

Title: Two Crowdsourced Telematic EDM Work Performances Using L2Ork Tweeter: Territorio Prismático and 8-bit Petal by L2Ork and L2Ork Community Ensembles

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L2ORK TWEETER COMMUNITY MEMBERS

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1. PROGRAM NOTES

A live performance of two co-created telematic EDM works that were devised using [L2Ork Tweeter](#) platform. Both works premiered in December 2023 by the Virginia Tech [L2Ork](#) and the L2Ork Tweeter community ensembles.

Territorio Prismático (<https://www.youtube.com/watch?v=6oVbAWTlp-E>) is the 5th crowdsourced telematic EDM work devised using L2Ork Tweeter software that enables telematic musicking in perfect sync regardless of the distance. It is also the 2nd work whose co-creation involved L2Ork Tweeter community members from UNTREF, Buenos Aires, Argentina. It is in part inspired by the bass line of the "roygbiv" EDM song by the Boards of Canada. Its world premiere featured performers over 5,000 miles apart, performing tightly synchronized EDM-style music.

8-bit Petal (<https://www.youtube.com/watch?v=hDMiE2OkGNA>) is 4th crowdsourced telematic EDM work devised by the L2Ork ensemble using L2Ork Tweeter software that allows for perfect sync among performers, regardless of their physical distance. It is inspired by "Raye" EDM song by Sultan + Shepard & Shallou, featuring its vocal line, as well as melodic and harmonic elements.

Every facet of both works is co-created by the ensemble members, including instrument design, part composition, and performance. The final iteration of both works is curated by the L2Ork Director Ivica Ico Bukvic. The conference performance will be live and will feature L2Ork Tweeter community ensemble members consisting of volunteer co-creators and performers from all over the world, with physical distances exceeding 11,000 miles. Community members partaking in this performance will be announced at the performance. A visual projection counterpart to the performance led by the visual artist Thomas Tucker will take place synchronously on the Virginia Tech campus.

l2ork.music.vt.edu

2. PROJECT DESCRIPTION

[L2Ork Tweeter](#) is a free and open-source program inspired by the unprecedented COVID-19 pandemic that has required a vast majority of the human population to

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practice prolonged social distancing. It is designed to bring communities together by empowering users around the world to engage in collaborative music making even over slow internet connections. It facilitates the exploration of audio synthesis and the rich variety of sounds one can generate using a customized frequency modulation algorithm. Tweeter supports up to twelve concurrent performers and as many additional guests, or audience members, as the server bandwidth allows, who can observe a performance live over the internet with pristine audio quality. Each user is given a customizable instrument with a tracker that can be populated by up to 64 loop-enabled keystrokes or notes. This intentional constraint requires users to build complexity through interaction with other users. It is in part inspired by the popular social media platform Twitter that imposes a similar design constraint of allowing only up to 280 characters per Tweet. As a result, and as evidenced by its name, L2Ork Tweeter can be seen as a musical counterpart to Twitter.

What arguably sets L2Ork Tweeter apart from other technological solutions for telematic musicking, are three key traits [1]:

1. It allows for perfect sync regardless the distance and latency, and is particularly conducive towards contemporary, tightly-synced EDM-style musicking;
2. Its audio output, regardless of whether the observer is a co-performer or an audience member, is pristine, regardless the internet connection quality, or bandwidth (as long as the internet connection is reasonably steady), and
3. It provides a rich set of tools for musical co-creation and instruction over distance.

Since its 2020 introduction, the Virginia Tech L2Ork and L2Ork Tweeter community ensembles have premiered five new co-created works across four continents, spawning a new satellite community ensemble located in UNTREF, Buenos Aires. For additional information, please consult the prior publication [1], the project [website](#), and/or the [L2Ork YouTube channel](#).

3. PERFORMANCE NOTES

Both works are envisioned to be performed telematically. Doing so requires the physical presence of the ensemble director or one of the ensemble performers at the performance venue who can use their own hardware (two laptops) for the live audio-visual output. In this scenario, the venue organizers should only need to provide one audio output (typically 1/8" stereo headphone jack) and one HDMI video output to the main screen. One laptop will be used for the audio-visual projection, while the other will be used for the performance of the ensemble member who will be attending in person. Both laptops will need to have access to a steady internet connection (ethernet preferred, WiFi is also an option—steady connection is more important than the bandwidth, as Tweeter requires very little of

it, with the Zoom connection with telematic performers taking up most of the bandwidth needs). This is the approach the ensemble wishes to explore for this performance, with the L2Ork ensemble director being present.

As an alternative, the hosting venue can install [Pd-L2Ork](#) free open-source software on the computer (all three major OSs are supported) that is connected to the venue's PA system. The same computer should have a reliable network connection to the internet. In parallel, the desktop of the same computer should be projected onto the performance venue's screen showcasing the software's main window that displays performer activity. Next to the window should be a Zoom session with performers. The software's main window may need to be zoomed out to accommodate both (using CTRL + and CTRL - and then resizing the unused portions of the window). Zoom session should not have audio connected, as performers will use the same to verbally communicate with each other to coordinate during the performance. Optionally, select performers can also be present on stage in which case they also need to have a stable wired or WiFi access. Optionally, other listeners (audience) in and outside the venue can experience the performance by connecting using the same free software.

The work can also be presented as a fixed media video, in which case a downloadable video will be provided.

If applicable, stereo audio output should also be mixed to the venue PA system's subs.

4. BIOS

Founded by Dr. Ivica Ico Bukvic in May 2009, and named as one of the top six national transdisciplinary exemplars (a2ru, 2015), and one of the top eight research projects at Virginia Tech (DCist, 2014), a contemporary multimedia ensemble Linux Laptop Orchestra ([L2Ork](#), pronounced as 'lohkr'), explores musical collaboration through the use of innovative human-computer interaction technologies for the purpose of pursuing an integrative approach to design, engineering, arts, and science.

The work of post-disciplinary creative Ivica Ico Bukvic (b. 1976) encompasses audio-visual, acoustic, and electronic research, technologies, performances, and installations, grants, and patent disclosures. His recent work focuses on creativity enabling technologies, such as mobile technology-mediated ensembles, and audio immersion, including spatialization and data sonification. Bukvic currently serves as the Director of Virginia Tech Institute for Creativity, Arts, and Technology's Creativity + Innovation interdisciplinary initiative. He is the founder and director of the Digital Interactive Sound and Intermedia Studio (DISIS) and the Linux Laptop Orchestra (L2Ork), and a member of the Center for Human-Computer

Interaction with a courtesy appointment in Computer Science. For additional info visit ico.bukvic.net

As a visual artist, Thomas Tucker specializes in harnessing new technologies to unveil invisible or immaterial subjects, ranging from unseeable forces to complex geometries and histories. His applied research spans virtual spatial environments, groundbreaking scientific and historic visualizations, and dynamic interactive artworks. Engaging in transdisciplinary collaborations at the forefront of art, technology, humanities, and sciences shapes his practice, evident in research contributions at this critical intersection. As a Creative Director, Thomas leads projects that exemplify successful transdisciplinary collaboration models, integrating art, creative technology, and visualization across diverse research methodologies. His work facilitates the integration of creative methodologies and technologies, aiding researchers in visualizing the intangible.

5. MEDIA LINK(S)

- 8-Bit Petal premiere video:
<https://www.youtube.com/watch?v=hDMiE2OkGNA>
- Territorio Prismático premiere video:
<https://www.youtube.com/watch?v=6oVbAWTlp-E>

6. ACKNOWLEDGEMENTS

This performance acknowledges the L2Ork and L2Ork Tweeter community ensemble members and co-creators who have participated in the ensemble in the spring 2024, many of whom have foundationally contributed to the development of the aforesaid two works. They are:

Virginia Tech L2Ork

Rohin Batra
Ivica Ico Bukvic, Director
Caroline Flynn
Austin Sherwood
Jacob Alan Smith
Diego Urquizo
Andrew Wickman
Lane Michael Wills
Cameron Young
Jin Yun

L2Ork Tweeter Community Ensemble

Gala Gonzalez Barrios (Virginia Tech, UNTREF)
Rohin Batra (Virginia Tech)
Ivica Ico Bukvic, Director (Virginia Tech)

Justin Kerobo (Virginia Tech)
Daniel Manesh (Virginia Tech)
Joaquín Montecino (UNTREF, Buenos Aires, Argentina)
Jacob Alan Smith (Virginia Tech alumnus)
Lauti Sosa (UNTREF, Buenos Aires, Argentina)
Caden Vandervort (Virginia Tech alumnus)
Lane Wills (Virginia Tech alumnus)

The final ensemble participants for this performance will be announced at the conference.

7. ETHICAL STANDARDS

The participants in the ensemble were either students enrolled in a class for credit or external volunteers. The ensuing crowdsourced content is attributed to all co-creators and co-performers. There is no known conflict of interest and there are no direct funds/investments associated with the creation and production of this work. This project does not involve any form of data collection beyond recording of the ensuing live crowdsourced telematic work.

8. REFERENCES

- [1] I. Bukvic, “Latency-, Sync-, and Bandwidth-Agnostic Tightly-Timed Telematic and Crowdsourced Musicking Made Possible Using L2Ork Tweeter,” *New Interfaces for Musical Expression*, the University of Auckland, New Zealand, 2022.