

# Light Up Kelowna: Coordination and Development of Networked Community-based Media Art Urban Screen Infrastructure

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## Abstract

The ‘Light up Kelowna’ urban screen features a variety of digital artists who use technology to push art in different and thought-provoking directions, tell our community’s vital stories and allow the public to engage with the artwork in a multi-dimensional and multisensory way. In this paper, we outline the structure for coordinating engaged parties in developing scalable urban screen infrastructure and considerations necessary for installing rear projection urban screens in existing city spaces. We discuss the network architectures and topologies for creating networked urban screen systems, borrowing concepts from networked music performance and installation contexts. Finally, we demonstrate the use of our approach for developing an urban screen, showcasing multiple exhibitions.

## Keywords

urban screen, network topologies, Multi-Agent Systems

## Introduction

Illuminating public spaces change the texture of urban environments by activating under-utilized areas. While simply turning on a light opens dark areas at night, media art projections add a layer of cultural engagement to energize citizens and manifest different feelings and details of experience. Urban screen initiatives that transcend the commercial use of displays toward media art are a medium for active public engagement and discovery in urban settings. As a situated media, the cultural capacity of such screens provides a platform for transforming people’s sense of participation and attachment in a place - providing an attraction for the creation of activity and shaping people’s movement in urban spaces [5].

As a platform to remediate the city, urban screens focus on the relationship between the artists, technologies, spaces, and aesthetics towards becoming integrated into people’s psyche. Dubois et al. [3] highlight key creative strategies to address these relationships that include: framing the large-scale digital projection and logic of the monument as expanded cinematic practice; engaging with technology art-making practices enable artists to create new telepresent and telematics rituals and opportunities for urban activism and identification; and there is a need to transform public screens into exhibition spaces.

Investigating the affordances and limitations of urban screens as communication infrastructure in a local suburban

area, Hannon [4] outlines how large urban screens operate in terms of their modalities (pre-recorded, live, interactive) and functions (information provision, event support, screen events, communication). Successful negotiation of the specific community needs becomes vital to realize the full potential of such a screen.

In 2020, we recognized the need to bring our community together through art and create content that can be enjoyed safely. Created in response to COVID-19 community needs, ‘Light Up Kelowna’ includes urban screen infrastructure dedicated to digital art exhibitions. Presented at one of Kelowna key public spaces, this program involves the community creating urban screen exhibitions for an accessible art experience in a public space. In the following sections, we outlined the structure for coordinating engaged parties in developing scalable urban screen infrastructure. Next, we detail the considerations necessary for installing rear projection urban screens in existing city spaces. Following, we go on to discuss the network architectures and topologies for creating networked urban screen systems. Finally, we demonstrate the use of our approach for developing an urban screen with the presentation of multiple exhibitions and present our conclusions.

## Urban Screen Infrastructure Coordination

Developing urban screens infrastructure requires negotiation between a network of municipal, venue management, funding, curatorial, and art community partners for possibilities transforming the locale. Struppek [7] highlights that content also needs to be coordinated in how, when, and in what specific locations screens can be integrated with the urban landscape and its architecture. It is this balance between content, location, and type of screen that determines the success of the interaction with the audience and artists. The Surrey UrbanScreen [6] project is an example of the success of the collaboration between institutions and artists for the realization of state-of-the-art urban screen infrastructure. For Surrey UrbanScreen, artists were critical in steering the original concept of its form and functionality through equipment rebuilds and enhancements. Light Up Kelowna closely aligns with this coordination structure for building the ongoing technological and artistic capacity of vibrant public displays.

For ‘Light up Kelowna’, the Arts Council of the Okanagan coordinated with the venue and City of Kelowna to negotiate installation spaces, and faculty from The University of British

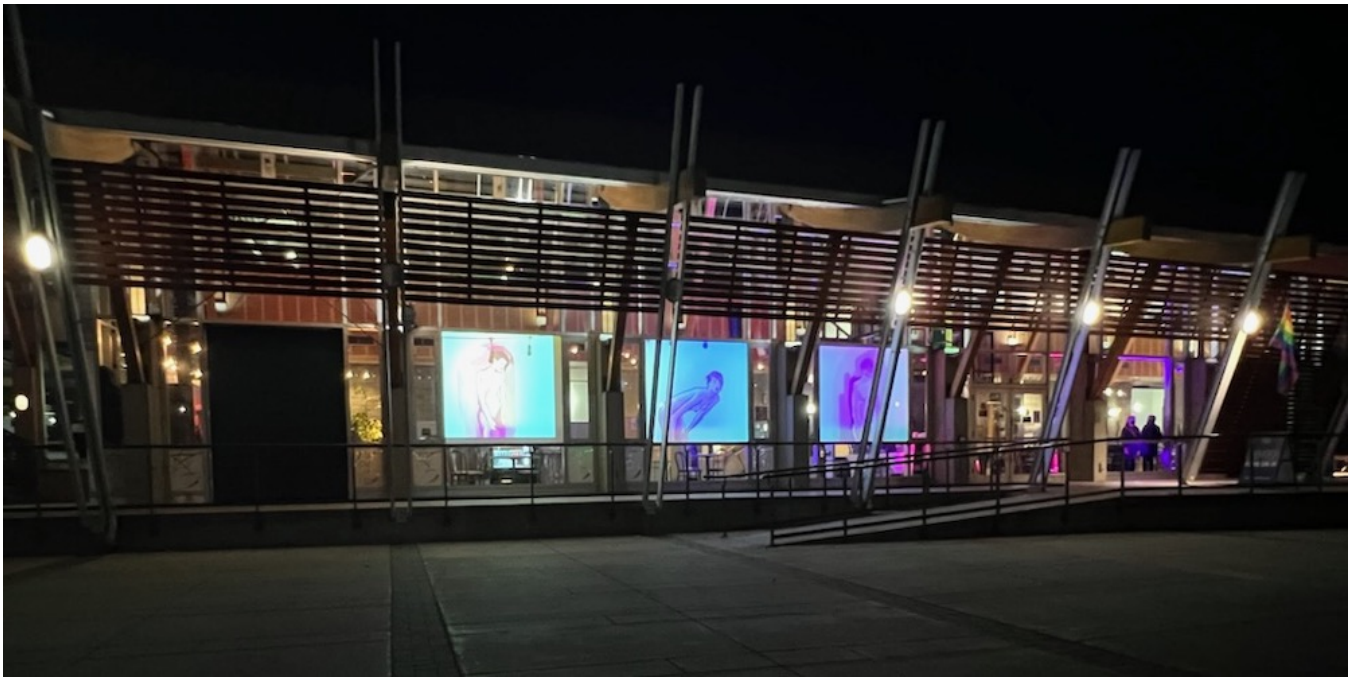


Figure 1: Image of Light Up Kelowna at Rotary Centre for the Arts. Kelowna, BC. Canada

Columba, Faculty of Creative and Critical Studies (UBC) who have the expertise to develop the urban screen system and exhibition curation. In addition, UBC generously funded the pilot project (Figure 2.). In our experience, the central co-ordination structure of the network simplified the workload of engaged parties resulting in an efficient turnaround from concept to realization. As a community-based project with support from publicly funded partners, Light up Kelowna is an art-specific urban screen not requiring negotiation with private entities to interrupt the cultural value with advertising, for example. The sole purpose of the urban screen as an exhibition space then affords flexibility for programming artists' work without needing to synchronize with other arranged content.

### Light Up Kelowna Urban Screen System

The Light Up Kelowna infrastructure is designed to inhabit underutilized surfaces appropriate for urban screen installations. We focus on the rear projection of large windows with minimal functional value, such as shopfronts, office buildings, and community venues. To modify such surfaces for rear projection, it is a simple matter of applying a frosted vinyl film to the inside of the window and positioning a projector in an appropriate location. The benefits of this approach are that it enables to install and uninstall of the system within a day, equipment is secured indoors, the minimal modification to the space makes it easier to negotiate installation with partners, the vinyl allows daylight to enter the building, and it is cost-effective compared to other solutions such as LED walls. Challenges with this approach are that projections will not work during daylight hours, there may be interference with objects and activities inside the building with the

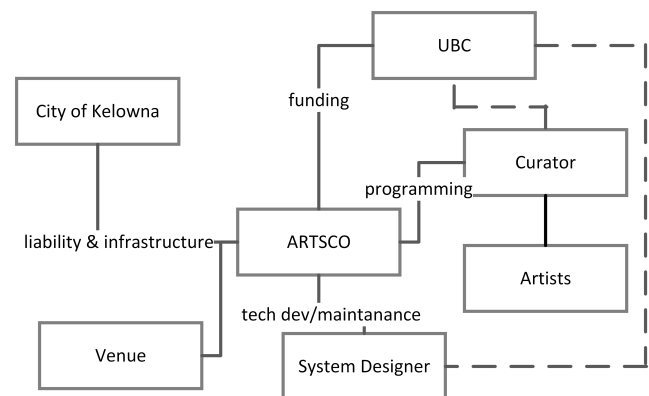


Figure 2: Diagram showing the coordination structure for Light Up Kelowna

projector image, and the quality of the image is susceptible to ambient light conditions. When identifying a location, these challenges must be considered. We used the following list of considerations to evaluate the urban screen installation:

- Window dimensions
- Viewability of urban screen
- Building impact of the installation
- Ambient lighting
- Projector mounting opportunities
- Image interference with building activities

The pilot of Light Up Kelowna described here is located on three adjacent mostly square windows at the main entrance of the Rotary Centre for the Arts (RCA) in Kelowna, BC, Canada - a multi-purpose venue designed to accommodate special events, theatre, music and visual arts. We identified these windows as optimal due to: their large scale; they face toward an open public space; the desirability of a triptych arrangement of the windows; good mounting options for the projectors; covering the windows with vinyl has a minor impact on the feeling of the inside space; and building activities have little interference with projector image.

### LUK Software system

Each window in the Light Up Kelowna system at the RCA has a dedicated projector and computer running projection mapping software written in OpenFrameworks. A conductor program on one of the machines is responsible for synchronizing media across the windows over a wireless local area network. Using a network approach has the added affordance of machines being spaced over larger distances to synchronize media throughout the city for the future scaling of the project across multiple venues and spaces.

As a systems approach, we borrow concepts from networked music theory. For example, Bevilacqua et al. [1] discuss their work with Local Area Networks in response to the COVID crisis for sound installations and performances. They develop infrastructure that allows an arbitrary number of clients to connect to the system and allow diverse levels of autonomy for agents to influence the media composition. In their view, the network is the key medium to support interaction at the level of the individual and collective, which forms the expressive potential of the work. Weinberg [9] defines and classifies the aesthetic and technical principles of such interconnected networks. Focusing on local area networks, he describes the centralized and decentralized topologies. He depicts a centralized synchronous network as a flower topology, where nodes are coordinated through a central hub. A decentralized network is then depicted as a star topology, where nodes are connected and independently manipulate each other's output. A third network combines these two with weighted influence between nodes and a central server. Outlining architectures representing a flower topology, Swift [8], and Brown [2] describe systems that offer accessible and engaging group experiences by affording audience participation with the media creation.



Figure 3: Image of human Player manipulating the screen segmentation and content

	explicit	ad-hoc
static	X	
dynamic		

Table 1: Conductor/Player topology typology

Most representing a flower topology, ‘The Light Up Kelowna’ system is designed around a Conductor/Player relationship (Figure 4.). In this, a machine is designated as a Conductor who sends instructions from a score to one or more machines in the role of Players that receive and execute instructions. Players may communicate back to the Conductor, who can act upon this dialogue. With the ‘Light Up Kelowna System’, Players may be autonomous computer-based agents or audience members. A Conductor/Player topology may be explicit or ad-hoc, wherein in the former, a designer assigns the Conductor role, while in the latter, the role of the Conductor is negotiated between the machines in the system.

The Conductor has in their knowledge base a list of Players in the orchestra that serves the functions of how to sequence instructions and where to send these. The list of Players the Conductor manages may be static or dynamic. In the case of a static list, the system operator specifies the arrangement of players and their addresses to send instructions. Alternatively, a dynamic list is populated and edited by the Conductor as a task of its operation. In the dynamic mode, a Conductor will receive a notification from a Player who has joined or intends to leave the orchestra and will update the list accordingly. Another strategy is the Conductor can send periodic pings to Players who reply to their presence, and the Conductor updates its knowledge base on these responses. The ‘Light Up Kelowna’ system uses an explicit static Conductor/Player topology (outlined in Table 1). Altogether, the result of this approach is a synchronized networked urban screen inhabiting multiple collocated spaces open to audience/performer interactivity. In the following section, we describe some of the exhibitions displayed for ‘Light Up Kelowna’.

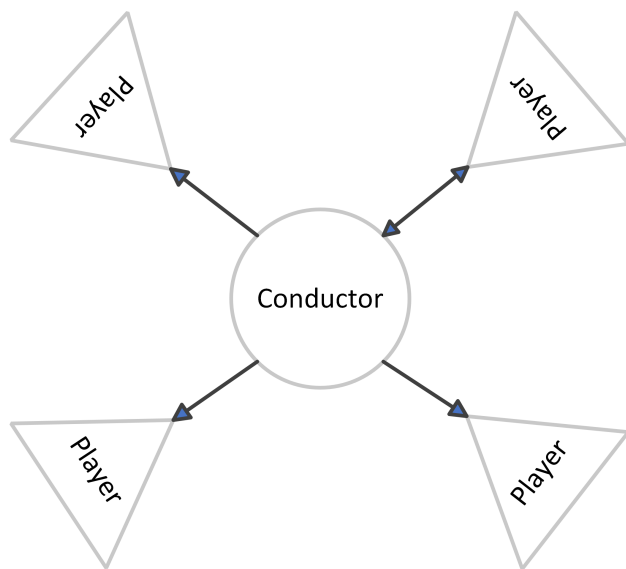


Figure 4: Graphic demonstrating the Light Up Kelowna Conductor/Player topology

### Out in the Wild

‘Light Up Kelowna’ improves access and inclusion for our community through art. This initiative adapts a public park and cultural area into a exhibit space, producing innovative and collaborative programming through digital storytelling exhibitions. ‘Light Up Kelowna’ enhances access to art for all community members with free digital art exhibitions in a public location. It involves and inspires the community through a sense of place and creates a place for all our members to participate in an art experience. ‘Light Up Kelowna’ creates audience experiences that are a personal journey of exploration and interaction, allowing visitors to social distance in a no-touch environment. This aligns with the requirements of today’s pandemic world and the increasing use of technology to connect people. Art and technology are now intertwined, and digital projections illuminate messages of hope, protest and community spirit.

### Collective Bodies

The Collective Body <sup>1</sup> is a transdisciplinary audio/video project that proposes to capture the circumstances of life in isolation during the COVID crisis. Using current communications technologies as a central metaphor, the artists record themselves separately: dancers make videos of specific body parts, then musicians respond with recordings, which are sent to other dancers, who then respond with videos, which are sent to musicians, and the rhizome-like pattern of simultaneous emergence expands. The material is gathered, tagged and shaped into a haunting, shimmering collage of diverse bodies projected onto the exterior of a public building, with outdoor speakers providing sonic sensuality. In prioritizing visual and sonic expression over linguistic communication,

<sup>1</sup><https://thecollectivebody.ok.ubc.ca> accessed:12/2022

which breaks the world into distinct, individual entities, we offer ways of being with others that simultaneously acknowledge differences and fundamental dependencies. The TCB project explores the constraints and unique possibilities of the digital connection while serving as a reminder of the deep importance and irreplaceability of shared physical space.

### Celestial Bodies

Celestial Bodies <sup>2</sup> is a multicultural creation of animated media that tell ancient astrological stories, exploring the belief systems that make up Canadian and Indigenous society’s diverse fabric. The multimedia projection shows animated images of star stories— alongside world-class cross-cultural music. Media Artists Aleksandra Dulic, Miles Thorogood, Jacen Dennis, Amberley John, and Emerald Holt created a multimedia presentation of animated images. The artists reinterpret the cosmological stories and oral histories from their cultural heritages — Greek, Chinese, African, and the Indigenous’ Haudenosaunee culture, and explore the meeting of cultures in their collaborative process with community members, where unique stars signifying individuals’ heritage were made. Each story is connected to a season, and characters from the heavenly world travel through time and space as the night unfolds, highlighting diverse cultural beliefs.

### Autolume Acedia

Autolume Acedia <sup>3</sup> is a hallucinatory meditation on the ancient emotion called acedia developed by creative A.I. artists Philippe Pasquier and Jonas Kraasch. Acedia describes a mixture of contemplative apathy, nervous nostalgia, and paralyzed angst. This emotion, first described by Greek monks two millennia ago, captures the paradoxical state of being simultaneously bored and anxious. Inspired and controlled by the music of Monobor, lost in winter soundscapes, the Autolume video generation system dreams about bodies, organs, and bones. Autolume is listening to the music to produce abstract imagery that seems to be dancing. A product of the latest Creative AI and Deep Learning algorithms from the Metacreation Lab, the piece is also a reflection on the analog and the digital and how they can meet to portray this emotion that has resurged during the current pandemic.

### Student Works

As part of Light Up Kelowna’s art-dedicated urban screen projection in the Rotary Centre for the Arts window, UBC graduate students showcase their work <sup>4</sup>. The exhibit was developed in the context of Graduate Studio in Visual Arts course that involves the critical analysis and production of independent artwork in various disciplines.

Kaytlyn Barkved’s thesis show Neuroqueer Imaging features select digital drawings from her exploration of the unique emotional and sensory perceptions that Autists experience. Kaytlyn is a queer disabled digital artist and Master

<sup>2</sup><https://blogs.ubc.ca/celestialbodies/> accessed:12/2022

<sup>3</sup><https://metacreation.net/autolume-acedia/> accessed:12/2022

<sup>4</sup><https://blogs.ubc.ca/fccsartwork> accessed:12/2022





Figure 5: Image of Collective Bodies triptych exhibition on Light Up Kelowna.



Figure 6: Image of Celestial Bodies triptych exhibition on Light Up Kelowna.



Figure 7: Image of Autolume Acedia triptych exhibition on Light Up Kelowna. Copyright of Philippe Pasquier and Jonas Kraasch

of Arts candidate in the Digital Arts and Humanities theme of the Interdisciplinary Graduate Studies program at UBCO.

Sam Neal's *Inland Waters*, 2021, captures the exploration of time, place and process. Sam collaborates with water bodies in the Okanagan using an early photographic process, cyanotype; a photographic process that utilizes UV light to create cyan-blue prints. He is a multi-disciplinary photographer, artist and Master of Fine Arts candidate at UBC.

### Conclusion

'Light Up Kelowna' has successfully navigated the pilot phase with a triptych screen format using rear projection techniques displaying media in three parts in a storytelling format. The project creates opportunities for community members and audience participation and artist presentations. In this paper, we outlined the structure for coordinating engaged parties in developing scalable urban screen infrastructure. We outline several considerations necessary for installation of rear projection urban screens in existing city spaces. We go on to discuss the network architectures and topologies for creating networked urban screen systems, borrowing concepts from networked music performance and installation contexts. Finally, we demonstrate the use of our approach for developing an urban screen showcasing multiple exhibitions. 'Light Up Kelowna' is planned as a continuing, long-term exhibition series and is easily adapted to meet new community needs and social/artistic directions in the future.

### Acknowledgments

We acknowledge that this work is located on the unceded territory of the Syilx Okanagan people in what is now called

Kelowna in British Columbia Canada. The Syilx people have lived and cared for this land for thousands of years and continue to be stewards of this place. We feel that there is much to learn from their world view and offer assistance to make a better future for all living things. We would like to thank, The University of British Columbia, Faculty of Creative and Critical Studies, and The City of Kelowna for financial support.

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Figure 8: Image of Neuroqueer Imaging by Kaytlyn Barkved. Copyright of the artist.



Figure 9: Image of Inland Waters triptych exhibition on Light Up Kelowna by Sam Neil. Copyright of the artist.

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with ARTSCO, Kirsteen is returning to her roots as an arts advocate and community organizer.

Aleksandra Dulic is an artist-scholar with expertise in interactive art, climate change communication, and media for social change. She is the Director of the Centre for Culture and Technology (CCT) at The University of British Columbia. She leads an interdisciplinary research team that engages multiple forms of art, media and information technologies as vehicles for the expression of community, culture, and identity.

### Author Biographies

Miles Thorogood is an assistant professor of digital art in the Faculty of Creative and Critical Studies and heads the Sonic Production Intelligence Research and Applications Lab at The University of British Columbia. His current research aims to identify the facets of human perception used in creative processes to develop computational-assisted tools for art and design making.

Kirsteen McCulloch is the Executive Director of the Arts Council of the Central Okanagan. Born and raised in the Okanagan, Kirsteen recently returned to Kelowna after many years of living and working in the technology sector in Vancouver. Her love of all things creative, progressive, and boundary-breaking was fostered at an early age. In her role