



Derek Kwan, *Bombay Beach* (2020), frame enlargement. Courtesy the artist.

SMALL-FILE MOVIES

SAVING THE PLANET,
ONE PIXEL AT A TIME

LAURA U. MARKS

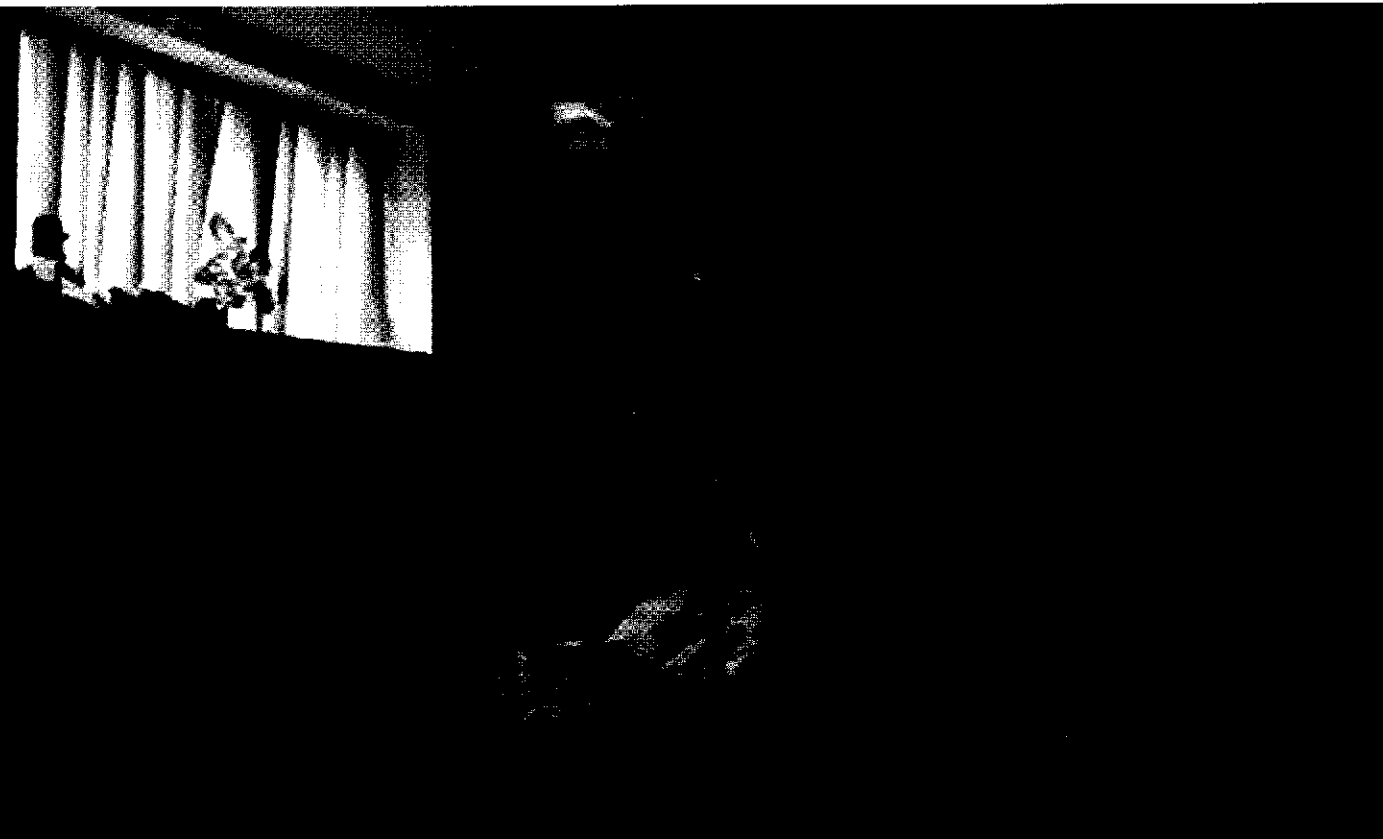
Bombay Beach by Derek Kwan (2'30" processing time) is only two and a half minutes and 4.9 MB, but it creates a sense of intensive time and impossible space. It begins with an almost still shot of round-lobed cacti in front of a trailer, behind them a blue-gray sky, and there is the soft sound of chimes, and wind on the microphone. Slowly, rectangular pixel groups peel the skin of the image, revealing luminescent moving forms. The image becomes inhabited by ever-moving pixel grids of different resolutions, which fill its stillness with abstract life. It feels like the sounds we hear are coming through windows cut by the pixels. The windows give way to another world, where a wave seethes on the grainy sand. Bubbles in the seafoam, pixel bubbles in the movie, the elsewhere in the here.

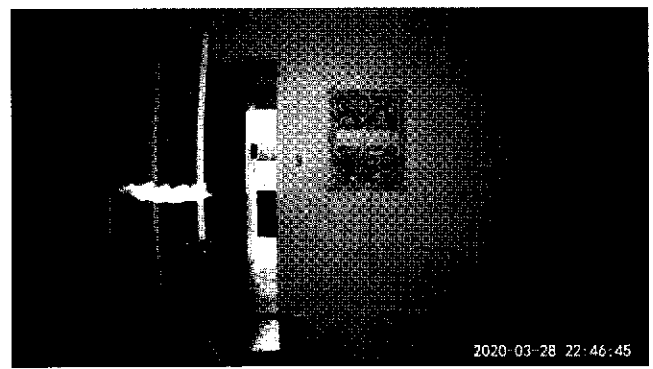
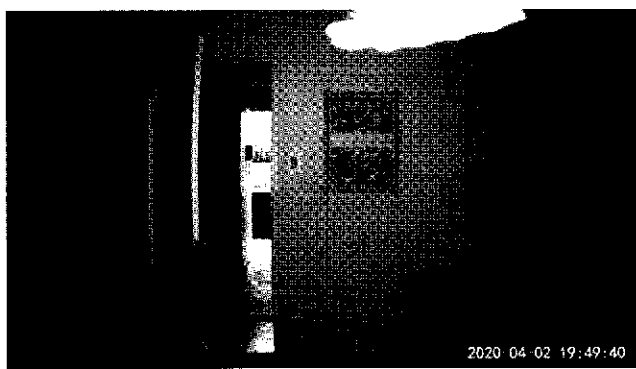
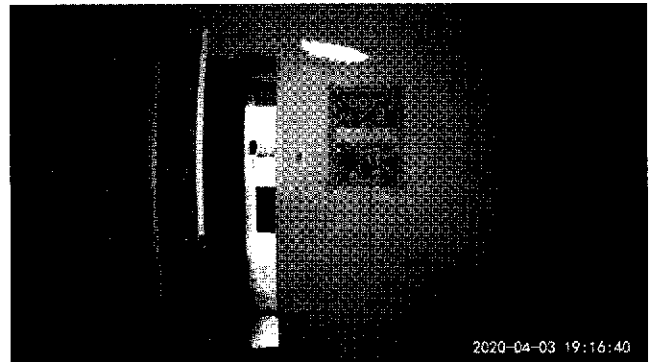
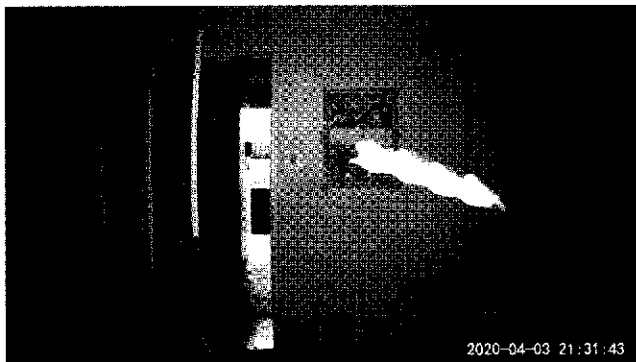
Another time-traveling movie, Hân Phạm's *Once Upon a Time* (Vancouver, 2020, 5:17, 5.67 MB, 14'0" processing time) begins in the protective space of the artist's bedroom. The yellow walls shimmer and disaggregate, and Vietnam floods into the room: music, Saigon street scenes contemporary and antique,

and war documentary, anchored by a queer and colorful theater piece. As is often the case with immigrants' precious media, glitch outnumbers image, the resolution is super-low, and the sound is raucous. The space of the movie expands to embrace all these noisy, jostling stories, then contracts back into the room, leaving no trace but a few yellow compression artifacts.

If we want to stream movies in high resolution, we have an ethical obligation to agitate for renewable energy. This sober conclusion arises from some simple facts: the Information Technology (IT) sector is responsible for about 7% of global electricity consumption. Within that sector the fastest-rising demand affects the data centers, networks, and devices that support streaming media. Streaming services, device manufacturers, and telecoms are rushing to hook consumers on high-speed, high-resolution movies. The manufacturers of data center and network hardware, and the engineers who work for them, are falling over themselves to meet this demand efficiently. Yet all of them admit that there is no way that increased efficiency will compensate for

Hân Phạm, *Once upon a Time* (2020), frame enlargement. Courtesy the artist.





ABOVE Weihan Zhou, *Moththth* (2020), frame enlargements. Courtesy the artist.

OPPOSITE Remy Porter, *Trying to Play* (2020), frame enlargement. Courtesy the artist.

the increased demand. And as long as the required electricity comes from fossil fuels—currently 80%, and falling, but not fast enough—streaming will generate an unacceptable level of greenhouse gases.

With a research team I have been studying the IT engineering and corporate literature.² We sense anxiety, buck passing, and misinformation. For example, a recent white paper from Dell, one of the most important manufacturers of computers used in data centers, celebrates the increased energy efficiency of its products.³ However, its authors admit that this efficiency is outpaced by rising energy consumption, as more units are sold to meet the overwhelming demand for high-speed data transfer.

The authors also note, “With respect to energy intensity, it’s becoming harder and harder to recognize gains with each generation of product.” We non-experts in IT often lazily believe that Moore’s Law guarantees that every aspect of digital media

will continue to double in efficiency every couple of years, but this does not apply by any means to the very physical hardware, let alone the electrical infrastructure, on which digital media rely. It is touching how engineers and manufacturers are working so hard to make incremental improvements in all aspects of the infrastructure, like Hans Brinker trying to prevent a flood by sticking his thumb in the dike.⁴ In contrast, network services like Cisco breezily project astronomical increases in the demand for streaming, given the expected increase in ultra-high-definition (4K) video, 8K video, and virtual reality, as well as non-video applications like self-driving cars. Cisco’s science-fiction visions have a disturbing way of becoming factual, because industry makes decisions based on their predictions.

A challenge, then, for people who love both the moving image and the environment is to reinsert the conditional tense in corporate pronouncements that we *will* be devouring ever more

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bandwidth. We *would* devour more bandwidth and contribute significantly to global warming *unless* we change our media habits.⁵

Of the many ways to decrease streaming energy demand, I will focus in the rest of this article on the beauties of small-file media. Small-file media celebrate their small energy footprint, making energy efficiency an interesting aesthetic constraint. In organizing the First Annual Small File Media Festival (August 10-12, 2020; smallfile.ca), with Sophia Biedka and Joey Malbon here at Simon Fraser University in Vancouver, I have learned a great deal about the pleasures of small (under 5 MB for five minutes!) movies, and about what it is we desire when we desire high resolution.

The festival received over 100 submissions: super-pixelly abstractions, elegant animations, stills combined with sound, GIF loops, datamoshing, surveillance footage, movies shot

with antique digital cameras. Some of the movies are highly compressed versions of existing works, but many of them were produced specifically for the festival. We could tell they were trying to please us, even flirting with us, doing cute tricks to meet our unusual criteria.

Hands down the most disarming of these was *Trying to Play* by Remy Porter (Pittsburgh, 3.3 MB, 5 minutes, 1:18 minutes processing time). Sharing her screen, a woman who introduces herself as Sheri Smelcer performs a search of her cluttered desktop for the movie she has made for the Small File Media Festival. While she unsuccessfully hunts for it, we get TMI about Sheri from her desktop with its soulful kittens and files with titles like “Tinder Losers” and “OqBSGgrAmw.” Sheri opens her “PORN” file, then the “ONLY JOKING” file inside it, all the while enthusing “You’re gonna just love it... I’ve never been part of a project like this before, um, super excited for my team, big shout



out.” There (right above “MY ANUS IS BLEEDING”) is the “PERSONAL PROJECTS” file, and inside it, the files “LARGE CARBON FOOTPRINT,” “HUGE MEDIA,” “BIG BIG FILES,” “MICRO VIDS,” “NANO MEDIA,” and “Small File Media.” Shari opens the “MICRO VIDS” file, but the movie is not there! Flustered, she opens “HUGE MEDIA” (filenames like “galaxy” and “clonmuskego”)—but the movie is not there either! Finally we watch Sheri download the movie. Line by line, the file size rises. Triumphant, she opens it up: of course, it’s the movie we’ve been watching.

O’Hara Lane by Colin Williscroft, shot in the filmmaker’s backyard and basement, inhabits the questing point of view of a cat named Stevens. The movie simultaneously “constitutes [Stevens] in the first person” and “is present at his birth and brings him on to the scene,” exemplifying Pasolini’s free indirect subjective.⁶ Williscroft uses only slight camera movement and shallow focus to maintain image quality, and the power of sound to carry the story, so that after using Media Encoder and Handbrake (total processing time 13:29) this three-minute narrative of feline existential longing comes in at just 2.75 MB.

At the beginning of the Coronavirus lockdown, Weihan Zhou moved out of his Manhattan apartment, first setting up a low-resolution, low frame-rate, motion-activated security

camera. *Moththth* (New York, 2020, 2:58, 3.9 MB, 21 seconds processing time) shows the gray and white footage relayed to Zhou at his distant location. A single life flickers in the stillness: a white moth, careening about the space, taking over Zhou’s home while he’s away. “I hate moths,” Zhou mutters, and, resentfully, “Moth must be very happy now. My sushi rice, and my comforter are all there. It travels around like a king.” But, as sirens sound constantly, he begins to worry that the moth might get lonely.

The small-file movie most likely to induce a seizure is *Sticky Note Studies #1 & #2 (Orange and Pink)* (Los Angeles, 2020, 1:06, 1.7 MB, 1:02 processing time) by Trevor Byrne. This tiny, silent film submerges the viewer in dense, illuminated, stroboscopic color that seems to pulse at different rhythms. At one point it permitted me to see my own eyeballs. At another moment it revealed the filmmaker leaning toward the camera. I doubt *Sticky Note Studies #1 & #2 (Orange and Pink)* would have been as aesthetically rich had it been shot in regular resolution: compression finds depth and texture in the colors of the movie’s eponym.

A graceful way to make small-file movies is to reduce the frame rate from 25 frames per second to 18 or 14. The resulting image has an oneiric quality, opening up spaces within movement as though something completely other might happen from one

frame to the next—as in Quin Martins’ *Extras* (Vancouver, 2009, 2:41, 4.81 MB, 1’33” processing time), a tiny detective movie whose sense of mystery is heightened by its low frame rate.

Other movies achieved smallness by taking advantage of once-despised (by me anyway) premade animations, like commercial GIFs and Instagram stickers, that reduce file size by being recognizable. Ashley Blewer’s 13-minute non-interactive website *Throttled* (Brooklyn, 2020, 4.2 MB, 1 kb/s) pullulates with feminine GIFs from the early Web, fairies and flowers gradually giving way to sex-work ads. Hany Rashed’s droll *My Instagram* (Cairo, 2019, 0:35, 6MB, 15 min processing time) shows a loop of a man screaming from an apartment window while a skeleton dances in front and hashtags scroll. I have a new level of admiration for artists who can draw novelty out of such branded images.

What uses the most broadband is photographic verisimilitude. High-resolution movies are “push” media, in McLuhan’s term: they push their world out for you to receive with minimal effort. Small-file movies are “pull” media—you have to go toward them, to use imagination and empathy. If you do, these movies stimulate the imagination; they are touching because they are inadequately actual, demanding because we have to supplement their inadequate actuality with our own.

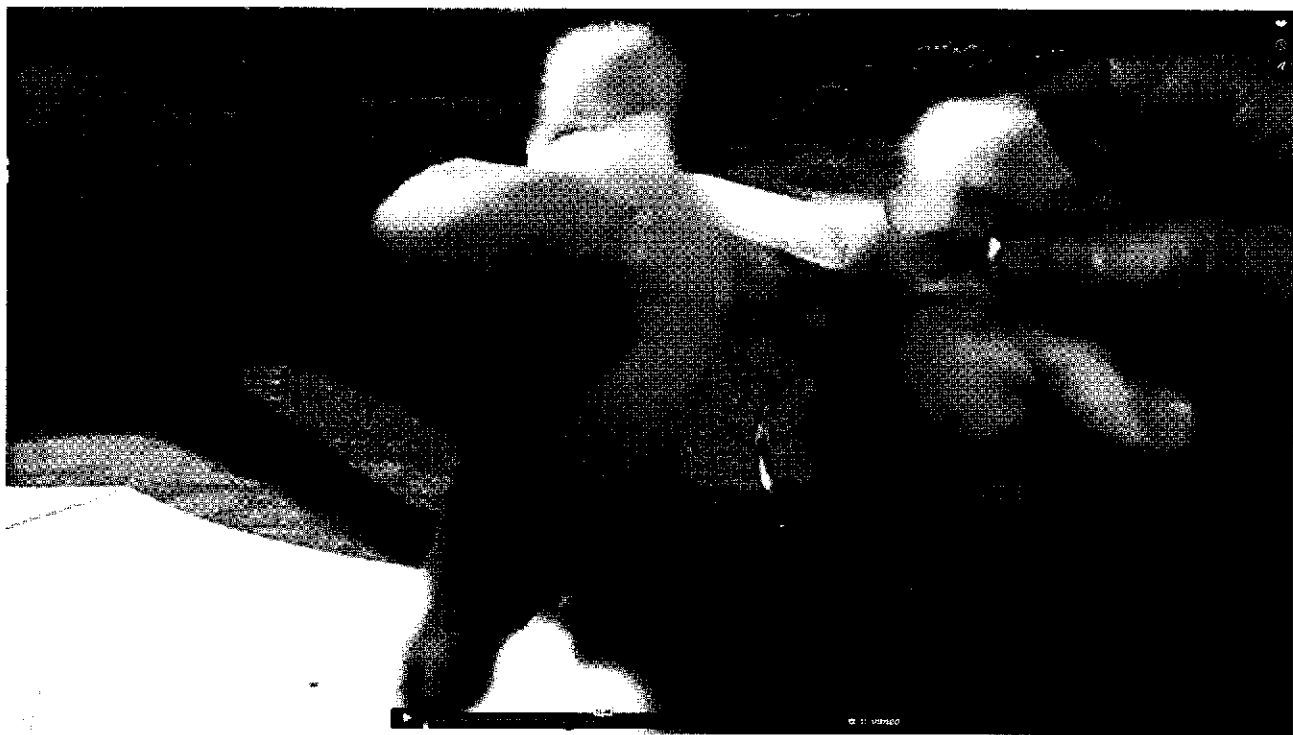
“It’s annihilating to watch these videos,” my spouse says, “but liberating. You have to create a void in yourself to care about this dog, these blobs of color.”

Because I love the photographic image and suspect algorithms of manipulating me, it was difficult for me to appreciate that computer-generated media are exemplary small file movies. But digital animation, games, and executable files (which unpack themselves at the user end) showcase human ingenuity and imagination, thriftiness and computational elegance. They can expand our embodied minds by inviting empathy with non-figurative forms, and with the software itself. Like the illuminated boxy faces built with palette shifting, an economical animation method from early video games, in Kristin Roos’ six-frame GIF *Screen Box City* (Vancouver, 2020, 684 KB).

I learned a lot about porn organizing the Small File Media Festival. The university lawyers would have preferred that we not mention porn in the call for work, but we stood firm (haha), because, by the Shift Project’s calculation, online porn viewing produces about .03% of greenhouse gas emissions. Until energy sources are renewable, the planet needs small-file porn.

Some submissions to the porn category were hard-core. Warren Chan’s *WRITHE* (Toronto, 2020, 1:38, 1.96 MB, 41 seconds processing time) is a looped mosaic of X-rated

OPPOSITE Ashley Blewer, *Throttled* (2020), frame enlargement. Courtesy the artist.
BELOW Pierre Leichner, *Dough Porn* (2014), frame enlargement. Courtesy the artist.



fucking, with sound track of moans and squishy sounds. Dooley Murphy's *A Shameless Plug* (Copenhagen, 2020, 504 kb) GIFs disconcertingly between a hand inserting a two-pronged plug into an outlet and slim fingers entering a woman's vagina and butt. Many cloaked the naked figures in pixels in a way that rendered them cerebral. Some were sweet. In Pierre Leichner's "Dough Porn" series, two figures, very approximately formed from pieces of dough, held and voiced by the filmmakers with the female and male voices switched, engage in a genial sexual encounter against a luxury backdrop cut from a magazine.

Regarding the contentious difference between porn and erotica, a first thought might be porn is a McLuhan "push" medium (ha), erotica a "pull" medium; that is, erotica is porn for people with poor internet connections. This distinction was not exactly borne out, but we certainly received some erotic small-file movies. In Sarah Kantowitz's *I Missed You* (1:13, 4 seconds processing time) a woman's pretty foot palpates various outdoor flowers, as some downtempo music plays. As soft petals meet soft pixels, I do feel their touch on my own soles.

In conclusion, small-file media can be effective as pornography, especially if the viewer uses their imagination and downloads the file for repeat viewings.

The festival also taught me that motion and rhythm don't need high resolution to directly move the viewer.⁹ Darcie DeAngelo's delightful *How Does She Do That?* (Lowell, MA, 1:34 minutes, 4 MB, few seconds processing time) loops shots of a dog leaping in the snow, in forward and reverse motion. There is little figurative detail but it's easy to not just admire but inhabit the animal's enthusiastic movement. And for some reason François Quevillon's very simple GIF file (Montréal, 2.6 Mb infinite loop, 1 minute processing time), a wave of bubbling hot water releasing clouds of steam behind a rusted fence, shot at a geothermal power plant, makes me want to cry. This finding suggests that moving images that rely on action, like sports and action movies, could be effective at low resolution.

Like many cinephiles, I have long despised video compression. (Many audiophiles feel the same about audio compression.) Features smear into approximations. Pixelly halos replace subtle gradations of color. Compression artifacts jump like fleas around the contours of things.

Compression is designed to get the best resolution for a given bit-rate. There's a long menu of codecs (compression-decompression algorithms) out there. The behemoth, MPEG-2, uses two compression methods (Adrian Mackenzie calls them "patent lineages," indexing the 19 companies involved in the design of the codec): one for brightness and color, one for motion. The discrete cosine transform detects changes in brightness—effectively, recognizes edges—and, like Leibniz's monad, extracts

their differentials. Motion compensation predicts transitions between frames by analyzing movement into directions and rate of movement of macroblocks, about 800 of them in a PAL DVD image.¹⁰

Codecs begin with the reasonable assumption that viewers care most about figures and movement, just as our ancestors, hunting prey and fleeing predators, presumably did. Thus compression anticipates what we want to see—figure, not ground; clear edges, not the uncertain space where things meet; large-scale action, not the shimmering of a grassy field—and to hear.

There are plenty of reasons not to love compression. It replaces perception with general ideas of what things look and sound like, nullifying cinema's compact with the world. Like a two-timing husband, compressed images show up with a big, garish bouquet to distract us from the loss of tender subtleties. It imposes a second-order perception that gives preference to significance, meaning, and causality: practical for hockey games, cooking shows, and the news but not for more experiential movies. Some critics argue that compression annihilates noise, uncertainty, the unknown, and the future, for example by using predictive algorithms that save memory and energy by anticipating the frames to come.¹¹ A radical critique says that compression replaces our perceptual engagement with the world with a set of signs that belong not to our eyes and ears but to the surveillant media corporations that own copyright of the compression algorithms. In short, in the gloomy view, compression insults viewers and listeners while colonizing our perception for corporate control.

I disagree with those who worry about the total corporate takeover of perception. People live in analog worlds that train their senses, even those who spend hours on addictive audiovisual media. As the artists in the Small File Media Festival show, codecs are plastic media that can be exploited for many different effects. Compression draws attention to the physicality of the platform, which comprises all the variables of pixel grid, definition, network speed, telecom company, energy efficiency, etc. Compression algorithms are cute and adorable in the way they try to please us with limited means—such as dithering, alternating two colors of a pixel in successive frames to give the impression of the average color. It's possible to grow fond of compression and admire it for aesthetic and social reasons, as well as environmental ones. Given the enormous cost to our planet of streaming media, it would be good to cultivate such an appreciation of compression's sneaky, gnarly, boot-faced charms.

Footnotes are online at:
www.mfj-online.org/marks-small-file/

