

# Transitions of Light

Nicholas A. Corrigan

Thesis Submitted to the faculty of Virginia Polytechnic Institute and State University  
in partial fulfillment of the degree of

Master of Fine Arts  
in  
Creative Technologies, School of Visual Arts

Thomas Tucker, Committee Chair  
Zach Duer  
Nate King  
Charles Nichols  
Tanner Upthegrove

May 10, 2022  
Blacksburg, Virginia

Keywords: digital art, light, light art, new aesthetic, post digital, technology, projection mapping, spatialized audio, TouchDesigner, creative technology

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## Abstract

My work attempts to articulate how the format visual information is presented in changes our understanding of the visual information and our relationship to it. I explore analog and digital conversions, the audio and the visual sharing 3 dimensional space, and explore our relationship with screens, information and light. This paper discusses the ideas and underlying themes within my digital works that center around light as a form of information and communication.

My work is also related to the transformation of technology that has occurred across many platforms throughout my lifetime. The most striking example is the telephone. The telephone has transitioned from an analog device on the wall that we speak into, to the phone we know today; a computer we carry around in our pocket with a screen we communicate through. This transformation of technology has changed our daily lives in ways past generations only dreamt of. We no longer log on or go online. We are always connected to a network of information, individuals and communities by an endless live stream of data. We live in an information super age, where we have access to nearly the entirety of knowledge humans have been able to acquire. Whether by reading by candle light, or a collection of pixels in the form of a screen, we use light to communicate all of these ideas and information. Social media, global positioning systems and on demand services have reached a point where our actions and nearly everything around us is tied to a computational system. My work attempts to bring this computational system into our physical space, where it can be acknowledged in the form of light and sound.

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## General Abstract

We live in an information super age, where we have access to nearly the entirety of knowledge humans have been able to acquire. Whether by reading by candle light, or a collection of pixels in the form of a screen, we use light to communicate all of these ideas and information. The format visual information is presented in changes our understanding of the visual information and our relationship to it. This paper discusses the ideas and underlying themes within my digital works that center around light as a form of information and communication.

## Table of Contents

<b>Abstract</b>	ii
<b>General Public Abstract</b>	iii
<b>Introduction</b>	1
<b>Artistic Practice</b>	3
<b>Kinetic Liquid Light As An Artform</b>	5
<b>A Collection of Artistic Works</b>	7
<b>Gathering Storm, Burning Forests</b>	7
<b>Introduction to “Under Pressure”</b>	7
<b>Rhythm And Harmony</b>	8
<b>Noise of the Celestine</b>	8
<b>Kinetic Liquid Light Synthesizer</b>	9
<b>Conclusion</b>	10
<b>References</b>	11

## Introduction

This paper discusses the ideas and underlying themes within my digital works that center around light as a form of information and communication. My work attempts to articulate how the format visual information is presented in changes our understanding of the visual information and our relationship to it. I explore analog and digital conversions, the audio and the visual sharing 3 dimensional space, and explore our relationship with screens, information and light.

My work is also related to the transformation of technology that has occurred across many platforms throughout my lifetime. The most striking example is the telephone. The telephone has transitioned from an analog device on the wall that we speak into, to the phone we know today; a computer we carry around in our pocket with a screen we communicate through. This transformation of technology has changed our daily lives in ways past generations only dreamt of. We no longer log on or go online. We are always connected to a network of information, individuals and communities by an endless live stream of data. We live in an information super age, where we have access to nearly the entirety of knowledge humans have been able to acquire. Whether by reading by candle light, or a collection of pixels in the form of a screen, we use light to communicate all of these ideas and information. Social media, global positioning systems and on demand services have reached a point where our actions and nearly everything around us is tied to a computational system. Algorithms enable a re-representation of our world based on our interaction with both our physical and digital worlds (1.3).

This digital re-representation has begun to materialize into the physical world in visual examples of what has been called the New Aesthetic, a term coined by James Bridle, and is related to the transition from the Digital age into the Post Digital Age (1.4). This transition saw the rise of the Internet and normalized our reliance on computers for everyday activities. It should not be thought of as the end of, or after digital, but rather as a continuation of the digital era in the sense that post modern, post colonialism and post industrialization represented a realization and a maturation of the previous era in which new systems are built upon and integrated into society.



1.1 Digital Camouflage is an example of digital re-representations of the physical world



1.2 The Grocon Pixel Building in Melbourne, Australia is an example of the New Aesthetic materializing in the physical world

My work situates itself where this analog and digital transition occurs. My work is based on live and real time inputs and outputs, is performative in nature, and is informed by my career as an audio visual technician and creative technologist. I commonly use analog inputs that are converted into digital signals, and manipulated through various software. The result is then converted back from a digital signal into analog forms of various media of light and sound. I experiment and iterate with various forms of light displays, monitors, projections, resolutions and formats that aim to show what can be lost and gained while translating forms between analog and digital through different media. These changing states from analog to digital, back to analog embodies the post digital. The resulting artifacts from changing resolutions, the degradation of signal and other results of the cycles of conversions and re-representation of the original input point to how we find, gather, share information and what may be intentionally, or unintentionally, lost and in some cases gained. The conversion between analog and digital and the translation across output formats becomes its own unique form.

This draws inspiration from the work of visual artist Jim Campbell. His work explores the how our eyes and brains interpret visual information, and the amount of information our senses need to understand and decode the world around us. Campbell forces the audience to question how our senses are interpreting the world by presenting the minimum of visual information.



2.1 Jim Campbell, Slur Two, 2016 – low resolution image, custom electronics, 600 LEDs, treated plexiglass. Used with permission of the artist

## Artistic Research and Practice

My digital arts practice utilizes technology to translate and communicate visual information in the form of light across various media systems. It is created for live and real time interactions and is performative in nature. My career as an audio visual engineer and technician that spans more than two decades helps to inform my artistic practice. I have witnessed the adoption and embracing of technology across all levels of production. Analog consoles and amplifiers have mostly been replaced with digital versions. Automation, LED lighting, digital routing, networking, real time video manipulation, and live interactivity have become more common and seamlessly integrated through technology during my time in the live entertainment industry. This has profound effects on how live shows are created, designed and produced. The use of digital technology, powerful computers and software designed to work without rendering and in real time, represents a time of transition in the performance and live entertainment industries.

Performance is an important aspect to my work. In a world where everything can be replicated, mass produced and commodified, performance becomes a rebellion against commodification. It elevates the moment to a sacred place that is shared by the artist and audience that cannot be replicated. Certain aspects of the performance can be documented and preserved as an artifact, but the moment a live performance is created within is a sacred space. By elevating the moment to this position, it calls into question the value of the moment, while acknowledging its refusal to be commodified. Any documentation is merely a partial reproduction of the original and missing some, if not many aspects of the experience. The moment can only be captured as a single dimension of a multidimensional object.

In addition to the obvious technological underpinning to my work, there are theatrical and thematic elements present as well. I use visual layers to build complexity, and use shape and color as different voices or characters in a work, as in Introduction..., Harmony And Rhythm, Noise Of The Celestine. Many of my works have some variation of a theatrical reveal, a technique employed by theatrical lighting designers that uses light and shadow to direct the audience's attention. I often will use the frame of the viewing space to reveal elements to the audience. The idea of many visual systems interacting together is also derived from my work in live theater.

Live entertainment technology is an industry that is in a constant state of evolution. This makes research and experimentation paramount to my artistic practice. Constant experimentation with new technologies allows my artistic practice to keep pace with industry trends. My experimentation has led me to use a palette of software and hardware to create a wide variety of work.

Often I find that my work is an attempt to quantify my experimentations in various forms of live theatrical and entertainment technology. My desire to work in real time has led me to use software that was built for such cases. TouchDesigner, Notch and Unreal have proven to be capable and nimble enough to handle many different scenarios and have become trusted tools for my visual work. I find myself using Ableton Live! for audio and music creation. The software



and output of my work continues to evolve with time and experimentation.

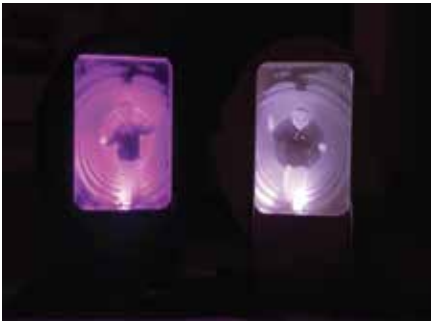
Projection mapping has become an integral part of my artistic practice. Mapping an image onto a surface with a projector or multiple projectors allows a great deal of flexibility to change spaces to exhibit and perform my work.

I have worked to integrate up to three projectors at once, both as a composite image and separate displays. I have experimented with projection mapping onto different flat and irregular surfaces and also using projection mapping to create multiple projections while using only one projector. I have consistently worked iteratively to scale up my ideas from small models, to larger spaces and the surfaces of buildings.

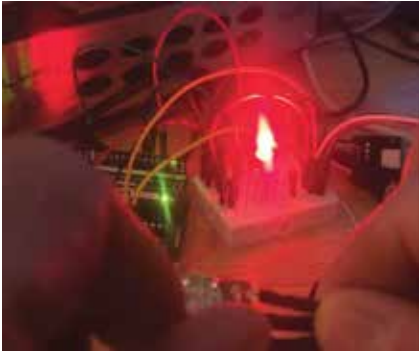


4.1 Corner Square, 2018 - Projection mapping example compliments of the artist

My work with programmable LED lighting has also grown in iterations. My career in live entertainment exposed me to programmable lighting and DMX lighting protocols, however, I had much to learn about programming LED lights with an arduino and eventually creating an array of lights. By integrating customizable lighting into my work using several hundred addressable LED lights, I was able to add another facet of lighting and communication to my work. I started using preprogrammed LED lights in laser cut works and moved onto programmable lighting controlled with an arduino. I found that communicating effectively and in real time with the arduino to be somewhat cumbersome and soon moved to other methods to communicate with an array of lights and convert video information into pixel mapped lighting control.



4.2 Nightlight, 2020 - Laser cut wood and plexi glass, LED



4.3 First iteration of programmable LED with arduino control



4.4 Iteration of programmable LED light using arduino with TouchDesigner

I am also interested in tracking the movement of objects with sound as a method to bring the digital into our physical space. My research and work in 3D environments and software such as Unity, Unreal and TouchDesigner allowed me to develop the visual vocabulary and skills to begin to create this type of interaction. After developing this skill, I optimized the movement and interactivity to be used in real time without the need for rendering using TouchDesigner.



From this point in my research, I began to develop a method for interactivity between a monitor and lights. My idea was to move an object from a monitor into the LED light array I created. I use a method of cropping and translation to create a system that encompasses the whole of these output systems. I have expanded that system to include multiple monitors, projectors and lighting. This level of interactivity between methods of output not only shows the difference between visual output from the source content, but also points to the space between these outputs. This space between is where it is possible for the digital to be acknowledged by the audience in the physical space.



5.1 Interaction of monitor with LED array



5.2 Monitor and LED array interaction with Leap Motion control

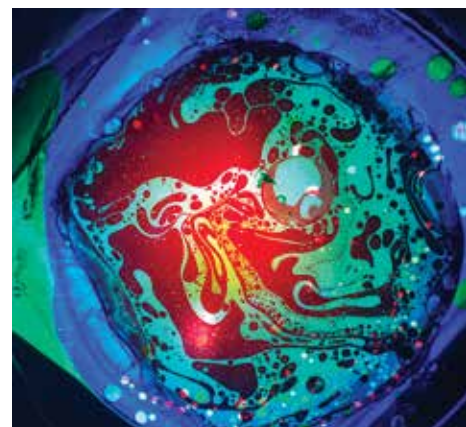


5.3 Interaction between monitor and projector with sphere and liquid light

The methods of interface and control in my work while I am creating it is an important factor in the choreography of my performances. I use MIDI to control and interface with many of my works. I have recently begun to create custom user interfaces in TouchDesigner to help manage all of the elements at play. By creating my own custom tools and interfaces, I can isolate the parameters I wish to control and make interactions more easily accessible. I also have experimented with gesture controlled interfaces such as the Leap Motion and Kinect. I have found that while my work consists of variations of light, most of the spaces my work finds itself are very dark and do not work well with gestural control. In my experimentation, I found most gesture controlled interfaces need good ambient light to work well.

### **Kinetic Liquid Light As An Artform**

One of the forms of analog inputs I chose to utilize is the kinetic liquid light painting. Liquid light art was popularized in the late 1960s and 70s as the light show from musical acts in small San Francisco venues such as the Avalon Ballroom and the Fillmore. In 1964, Elias Romero was experimenting with overhead projectors and liquids to produce abstract landscape scenes for a play in the Mission District in San Francisco. Romero moved in across the street from a struggling painter named Bill Ham and Romero stored some of his equipment in Ham's basement studio. The two began to create experimental light performances (5.5).



5.4 Photograph of Liquid Light compliments of the artist

This was before concert lighting and lighting consoles revolutionized the live music experience. Bright stage lights were expensive, hot and needed an electrician to operate properly. In contrast to professional lighting, overhead projectors were inexpensive and easily acquired. Romero's controlled style was very different from Ham's wild use of color and movement. Ham is credited with creating the first San Francisco psychedelic light show, a mural programmed to operate indefinitely in Virginia City, Nevada for the San Francisco band the Charlatans in 1965 (6.3). When Ham returned to San Francisco, he started performing his liquid light projections with bands on the weekends. By 1967, Bill Ham was asked to provide his kinetic liquid light aesthetic full time at the Avalon Ballroom (6.4). His light shows transformed the Bay area music scene and were soon imitated in other venues by The Brotherhood of Light, The North American Ibis Alchemical Company, Little Princess 109, and Heavy Water among others. In a few year's time, the liquid light aesthetic spread to the East Coast as well (6.5). The Joshua Light Show gained notoriety by creating similar work for Bill Graham at the Fillmore East in New York City (6.6).



6.1 Bill Ham with Light Sound Dimension circa 1968; Bill Ham (lower left) is credited with creating the first psychedelic liquid light show in 1965

This aesthetic points to a transformative time in music, culture and technology in America that has parallels to our current time of transition. The threat of communism and the resulting nuclear armament between the United States and the Soviet Union, and the investment in NASA and the space race, both created huge leaps forward in technology. Civil unrest, the Civil Rights movement throughout the 1960s, the normalization of violence and murders of prominent leaders, all can be paralleled to current events. Advances in

technology, the Internet, the normalization of violence and mass shootings, civil unrest in the form of the Black Lives Matter movement, the attack on the US Capital, and the rise of Authoritarianism throughout the world.

My use of the kinetic liquid light aesthetic reacquaints my audience from this rich cultural time of transformation and transition. It is here that I wish to position my audience's attention in the present towards the future.

The use of liquid as a filter of light allows the audience to witness perpetual movement and brings the temporal into full view. Time becomes a performative element. This further elevates the moment to a sacred space, where the structure of the past and the possibility of the future are realized.



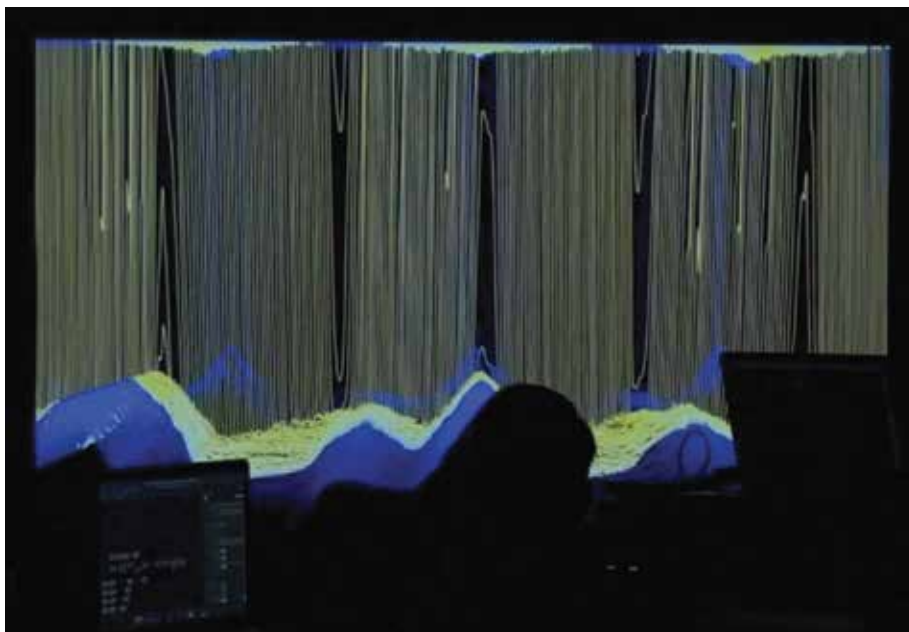
6.2 The Mothers led by Frank Zappa perform in front of a liquid light projection by the Joshua Light Show at the Fillmore East in 1971

Using this as a starting point, that is then translated into a digital format, represents a direct tie to the past lineage of live performance that is re-represented in a digital context with new possibilities.

## A Collection of Artistic Works

### Gathering Storm, Burning Forests, 2019; Digital visualization – Digital, Audio, Video

This work was inspired by watching a gathering storm over the mountains near my home in Blacksburg and by historically large fires in California and the West. This work explores the beauty and power of nature and how our perspective and opinions of it may change depending on our proximity to it. I use a visual synthesizer that is converted into a digital signal and manipulated with a linear effect stylized after an analog video effect created by video

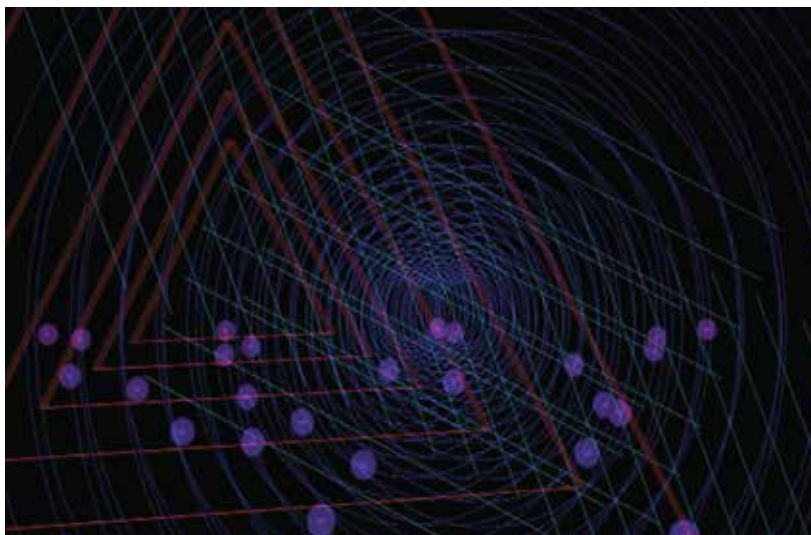


7.1 Still image from video of Gathering Storm, Burning Forests, 2019

broadcast engineers Steve Rutt and Bill Etra in 1972. Manipulation of the z-axis coupled with the movement, noise and color of the visual synthesizer create a moving landscape that changes color and mood with the musical elements accompanying the live video input.

### Introduction to “Under Pressure,” music by The War On Drugs, 2021; Digital

The direct relationship between audio and visual is explored using primitive computer generated shapes moving in space. Patterns of shapes fade in and out with voices in the music. The smooth movements of programmed oscillations are positioned as counter voices against the slightly irregular analog gestures performed by the artist in time with the music using a programmed midi interface.



7.2 Still image from video of Introduction to Under Pressure, 2021



### **Rhythm And Harmony, 2021; Digital, LED Light Array**

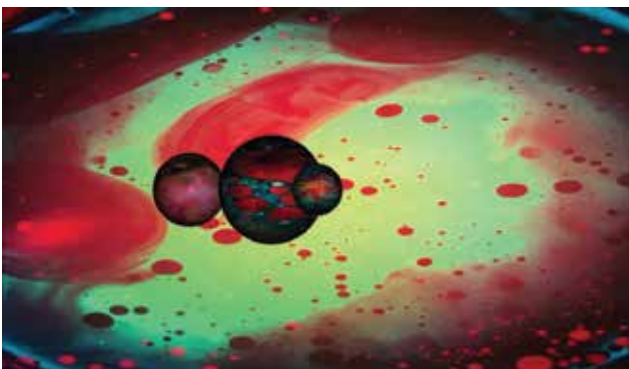
This is a light translation of a drum beat shown to me by a colleague he affectionately called the “Ghetto Beat.” The “Ghetto Beat” is a cornerstone of modern drumming and variations can be heard in music from the 1950’s to music today. A familiar example would be the sampled rhythms of Clyde Stubblefield, who gained notoriety with James Brown’s band from 1965 to 1970 (7.8). The relationship between sound and light are explored as a direct translation between the voices of the drum set (high hat, snare and kick drum) and the blinking of the colored circles in this work. The red, green and blue colors blink in time with the rhythm and slowly oscillate to blend the color as the rhythms meet in space. I slowed the visualization of the rhythm down to make the visualization easier for the audience to follow and more pleasing to the eye.



8.1 to 8.5 Video stills from Rhythm And Harmony, 2021

### **Noise Of The Celestine, 2021; Digital**

This work utilizes several kinetic liquid light examples as the surfaces of orbiting bodies. This work explores thematic and narrative themes of creation and destruction. The work begins with a sphere rapidly getting larger and smaller, then receding into the background of a unnatural star field. Each orbiting body has a collection of sound associated with it. The level of the sounds are linked with the size of the bodies as well as their position relative to the camera as it moves dynamically through the orbital system and utilizes audio spatialization within a stereo system.



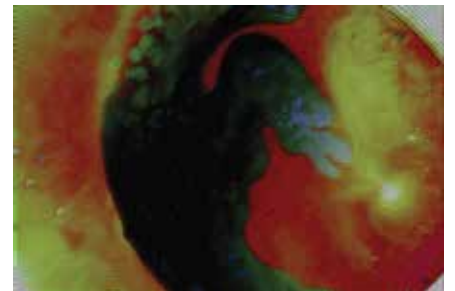
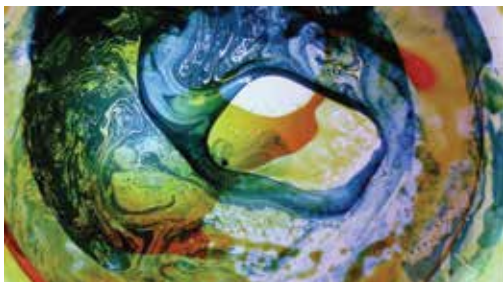
8.6 - Still image from video of Noise Of The Celestine, 2021



8.7 - Still image from video of Noise Of The Celestine, 2021

**Kinetic Liquid Light Synthesizer, variations 2021 to 2022 – Various custom electronics, liquid light, LED light, generative digital, spatialized audio**

The Kinetic Liquid Light Synthesizer is an ongoing exploration between analog and digital as it relates to organic and synthesized, and how the two affect each other. I begin with a liquid light input to a digital camera. I create a system of feedback and interaction between the visual information and the musical voices, which affects certain parameters and the output of musical voices, which then affect the visual output. I also employ several different visual feedback loops and glitch effects that are paired with musical voices. I have experimented with different systems of control and various methods of and combinations of output including limiting the visual data, and cropping the visual input into sections to control different aspects of the feedback systems. The latest variation of this work outputs to a monitor, a projector and a pixel mapped LED array. I have attempted to reveal all of the output methods in a theatrical manner. The transition of the image across the three visual outputs creates a visual representation of how the medium of the output can affect the way we perceive the source material and change what is being communicated.



9.1 to 9.5 Images of the Kinetic Liquid Light Synthesizer, 2021 -2022

## Conclusion

We used to communicate through analog devices such as the telephone, but now we have a phone we carry in our pockets. Instead of talking into a device, we look into a screen for information and to communicate with others. Light and pixels are the way we inform ourselves and communicate. We interact with our digital world through screens. This fundamental change has altered the ways we communicate, how we gather, the ways we find and parse information in profound ways. The digital lens we use to parse all the information we are presented with on a daily basis fundamentally changes the way we see the world.

My work attempts to articulate how the format visual information is presented in changes our understanding of the that information and our relationship to it. I use analog formats from the recent past in conjunction with new digital technology. The output of this analog to digital conversion presents the audience with a visual representation of how information changes as it is converted through several light-based media systems. This digital re-representation of visual information in the form of light presents the differences between the quality of visual information when it is translated over this analog to digital conversion. When the quality of information changes through technology and formats, our experience and understanding of the world changes as well.

Although the word telephone may have evolved to phone, these are two very different technologies that have changed how we interact and understand our world. Our phones are just one example of how we regularly interact with a computational system that has direct effects in our lives. On demand services, social media, global positioning and mass surveillance, just to name a few, have fundamentally changed how we interact with the world around us and how that world interacts with us. We reconcile our biological selves with our digital avatars on a daily basis. As our world begins to emerge from the more than two years of the Covid-19 Pandemic, we may find that our reliance on technology has accelerated even more. Our digital identities are just as relevant as our identity in the physical world.

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