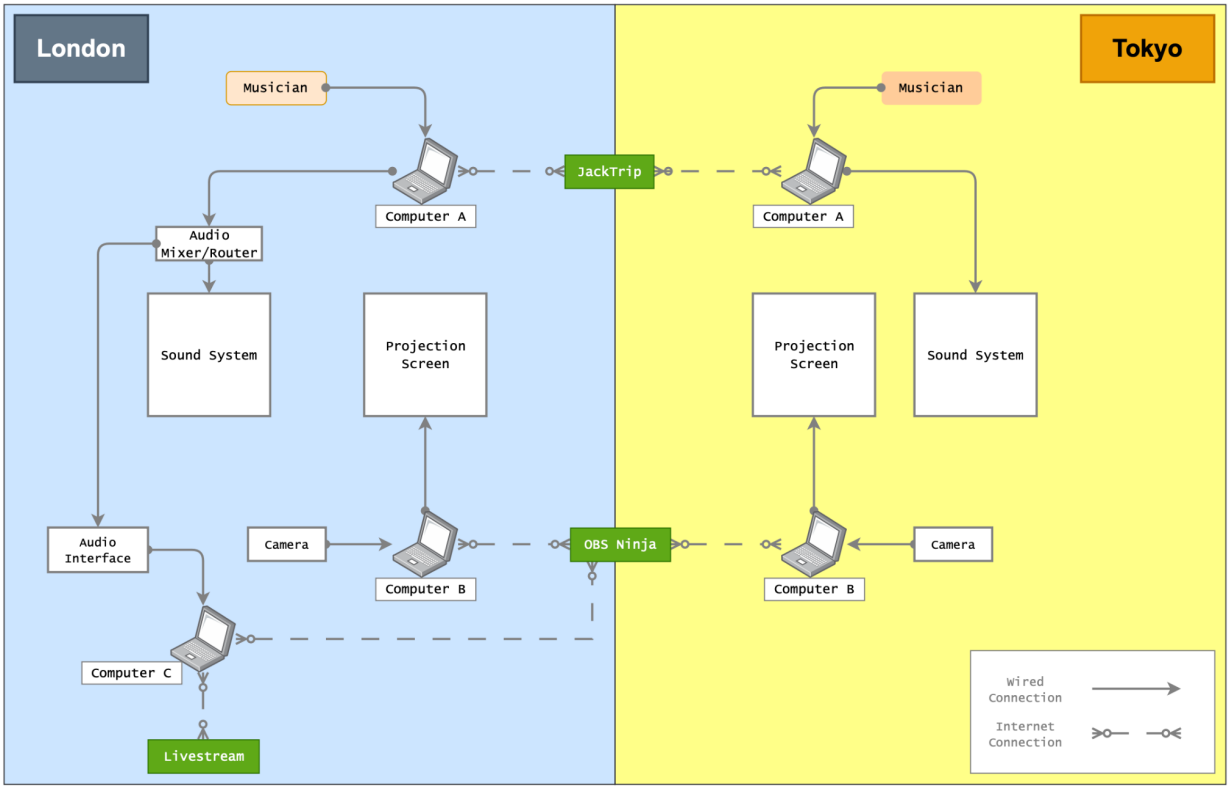
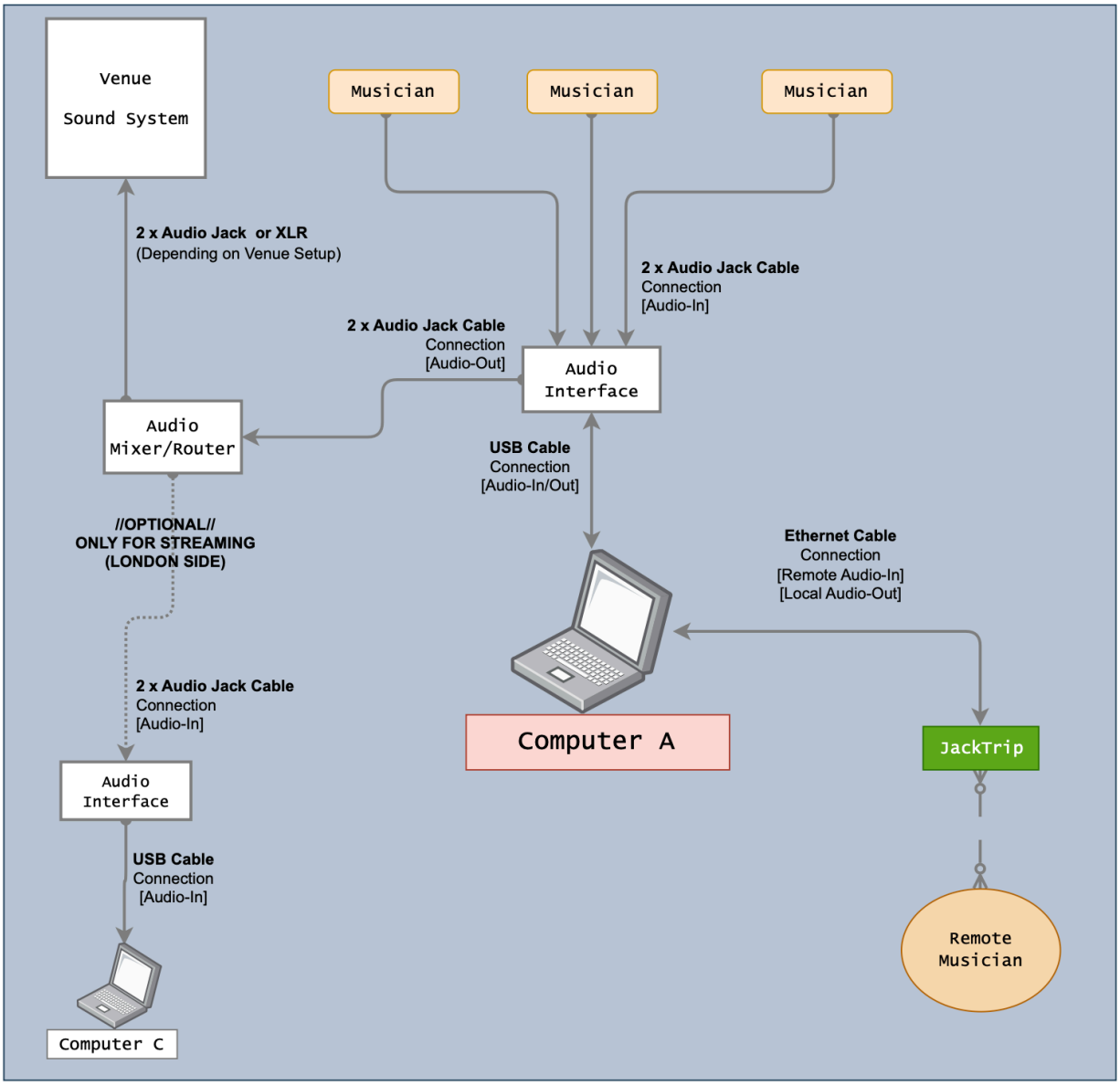
Appendix



Beyond Time and Space - London Tokyo Online 2023, Tech Rider 1



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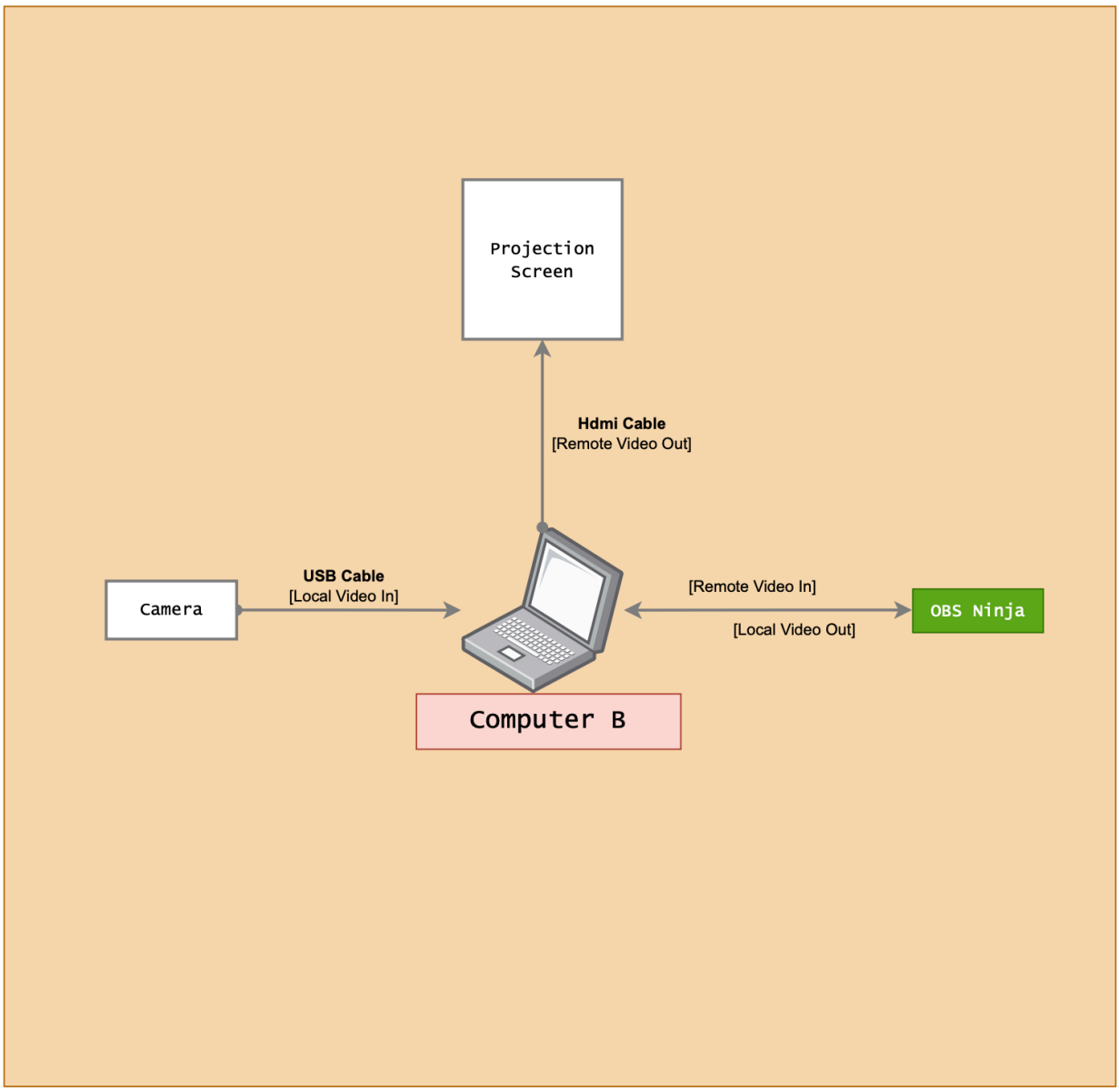

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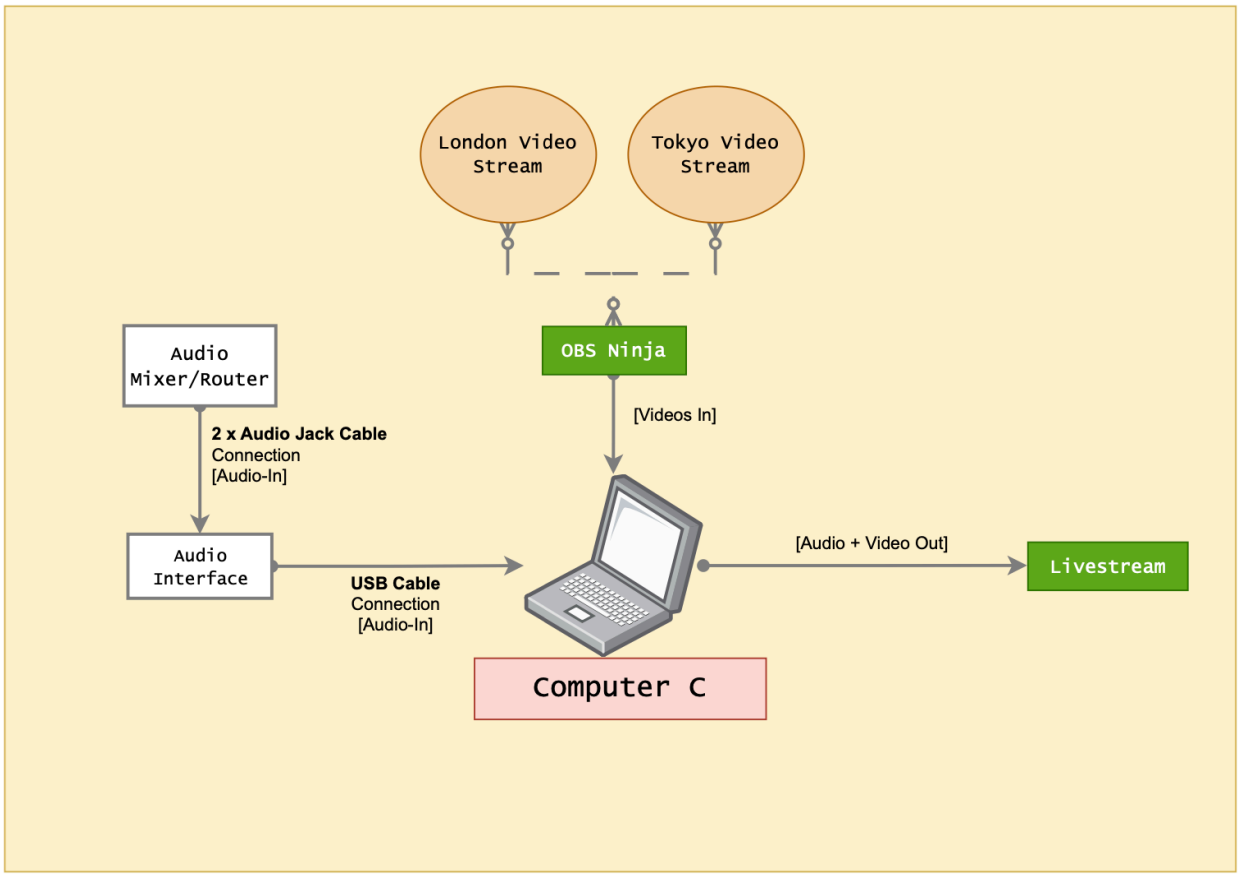

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