

## Distributed Networks of Listening and Sounding: 20 Years of Telematic Musicking

Doug Van Nort  
vannort@yorku.ca

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# Distributed Networks of Listening and Sounding: 20 Years of Telematic Musicking

DOUG VAN NORT<sup>1</sup>

## Abstract

This paper traces a twenty-year arc of my performance and compositional practice in the medium of telematic music, focusing on a distinct approach to fostering interdependence and emergence through the integration of listening strategies, electroacoustic improvisation, pre-composed structures, blended real/virtual acoustics, networked mutual-influence, shared signal transformations, gesture-concepts and machine agencies. Communities of collaboration and exchange over this time period are discussed, which span both pre- and post-pandemic approaches to the medium that range from metaphors of immersion and dispersion to diffraction.

## Introduction

It has occurred to me recently that early 2023 marks my 20<sup>th</sup> anniversary of performance and compositional practice in the realm of telematic music. During this time period I have almost exclusively kept to the realm of practice with regards to telematics and have not written much about this work. I have spent much time writing about areas that I feel encircle important issues of telematic music practice including instrumentality, digital/electronic instrument design, performance practice in the context of electroacoustic improvisation, AI and machine improvisation, noise, and more recently epistemological issues surrounding sound/technology/performance,<sup>2</sup> but telematics itself has somehow largely escaped my scholarly focus until now. Some of these past telematic music performance practices have been noted in the margins of some foundational writings on the subject.<sup>3</sup> However, there are distinct throughlines that are not captured by these notes. As such, this article is focused on looking back at past pieces in order to trace these throughlines with respect to a coherent

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<sup>1</sup> DisPerSion Lab, York University, Toronto, ON. vannort@yorku.ca.

<sup>2</sup> See [dvntsea.com/writing](http://dvntsea.com/writing).

<sup>3</sup> Pauline Oliveros, Sarah Weaver, Mark Dresser, Jefferson Pitcher, Jonas Braasch, and Chris Chafe, "Telematic music: six perspectives," *Leonardo Music Journal* 19, no. 1 (2009): 95–96. Pauline Oliveros, "Networked Music: Low and High Tech," *Contemporary Music Review* 28, no. 4–5 (2009): 433–435. *ibid.*, "Reverberations: eight decades," *Jefferson Journal of Science and Culture* 2 (2012): 41–55. *ibid.*, "From Outside the Window: Electronic Sound Performance," in *The Oxford Handbook of Computer Music*, ed. Dean, R.T. (Oxford: Oxford University Press, 2011): 467–472. Sarah Weaver, "Synchrony: Music of Sarah Weaver and Collaborations (2006–2019)," *Journal of Network Music and Arts* 2, no. 1 (2020): 6.

approach to several factors: engaging not only the technological affordances of the medium<sup>4</sup> but also the sonic affordances, integrated compositional approach to the dual concepts of telematic and networked music,<sup>5</sup> audience participation, a shared signal/feedback approach that is exemplary of something that I call “intersubjective resonance,” and the ways that all of these factors of the telematic medium both engender and require an approach to “distributed listening” as discussed in Van Nort 2016.<sup>6</sup>

## Awakenings

My beginnings in telematic music were concurrent with—and thus deeply intertwined and co-emergent with—my training and practice in Deep Listening.<sup>7</sup> They also paralleled my move away from a purely studio approach to composition and towards an interactive one, developing an electronic music improvisation practice and instrumental system in the process. I first met Pauline Oliveros in December 2001 during the first year of my MFA studies at RPI, and in Winter 2002 subsequently worked on interactive installation pieces that were integrated into *Library of Maps: An Opera in Many Parts*. This Oliveros/Roth collaboration spanned Troy, NY and Oakland, CA and included a cross-country simultaneity of events, and so the sense of geographic reach across time and space was embedded in our own collaborations from the start. I also began serving as a research assistant to Oliveros, as well as teaching assistant for her Deep Listening class. This would eventually evolve into a situation that would happen a number of times over the years: namely, my teaching the Deep Listening class while Oliveros herself sat in as another participant, later giving me feedback and comments on the facilitation—perhaps a unique experience in the context of Deep Listening certification training. This began a very close, sustained 15-year collaboration with Pauline Oliveros as mentor, then also friend as well as artistic and scholarly collaborator.

As a follow-up to *Library of Maps*, one year later in January 2003, we began working on a mixed-media telematic piece, using the still-new Internet2 high-speed infrastructure, to link RPI with collaborators at Cal State University Hayward in California, facilitated by Scot Gresham-Lancaster. Brian Lonsway and his architecture students created 3D scenes to be placed in the shared virtual space via green screening. I was joined at RPI by vocalist Myriam Hammani, and Mills students Anne Hege and Tadashi Usami, as well as dancers from Mills, that participated on the California side. For the resultant concert in early April 2003, we settled on the title *Peerings*, to evoke a sense of peering through a portal at a distance—which certainly was descriptive of the feeling of the medium of the day

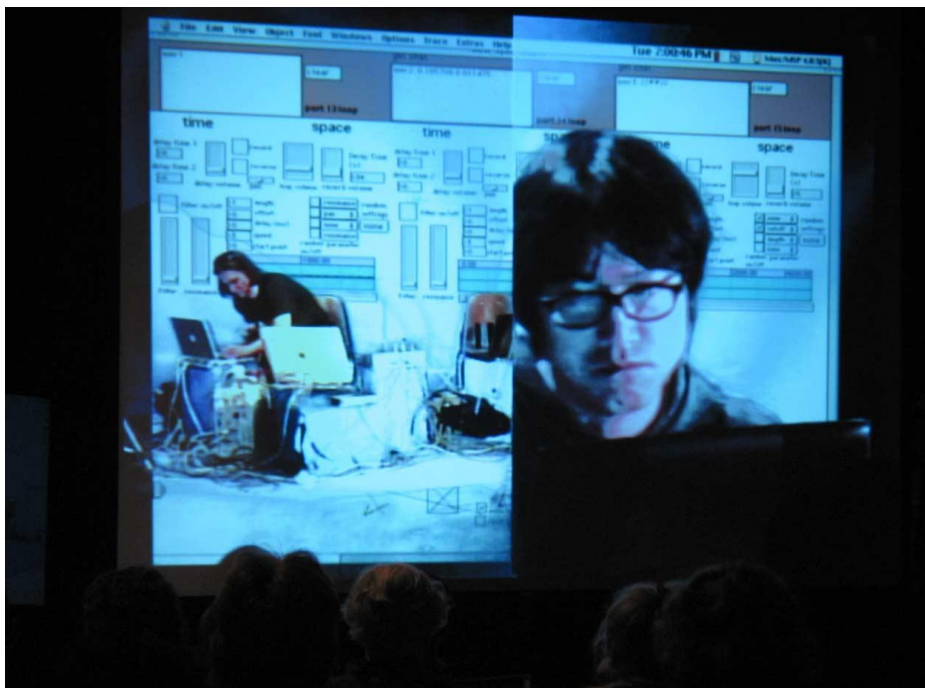
<sup>4</sup> Jonas Braasch, “The telematic music system: Affordances for a new instrument to shape the music of tomorrow,” *Contemporary Music Review* 28, no. 4-5 (2009): 421–432.

<sup>5</sup> The distinction between these two concepts is discussed further in Eric C. Lemmon, “Telematic Music vs. Networked Music: Distinguishing Between Cybernetic Aspirations and Technological Music-Making,” *Journal of Network Music and Arts* 1, no. 1 (2019): 2.

<sup>6</sup> Doug Van Nort, “Distributed listening in electroacoustic improvisation,” *Leonardo Music Journal* 26 (2016): 35–38.

<sup>7</sup> Cf. “About Deep Listening,” The Center for Deep Listening, accessed February 27, 2023, <https://www.deeplisting.rpi.edu/deep-listening/>.

(despite the best-possible internet connection) and available technologies,<sup>8</sup> and was further amplified by the Maya 3D worlds which extended a sense of disembodied screen-glancing. Within this project were a number of pieces. In addition to contributing music to a dance piece, I focused energies on a duo collaboration with Usami. Entitled *Awakenings*, this piece brought together a shared-instrument networked music approach to telematic musicking, including audience participation as part of this process. For the piece, a simple-yet-elegant Supercollider synthesizer (created by Usami with modest additions by myself) allowed us to mutually control tempo and key changes while individually shaping tones. Inspired by this sense of shared sounding, I wished to extend this and so created the Peeringscope in Max/MSP, a simple patch that would allow up to three audience members to control what I called “time and space” by capturing our sound and looping/mixing this into the performance, as well as reverb for the shared sounds. A split screen shot of myself and Usami during this performance, with Peeringscope presented in the background, is depicted in Figure 1. The audience participation was projected so as to clearly express the agency and influence of the audience’s contribution to all viewers at the two sites. Aside from being a minor miracle to get all of this working with the given firewalls and technological infrastructure, as I discussed in Van Nort 2016,<sup>9</sup> this piece brought together two distinct approaches that I recognize in broader electroacoustic improvisation (EAI) practices and which persist for me into current works: a distributed approach to the act of creating compositional structures, and the act of sharing sonic gestural influence via shared signals, in this case by opening the metaphorical circuit to include the audience.



**Figure 1:** Performance of piece *Awakenings* by Doug Van Nort and Tadashi Usami, April 2003.

<sup>8</sup> This included a Vbrick multicast system for the networking between sites.

<sup>9</sup> Van Nort, "Distributed listening in electroacoustic improvisation."

## Re-Awakenings

In 2004 the pioneering network music band The Hub<sup>10</sup> decided to re-form after many years, at the invitation to do a featured performance for the Dutch Electronic Arts Festival (DEAF). Building upon the energy and success of Peerings and Awakenings, I was invited to perform in the concert along with The Hub and Tadashi Usami. I played in two pieces: an updated version of the Supercollider piece from Awakenings<sup>11</sup> and a new mutual-influence networked piece by Chris Brown. In contrast to the Peerings event where I performed from a green-screen studio and was projected to dual audiences next door and in California, in this case I simply performed from my apartment in Montreal, using headphones and no web camera. All audio was generated via synthesis at each performance site, with OpenSoundControl messages being shared between performers. Much as I primarily learned about Deep Listening and Pauline Oliveros' work through direct studies and later collaboration with her, rather than reading about it in books, at this time I knew very little about the Hub and their influence on networked music and future practices such as the laptop orchestra model.<sup>12</sup> Rather, it was direct collaborative encounters such as DEAF 04 that gave me firsthand experience of the unique nature in which co-dependent actions and parameter sharing lead to a unique aesthetic and a sense of emergent, distributed composition. Another thing that the DEAF event illuminated for me was that I could be sitting in my studio in Montreal, in shorts and with no visual feedback, yet there could be a large audience in Rotterdam that would experience a greatly magnified sonic result of my actions in concert with the other performers. This type of laptop-ensemble performance that The Hub pioneered is so very disembodied and opaque. In any setting it requires the listener to decide how to negotiate meaning, intention and engage with "who's playing what"—or whether to decide to care about this at all. Adding in players from around the globe can be seen as exacerbating this issue of understanding musical voice and causality. At the same time, experiences such as DEAF 04 and many since cause me to consider that the telematic medium can be perfectly suited for this kind of work, as these questions are already in play for all listeners, both audience and performer—thus there is already a "complex network" schema in place—and so it becomes a natural extension to widen the distributed listening further. That said, the potentially massive gain of digital electronics—in terms of volume, yes, but also other various chains of causality—requires a heightened sensitivity of all performers in navigating multiple technological infrastructures (both audio and networking)<sup>13</sup> and being able to project one's listening into another venue. Building upon these early telematic experiences as well as EAI practice and Deep Listening training, this phenomenon of distributed listening has continued to operate in my work as a centralizing compositional principle. In practice, as will be discussed in upcoming examples, this manifests through a combination of listening and attention strategies (expressed in text/graphic scores), shared signal

<sup>10</sup> For a discussion of the history and significance of The Hub see Scot Gresham-Lancaster, "The aesthetics and history of The Hub: The effects of changing technology on network computer music," *Leonardo Music Journal* 8, no. 1 (1998): 39–44.

<sup>11</sup> Usami and I had also performed this piece a second time prior to DEAF, along with two other performers, at the Supercollider Summer School in 2004 at STEIM, with performers connecting from Montreal, Tokyo, Oakland and Amsterdam.

<sup>12</sup> For more about laptop orchestras, see Dan Trueman, "Why a laptop orchestra?," *Organised Sound* 12, no. 2 (2007): 171–179.

<sup>13</sup> The technologies included the bi-directional networked OSC messages, synthesis at each site and audio systems at each site.

processing and mutual influence of musical structures. These seek to set up conditions for the emergence of distributed listening, the preservation of the creative agencies of every performer, and the sense of co-creation of sonic materials (or what I would call intersubjective resonance).

## 2005–2007: Transitionings

The period of 2005–07 saw me intensively engaging in doctoral research that focused on instrument design, questions of mapping, and the intersection of post-Schaefferian music theory and sonic perception. This helped me to expand upon my early 2002–03 GREIS system, for improvised electroacoustic performance.<sup>14</sup> Performance with this system, particularly in ensemble contexts, has greatly informed my subsequent practices in telematic music. Meanwhile, Oliveros had kept me updated on the developments happening at RPI that built upon our 2003 collaboration and would come to be defined as a collaborative exchange called the Telematic Circle.<sup>15</sup> I engaged in several collaborations during this period involving Oliveros and others, with new sites and partners which afforded me a new creative context to explore and create new compositional and performative systems. In particular, there was an important confluence of events and pieces that reinvigorated and gave context to further articulate my two distinct approaches to networked/telematic musicking.

In 2005 Oliveros invited me to perform in a concert with her and Zack Settel, which would link RPI and the Société des Arts Technologiques<sup>16</sup> in Montreal and have small audiences in studios on both sides. For this event we were to have 8 channels of high-quality audio transmitted in both directions. This was notable as it was in the days before JackTrip, the current standard for high-quality and low-latency multi-channel audio, was readily available.<sup>17</sup> Also notable for the day was engaging a cross-border high-speed network that required a “handshake” between the U.S.-based Internet2 and Canadian Canare networks, with one site (the S.A.T.) being an independent arts organization and thus not having the massive infrastructure and staffing of a university setting. I was not involved in the low-level<sup>18</sup> system administration required to make this work, but I do recall a lot of back-and-forth, frantic calls and tests leading up to the event, with some degree of uncertainty about it all working. These frantic preparations happened right up until showtime, and as part of the improvisational decision-making I needed to adapt my setup to the network realities. For my part, I had been developing my performance system towards an ability to be flexible for improvisation, which included the ability to do real-time<sup>19</sup> transformation of live sounds as well as to output sound in four channels. For this concert,

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<sup>14</sup> Doug Van Nort, “Multidimensional scratching, sound shaping and Triple Point,” *Leonardo Music Journal* 20 (2010): 17–18.

<sup>15</sup> Oliveros et al., “Telematic music: six perspectives,” 95–96.

<sup>16</sup> For more information see <https://sat.qc.ca/>.

<sup>17</sup> Cf. Juan-Pablo Cáceres and Chris Chafe, “JackTrip: Under the hood of an engine for network audio,” *Journal of New Music Research* 39, no. 3 (2010): 183–187.

<sup>18</sup> This term is meant in the systems theoretic sense of being very close to the fine-detail level of operations on the signals and network functioning vs. more abstracted design aspects of signal flow, not in any sense of social hierarchy.

<sup>19</sup> Note that in the context of this discussion, “real-time” refers to activities that are perceived as happening in the present moment, in contrast to actions or ideas that are pre-planned or which require longer time delays between action and result.

these transformations included taking a live feed from Settel's saxophone as well as live feeds from Oliveros' accordion via the network. The presence of eight channels allowed me to receive direct feeds from Oliveros while also allowing her to feed spatialized sound from her EIS system.<sup>20</sup> The technology ended up working well, and I recall a strong sense of listening, connection and resonance from the trio that I believe was greatly amplified by this particular immersive, shared-signal topology.

What really struck me was that in this immersive situation as we sat inside a ring of speakers, blending with Oliveros' incoming sound, we were constructing a virtual space that was distinct from the acoustic realities of either of our spaces, and that another virtual space was constructed by Oliveros in her respective ring of speakers. Moreover, it became clear that my live-transformations and re-injection of content into performance space from both "sides" of the performance created a bridge that interpolated and morphed between these two virtual spaces, blending them to become a single coupled virtual space. Much has been written about either "overcoming" latency in the telematic medium or playing with it as a compositional parameter,<sup>21</sup> but I think it is worth reflecting on how EAI is uniquely suited to and perhaps even flourishes in this telematic medium. In particular this builds upon ways that EAI performers need to negotiate emergent sonic meaning on multiple time scales, closing one's eyes and listening into the "abyss" of this collective mass for voices-in-sound. There is already a "distancing" at play in EAI due to amplification, spatial displacement of one's sound source, and lack of direct action/sound causality that obscures sound source and temporality of initiating gestures, which requires performers to guide their actions by a listening-in-search to their resultant electronics (or amplified acoustics) in the context of the larger sound field. It is already a kind of co-constructed emergent space that translates smoothly to telematics, and I have found that metaphorically reaching across the divide by transforming and playing with remote signals further integrates the sense of connection from distant sites. This 2005 event was a first for me regarding this distant-transformation practice, and I have integrated this into performances many times since then.

In 2006 I invited composer Kim Cascone to McGill University in order to conduct a workshop. Inspired by John Maeda's "Human Powered Computer Experiment,"<sup>22</sup> the format applied a simple genetic algorithm process and the metaphors of crossover, mutation, mating, etc. to generate an emergent pool of sound materials by splicing and swapping soundfile fragments. I named this group of fifteen participants the Montreal Genetic Laptop Orchestra,<sup>23</sup> and we performed our co-created materials in concert with Cascone at the SAT in Montreal. Inspired by this experience, I decided to push

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<sup>20</sup> For more about the EIS system see David Gamper and Pauline Oliveros, "A performer-controlled live sound-processing system: New developments and implementations of the expanded instrument system," *Leonardo Music Journal* 8, no. 1 (1998): 33–38.

<sup>21</sup> E.g. Michael Rofo and Federico Reuben, "Telematic performance and the challenge of latency," *Journal of Music, Technology & Education* 10, no. 2-3 (2017): 167–183.

<sup>22</sup> This performative experiment took place in Nara, Japan in 1993. For documentation see "Human Powered Computer Experiment," John Maeda, accessed April 24, 2023, <https://vimeo.com/2745677>.

<sup>23</sup> MGLO predated the Princeton Laptop Orchestra, and perhaps was one of the earliest uses of this construct/terminology.

this working method much further and develop a suite of pieces based on this format that I called “Genetic Orchestras,” with algorithms applied to gathering human “fitness” ratings and selecting material for mating. Compositional rules included constraints on how crossover of files could occur (e.g. cross-synthesis methods in one piece, or N number of chopped-up and re-assembled files in another), and how and when mutation of sound file fragments could occur (e.g. certain types of distortion, reverb, time-stretching). The resultant pool of files are then performed with a software instrument I had created, which further defines the types of performance actions and sound worlds that are possible in different sections of a given piece.

In 2007 the Deep Listening Convergence<sup>24</sup> event brought together 45 invited artists in a “virtual residency” of online-based collaboration (using Skype or iChat a/v) for a six-month period, followed by a three-day festival of in-person concerts. As one of the participating artists, it occurred to me that my newly-developed Genetic Orchestra project would be perfectly suited to this context. It maintained the emergent, collectivist spirit of EAI as discussed previously (albeit in an out-of-time context), but the shared pool of sound files presented its own kind of virtual space that paradoxically could be thought of as the “real” sonic space. That is, each participant has access to the same ground truth of sonic content, to compare this reality to a very drastically different, low-fidelity reality of performing over Skype (particularly in 2007). Given that the final performance was to be presented in a co-located space at the Lifebridge Sanctuary in High Falls NY, I decided that it would make sense to offer a piece whose sonic materials were not fundamentally mediated by Skype audio, but rather persisted through time and space to the final venue; I called the piece DLCGO: Deep Listening Convergence Genetic Orchestra.<sup>25</sup> Eleven performers took part in the months of rehearsals and final performance, which followed cycles of rating/mutating/rehearsals/repeat. The simple technologies employed allowed for a low barrier of access for participants who didn’t have a computer music background (e.g. at least one performer bought a laptop to take part in the piece). The low bandwidth and wide accessibility of Skype, coupled with the open source tools and laptop-and-headphone approach for the piece meant that performers chose to connect from a very disparate set of locations: a home studio, a coffee shop, a cottage in the mountains, an office space, etc. Background noises coupled with intense distortions and compression from Skype meant that each participant and each session were multi-prismatic, with a very distinct set of sonic realities. That said, the presence of a compositional framework and a shared set of sound files meant that there was a coherent template that could be compared against the noise of any one rehearsal session and could thus synchronize our collective sonic imaginations.<sup>26</sup> While I have always been more attracted to the sensual, concrete nature of what John Cage would call “sound itself” as compared to the abstract representations of notes on a page, this Genetic Orchestra compositional structure has been well suited to the Telematic context by grounding participants in the real, lived

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<sup>24</sup> Cf. <http://www.mediateletipos.net/archives/6168>.

<sup>25</sup> An excerpt can be listened to here: <https://soundcloud.com/dvntsea/dlcgo>.

<sup>26</sup> This is in the spirit of how Sarah Weaver refers to “synchrony” as a means to align collective awareness in time and space, though here in a distinct manner with multiple timescales beyond the moment of performance.



experience of listening to the same sonic realities while also centering attentions to a higher-level, abstracted notion of organized sound that transcends any one performance space while still emerging from these materials. Motivated by such experiences, I continue to consider new ways of balancing these concrete and abstract approaches in composing for the telematic medium.

Also notable from this experience, the low-tech accessibility of the piece and the file-sharing aspect led to a strong sense of community engagement, as well as a diverse pool of performers, and is something that I continue to consider in developing both compositional frameworks and their related technologies for a given piece. The sense of connection and community persisted, with participants taking part in multiple versions of the project, with continual online evolution of the work from the Convergence event up until a telematic performance at the 2007 International Society of Improvised Music (ISIM) at Northwestern University. From this point the piece branched out to different communities of practice, including several different pieces in this series (which have continued to be performed) that were created for laptop ensembles directed by composer Paula Matthusen, including the Florida Laptop and Electronic Arts (FLEA) Ensemble in Miami and the TONE laptop ensemble at Wesleyan University in Connecticut.

### **Community, Technology, Accessibility**

The DLCGO and subsequent experiences raised issues for me that I feel still bear consideration in telematic music productions. There is a wonderful and paradoxical localness (despite the geographical remove) to much work in the medium in the sense that many people working in it are very closely connected socially, with new approaches and collaborations having spread amongst long-time friends and colleagues, as can be seen by such initiatives as the Telematic Circle. Case in point, I developed a close connection with Pauline Oliveros that led by association to collaborations with Sarah Weaver, Chris Chafe and others, while the Peerings project with Gresham-Lancaster had me working with The Hub before I even fully knew their long history.

On the other hand, there is an inherent danger in the field perpetuating the need for “insider” status, both in terms of social connections as well as technological access. Certainly there exists consciousness of this and good work being done to address it, as well as advances in accessible technologies since 2007. That said, I feel that the need for mindfulness of this issue remains, lest the telematic medium mirror and import many of the broader issues of class and access that continue to plague contemporary society. While I certainly don’t have an answer to this complex set of issues, as one attempt to at least engage it, in recent years I have developed a Canadian Social Sciences and Humanities Research Council (SSHRC) funded project entitled “Connecting Communities Through Telematic Music,” as I will discuss in a later section on “Dispersions.”

## Acoustic Transparency and Coupled Spaces

In the context of the kind of work that I describe here, which merges EAI and a sound-focused approach to musicking,<sup>27</sup> integrated composition/improvisation strategies, electronic mediation/processing and both signal and musical parameter “sharing,” I feel that the most interesting perspective is not one of overcoming or circumventing the differing low-vs-high tech telematic qualities such as latency, compression and related timbral changes. Rather it is about differing “flavours” that an ensemble works with and incorporates into their listening strategies, not unlike adapting to an audio system, a microphone, a room. That said, when low-latency and high-quality transmissions become possible, there can be a level of transparency of captured/transmitted sound that opens up new possibilities to hear and play with the acoustic realities of multiple, dispersed performance venues. It is now well-documented in the field that JackTrip facilitated this possibility for telematic music beginning in the mid-2000s, and in 2007 at the International Conference on Auditory Display (ICAD) we engaged this in a featured performance that played with multiple real and virtual spaces. In this context (a major source of focus in future projects, as discussed in later sections), I refer here to a “real” and “virtual” duality in the sense of performer or audience perceptions of an actualized place—“here”, “there”, etc.—in contrast to a constructed “somewhere else” that does not exist outside of the network or in any physical location. In the context of the ICAD performance, in addition to a large number of production and technical crew on all sides and a video artist blending virtual scenery, performing from McGill University in McGill were Pauline Oliveros (accordion), Doug Van Nort (electronics), Jonas Braasch (saxophone) and Jefferson Pitcher (guitar). At RPI in Troy, NY were Bobby Gibbs (clarinet), Dan Valente (violin) and Elizabeth Karp (harp), at KAIST in South Korea was Chris Chafe (Celletto), and at Stanford University was Juan Pablo Caceres (synthesizer). Each of these sites were spatialized using the newly-developed ViMiC spatialization system,<sup>28</sup> integrating all sites in a blended, virtual space on the Montreal side, which was framed as the “main site” for the performance.<sup>29</sup> I performed electronics that also included processing of other performer’s signals, furthering the construction of a shared virtual space. Unique to this concert, and true to the theme of acoustic display, as part of Braasch’s sonic design concept the audience were also given wireless, open-back headphones that provided perspective from the viewpoint of a binaural dummy head that was placed near the stage in Montreal (Figure 2). This multi-site take on blending real, coupled spaces into a simulated virtual space, and the ability to play with multiple acoustic perspectives was facilitated by the transparency of the cutting edge network arts technologies of the day (JackTrip as well as UltraGrid for video).

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<sup>27</sup> Christopher Small, *Musicking: The meanings of performing and listening* (Middletown: Wesleyan University Press, 1998).

<sup>28</sup> Nils Peters, Jonas Braasch, and Stephen McAdams, “Sound spatialization across disciplines using virtual microphone control (ViMiC),” *Journal of Interdisciplinary Music Studies* 5, no. 2 (2011).

<sup>29</sup> “Tele-Colonization [liner notes],” accessed February 27, 2023, [https://www.deeplisting.org/site/sites/default/files/downloads/TeleColoniztion\\_LinerNotes.pdf](https://www.deeplisting.org/site/sites/default/files/downloads/TeleColoniztion_LinerNotes.pdf).



**Figure 2:** Image of Van Nort, Oliveros and Pitcher performing during rehearsal for ICAD 2007 performance. Binaural dummy head can also be seen on stage.

### **2008–2013: Triple Point, Quartetto Telematico, Networked Agency**

The ICAD performance was the start of discussions with myself, Oliveros and Jonas Braasch about a grant project that would bring together telematics and artificial intelligence. This would lead to two successful National Science Foundation grant projects that would bring me to RPI as a Postdoctoral Research Associate. Rather than “plug in” some research work to an overarching design, very true to my approach and to that of Deep Listening and Pauline Oliveros, the work that I developed in the context of this project instead emerged from weekly improvisation sessions as generators of ideas. Building on the telematic sessions in 2005 and 2007, I decided to forgo any sample-based materials for my GREIS system and take on the challenge of starting from a “blank slate” to draw signals from other performers on the fly while transforming this source material to serve as my own clear performative voice, a practice that I have discussed in detail in Van Nort 2010.<sup>30</sup> Our co-located trio would come to be called Triple Point, and these weekly sessions would often include Chris Chafe on celletto (whose sound I would also draw from), wherein we would refer to ourselves as Quartetto Telematico. This group performed weekly for five years and continued beyond this, producing five albums of music, including

<sup>30</sup> Van Nort, “Multidimensional scratching, sound shaping and Triple Point,” 17–18.

*Phase/Transitions* which also features several tracks with the telematic quartet.<sup>31</sup> Given the cross-coupled and mutual-influence nature of the performance setup, this Triple Point configuration required a heightened awareness of all sonic gestures and a need to listen “through” the layers of sonic processing and chain of causalities. This approach to distributed listening was further intensified in the quartet configuration, with Chafe performing with no video and multi-channel cello signals being both spatialized as well as transformed and returned into the sonic network of activity. As these sessions progressed, it became clear to me that the most interesting integration of artificial intelligence was to amplify this sense of distributed agency<sup>32</sup> by modeling my approach to listening and musical transformations, leading to the design and creation of my machine improviser FILTER system<sup>33</sup>—which became a fourth member of Triple Point. This group served as an important creative context to explore interdependent musicking in the telematic context. I’ll briefly discuss several notable examples from the period of 2008–2014.<sup>34</sup>

### **Triple Point, Double Trio at Sonorities Festival (2008)**

This first telematic concert for Triple Point featured a sextet improvising telematically using JackTrip for audio and Skype for visual networking. This was one of the only times we three were in the same location in the context of a telematic concert. While we performed dozens of concerts together in the same space as a trio, in the telematic context it was much more common for us to be dispersed geographically, typically including other performers as in this 2008 concert.

### **Quartetto Telematico, Latent Sea at Casa da Musica (2009)**

This concert was curated by Evan Parker, Nic Collins and Pauline Oliveros, and included two other telematic pieces—a duo involving Parker and Disparate Bodies by Pedro Rebelo. This first public performance featuring Quartetto Telematico was an early opportunity for me to compose software structures that would allow the four of us to improvise within and nonlinearly traverse different musical states in performance. The algorithms were early prototypes of an interactive system driven by sonic gesture recognition,<sup>35</sup> that would eventually become part of the FILTER system. There was also a kind of “sleight of hand” that played with the veracity of performance space/time: we projected a recorded video of Pauline Oliveros performing accordion, and the agent system’s recognition of Chafe’s daxophone playing was used to jump to pre-set sync points in the video. What felt visually like a sense of network glitch was in fact nonlinear jumping in video playback, which also faded between accordion

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<sup>31</sup> Triple Point [Pauline Oliveros, Doug Van Nort, and Jonas Braasch], *Phase/Transitions*, Pogus Productions 21078-2, 2014, <https://dvntsea.bandcamp.com/album/phase-transitions>.

<sup>32</sup> Or as Oliveros referred to it, “interdependent interactivity.” Oliveros, “Networked Music,” 433–435.

<sup>33</sup> Doug Van Nort, Pauline Oliveros, and Jonas Braasch, “Electro/acoustic improvisation and deeply listening machines,” *Journal of New Music Research* 42, no. 4 (2013): 303–324.

<sup>34</sup> See appendix for details about the following performances.

<sup>35</sup> Doug Van Nort, Jonas Braasch, and Pauline Oliveros, “A system for musical improvisation combining sonic gesture recognition and genetic algorithms,” in *Proceedings of the 6th Sound and Music Computing Conference*, ed. Gouyon F, Barbosa Á, and Serra X, (Barcelona: Sound and Music Computing, 2009): pp. 131–136.

audio playback points. Meanwhile, Oliveros was actually in Dartington, UK performing with us (without video) over Skype, playing accordion and iPhone synthesizer. I transformed (via GREIS) both Oliveros' recorded and live signals, in order to interpolate time and space and blend the different temporal and timbral realities of the different mediums.

### **North South Currents (2010), Guelph Jazz Festival**

While the Guelph Jazz Festival was the context for this event, this three-site improvised telematic performance was interesting for the equal attention to staging and audience presentation for all sites, and the performance was also aligned with the Nuit Blanche public art event in Bogotá. The EMPAC audience perspective can be seen in Figure 3, and it is clear that the visual cues were primarily for the audience, while we musicians focused on engaging in the expanded sound field. This concert afforded me the opportunity to explore an expansion of my practice of transformation-at-a-distance, working with incoming streams both locally, from Guelph (accordion and cello) and from Bogotá. This enhanced the sense of both call-and-response across sites as well as multidimensional layering of differing spaces and temporalities.<sup>36</sup>



**Figure 3:** Three-site Telematic Performance at 2010 Guelph Jazz Festival.

<sup>36</sup> An excerpt can be found here: dvnt sea, "Telematic Performance at Guelph Jazz Festival," Vimeo, November 18, 2011, <https://vimeo.com/32304999>.

### **Triple Point and Filter, Distributed Composition #1 at NIME (2011)**

This composition was created for Triple Point, FILTER, and the telematic medium. The title of the piece refers not only to the physical distribution of the human players, but also to the distributed musical cognition between human and machine—making it a distributed composition in several senses of the word. The FILTER system itself had a hand in composing the structure in that it acted as conductor, determining when a member of the quartet would have the option of playing. I defined a set of musical states that populated the possible combinations of players and types of sonic transformations (and spatial gestures) that the system would enact. Spatialization was used to express the sonic agencies of each player: the local and remote human players were presented on stage, and their sound was localized to the stage, while FILTER was only present in the surrounding eight channels of audio. My sense of this piece and performance were that they offered one step towards advancing the dialogue on distributed approaches to composition—as a non-hierarchical mode of engagement and planning between human performers as well as between human and machine performers, where each is potentially located in disparate geographical locations.

### **Telematic Performance at Net-Music 2013: The Internet as Creative Resource in Music (2013)**

This performance, taking place in the context of a symposium on telematic music, was fully online and thus had no physical locus of audience for which to construct a blended real/virtual venue. Within the context of this keynote we arrived at a structure that would offer variation and strategies to showcase the different “voices” present for a dispersed audience. The performance began with a Chafe/FILTER duo, which transitioned into a Quartetto Telematico section, and moved into a full ensemble realization of the piece *Four6* by John Cage (which was dedicated to Oliveros for her sixtieth birthday), adapted to seven players. The first two sections allowed for a kind of discursive unfolding of the sonic agencies of human/machine players while allowing for theme and variation of sonic materials. The integration of the Cage piece allowed for layering and multiple timescales through the piece’s use of flexible time brackets and provided the attentional challenge of maintaining consistent dynamic and tone in the imagined “meeting place” of the network.

### **Quartetto Telematico at Frontiers Festival (2014)**

The final performance for this specific quartet configuration occurred as part of the Frontiers Festival, with the festival audience in Birmingham. On the Montreal side (Figure 3) I had been working in the Hexagram black box and was able to design an immersive sonic-haptic context using 16 channels of spatialized sound and haptics using an overhead/under-foot system. I presented this performance as volume 3 of the “Topological Improvisations” series I was curating as a Postdoctoral Fellow at the

Topological Media Lab.<sup>37</sup> This approach to playing with telepresence through sonic/haptic immersion has since become central to my later telematic pieces.



**Figure 3:** Oliveros/Van Nort during Quartetto Telematico performance, Frontiers Festival, 2014.

### 2008-2013: Large Ensembles, Interdependence and Mixed Realities

In parallel to this professional, small ensemble performing context I joined the Tinnabulate ensemble at RPI, becoming Co-Director with Oliveros and Braasch. This pedagogical context served as a backdrop for larger ensemble experimentation with concepts of mixed reality in the telematic medium. Notable examples, among many others, include:

**2008:** A performance at EMPAC with the Avatar Orchestra Metaverse<sup>38</sup> that blended physical and virtual space (Figure 4). This afforded me the challenge of adapting my transformation-at-a-distance practice to sending and receiving from Second Life and blending real/virtual space.

<sup>37</sup> Cf. "T.I: Vol. 3: Quartetto Telematico," Topological Media Lab, accessed February 27, 2023, <http://topologicalmedialab.net/events/news-and-events/t-i-volume-3-quartetto-telematico/>.

<sup>38</sup> Cf. "Avatar Orchestra Metaverse," accessed February 27, 2023, <http://www.avatarorchestra.org/>.



**2009:** A two-site performance with Mark Dresser's ensemble at UC San Diego of the piece "Quasimodo the Great Lover" (1970) by Alvin Lucier. This prose piece states that it is "for any person who wishes to send sounds over long distances through air, water, ice, metal, stone, or any other sound carrying medium, using the sounds to capture and carry to listeners far away the acoustic characteristics of the environments through which they travel." In this telematic version, I acted as "sound/space mixer", receiving the signals from twenty performers at both sites and improvisationally sending these through varying spaces on the RPI side, including a large hall, a milk jug, and a stairwell, among others. There were surely two very distinct realities at the two concert sites; on the RPI side the sense of shifting spaces was very apparent in the mix, and this practice of sound/space mixing felt somewhere between conducting and high-dimensional shaping of sonic content.



**Figure 4:** Tintinnabulate and Avatar Orchestra Metaverse in "Mixed Reality" Performance, 2008.

**2012: Disorderly/Orderly**, a laptop ensemble composition performed by Tintinnabulate at the Arts Center of the Capital Region in Troy, NY. This piece brought together signal-sharing of group tempo and musical key (similar to Awakenings) and circuit-bent electronics. It also introduced a "human cyborg" performer who could be instructed by the audience in another space within the building to engage (or even interfere) in the performance, to dance, etc. Audience members were also allowed to come up to a computer located in the performance space running the software instrument, becoming a member of the ensemble. In this way, the piece played with a hyper-localized sense of expanded presence and with breaking down the "fourth wall" of audience-performer engagement. Shared influence of musical structure, as well as hand gestures and a text and graphic-based score, acted as a centering principle for performance actions.





**Figure 5:** Disorderly/Orderly, for networked ensemble and circuit bent electronics (left) and audience-controlled human cyborg (right), 2012.

External to these RPI-based ensembles, in this time period I began exploring telematic collaborations with other artists and ensembles. Notably, in 2011 I began a telematic collaboration with sound artist and composer/performer Judy Dunaway. Framed as a “Transmission Art Performance Project,” we were both located in the radio studio for WGXC/ free103point9 in Hudson, NY. We scanned the airwaves for radio signals and encouraged call-in sounds from the community, which we then improvisationally transformed and re-broadcast over the radio. Through this process, we explicitly invited the community to engage us “in the loop” of performance, which could have included notable feedback given our analog setup. In 2012 we greatly expanded this analog/digital cross-medium feedback exploration for the Network Music Festival in Birmingham, UK. Titled *DVNT and Dolly Do Birmingham*, we constructed a closed feedback loop that traversed Skype, Ustream and BlogTalkRadio, again injecting influence/transformation of sounds by ourselves into the loop. I was located in Troy, NY and Dunaway was in Boston, MA, while the results of the process were presented in four channels, with projected visualization of the process projected on an otherwise empty stage in Birmingham.

In 2013 I was invited by Matthew Burtner to create a piece for his MICE laptop ensemble at the University of Virginia, as part of the Zerospace Festival. I decided to further engage this sense of interdependence and co-creative emergence that the networked music paradigm can foster by creating a new piece, titled *Discursive/Dispersive*. I created a granular software instrument that could be performed by laptop players within the constraints of specific sound files and sonic presets. I then constructed a “conductor” software that could control the higher-level details of the performer patches as well as send text instructions and timing messages. In particular, each performer patch contained a genetic algorithm that drove granular synthesis, and my conductor role focused on controlling the rate and probability of mutation, evolution and transformation of the materials, allowing me to steer/influence the overall shape of the work while performers reacted to and contributed to the inner details of the piece. This brought a real-time sense of evolution and emergence that previously was enacted out-of-time in pieces like the genetic orchestras. I create a number of

pieces using this approach, including the non-telematic *On-to-genesis*, created for and performed with the Composers Inside Electronics at Roulette in New York, 2012.<sup>39</sup>

Finally, in 2010 I began performing in pieces by Sarah Weaver, both local and telematic. In the context of telematic works I have tended to continue engaging with themes related to transformation at a distance, and a sense of (very) distant listening. Each of my contributions to these projects have tended to work for me as a “piece within a piece”: they maintain compositional and performative integrity and stand on their own as creative works, yet need to function within the context of Weaver’s scores. This has included streaming and sonically transforming distant recordings of environmental soundscapes in an otherwise local concert at the Austrian Cultural Forum in New York and creating interactive and performable sonifications of NASA Kepler mission data related to habitable planets.<sup>40</sup> By themselves, the many local concerts we have done afforded me an opportunity to further my practice and musical language while learning and reacting to Soundpainting gestures. Adding in the extra layer of needing to create, listen “within,” and perform these malleable systems that are deeply contingent on far flung signals has been a productive challenge that has informed my compositional and performative practice in telematics.

## 2014–2019: Dispersions

The 2008–13 period helped me to articulate and refine an approach to the medium that engaged a deep coupling of mutual influence both through shared signals in multiple sonic spaces, distant transformations and also through networked interdependence, all requiring a practice of distributed listening. By 2014 I started to reflect on this set of activities and how they related to a broader sense of distributed agency, also including human-machine collaboration. As one exploration of how telematics and machine improvisation were both situated under this umbrella, in 2014 I curated a collection for the Computer Music Journal on the theme of “Distributed Composition and Musical Metacreation.”<sup>41</sup> Also at this time I moved to York University in Toronto, ON to serve as Canada Research Chair, and in this context founded a research/creation laboratory that I named the DIStributed PERformance and Sensorial ImmersiON (aka DisPerSion) Lab,<sup>42</sup> which has a focus on distributed creativity that may be dispersed across geographic distances or across ensembles of human and machine collaborators. This created a physical base camp to continue work in telematics, and in this space I have designed—and with the help of student lab members built—an ambisonic spatialization system and multi-channel haptic floor to further explore the role of sonic/haptic space (both real and virtual) in the construction

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<sup>39</sup> Cf. Doug Van Nort, “On-to-Genesis (2012),” accessed February 27, 2023, <http://dvntsea.com/ontogenesis/>.

<sup>40</sup> For more on this project see Weaver, “Synchrony,” 16–17.

<sup>41</sup> Doug Van Nort, “Sound and Video Anthology: Content,” *Computer Music Journal* 38, no. 4 (2014): [https://doi.org/10.1162/COMJ\\_x\\_00276](https://doi.org/10.1162/COMJ_x_00276).

<sup>42</sup> “DisPerSion Lab,” accessed April 24, 2023, <http://dispersionlab.org/>.

of perceived telepresence in performance. I will briefly mention several projects which further this work.

### **Uncanny: A Telematic nO(t)pera (2016)**

This piece engaged the performance space as a “total work” that included visuals and a sense of dramaturgy driven by the composition of time and interactivity—and thus it is a “nO(t)pera,” i.e. it is not an Opera but it is not-not an Opera. It is a semi-structured, semi-improvised performance linking five performers and their audience across one virtual and five real sites of performance. The musicians utilize their deep listening skills as they listen across networks, across North America, and across radically different acoustic spaces and instrumentations, in order to find convergence through musical dialogue. Performers from Stanford (California), RPI (New York), and York Special Projects Gallery were projected onto materials within the DisPerSion Lab, forming an uncanny trace of their bodily presence, embedded on a blended “stage” with a live electronics performer. Public activity from the hallway of the neighbouring building on York’s campus, leading up to the Special Projects gallery where Bourne was performing, was mapped into visual and sonic art and projected within DisPerSion Lab, creating a texturized “double” of the activity just outside the Gallery site of performance. The DisPerSion Lab website provided another realization of the performance, allowing audience to chat, interact via Twitter, listen to individual streams or the entire mix, and alter the outcome by conducting the musicians using a web-based interface during one section of the piece. The York-based audience was invited to wander between the differing performative realities of the public spaces, the virtual online platform, the live performance within the gallery, and the live performance within DisPerSion lab. The overarching composition and design vision for the piece was an uncanny sense of being/not-being “there,” as one moved between local sites while hearing the sounds of other neighbouring performance locations in the distance. Students from my “Performing Telepresence” course contributed visual design work for the staging, theatre lights and projection, as well as programming and administrative work.<sup>43</sup>



**Figure 6:** Uncanny: a Telematic nO(t)pera performance showing DisPerSion Lab space (left), Gallery Space (centre) and Projected graphic scores chosen by audience (right).

<sup>43</sup> “Uncanny: A Telematic nO(t)pera (2016),” Doug Van Nort, accessed April 24, 2023, <http://dvntsea.com/notpera/>.

### **STAPLR Dispersion (2016)**

This was a collaboration with York University Associate Librarian William Denton and the aforementioned students of the Performing Telepresence course. Denton created a real-time sonification of the library's reference desk activity, called STAPLR (Sounds in Time Actively Performing Library Reference).<sup>44</sup> Equal parts installation, sonification, and performance, the STAPLR Dispersion piece created a performative conversation with the library space, influencing the data streams and drawing attention to the practices and rituals of the library. We created sound and light instruments to receive the library data, which defined an immersive space within the DisPerSion Lab that spatialized the sound and light based on the library branch that the data was coming from. Twitter was scraped for hashtags and keywords, which modified the results and were displayed as part of the piece. Laptop stations showing the stream from the lab, the sonification stream and the Twitter comments were placed at five different library branches and students embedded themselves (quietly!) with headphones at each station. Library patrons were made aware of the ongoing activity and encouraged to join in and influence the piece either by tweeting or by engaging the reference desk, thereby altering the sonified data and engaging the public in a performative interaction with the library space. Various students and librarians moved between libraries and the immersive lab space, creating a meditative engagement with public space, data, archives and performative practices in everyday life.

### **Intersubjective Soundings (2017)**

Since 2015 I have run an ensemble called the Electro-Acoustic Orchestra (EAO) that functions as a course as well as a year-round professional performing ensemble.<sup>45</sup> Having learned Soundpainting as a performer as noted above, I decided to integrate this into the group as a means to create form and to center attentions. This started as a pedagogical decision but has evolved into a new gestural language that adds many new gesture-concepts to Soundpainting specific to electroacoustics and integrates compositional practice that merges these concepts with text and graphic scores as well as software instruments/structures. When the group gets to a level of fluency with this practice, with close coupling and "two-way mind reading" happening in performance, it has struck me that my gesture-based real-time composition practice feels very similar to real-time transformations of collaborators, as in Triple Point or other groups. To amplify and explore this further, I have integrated this cross-performer transformation practice in the context of the EAO, with an ongoing project including the use of MYO armband sensors allowing me to use gesture, motion, and muscle tension as a means to transform the sounds of the ensemble and blur the line further between symbolic<sup>46</sup> gestures for decisions on structure and continuous gestures for active sound-shaping. The feeling of playing "into" one another's sound and reinforcing the shared, collective sound was first explored with the piece Intersubjective Soundings, which focused on this experience in the telematic medium. Figure 7 shows

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<sup>44</sup> <https://staplr.org/>, accessed February 27, 2023.

<sup>45</sup> "Electro-Acoustic Orchestra", DisPerSion Lab, <http://dispersionlab.org/eao/>, accessed April 24, 2023.

<sup>46</sup> In this context, "symbolic" refers to discrete representations (e.g. as of a note or a gesture) that are segmented in time, space, and concept, in contrast to continuous representations that require segmentation on the part of the viewer/listener.

the first performance of this project at the International Conference on Movement and Computing (MOCO) in 2017, where I performed from Goldsmith's University in London while the EAO performed from the DisPerSion Lab in Toronto.<sup>47</sup> This performance also highlighted for me the distinct sonic realities of differing locations: EAO members later remarked to me on how my electronics existed “inside” the ensemble sound on their end, while in London the experience was (as the piece called for) that of a wall of sound that transformed and integrated the performer sounds, with audience commenting on aspects such as spectral shimmer, layering and a visceral relationship between movement and sound.



**Figure 7:** Intersubjective Soundings, performed with real-time conduction/composition/ sound-transformation in London (left) and ensemble playing in Toronto (right).

### **Tele-Conduction<sup>48</sup> (2017) and Real Virtuality (2018)**

These two projects were in collaboration with Thomas Gerwin, connecting the DisPerSion Lab to Germany. The first concert connected the lab with the Exploratorium in Berlin, and featured pieces commissioned by New Adventures in Sound Art (NAISA) for their Deep Wireless Festival. This included pieces by Thomas Gerwin (Germany), Sarah Weaver, Glen Hall and Doug Van Nort (Canada), which were performed by the Electro-Acoustic Orchestra and an ensemble in Berlin. The Real Virtuality event connected the lab with the Brandenburg New Music Festival in Potsdam, with performances by the EAO in collaboration with the Stream ensemble. Pieces for this group were created by Doug Van Nort (Canada) and Thomas Gerwin, John Rausek, and Sabine Vogel (Germany), and also included cross-site Soundpainting gestures involving Vogel and Van Nort.

<sup>47</sup> This approach is described further in Van Nort 2018.

<sup>48</sup> This event name was chosen by NAISA to reference the general concept of composition/conducting languages, and is not an explicit reference to the Conduction system by Butch Morris.

### Telematic I and II (2019–20)

In 2019 I commenced the aforementioned SSHRC-funded research project “Connecting Communities Through Telematic Music.” The focus was on enhancing community access and cross-cultural exchanges by adapting high-quality streaming approaches most commonly requiring a university-grade network and specialized technical knowledge to a community arts space—in this case the Array Space in Toronto.<sup>49</sup> In terms of technologies for lowering the barrier to access for production and tech staff who may not be low-level programmers, we developed a set of solutions including *disperf* for assessing and adapting network conditions<sup>50</sup> and *Maxtrip* for easy and interactive use of JackTrip via Max/MSP.<sup>51</sup> The project also included attention to audience engagement and interaction, as well as integrating virtual acoustics for blending real/virtual acoustics between sites, and we adapted our laboratory-based virtual acoustics system for the telematic context. My creative interest was in further exploring sonic-meditation style text and graphic pieces that focused attentions on distance, space and connectivity, coupled with dynamically changing virtual acoustics so that performers felt a sense of sounding in one another’s acoustic space, or in some virtual shared acoustic room. The concerts, produced with Arraymusic, were simply titled Telematic I and Telematic II. The first concert was presented as part of NowNet Arts Conference, linking Toronto and Stony Brook University. Array Space Performers were Anne Bourne (cello), Rick Sacks (percussion), David Schotzko (percussion), Doug Van Nort (GREIS/electronics), while Stony Brook Performers were Ethan Cayko (percussion and electronics), Taylor Long (percussion), Kevin Kay (bass clarinet). For this first performance I created a piece called *Innerspace* wherein different virtual acoustic conditions/reverberations would envelop the two-location ensemble sound throughout, with dynamic changes over the course of the piece. Text-based structures of rolling duos/trios/quartets/whole group with varying shapes and qualities (e.g. conditions of noise, tone, pointillism, sustained sound, pitch ranges) focused the inquiry into playing together in the shared real/virtual musical space. The virtual spaces were defined by measurements of the actual performance venues, allowing for an interpolation between real and virtual acoustic spaces. In February of 2020, Telematic II connected the DisPerSion Lab and Array Space performance of an updated version of the same piece, this time allowing me to more finely play with the acoustics of the two venues, having visited and rehearsed in both in advance of the performance. DisPerSion Lab performers were Sarah Peebles (sho) and Doug Van Nort (GREIS/electronics), while Array Space performers were Glen Hall (bass clarinet) and Casey Sokol (piano/prepared piano).

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<sup>49</sup> “Arraymusic,” accessed April 24, 2023, <https://www.arraymusic.ca/>.

<sup>50</sup> Michael Palumbo, Doug Van Nort, and Rory Hoy, “Disperf: A Platform for Telematic Music Concert Production,” in *Proceedings of the 2020 International Computer Music Conference* (Santiago, Chile: 2020).

<sup>51</sup> Rory Hoy and Doug Van Nort, “A Technological and Methodological Ecosystem for Dynamic Virtual Acoustics in Telematic Performance Contexts,” in *AM '21: Proceedings of the 16th International Audio Mostly Conference*, 169–174, <https://doi.org/10.1145/3478384.3478425>.

## 2020–2022: Diffractions

As is well-documented, things changed drastically in March of 2020 due to the COVID-19 pandemic and related quarantine conditions. Like many others I was home and simply wanting to engage in the social act of musicking. Fortunately the technological conditions facilitated this in two important ways. First, the JackTrip software had recently introduced new improvements<sup>52</sup> that greatly reduced the need for special port forwarding rules to be set up by performers connecting as “clients” to the network. Second, in my home city of Toronto, fiber optic networks had greatly expanded, and I now found myself with a network speed of 1Gbps upload and download, comparable to my university-based lab’s network that would allow me to run a reliable JackTrip server from home. For the next two years I built upon the momentum of recent work and of the SSHRC grant project, but like many others had completely shifted the focus to working with larger scale and more widely dispersed performers who were on home network connections. While the preceding years had a physical basis for laboratory investigations in an immersive setting, I now focused on the “laboratory” conditions of the network as an incubator, exploring the work as it manifested in the purely distributed context. If immersion and dispersion were metaphors to describe the work to date, this period was one of diffraction—or the spreading out and bending of waves to avoid obstacles.

### Dispersion Relations X (2020–21) and DVN-EAO (2020–present)

Previously I had run a series called “Dispersion Relations,” in which I invited two to three performers per session to improvise with me in an overlapping solo/duo/trio/quartet format in the immersive laboratory setting. The focus was on locality and community building, blending a mixture of professionals and students in curated combinations. Early in the pandemic I transitioned to an online format (for which I added an “X” to the title) and put out a call for participation. The response was greater than I could possibly manage for the small, focused ensemble structure. After about fifteen sessions with this format, I started playing with differing formats aimed at broader inclusion. This included the One-Sample Ensemble in which every participant contributed one 1–10 second sample, and all players used this as source material for electroacoustic improvisation—harkening back to the shared sound pool approach of DLCO. This also included a return to the Electro-Acoustic Orchestra in a completely online format. Weekly to bi-weekly sessions were framed as “open rehearsals,” allowing people to drop in and just watch, e.g. to learn the gestures and musical language. Over time this turned into multiple ensemble sessions, with one focused on more introductory approaches and the other on more advanced concepts that made faster, more complex gesture-concepts possible. The latter group has greatly evolved since then and has stabilized into what I consider the most advanced and integrated version of the group, allowing me to go much deeper in composing “palettes” of material—text and graphic scores—that can be mixed and matched on the fly in performance, combined with software instruments/systems as in the *Intersubjective Soundings* piece. To differentiate, I call this group

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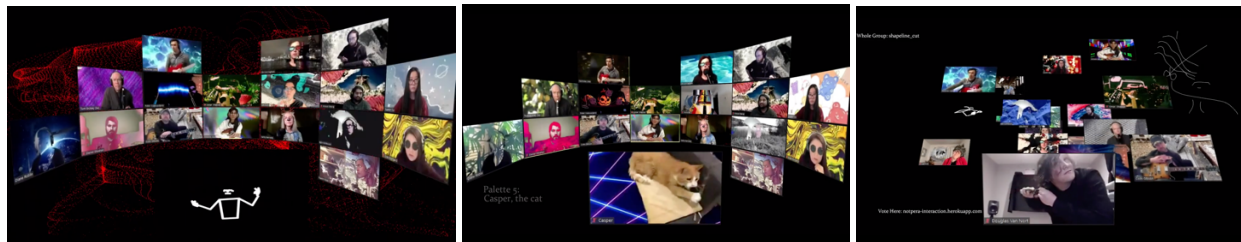
<sup>52</sup> In particular the improvement that made this possible is a technique called NAT traversal, which works in both Jacktrip’s Hub and Peer-to-Peer modes.



*thee Doug Van Nort Electro-Acoustic Orchestra*, and its current members include: Tom Bickely (EWI, synthesis), Viv Corringham (voice, electronics), Björn Eriksson (analog electronics), Rory Hoy (bass, electronics), Kathy Kennedy (voice, electronics), Kieran Maraj (digital electronics), Omar Shabbar (guitar, electronics), Danny Sheahan (violin, electronics), Doug Van Nort (composition/conducting, electronics). Meanwhile, having expanded ensemble layers allows for larger scale performances.

### **Quarantine: a Telematic nO(t)pera (2020)**

I decided to return to the nO(t)pera format, in this widely distributed format. This piece was created for the Electro-Acoustic Orchestra (EAO), for the Winter Solstice, for the virtual space of connected isolation, for Casper the cat, and for self-sanity.<sup>53</sup> As before, it was not an Opera, but it was not-not an Opera. It is a composition for musical, visual, and virtual engagement. The music consists of six movements that span disparate sonic landscapes. It is organized by pre-composed<sup>54</sup> palettes that integrate text, graphics, and software instruments, and are augmented with additional real-time composition via my unique electroacoustic-oriented expansion upon Soundpainting. This content was a crystallization of ideas that emerged from those months of regular online rehearsals that dated back to the beginning of the pandemic, bringing together performers from three continents and numerous time zones. As a meditation on (and a product of) our network-mediated present, the nO(t)pera also introduced diverse networks of improvised cross-collaboration: performer-machine collaboration, performer-animal collaboration, and audience-machine-performer collaboration. In one movement of the piece, my cat Casper was the initiator of “shapeline”<sup>55</sup> content that defined performers’ musical responses, while in another movement the audience was invited to improvise drawings as input that would be interpreted by machine learning algorithms, and in turn were used to determine the overall structure and sonic content of the music. These elements can be seen in Figure 8.



**Figure 8:** Quarantine: a Telematic nO(t)pera (2020) performance with movements including machine perspective (left), animal collaboration (centre) and audience participation (right).

<sup>53</sup> For full credits see Doug Van Nort, “Quarantine: A Telematic nO(t)pera (2020-21),” accessed April 24, 2023, <http://dvntsea.com/quarantine-telematic-notpera>.

<sup>54</sup> This term is used in the same sense as “pre-planned”, which is to say composed prior to performance rather than in-the-moment.

<sup>55</sup> Shapeline is a Soundpainting gesture-concept in which movements are interpreted in sound by performers.



### Listening and Sounding in/to the Pandemic (2020–22)

As a third and final project exploring virtual acoustics and listening strategies, I shifted focus towards a research/creation project that explored dimensions of perceived telepresence in this complex environment (that was made further complex due to stay-at-home pandemic conditions). I once again created a telematic-centric piece called *Quara(n)ttune*<sup>56</sup> that integrated listening and sounding strategies relative to real, virtual, and metaphorical concepts of spatial “attunements” along with inter-performer pairings called “allowances.” Serving as both a creative project and a research study, I enlisted 18 performer-subjects to perform the piece in trio pairings, which also included changing virtual acoustic conditions. Grounded theory methodology was applied to interviews with participants and the results of this study are discussed in detail in a forthcoming article.<sup>57</sup>

### Conclusion and Future Directions

I have described a trajectory of work that I believe demonstrates the evolution of a practice that has distinct and coherent thematic throughlines that integrate several dimensions. These include compositional use of dynamic and coupled real/virtual acoustic spaces, and text/graphic pieces in the style of *Sonic Meditations*<sup>58</sup> that focus attentions toward differing concepts of time/space/interconnection. Oftentimes, these intersect with applications of shared-signal sonic transformations that span the network and which foster a sense of intersubjective resonance, and with interdependence via mutual-influence of interactive systems. This work emerges from a composer/performer approach to the telematic medium that integrates the language and practices of electroacoustic improvisation with gesture-concepts that allow for real-time composition. Much as I am drawn to free improvisation, electroacoustics, and noise because of the ways they can depart from codified and hierarchical rules of the more established western musical practices, and thereby have the ability to foster new types of collective sociality and engagement in the medium of sound, I think the telematic medium is perfectly suited to furthering this kind of work. It does so through its fostering of multiplicities of time scales, explicit interjection of networks on multiple levels of interaction, and demands for expanded listening strategies and attention to the sonic field. Possibilities for diverse, cross-cultural connections are immense and yet are not a given unless social and technological barriers are removed. As I continue work in this area, I intend to further articulate an approach whose goal is to move beyond the extremes of standard Western notation or free improvisation, exploring the locus and the essence of “the musical work,” and the ways that the subjective positions of composer, performer, interpreter, conductor, and audience can shift in telematic musical contexts that integrate text and graphic scores, gesture languages for real-time composition, audience participation, and computational instruments. I remain informed by the position that there is often a hierarchical, politicized, false either/or dichotomy

<sup>56</sup> The score can be found here: <https://www.instagram.com/p/Cj5dp4JMnLz/>, accessed February 27, 2023.

<sup>57</sup> Doug Van Nort, “Listening and Sounding in/to the Pandemic: A Grounded Theory Analysis of Perceived Telepresence in Diverse and Dispersed Telematic Music Performance Contexts,” manuscript in preparation.

<sup>58</sup> See Pauline Oliveros, *Sonic Meditations* (Baltimore, MD: Smith Publications, 1974): 5.

presented between composition and improvisation, and that instead the creative essence of a composer can leave its signature on a work (distributed across graphic/text structures, softwares and gestural languages), while also recognizing and being deeply influenced by the improvisational, creative agencies and sonic identities of every performer, in an emergent fashion.

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## **Appendix: Selected Telematic Music Performance Events 2003–2022.**

**Peerings, April 29, 2003. Rensselaer Polytechnic Institute (RPI) in Troy, NY and Cal State University, Hayward (CSU Hayward) in California. Audience at both sites.**

**Performers:**

RPI: Doug Van Nort (electronic music, audience participation system), Mimi Hammani (vocals), Scott McGinley (virtual environments), Chi Ying Shen (virtual environments), Jen Mesch (dance).  
CSU Hayward: Anne Hege (vocals), Tadashi Usami (electronic music), Dena Berman (dance), Kristen Studer (dance), Penny Hutchinson (dance)

**SuperCollider Workshop Concert, July 2004. STEIM in Amsterdam, NL. Audience in Amsterdam.**

**Performers:**

Doug Van Nort (Montreal, electronics), Tadashi Usami (Tokyo, electronics), Roddy Schrock (Amsterdam, electronics) and Michael Cox (Oakland, electronics)

**Dutch Electronic Arts Festival (DEAF 04), November 2004. Rotterdam, NL. Audience in Rotterdam. Part of The Hub reunion concert.**

**Performers:**

Rotterdam: The Hub (Chris Brown, John Bischoff, Tim Perkis, Scot Gresham-Lancaster, Mark Trayle, Phil Stone) (all: electronics)  
Tokyo: Tadashi Usami (electronics)  
Montreal: Doug Van Nort (electronics)

**Network Music Performance, April 2005. Rensselaer Polytechnic Institute (RPI) in Troy, NY and Society of Art and Technology (S.A.T.) in Montreal. Audience at both sites. Transmission of 8 channel audio between S.A.T. in Montreal and iEAR studios at RPI.**

**Performers:**

Pauline Oliveros (RPI, Accordion), Zack Settel (Montreal, saxophone), Doug Van Nort (Montreal, GREIS/electronics)

**DLCGO! by Doug Van Nort, June 2007. Lifebridge Sanctuary, High Falls, NY. Audience in High Falls. Telematic Evolution of Piece occurred between January and June 2007. Part of the Deep Listening Convergence.**

**Performers:**

Online and at Lifebridge: Al Margolis, Pauline Oliveros, Kristin Norderval, Tom Bickley, Monique Buzzarté, Doug Van Nort, Kim McCarthy, Roberto Rodriguez, Scot Gresham-Lancaster, Tom Bickley, Katharina von Rutte, Zevin Polzin (all: DLCGO software instruments)

**Telematic Performance International Conference on Auditory Display (ICAD), July 2007. Linking McGill University, Montreal, Rensselaer Polytechnic Institute in Troy, NY, Stanford University, Palo Alto, CA, and KAIST, South Korea. Audience in Montreal.**

**Performers:**

Rensselaer Polytechnic Institute: Bobby Gibbs (clarinet), Elizabeth Panzer (harp), Daniel L. Valente (violin, ViMiC processing), Bart Woodstrup (live video processing)  
 Stanford University: Juan-Pablo Cacere (synthesizer and laptop)  
 KAIST (South Korea): Chris Chafe (celletto)  
 McGill University: Jonas Braasch (soprano saxophone), Pauline Oliveros (accordion), Jeff Pitcher (electric guitar), Doug Van Nort (GREIS/electronics)

**Technical Production:**

RPI: Jayeeta Chowdhury (camera), Nigel Westlake (internet system administration).  
 KAIST: Seungyon-Seny Lee (camera and audio recording)  
 McGill University: Sungyoung Kim (live sound engineer), Kent Walker (live sound engineer), Nils Peters (ViMiC spatial sound processing)

**DLGO (Deep Listening Genetic Orchestra) by Doug Van Nort, December 2007. Northwestern University, Evanston, Illinois and Distributed Online Participants. Audience in Evanston. Part of the International Society of Improvised Music (ISIM) Festival.**

**Performers:**

Evanston: Andrew Causey, Gayle Young, Kim McCarthy, Rami Gabriel (all: DLGO software instrument)  
 Distributed: Al Margolis, Doug Van Nort, Katharina von Rutte, Pauline Oliveros,, Tom Bickley and Zevin Polzin (all: DLGO software instrument)

**FLEAGO by Doug Van Nort, April 2008. Miami, Florida and Rensselaer Polytechnic Institute (RPI) in Troy, NY. Audience in Miami. Part of 12 Nights: Computer Music and Art at Harold Golen Gallery.**

**Performers:**

Miami: FIU Laptop and Electronic Arts Ensemble (dir. Paula Matthusen). (all: FLEAGO software instruments)

RPI: Doug Van Nort, Cristyn Magnus, David Rhoderick (all: FLEAGO software instruments)

**Tintinnabulate and AOM, November 2008, Experimental Media and Performing Arts Center (EMPAC) in Troy, NY and Second Life. Audience at EMPAC and in Second Life. Tintinnabulate ensemble performs with the Avatar Orchestra Metaverse performing at U21 Global in Second Life**

**Performers:**

RPI: Tintinnabulate (dirs. Pauline Oliveros, Doug Van Nort, Jonas Braasch)

Second Life: Avatar Orchestra Metaverse

**Telematic Performance, December 2008. Sonorities Festival, Sonic Arts Research Center (SARC), Belfast, Northern Ireland and Rensselaer Polytechnic Institute (RPI) in Troy, NY. Audience in Belfast.**

**Performers:**

RPI: Pauline Oliveros (V-Accordion), Doug VanNort (GREIS/electronics), Jonas Braasch (soprano saxophone)

Belfast: Pedro Rebelo (electronics), Franziska Schroeder (saxophone), Alain Renaud (guitar)

**FLEAGO by Doug Van Nort, February 2009. Miami, Florida and Rensselaer Polytechnic Institute (RPI) in Troy, NY. Audience in Miami at the The Herbert and Nicole Wertheim Performing Arts Center.**

**Performers:**

Miami: FIU Laptop and Electronic Arts Ensemble (dir. Paula Matthusen). (all: FLEAGO software instruments)

RPI: Doug Van Nort, Cristyn Magnus, David Rhoderick, Shane Myrbeck, Luke Noonan (all: FLEAGO software instruments)

**Telematic Performance of Quasimodo the Great Lover by Alvin Lucier, February 2009. Rensselaer Polytechnic Institute (RPI) in Troy, NY and University of California, San Diego (UCSD) in San Diego, CA. Audiences in Troy, San Diego and online via Ustream.tv.**

**Performers:**

RPI: Tintinnabulate (dir. Pauline Oliveros), Doug Van Nort (Sound Space Mixer)

UCSD: VistaMuse Ensemble (dir. Mark Dresser)

**Note About Sound Space Mixer Role:** Acoustic Musicians at both sites performed an adapted version of the score. Van Nort equalized, mixed and routed these performer signals between various spaces around RPI before sending them back into the stream. The spaces included a guitar body, a transducer and mic pickup inside a milk bottle, a large reverberant room with boombox/mic setup, a narrow stairway with mic/speaker setup, and a guitar amp pointed at piano strings with pickup.

**Telematic Performance, April 2009. Experimental Media and Performing Arts Center (EMPAC) in Troy, NY and Indiana University – Purdue University in Indianapolis, IN. Audience at both locations.**

**Performers:**

EMPAC: Tintinnabulate ensemble (dir. Pauline Oliveros)

Indianapolis: IUPUI ensemble (dir. Scott Deal)

**About the program:** The two ensembles performed in several telematic pieces, including Telematic Drum Circle by Byeong Sam Jeon and combat music by Cristyn Magnus.

**DroneIphonia by Pauline Oliveros, May 2009. Sonorities Festival, Sonic Arts Research Center (SARC) in Belfast, Northern Ireland, Banff Centre in Banff, Alberta, and Rensselaer Polytechnic Institute (RPI) in Troy, NY. Audience in Belfast.**

**Performers:**

RPI: Van Nort (processing distant iPhone/drone players and instrumentalists via GREIS)

Banff Centre: Chris Chafe (iPhone, cello)

SARC: Pedro Rebelo (iPhone, piano), Franziska Schroeder (soprano saxophone), Gascia Ouzounian (violin), Manuela Meier (accordion), Justin Yang (saxophone), Pauline Oliveros (iPhone/bandoneon), Chris Corrigan (spatialization and mixing)

**Quartetto Telematico performs Latent Sea, July 2009. Casa da Musica in Porto, Portugal, Rensselaer Polytechnic Institute (RPI) in Troy, NY, and Dartington, UK. Concert for Sound and Music Computing International Conference, curated by Pauline Oliveros, Evan Parker and Nic Collins.**

**Performers:**

Porto: Chris Chafe (daxophone), Doug Van Nort ( GREIS, live algorithms)  
RPI: Jonas Braasch (soprano saxophone)  
Dartington: Pauline Oliveros (accordion, iphone synth)

**North South Currents, July 2010. The Guelph Jazz Festival in Guelph Ontario, Experimental Media and Performing Arts Center (EMPAC) in Troy, NY, and Bogotá, Colombia. Three Audiences: Guelph, EMPAC, and Bogotá.**

**Performers:**

Guelph: Pauline Oliveros (accordion), Anne Bourne (cello), Ben Grossman (hurdy gurdy) and Jesse Stewart (percussion)  
EMPAC: Doug Van Nort ( GREIS/electronics), Jonas Braasch (soprano saxophone), Curtis Bahn (sitar, electronics)  
Bogotá: Ricardo Arias (balloons)

**iEAR Presents! Series Concert, November 2010. linking Rensselaer Polytechnic Institute (RPI) in Troy, NY, and Center for Computer Research in Music and Acoustics (CCRMA) in Palo Alto, CA. Audience in Troy.**

**Performers:**

RPI: Tintinnabulate (dir. Pauline Oliveros), Miya Masaoka (koto)  
CCRMA: Soundwire (dir. Chris Chafe)

**About the Program:** The two ensembles performed a new piece by Masaoka.

**Distributed Composition #1, June 2011, Betong, Oslo, Norway, Rensselaer Polytechnic Institute (RPI) in Troy, NY, and Center for Computer Research in Music and Acoustics (CCRMA) in Palo Alto, CA. Audience in Oslo. Curated concert for the International Conference on New Interfaces for Musical Expression (NIME).**

**Performers:**

Oslo: Doug Van Nort ( GREIS, electronics), FILTER system  
RPI: Jonas Braasch (soprano saxophone)  
CCRMA: Pauline Oliveros (accordion)



**A free103point9 Transmission Art Event, September 2011, WGXC-90.7 FM, Wave Farm in Hudson, NY. Radio and online audience. Improvisation on-air with radio streams and call-in sounds.**

**Performers:** Judy Dunaway (Hudson, feedback system) and Doug Van Nort (Hudson, feedback system/GREIS)

**Re:Sonance of Mahler's Song of the Earth, January 2012. Austrian Cultural Forum in New York, NY.**

**Performers:** Min Xiao-Fen (voice/pipa), Yoon Sun Choi (voice), Franz Hackl (trumpet), Bruce Williamson (woodwinds), Dave Taylor (bass trombone), Mark Helias (bass), Gerry Hemingway (percussion), Doug Van Nort (GREIS/electronics), Sarah Weaver (composer/conductor)

**About the Performance:** For this double quartet electroacoustic piece, Van Nort captured and transformed live environmental audio streams, which were woven into the composition at the New York site.

**DVNT and Dolly Do Birmingham UK, January 2012, Network Music Festival in Birmingham, UK. Birmingham audience.**

**Performers:** Judy Dunaway (Boston, MA, feedback system) and Doug Van Nort (Troy, NY, feedback system/GREIS)

**About the Piece:** For their presentation at the Network Music Festival, Dolly Ferret (aka Dorothea Ferrette aka Judy Dunaway) and DVNT (aka Doug Van Nort) created a sound feedback loop between two live streaming systems, and visually expressed their respective network angles of the loop. Dolly was located in Boston, Massachusetts, USA and DVNT in Troy, New York, USA. The piece was presented live via two projected browsers at the festival, and was available worldwide via URLs that were announced on the festival page just prior to the performance date.

**'Disorderly/Orderly' for Supercollider Ensemble and Circuit-Bent Casio, April 2012. Arts Center of the Capital Region in Troy, NY. Audience dispersed across the building.**

**Performers:** Tintinnabulate ensemble (dir. Pauline Oliveros, Doug Van Nort, Jonas Braasch), Josh Shinavier (human robot performance), audience participation

**About the Piece:** The Disorderly world of a cracked Casio keyboard supercollides with the pure Order of an ensemble of laptops, playing sequences of modulated sine tones. The audience controls rhythm, tempo, mode and deviation while text chatting with the performers. Audience in a remote location control human robot interventions.

**Keynote Telematic Performance, January 2013. Net-Music: The Internet as Creative Resource in Music Conference/Festival. Performers at The Experimental Media and Performing Arts Center (EMPAC) in Troy, NY, Center for Computer Research in Music and Acoustics (CCRMA) in Palo Alto, CA, and in Singapore. Audience fully online and distributed.**

**Performers:**

EMPAC: Pauline Oliveros (V-Accordion), Doug Van Nort (GREIS/electronics), Jonas Braasch (soprano saxophone), FILTER system

CCRMA: Chris Chafe (celletto)

Singapore: Ang Mo Faux (Steven Miller, Peter Edwards, Ty Constant)

**Discursive/Dispersive by Doug Van Nort, February 2013. University of Virginia in Charlottesville, VA, and Experimental Media and Performing Arts Center (EMPAC) in Troy, NY. Audience in Virginia. Part of Zerospace: an interdisciplinary initiative on distance and interaction.**

**Performers:**

EMPAC: Doug Van Nort (EMPAC, Composition and Genetic Algorithm “Conducting”)

Charlottesville: MICE Ensemble (dir. Matthew Burtner)(all: Discursive software instruments)

**Universal Synchrony Music, April 2013. Simons Center for Geometry and Physics Consortium for Digital Arts, Culture, and Technology (cDACT) in Stony Brook, NY and University of California, San Diego (UCSD) in San Diego, CA.**

**Performers:**

Stony Brook: Jane Ira Bloom (sax), Min Xiao Feng (pipa), Ray Anderson (trombone), Matt Wilson (drums) Doug Van Nort (electronics, sonification of NASA Kepler mission data) and Sarah Weaver (composer/conductor)

San Diego: Mark Dresser (bass), Michael Dessen (trumpet), Myra Melford (piano), Nicole Mitchell (flute)

**Quartetto Telematico at Frontiers Festival, April 2014. Birmingham Conservatoire in Birmingham UK, Center for Computer Research in Music and Acoustics (CCRMA) in Palo Alto, CA, Hexagram Black Box in Montreal, QC, and Experimental Media and Performing Arts Center (EMPAC) in Troy, NY. Audience in Birmingham and Montreal.**

**Performers:**

Birmingham: Pauline Oliveros (accordion)

CCRMA: Chris Chafe (celletto)

Hexagram: Doug Van Nort ( GREIS/electronics)

EMPAC: Jonas Braasch (soprano saxophone)

**Universal Synchrony Music, Volume 2, April 2014. Simons Center for Geometry and Physics Stony Brook. New York and Center for Computer Research in Music and Acoustics (CCRMA) in Palo Alto, CA. Audience in Stony Brook.**

**Performers:**

Stony Brook: Ray Anderson (trombone), Robert Dick (flute), Miya Masaoka (Koto), Min Xiao-Fen (pipa), Doug Van Nort (electronics/sonified NASA data), Sarah Weaver (composer/conductor)  
CCRMA: Alex Chechile, Cathleen Grado and Shu Yu Lin (all: electronics and sonification)

**Universal Synchrony Music, Volume 3, January 2015. Bing Concert Hall, Stanford University, Palo Alto, CA, and DisPerSion Lab, Toronto, ON.**

**Performers:**

Stanford: Dylan Hunn (percussion), Kitty Shi (piano), Sarah Weaver (composer/conductor).  
Dispersion Lab: Doug Van Nort (electronics/sonification), Rick Demeester (electronics/sonification), Rory Hoy (electronics/sonification), Rose Zhou (live visuals), Akeem Glasgow (live visuals), Christina Kan (live visuals), Tony Nguyen (live visuals)

**Dispersion Lab Production Team:**

Data Structuring and Sonification: Rick Demeester, Rory Hoy  
Visualization: Anas Ashraf, Erica Ferkul, Akeem Glasgow, Christina Kan, Dylan Reymer, Justin Hsieh, Rose Zhou  
Networking and Streaming: Kayla MacDonald, Sam Noto, Tony Nguyen

**Stanford Streaming and Media System:**

Chris Chafe, Eoin Callery, Constantin Basica

**Game of Drones, March 2015. DisPerSion Lab, Toronto, ON, and Concordia University, Montreal, QC. Audiences in Toronto and Montreal.**

**Performers:**

Toronto: York Students of "Designing Interactive Performances" course (dir. Doug Van Nort).  
Montreal Concordia Laptop orchestra (CLOrk) (dir. Eldad Tsabary)

**STAPLR Dispersion, February 2016. DisPerSion Lab, Toronto, ON, and York University Libraries (Bronfman, Maps, Scott, SMIL, Steacie) in Toronto, ON. Audience at DisPerSion Lab, distributed amongst York University Libraries, and online.**

**Performers:** Audience at all sites (Twitter and library data interface)

**Conception and Direction:** Doug Van Nort

**Library Data Sonification:** William Denton

**Sound, Light and Text Instrument Design:** Doug Van Nort and students from his “Performing Telepresence” Digital Media course

**Uncanny: A Telematic nO(t)pera, March 2016. DisPerSion Lab in Toronto, ON, York Special Projects Gallery, York University in Toronto, ON, CRAIVE Lab, Rensselaer Polytechnic Institute in Troy, NY, and Center for Computer Research in Music and Acoustics (CCRMA) in Palo Alto, CA. Audience in Toronto, Troy, Stanford and online.**

**Performers:**

Special Projects Gallery: Anne Bourne (cello)

CCRMA: Chris Chafe (celletto)

CRAIVE Lab: Pauline Oliveros (V-Accordion), Jonas Braasch (soprano saxophone)

DisPerSion Lab: Doug Van Nort ( GREIS/electronics)

**Conception and Direction:** Doug Van Nort.

**Tele-Conduction, February 2017. DisPerSion Lab in Toronto, ON, and Exploratorium in Berlin, Germany. Audiences at each location. Presented by Sensorium Centre and DisPerSion Lab in Partnership with New Adventures in Sound Art.**

**Performers:**

DisPerSion Lab: Electro-Acoustic Orchestra (dir. Doug Van Nort)

Berlin: Ivo Berg (recorder), Jenny Doell (dance), Reinhard Gagel (accordion, piano, Mini-Moog), Thomas Gerwin (banjo, objects, electronics.), Dietrich Petzold (violin, viola)

**Composition:** Doug Van Nort, Thomas Gerwin, Sarah Weaver and Glen Hall

**Audio Broadcast:** NAISA radio

**Intersubjective Soundings (for MYO armbands, Soundpainting Conducting and Telematic Ensemble), June 2017. Deptford Town Hall, Goldsmiths in London, UK, and DisPerSion Lab in Toronto, ON. Audience in London. Part of the International Conference on Movement and Computing (MOCO).**

**Performers:**

London: Doug Van Nort (composing/conducting, MYO-based transformations)

DisPerSion Lab: Dave Bandi (guitar), Chris Cerpnjak (cymbals, glockenspiel) , Glen Hall (saxophone), Ian Jarvis (catRT+supercollider) , Ian Macchiusi (Moog mother), Mackenzie Perrault (guitar), Danny Sheahan (keys, samples), Fae Sirois (violin), Lauren Wilson (flute)

**Real Virtuality, October 2017. DisPerSion Lab in Toronto, ON and Kunsthaus Sans Titre in Potsdam, Germany. Audience in Toronto and Potsdam. Part of Intersonanzen and the Brandenburg New Music Festival.**

**Performers:**

DisPerSion Lab: Electro-Acoustic Orchestra (dir. Doug Van Nort)

Potsdam: Ivo Berg (recorder), Jenny Döll (dance), Reinhard Gagel (accordion, Moog synthesizer), Thomas Gerwin (banjo, objects, live electronics), Dietrich Petzold (violin,, viola), Sabine Vogel (Soundpainting)

**Composition:** Thomas Gerwin, John Rausek, Doug Van Nort, Sabine Vogel

**Telematic Performance, April 2018. Stony Brook University in Stony Brook, NY, and DisPerSion Lab in Toronto, ON. Audience in Stony Brook. Part of “Network Music: Artistic and Technological Strategies for Public and Private Networks.”**

**Performers:**

DisPerSion Lab: Lauren Wilson (flute), Christopher Anderson-Lundy (saxophone), Brian Abbott (guitar), Aaron Corbett (modular electronics), Mackenzie Perrault (guitar), Rory Hoy (bass, electronics), Danny Sheahan (voice, recorder, electronics), Ian Jarvis (digital electronics), Doug Van Nort (composing/conducting).

Stony Brook: Mary Edwards (keyboards/nord modular, bells), Michael Dessen (trombone)

**Universal Synchrony Music volume 5, February 2019. DisPerSion Lab in Toronto, ON, Northwestern University in Evanston, Illinois, and DiMenna Center for Classical Music in New York, NY. Audience in New York. Part of NowNet Arts Festival.**

**Performers:**

DisPerSion Lab: Doug Van Nort (electronics/sonifications), Kieran Maraj (electronics)

New York: Jane Ira Bloom (soprano saxophone), Robert Dick (flutes), Min Xiao-Fen (pipa), Ned Rothenberg (woodwinds), Denman Maroney (piano), Mark Dresser (bass), Sarah Weaver (composer/conductor)

Evanston: Stephan Moore (electronics)

**Telematic I, November 2019. Array Space in Toronto, ON, and Stony Brook University in Stony Brook, NY. Audience in both locations. Part of NowNet Arts Conference.**

**Performers:**

Toronto: Anne Bourne (cello), Rick Sacks (percussion), David Schotzko (percussion), Doug Van Nort ( GREIS/electronics, composition)

Stony Brook: Ethan Cayko (percussion, electronics), Taylor Long (percussion), Kevin Kay (bass clarinet)

**Virtual Acoustics Integration:** Rory Hoy

**Telematic II, February 2020. Array Space in Toronto, ON, and DisPerSion Lab in Toronto, ON. Audience in both locations.**

**Performers:**

Toronto: Glen Hall (bass clarinet), Casey Sokol (piano, prepared piano)

DisPerSion Lab: Sarah Peebles (sho), Doug Van Nort (GREIS/electronics, composition)

**Dispersion Relations X, April-June 2020. Widely distributed performers. Audience totally online. Zoom and JackTrip based improvisation sessions spanning the pandemic period.**

**Performers:** Alex Ring (St. Catharines, ON, violin), Maurice Rickard (Pittsburgh, PA., guitar + Max/MSP), Erin Corbett (Toronto, ON, modular synths), Doug Van Nort (Toronto, ON, GREIS/electronics, harmonica, voice), Matt Wellins (Troy, NY, computer), Jane Rigler (Colorado Springs, CO, flutes and electronics), Rory Hoy (Brampton, ON, bass + electronics), Danny Sheahan (Mississauga, ON, voice), Viv Corringham (New York, NY, voice), Ian Jarvis (Toronto, ON, laptop), Tom Bickley (Berkeley, CA, EWI), Zovi McEntee (New York, NY, theremin), Joel Ong (Toronto, ON, guitar, no input mixer), Dolly Ferret (Boston, MA, channeling), Rob Gill (Ontario, live multitrack mixing), Norman Lowrey (Kingston, NY, singing masks, automata, chatterboxes), Gayle Young (Grimsby, ON, Amaranth and toys), Holland Hopson (Tuscaloosa, AL, electronics), Lo Bil (Toronto, ON, voice), Joe Geek (Boston, MA, electronics), Kathy Kennedy (Montreal, QC, voice petals), Diane Roblin (Toronto, ON, piano + Yamaha ReFace), Björn Eriksson (Sollefteå, Sweden, recorder, small bells, dictaphone, voice, toy piano), Amy Melissa Reed (Auburn, CA, voice, electronics), Fae Sirois (Montreal, QC, violin, modular synth, contact mics), Glen Hall (Brampton, ON, woodwinds, electroacoustics), Bill Gilliam (Ontario, piano, prepared piano), and Joe Sorbara (Guelph, ON, drums, percussion)

**Electro-Acoustic Orchestra: Open Rehearsals/Concerts, June-December 2020. Widely distributed performers. Audience totally online. Zoom and JackTrip-based EAO sessions spanning the pandemic period.**

**Performers:** Colin James Gibson (Toronto, ON, guitar), Faadhi Fauzi (Toronto, ON, electric guitar, FM synthesis), Danny Sheahan (Mississauga, ON, violin), Tom Bickley (Berkeley, CA, EWI + synthesis, recorders), Rob Gill (Ontario, live multi-track mixing), Diane Roblin (Toronto, ON, piano, keyboard), Aida Khorsandi (Toronto, ON, laptop, found objects, voice), Rory Hoy (Brampton, ON, bass + electronics), Omar Shabbar (Toronto, ON, electric guitar), Viv Corringham (New York, NY, voice, vocal processing), Kieran Maraj (Toronto, ON, electronics), Lo Bil (Toronto, ON, vocals, movement), Amy Reed (Auburn, CA, voice, electronics, guitar), Kathy Kennedy (Montreal, QC, voice petals),

Björn Eriksson (Sollefteå, Sweden, AudioMulch, dictaphone, voice, bells), Biagio Blaise Francia (Southern Italy, electronics), Fae Sirois (Montreal, QC, violin+ electronics), Gayle Young (Grimsby, ON, strings, stones, toys), Maxwell Moorehead (Boston, MA, streaming), Doug Van Nort (Toronto, ON, composing/conducting)

**Quarantine: A Telematic nO(t)pera, December 2020. Widely distributed performers. Audience totally online.**

**Performers:**

Electro-Acoustic Orchestra: Tom Bickley (Berkeley, CA, EWI+synthesis), Lo Bil (Toronto, ON, voice), Viv Corringham (New York, NY, voice+electronics), Björn Eriksson (Sollefteå, Sweden, feedback boxes), Faadhi Fauzi (Toronto, ON, synths), Colin James Gibson (Toronto, ON, guitar), Yuanfen Gu (China, notpera granular patch), Rory Hoy (Brampton, ON, bass+electronics), Melanie Jagmohan (Brampton, ON, guitar+legos), Kathy Kennedy (Montreal, QC, voice+electronics), Aida Khorsandi (Toronto, ON, notpera FM patch), Nicholas Lina (Toronto, ON, bass), Kieran Maraj (Toronto, ON, electronics), Diane Roblin (Toronto, ON, inside piano+synths), Omar Shabbar (Toronto, ON, guitar+electronics), Danny Sheahan (Mississauga, ON, violin+electronics), Peter Vukosavljevic (Toronto, ON, percussion), Doug Van Nort (Toronto, ON, composing/ conducting)

**Composition and Direction:** Doug Van Nort

**Live action-or-lack-thereof:** Casper, the cat

**Cat-herding and video work:** Stacy Denton

**Virtual Staging and visuals:** Rory Hoy

**Machine Learning (conducting and drawing recognition):** Kieran Maraj

**thee Doug Van Nort Electro-Acoustic Orchestra: nO(t)pera Summer Solstice Selections, June 2021. Widely distributed performers. Audience totally online.**

**Performers:**

Electro-Acoustic Orchestra: Eric Bhatnagar (Brampton, ON, guitar+pedals), Tom Bickley (Berkeley, CA, EWI+FM synthesis), Viv Corringham (New York, NY, voice+electronics), Björn Eriksson (Sollefteå, Sweden, feedback boxes), Rory Hoy (Brampton, ON, bass+electronics), Kathy Kennedy (Montreal, QC, voice+electronics), Aida Khorsandi (Toronto, ON, notpera FM patch), Kieran Maraj (Toronto, ON, electronics), Omar Shabbar (Toronto, ON, guitar+electronics), Danny Sheahan (Mississauga, ON, violin+electronics), Doug Van Nort (Toronto, ON, composing/conducting).

**Composition and Direction:** Doug Van Nort

**Live action-or-lack-thereof:** Casper, the cat

**Cat-herding and video work:** Stacy Denton

**Virtual Staging and visuals:** Rory Hoy

**thee Doug Van Nort Electro-Acoustic Orchestra: Works for the Winter Solstice, December 2021. Widely distributed performers. Audience totally online.**

**Performers:**

Electro-Acoustic Orchestra: Tom Bickley (Berkeley, CA, EWI+FM synthesis), Viv Corringham (New York, NY, voice+electronics), Björn Eriksson (Sollefteå, Sweden, feedback boxes), Rory Hoy (Brampton, ON, bass+electronics), Kathy Kennedy (Montreal, QC, voice+electronics), Kieran Maraj (Toronto, ON, electronics), Omar Shabbar (Toronto, ON, digital electronics), Danny Sheahan (Mississauga, ON, violin+electronics), Doug Van Nort (Toronto, ON, composing/conducting)

**Composition and Direction:** Doug Van Nort

**Virtual Staging:** Rory Hoy

**thee Doug Van Nort Electro-Acoustic Orchestra, October 2022. DisPerSion Lab in Toronto, ON, and widely distributed performers. Audience in Toronto, in Gdansk, Poland, and online. Keynote Performance for Sensoria: The Arts and Science of Our Senses.**

**Performers:**

DisPerSion Lab: Rory Hoy ( bass, electronics), Kieran Maraj (electronics), Omar Shabbar (guitar, electronics), Doug Van Nort (composing/conducting)

Distributed: Tom Bickley (Berkeley, CA, EWI+FM synthesis), Björn Eriksson (Sollefteå, Sweden, feedback boxes), Kathy Kennedy (Montreal, QC, voice+electronics), Danny Sheahan (Mississauga, ON, violin+electronics)

**DisPerSion Lab site, overture/underture piece – lighting and haptics:** Doug Van Nort

**DisPerSion Lab site, in-performance lighting:** Kieran Maraj

**Virtual Space stream staging and visuals:** Rory Hoy

**Networking, audio, tech:** Rory Hoy, Omar Shabbar, Kieran Maraj

**About the Performance:** Audience at DisPerSion Lab in Toronto experienced an immersive haptic/sonic/light opening section. Concert streamed to main event location in Gdansk, Poland as well as online.

**thee Doug Van Nort Electro-Acoustic Orchestra: ‘live’ for the winter solstice, December 2022. DisPerSion Lab in Toronto, ON, and widely distributed performers. Audience totally online. A live performance recorded on December 19 2022 and released to streaming on December 21 2022, for the winter solstice.**

**Performers:**

DisPerSion Lab: Doug Van Nort (composing/conducting)



Distributed: Tom Bickley (Berkeley, CA, EWI + synthesis), Viv Corringham (New York, NY, voice+electronics), Bjorn Eriksson (Sollefteå, Sweden, analog electronics), Rory Hoy (Brampton, ON, bass+electronics), Kieran Maraj (Toronto, ON, digital electronics)