



(left to right) Dave Robert and Greg Hermanovic of Derivative set up gear for Plastikman's live performance at the Mutek festival in Montreal; Richie Hawtin (aka Plastikman) surrounded by controllers and equipment; Hawtin tests the system before his performance; Hawtin and Derivative's Jarrett Smith work out last minute glitches; Plastikman works the controls in performance

Derivative adds a new Touch to electronic performances, merging visuals with sound to produce a new paradigm in digital music

Sounds like motion

by Bob Kim

ALL PHOTOS COURTESY DOUG COOMBE





(left) An enthusiastic Mutek audience voices its appreciation; (right) visual effects ebb and flow with the music

It's June 4, 2004 at the [Mutek](#) experimental music festival in Montreal. Unbeknownst to the capacity crowd at the Metropolis nightclub, something extraordinary is about to happen. The fact that acclaimed DJ [Plastikman](#) is giving his first performance since 1995 is something in itself; that the show will have the fully immersive sensory exploration for which Plastikman is famous is also worthy of note.

But as he takes the stage amid screams and whistles, those who pay attention—those who are there for more than *just* the music, slowly come to a realization. This is something they've never seen before.

Visuals which seem to ebb and flow with the music are generally nothing to write home about—folks have been putting visuals to music for decades. And with the state of technology these days, *of course* they would move with the music. Heck, your screensaver can do that.

What's different on this June night at Mutek is the *way* in which the visuals move with the music. There seems to be a quirkiness to them, as if there was personality behind their behaviour.

What Plastikman (aka Richie Hawtin) and visual effects wizards [Derivative](#) have done this night is revolutionize what was traditionally a one-way dynamic. Instead of tailoring the visuals to the music, we've come full circle—now the visuals are also shaping the music.

FROM TRIPPY TO WIMPY

People have been adding visual effects to music since the tripped-out oil sheets of the 60s. In the disco era, basic synchronizing of light shows to audio was developed; then someone realized that you could tie

lights to certain frequencies being output by the system. Suddenly, strobes flickered with the kick drum, beams could move to the melody. Still, these systems weren't very intelligent, and you could often get better results through a skilled operator.

With the advent of cheap computer processing power in the 90s, [Ninja Tune](#) founders Coldcut became pioneers when they wrote proprietary software that would sync video sequences to specific audio tracks. When a new track was called, the video would change accordingly. Mixing between two tracks would superimpose video sequences. At the time, this was nothing short of revolutionary.

Unfortunately for us, more often than not there would simply be a series of low resolution sequences looped in an irritating fashion, with no thought to the music whatsoever. Some got really lazy, simply calling up visuals in [Winamp](#), and projecting them onto the wall.

TWO-WAY AUDIO-VISUAL CONTROLS

The technologies through which Richie Hawtin controls his show at Mutek are unlike any electronic music system ever used before. Hawtin manipulates a custom rig, comprised of his usual collection of sequencers, drum machine, and synthesizers. His custom-designed MIDI controller, the CTRL LIVE, gives him control over the audio, video, lighting and effects simultaneously. The CTRL LIVE system manages two applications—[Ableton Live 3](#) for audio, and Derivative's [TouchMixer](#) for video and lighting effects.

When Hawtin calls up an audio track, a command is sent simultaneously to the TouchMixer, which initiates a Touch visual

element or effect. The Touch Synth for the whole show is a collection of over 100 images, movies and 3D algorithms with user-configurable behaviours attached to each, and every behaviour or characteristic can be controlled by faders.

What distinguishes [Touch](#) from any other system, explains Derivative founder Greg Hermanovic, is that "it's not the sound loop that's controlling Touch. Touch isn't receiving a sound wave—it's receiving MIDI. When Ableton starts, repeats or ends any sound loop, it signals TouchMixer so TouchMixer can start, continue or end some layer of effect.

"The way that we make a visual element look like it's following the sound is by drawing curves along the sound's timeline that, say, rise and fall at beat 2 and 4 if a high hat is at beat 2 and 4. This is better and more flexible, because you can start bringing on the visual element *before* you hear the sound—that's what builds the anticipation. While we're developing the visual for the song, we craft that relationship between sound and image—that's the art of it!"

The stunning art in Plastikman's Touch Synth show was the product of an international collaboration of video artists, designers and animators, led by Derivative partner and artist, Jarrett Smith. The contributions of Dave Robert, who helped assemble the 26-song framework of visuals, Jeffers Egan, who developed synthetic video elements, Toronto-based design house [Crush Inc](#), New York City's [Honest](#), which developed morphing graphics and video images, and the show's producer, Kevin McHugh, made this the most electrifying performance ever witnessed at the Mutek festival.

The implications of what Derivative has created are profound. Traditionally viewed as an accessory to music, the visuals are now on equal footing with the sound. This liberation of a performance's visual aspect from the audio gives us—for the first time in

a long time—a truly new paradigm.

No longer are visual effects simply something to occupy our eyes. Nor are they just an element designed to accompany the music. Now they describe the dialogue which takes place between artist and audience. With the TouchMixer, Hawtin can play images like an instrument. And with this narrative now a dialogue, not only do the visuals follow the audio, but the audio also accompanies the visuals.

ENTER STAGE LEFT—THE AV-J

This evolution in sound and sight also implies something else, which became evident to the Plastikman faithful—one person is running the whole show.

In a conventional performance, the audio component comes from one source (the artist), and the visuals come from another (the visual effects dude). The visuals follow cues in the music and are shaped accordingly. The level to which the two are integrated depends on a number of factors: the skill of the visual effects dude, the budget, and how much the artist actually cares about it.

But even in the most tightly coordinated high budget show, there is always a discon-

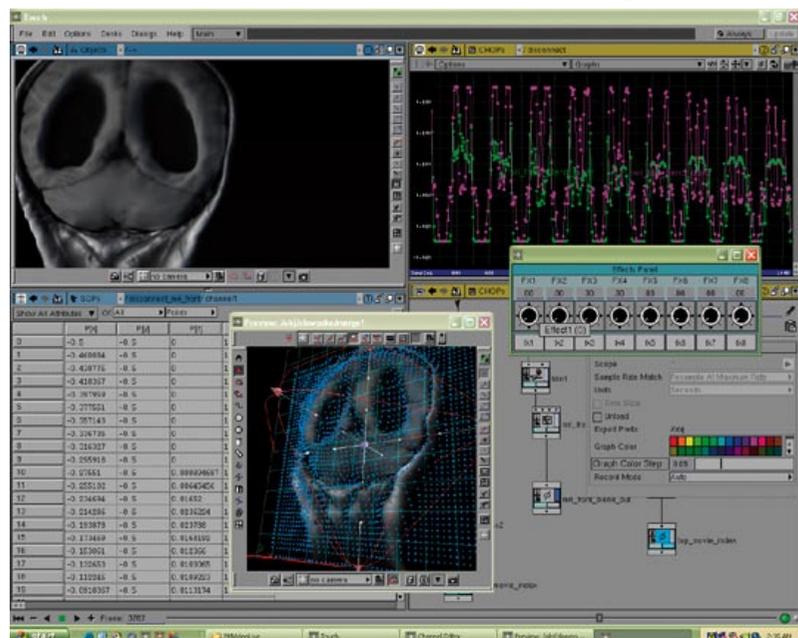
Richie Hawtin's Ableton Live audio controls allow him to manipulate sound on the fly, which generates a whole range of captivating Touch Synth visual effects.



nect, as there are always at least two people involved in the performance. Those artists who can afford the high end rigs often don't get involved directly in the visual aspect. Like choreography or set design, this is something they rely on someone else to execute.

What's interesting about Derivative's Touch system is that the artist is forced to think very carefully about the visual aspect of a show, as the two are, by definition,

Derivative's Touch software lets an artist merge sound and visuals together into one cohesive presentation where graphics can be manipulated to reflect the music, and vice versa.



organically linked. If changing a setting in audio (for instance, gain level) changes a setting in video (such as object rotation speed), what happens if the audience begins to respond to something they see instead of hear? Focusing the visuals on the desired effect brings this dynamic full circle; and working toward a desired visual effect drives the music.

Talking about the first time the complete CTRL LIVE rig was fired up for testing, Hermanovic describes what happened when Richie Hawtin started moving audio faders to see the visuals attached to them.

"That's when it started to get mad. Richie's face lit up, as did everyone else's. Next thing we knew, he was bringing in sound elements from unrelated songs, perfectly in sync, just to see what their visuals looked like together. Then Rich realized that the visual compositions were guiding his musical compositions."

WHEN RICHIE MET GREG

Hermanovic's relationship with Hawtin began in 1999, when Geoff Marshall of animation house

Chromacide made live graphics for Hawtin using Hermanovic's special effects software, **Houdini**. However, in order to get the power and accuracy they needed, anything that was worth showing required the use of high end workstations (which, incidentally, are also extremely heavy).

Hermanovic recognized that if the technology was to be feasible for the mass market, and if it was to be adopted and used by artists, then software and hardware first had to catch up.

As he describes, "We knew that if we waited a few years for software to mature and costs to come down, we could make another leap ahead—without training to be weight-lifters."

In 2004, Hawtin contacted Hermanovic with the intention of pulling something off. Something big.

He wanted to explore the relationship between audio and visual effects in a way that had never been done before. All the audio, video and lighting would be controlled by one person, from one piece of gear—through what was to become the CTRL LIVE controller.

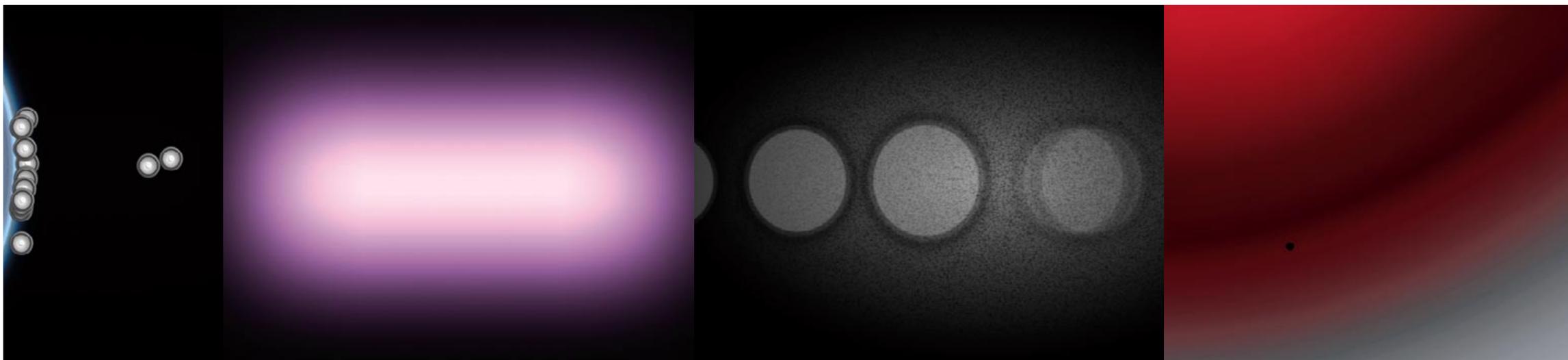
Hawtin showed the Derivative crew a copy of **Norman McLaren's** experimental film, *Synchrony*, and asked if they could make something like that. McLaren was a pioneer in the field of animation, incorporating light, color, motion and sound into an eclectic soup of contrast and evolution.

In the 1930's, McLaren pioneered the use of making movies without cameras—by painting directly onto the film itself (contemporary animation, anyone?). In the early 40s, he made what were perhaps the first forays into audio-video experimentation when, in a moment of foreshadowing, he began drawing directly on the audio track of the film and created "animated sound"—that is, sound which is driven by visual input.

Hermanovic had to chuckle when he recalled being asked to reproduce *Synchrony* in real-time animation. One day back in 1980, when he was laid up with a broken arm, he gave himself the challenge of writing a program that would digitally reproduce *Synchrony*. Writing on newsprint with his very shaky left hand, this outline became the basis for Touch. They made a prototype visual, loosely based on *Synchrony*, and then moved forward to create visuals for the remaining 26 songs in Hawtin's anticipated Mutek set.

Making the visuals was one thing. Getting Touch to talk to Live (Hawtin's audio sequencer of choice) was something else.

Working with Ableton, developers of Live, Derivative adapted the Touch system to accept MIDI clock and loop start/stop/repeat events, which were being output by a custom build of Live 3, designed specifically for this project (the features they developed will not be available until after Live 5).



THE STORY OF DERIVATIVE

Derivative is the twisted child of Greg Hermanovic, best known for his ground-breaking 3D effects company [Side Effects](#) and its flagship software product, Houdini.

Since its inception, Side Effects has been an innovator in the field of 3D special effects—first to put a GUI onto a procedural modeling system (1987), first to use particle systems (1992), and first to include motion capture and time-frame sampling (1993). Houdini has been used in over 180 feature films, including *The Matrix*, *Titanic*, *How the Grinch Stole Christmas*, *Fantasia 2000*, *X-Men*, and *Spiderman*.

Houdini is powerful stuff, but it is designed to produce highly detailed film and video animation and effects. However, Hermanovic had always had a vision of developing software for real-time animation.

“Derivative spun off from Side Effects in 2000,” he says, “fuelled by artists’ growing appetite for interactive visual tools (which paralleled what kids were seeing with music software), and also by new laptops with fast CPUs and graphics chips that could render rich layers of textures in real-time.”

Touch was cloned from Houdini, but taken in a different direction. Instead of being special effects software targeted to production houses and the Hollywood elite, Touch was to be a tool for the masses.

[Moore’s Law](#) (which dictates that computer processing power will double every 18 months) has been remarkably accurate—and in 2000, the timing and costs were right.

Touch is based on procedural modeling, much like the modular sound synths of the 70s, but this time applied to graphics. However, unlike Houdini, it is Hermanovic’s eclectic tastes and passions which have driven the development of the application, rather than business needs. Hermanovic claims to be influenced by factors as diverse as the first generation of synthesizers, the

abstract films of [John Whitney](#) and Norman McLaren, the art of [Bill Viola](#)—even [Balinese shadow plays](#).

TOUCH—A SIMPLIFIED ANIMATION TOOL

Touch is not exactly an animation package; it’s more like a toolkit for building interactive experiences.

Designed to allow the ordinary user to create 3D effects and movement, the objective all along has been ease of use without sacrificing power and flexibility. Those who have spent any amount of time with high end niche programs for either audio or video will tell you that the two are usually mutually incompatible.

As such, Touch is an open-ended animation tool. Never wanting to dictate the terms of the creative process, Hermanovic developed a system of 300 building blocks that lets an artist describe interactive experiences without knowing any programming. The user simply drags objects onto [TouchDesigner](#) (the development app), draws connections between them, and the process begins. Those with a background in programming will recognize this as a kind of API for interactive experiences.

The Touch system itself is comprised of three applications. TouchDesigner is used to create Touch Synths, which are the core of the Touch system. These video synths can either be viewed independently with the [TouchPlayer](#), or they can be mixed and affected through the TouchMixer, which is what Hawtin used for the Mutek show.

The movies, stills and 3D algorithms which make up a Touch Synth are designed to evolve and interact according to 3D modeling rules. Each aspect of the behaviour of the object can be assigned to a fader in the control panel, allowing the VJ to blend pre-keyframed motions, camera moves, lighting, and other actions. The TouchMixer then allows all the synths to be customized live on the fly, according to mood or audi-

ence response. When working with an audio artist, the results can be astoundingly beautiful.

DIGITAL ARCHITECTURE

A burgeoning interest in Touch by the architectural community has triggered another area of development for Derivative. Touch is now being used to bring a sensitivity and elegance to the design of structures through the addition of digital media.

One of the most exciting installations of the Touch system is in the [Prada building](#) in downtown Tokyo. Derivative was called upon by the renowned architectural firm [Herzog & de Meuron](#) to develop different animation concepts to be projected onto five surfaces throughout the building. Being all-glass and open concept in design, the images saturate and smooth the architecture. During the evening, the Touch system illuminates the entire edifice and its immediate surrounding area, so that the structure itself comes to life—pulsing and glowing in the Tokyo night.

The images themselves are designed to resemble the surfaces on which they are being projected. For example, at the top of the building, a latticework of holes punched out of metal surrounds Derivative’s projections. The images on the screen are designed to resemble the lattice—that is, until the lattice seems to throb and give way to shapes and wave forms which try to break free from underneath.

The danger of an installation such as this is to avoid repetition. If it were to simply loop pre-rendered images, the constant repetition—no matter how complex the visuals—could easily bore customers and employees. But here is the genius: Touch has a certain amount of serendipity built into it. No matter how often the exact same sequence of faders and knobs are executed, the result is always a little bit different from the time before. So, in the Prada building,

Derivative founder Greg Hermanovic is the driving force behind Touch.

the experience is always unique and captivating, adjusting daily according to sunset and sunrise times; and during the 48 hours around the full moon, it shifts its colors to an icy blue palette—acting in essence like a full moon indicator.

WHAT THE FUTURE HOLDS

I download the [TouchPlayer](#) and some sample synths to see if I can make a Groundbreaking Interactive Experience. After several hours of fiddling with faders and poking at pixels, I come to a realization which makes me happier than I expected: it’s not easy to make something beautiful.

Sure, I’ll be the first one to shout about the democratization of technology to anyone who will listen. And yes, I tend to get a little anarchic when it comes to intellectual property rights. But just because anyone can do it, that doesn’t mean it should be easy.

What Greg Hermanovic has created is nothing short of revolutionary. But as with all artistic revolutions, it will take time.

Hear the hypnotic motion of the music... see the vibrant colors of the chords...

Are you ready?

Bob Kim is a DJ/house music producer who masquerades during the day as a maker of websites. High falootin’ po-mo analysis was provided by the twisted non-linear mind of Mark McCutcheon.

