



New Twists in Circuit Bending

Martin Howse and Darsha Hewitt are among a number of artist-investigators cracking, hacking, and making instruments to explore and critique our relationships with technology, the earth, and each other.

BY GREG J. SMITH

Detail of Oi, Kant (2018), a handmade, made-to-order “drum-ish machine” made by Polish DIY electronics artist Ewa Justka.

PHOTO BY EWA JUSTKA



LEFT: Martin Howse facilitating his Radio Mycelium workshop, which actively examines cross-spore germination between two parallel wide-area networks: radio-based communication technologies and the single-organism network of the mycelium (FOAM, Brussels, 2011). **BELOW:** Canadian new-media and sound artist Darsha Hewitt performing *20 Oscillators in 20 Minutes*, an experimental music performance / technical challenge / standup comedy act in which she attempts to build twenty sound-generating square-wave oscillators in twenty minutes.

OPPOSITE PAGE: *DIY Telephone Feedback Performance*, limited edition poster commissioned for Kontrollmodus Feedback exhibition at Halle 14, Leipzig (2015); by Darsha Hewitt.

register through it) for bespoke distortion. ERD was not only the progenitor but the namesake for the series that followed, and Howse quips that his forays into Eurorack aspired to “rough it up a little around the edges.”

More modules followed: ERD/WORM (a garbled jabberwocky machine drawing on speech-synthesis algorithms), ERD/SIR (which ports aspects of the Blackdeath’s

chaotic character to the modular CV/gate method of controlling synths), and ERD/γ (which monitors the radioactive decay of a trace sample of Uraninite to generate random voltage and timing). That latter module is finicky, though, and requires occasional maintenance; on his Web site, Howse dryly notes that it will require recalibration “in perhaps a few billion years.”

IN HER LASER-FOCUSED ARTIST’S STATEMENT,

Darsha Hewitt, a Canadian ex-pat media artist based in Germany, describes electronic sound as a central medium within her practice; this is not, however, the same thing as identifying as a sound artist. Hewitt engages with technology as a media archaeologist—her practice is fueled by earnest curiosity.

“I don’t have an end result in mind when I begin a project. A circuit, or an old television, anything I find at the second-hand store—I listen to objects and see what they give me,” she says over Skype from her Berlin studio. In *Feedback Babies* (2013–17) she deployed an array of circa-1985 Fisher-Price nursery monitors, and strung scores of handsets up to a pulley system that gracefully bowed them towards their corresponding monitor, then tugged them back to an upright position, which created waves of gentle feedback. *Electrostatic Bell Choir* (2013) pairs ancient television sets with electrostatic bells salvaged from rotary phones and grandfather clocks. When the TVs’ CRT tubes fire they emit static electricity, making the bells tingle delicately. The installation is part rhythm machine, part kinetic sculpture. “Electronics are inherently noisy. We could look at that on a philosophical level; and on a literal level, there’s fuzz and buzz happening inside—I try to extract that from the machine.”

Hewitt’s video series *A Sideman 5000 Adventure* (2015) is an illustrative documentary on the intricate technological workings of the Wurlitzer Sideman (one of the world’s first drum machines), which had ten presets—Cha-cha, Foxtrot, Tango, etc.—that could be cued up for rhythmic accompaniment. The machine is a 1959 antique—cabinet-sized, clunky, electromechanical—but where others might have seen only nostalgia or obsolescence, she saw narrative potential. “Making DIY videos was always a side project of mine . . . but the entire Sideman project *revolved* around video.” In a break from previous projects, Hewitt decided her Wurlitzer tinkering should be viewed on YouTube rather than exhibited in a white cube. Made by Hewitt with videographer and fellow artist Lauren Moffatt, the series’ ten episodes chronicle a teardown of the Sideman. Sporting a green Adidas tracksuit and with a toothpick hanging out of the side of her mouth, a



decidedly casual Hewitt and her stop-motion-animated robot sidekick explain the nuances of the Sideman’s inner workings—like its signature tone generator and tempo wheel. Beyond the commendable accessibility, there’s an embedded critique of gendered technical expertise. One only need consult subscriber stats to see that the synth-expert corner of YouTube is overwhelmingly male; most of these so-called experts review or demonstrate gear or share songwriting and workflow tips—they aren’t taking instruments apart and explaining how the components work.

“I’m fully aware that the fact that I was a woman doing this added a certain complexity,” says Hewitt. “But I wanted to make a contribution, not talk about the political aspects, and

DIY TELEPHONE FEEDBACK PERFORMANCE

mit/with DARSHA HEWITT

a fun
Experiment
to do alone, or with
a friend or with
lots of
people!

ein lustiges
Experiment
das du allein, mit einem
Freund(in) oder mit vielen
Leuten machen
kannst!

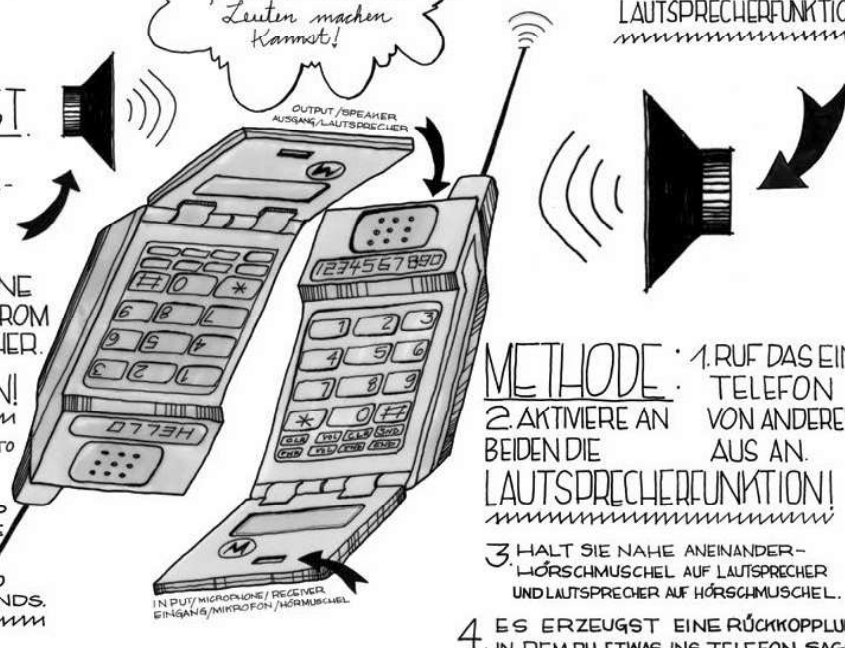
MATERIALLISTE

- 2 TELEPHONE*
- * ES MÜSSEN KEINE SMARTPHONES SEIN
- SIE BRAUCHEN ABER EINE
LAUTSPRECHERFUNKTION!

MATERIAL LIST

- 2 TELEPHONES*
- * THEY DON'T HAVE TO BE SMARTPHONES -
THEY JUST NEED A
SPEAKER FUNCTION!

- METHOD:**
1. CALL ONE PHONE FROM THE OTHER.
 2. ENABLE THE SPEAKER FUNCTION!
 3. CLOSELY ALIGN MICROPHONE TO SPEAKER AND SPEAKER TO MICROPHONE.
 4. INITIATE THE FEEDBACK LOOP BY MAKING A SOUND INTO THE PHONE.
 5. MOVE THE PHONES AROUND TO MAKE DIFFERENT SOUNDS.



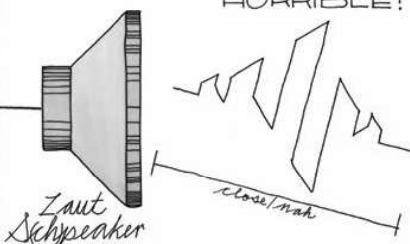
- METHODE:**
1. RUF DAS EINE TELEFON VON ANDEREN AUS AN.
 2. AKTIVIERE AN BEIDEN DIE LAUTSPRECHERFUNKTION!

3. HALT SIE NAHE ANEINANDER -
HÖRSCHMUSCHEL AUF LAUTSPRECHER
UND LAUTSPRECHER AUF HÖRSCHMUSCHEL.
4. ES ERZEUGST EINE RÜCKKOPPLUNG
IN DEM DU ETWAS INS TELEFON SAGST.
5. BEWEGE DIE TELEFONE
ZUEINANDER UM UNTERSCHIEDLICHE
TÖNE ZU ERZEUGEN.

HOW DOES IT WORK?

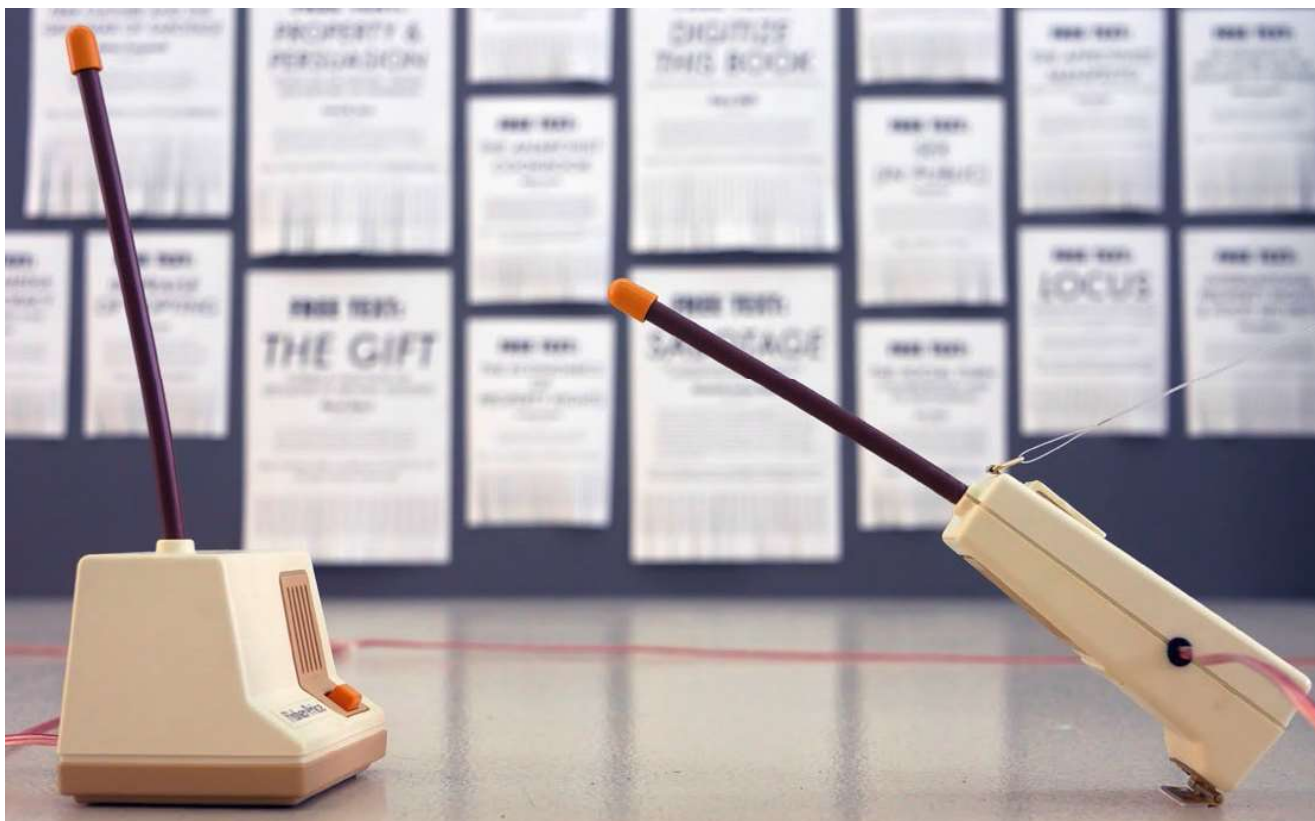
BASICS OF FEEDBACK

WHEN THE INPUT AND THE OUTPUT OF AN AUDIO SYSTEM ARE IN CLOSE PROXIMITY TO ONE ANOTHER YOU MAY HEAR SOMETHING THAT SOUNDS LIKE A SCREAMING BABY OR CREEPY BIRDS. A FEEDBACK LOOP IS STARTED WHEN A SOUND ENTERS THE AMPLIFICATION CIRCUIT - THIS COULD BE INTERNAL ELECTRONIC NOISE OR SOUND FROM THE ENVIRONMENT. THIS SIGNAL TAKES A SHORT BUT WILD RIDE THROUGH THE AIR BEFORE RE-ENTERING THE CIRCUIT. THIS CREATES AN AUDIBLE OSCILLATION THAT BUILDS UP UNTIL IT PEAKS. SOMETIMES FEEDBACK IS HORRIBLE! FUN!



WIE FUNKTIONIERT DAS? GRUNDLAGEN DER RÜCKKOPPLUNG

WENN EINGANG UND AUSGANG EINES AUDIOSYSTEMS IN GERINGEN ABSTAND ZUEINANDER GEBRACHT WERDEN, KANN MAN GERÄUSCHE HÖREN, DIE KLINGEN WIE EIN SCHREIENDES BABY ODER WIE GRUSelige VÖGEL. EINE RÜCKKOPPLUNGSSCHLEIFE ENTSTEHET, WENN SCHALL INS KOMMUNIKATIONSSYSTEM EINDRINGT - ETWA INTERNES RAUSCHEN ODER UMGEBUNGSGERÄUSCHE. DAS SIGNAL BEGIBT SICH DANN AUF EINEN KURZEN ABER WILDEN RITT DURCH DIE LUFT, BEVOR ES WIEDER IN DEN STORMKREIS EINDRINGT. DAS ERZEUGT EINE HÖRBARE SCHWINGUNG, DIE LAUTER WIRD, BIS SIE EIN GEWISSES MAXIMUM ERREICHT. MANCHMAL MACHEN RÜCKKOPPLUNGEN SPAS!
MANCHMAL KLINGEN SIE SCHRECHLICH!



just put my material out there to show that it's possible to explain tech without using super-complicated language." She also steered clear of the cult of worship by selecting the clunky Sideman over iconic early-'80s drum machines like the Roland TR-808 or Linn Electronics' LinnDrum. "I think that often in electronic music there is a real fetishization of gear, and I find that a bit boring. It can be a little inhibiting, when you want to get into something and people are so focused on gear."

A Sideman 5000 Adventure is a performance of expertise. Hewitt's *20 Oscillators in 20 Minutes* foregrounds similar acumen, but without the benefit of multiple takes. "I kept getting asked to do performances because there is sound in my work; and my reaction was always 'Ugh. That's the scariest thing I could think of,'" recalls Hewitt. "One thing that I can do in front of people, though, is build electronics." So, she plugs into a mixer in front of a festival or event audience and does exactly that. "I start with pretty bare circuit boards, and over the course of twenty minutes I build twenty square wave oscillators with chips, resistors, and capacitors . . . so we have a square wave, which at one frequency can sound like a beating heart, and at a higher frequency might make a horrible screeching sound." Starting with low-frequency oscillators, Hewitt builds circuits one-by-one. "It's inherently rhythmic, because the tones are pulsating continuously. It's improvisation because I don't know exactly where it is going to go." As the clock counts down, the tempo picks up.

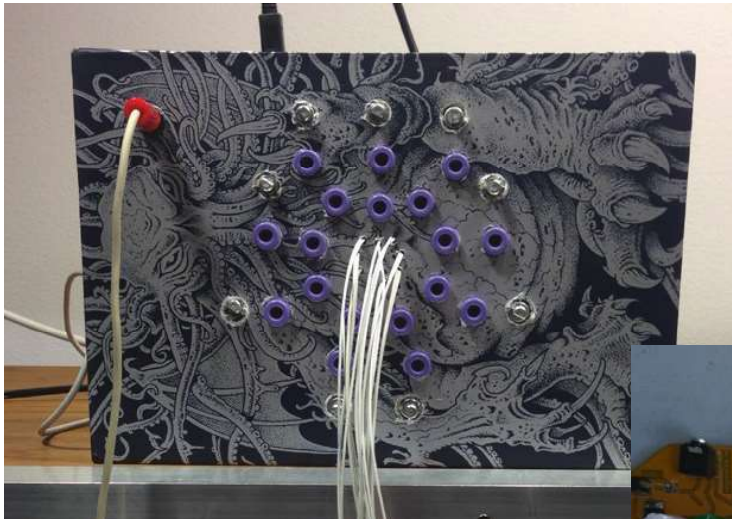
Things inevitably go sideways: a fumbling start leads to an excruciating two minutes of silence, mistakes register as jarring squelches or pops. Miked up, Hewitt provides colour commentary, describing the merits of the 555 timer-integrated circuit chip she's using to build the oscillators. "When I'm uncomfortable in front of people, I tell jokes," says Hewitt, who self-deprecates, solders, and sweats. "It sort of turns into a sport, where people are cheering me on." By the twenty-minute mark she's won the audience over and taught them a thing or two about electronics in the process. "My idea of performance comes from the fine arts: the Fluxus approach, testing endurance versus doing a musical performance and bowing at the end." Hewitt first presented the piece at Le Labo, a

Toronto-based artist-run centre, as part of Nuit Blanche in 2011, then triumphantly performed it for an audience of 3,000 at 32C3, the 2015 edition of the Chaos Computer Club's annual hacker summit in Hamburg.

WHAT EXACTLY CAN WE EXTRAPOLATE FROM HEWITT AND Howse's engagement of synthesizers and electronic instruments? Drawing on the time-honoured—and revenue-generating—tradition of artist's multiples, Howse ports the substance of his research into devices. While Hewitt is harder to pin down, her archaeological excavations of media foreground the inner workings of electronic instruments—the building blocks of sound synthesis—as a site of performance.

Paul Théberge's book *Any Sound You Can Imagine: Making Music / Consuming Technology* (1997) ruminates at length on the rapid growth of the music-technology industry in the 1980s and '90s as spurred by nascent digital instruments, such as synths and samplers, and protocols such as MIDI. He uses a framework gleaned from communications scholar Douglas Gomery that schematizes the arrival of new technologies in three discrete phases: invention, innovation, and marketing. When viewed this way, DIY synth practice can be filed under invention. At this formative stage of development, Howse and Hewitt are no different than electrical engineers who sit down at a workbench with aspirations to discover new modes of synthesis and sound processing. It's just that they do so with no intention of moving towards the commercialization of their inventions.

Hewitt and Howse are not the only artists operating at the fuzzy edges and far corners of the music technology economy. New York City-based composer and sound artist Tristan Perich's *1-Bit Music* (2004) and *1-Bit Symphony* (2010) are works of lo-fi minimalism composed around the capabilities of rudimentary circuits, and then coyly released as the electronics housed in a CD case with a built-in headphone jack—blurring the lines between synthesizer, composition, and storage and distribution format. *Noise Patterns* (2016) saw him further refine the concept, more tightly integrating his cascading waves of raw digital



OPPOSITE PAGE: Darsha Hewitt's *Feedback Babies*, an electromechanical sound installation featuring circa-1983 Fisher-Price nursery monitors. LEFT: Sam Conran's Kabbalistic Synthesizer (2015). BELOW: Ewa Justka's Oi, Kant! (2018).

noise with the underlying hardware of the circuit board and electronics that generated it.

British sound artist Sam Conran's Kabbalistic Synthesizer (2015) uses the live input of Jupiter's radio emissions, a cosmic ray detector, and other extraterrestrial forces to create otherworldly tones and textures. Conran, who is "first and foremost interested in new sounds," as he explained via email, has recently been working on a box called the 9-Dimensional Chaotic Attractor. Produced in collaboration with physicist James Jackson, the device uses a multidimensional dynamical system to generate control voltage—specifically calibrated for the Buchla 200e modular system at EMS Stockholm, where Conran was composer in residence in early 2018. Conran also creates quasi-divinatory systems, but, unlike Howse, he's interested in the instruments that major music technology manufacturers are producing, especially the Swedish company Elektron. "I see similarities to the Kabbalistic Synthesizer, in the way their devices are creating the potential to present music in an alternative way, that isn't so much live reproduction but performance," he says.

Polish electronic noise artist and instrument-builder Ewa Justka conveys similar pragmatism, declaring in an email: "To be honest with you, I'm not a purist." The London-based designer of eccentric instruments like Oi, Kant! (a wonky drum machine with three voices—kick, bassline, cymbal—and built-in sequencer) and Scramble Everything (a random sequence generator, effects unit, and pitch shifter), her one-of-a-kind designs find their way into her kit for her techno and noise gigs or onto her online shop. "I mainly use DIY instruments in my set, but most of the time I stick to commercial synths combined with things I've built." She cites the TB-03 and TR-09 from Roland's Boutique series and the MC-202 as go-to devices, but notes "it's not that important for me what tool is used for music production . . . just because building weird synths for people gives me loads of satisfaction doesn't mean I reject commercial instruments. It's not either or."



FOR BETTER AND FOR WORSE, ARTISTS BUILDING THEIR OWN INSTRUMENTS

operate in shadows cast by marketing departments. The music technology industry draws its life breath from the consumptive tendency of musicians and hobbyists by capitalizing on anxieties of obsolescence and working overtime to inspire that next big purchase. DIY practice is driven by different values: it privileges knowledge-sharing and transparency, foregrounds logics of assembly, and embraces the messiness of material culture; crucially, it also sounds wild and untamed.

A term that came up repeatedly in these interviews was the black box, the idea that technology—the tool or instrument we reach for—is inscrutable and should *just work*. DIY instrument builders are not satisfied with that status quo. They wish to breach the metaphorical opaque volume and figure out how it works.

Garnet Hertz says we need those black boxes in contemporary society: "Black boxes to build off each other and make more advanced technologies for society to develop—there's black boxes on top of black boxes on top of black boxes." While that stack of interdependencies affords conveniences and seamless interactions—from smartphones to synthesizers—it also leaves us alienated. Seen in this light, the resurrection of an obsolete drum machine, or the design of an idiosyncratic circuit that runs signals through soil to distort them, are not simply new ways of engaging sound and new modes of performance—they are also a sharp rebuttal of the forces that animate consumer culture.

GREG J. SMITH is a Toronto-based writer and editor interested in media art and its broader cultural implications. He is the editor of HOLO magazine and a contributing editor to Creative Applications Network, <www.creativeapplications.net>. His writing has appeared in Rhizome, Vectors, ICON, the V2 Institute for the Unstable Media's Blowup Reader eBook series, and numerous catalogue essays.

ON THE CD: *Substrate*

LINKS: <1010.co.uk/org> (Martin Howse); <darsha.org>, <conceptlab.com> (Garnet Hertz); <ewajustka.tumblr.com>; <www.samconran.com>