

Livening Things Up: Australian Hand-Built Electronic Instruments

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Australia is in many ways an outpost for sound practices and experimental music. Works that originate here often look outward to relatively nearby areas such as South East Asia, the South Pacific and East Asia, as well as to the canonical practices of Western experimentalism. But Australians also look inward to their own history of sound art. *Larrikin*, a common local term for someone who does not observe convention, is likely derived from the verb “lark”—to play or behave in a mischievous way, and many of the artists discussed in this essay demonstrate larrikin behavior. Their style of making welcomes the public with a reflexive, self-deprecating sense of humor. They tinker with found materials and hack toys, microwave ovens, automobiles, bandsaws, breadboards, e-waste and volatile gases. Some are more serious about it than others.

There are three dominant approaches to hand-making electronic sounds in Australia: appropriating everyday electronics through hardware hacking; positioning human bodies as a kind of hardware that can control, or be controlled by, electronics; and investigating cosmic energies of the electromagnetic spectrum. This chapter does not pretend to present a complete list of attitudes or of instruments, only to offer a gathering some examples of how recent artists have developed the ideas and processes of handmade electronic music in Australia.¹

It is important first to acknowledge, however, earlier Australian instrument makers who established ways of working with handmade electronics. In the 1970s Joseph Stanislaus Ostojak-Kotkowski (1922–1994) and dancer Philippa Cullen (1950–1975) used the electromagnetic spectrum in their sculptural theremins and experimented with biofeedback.² Other artists active in this early period include Warren Burt, Ron Nagorcka, David Chesworth, Tsk Tsk Tsk and those who worked at the Clifton Hill Community Music Centre in Melbourne, as well as the Bush Video collective in Sydney.

On an episode of the 1986 Australian TV music show *Edge of the Wedge* about the electronic post-punk band Severed Heads, the presenter’s head speaks from a cathode ray tube set atop a rack of electronic gear, and remarks: “it’s getting a bit boring in here, can you do something to liven it up?” Band member Stephen Jones obliges by tweaking knobs on his home-made video synthesizer, whose nest of wires and circuit boards is visible beneath the acrylic plastic cover. The presenter’s face is then surrounded by colorful geometries and pulsing, waveforms.³

More recently, handmade synthesizers and hardware hacking continued to motivate by communities such as the record label Clan Analogue (1992–), the Sydney chapter of Dorkbot (2005–), and the Instrument Builders Project (2013–), along with many spaces and collectives, including Lanfranchis (2002-2007) and Serial Space (2007-2013) in Sydney, the Wired Lab in Wagga Wagga (2007–), and Electrofringe Festival (1998–).

Playing with the Everyday

Since 1995, the band Toy Death have been performing on stage in endearingly elaborate, somewhat terrifying toy-like costumes, attempting to play metal music with an array of circuit-bent toys that would impress any child by its sheer number. The interesting contradictions of this task can be heard in their most popular song, “Barby Army” (2012). In concert, they build dance-worthy tunes from layers of sound, emphatically pushing the buttons of toys, quickly scrambling and distorting the farm house noises and buoyant built-in jingles, turning voices from cheerful to scary, converting bovine moos to the groans of some unidentifiable creature. Cathartic endings to their songs are produced when the grown-up toy-people collapse structure and discipline.



Figure 1 Toydeath performing at *OP SHOP: TOYDEATH* in 2013 at Maitland Regional Art Gallery. Photo © Luke McMaster, used by permission.

In Brisbane, Ross Manning and Alan Nguyen formed Faber Castell (2003-2008) with a collection of dodgy instruments. They created rhythms with “records” made of sandpaper and lenticular prints, drums with contact mics connected to effects pedals, and a Synare (an early percussion synthesizer in drum-like form). Volatile feedback erupted from speakers fed from headphones acting as microphones, wrapped around the drums, while Nguyen and Manning attempted to communicate with the audience by laying hands on circuit-bent Walkie-talkies. By shining light through acetate prints on a spinning fan, they modulated photoresistors at rapid speed. Their sets would often end destructively, with the performers playing drums with their heads, sticking pins in Walkmans or pouring beer on the electronic equipment, permanently damaging its sonic character.⁴ They would then un-clean up the dance floor with an inverted vacuum cleaner, that blew air into a rubber glove fitted with party horns for fingers; shifting the settings of the vacuum would modulate the pitch of the squealing horns.



Figure 2 Faber Castell, Liquid Architecture festival in Melbourne 2004. Photo © Alan Nguyen, used by permission.



Figure 3 Hirofumi Uchino's *DC - Discharger* (1998) with the light on. Photo © Hirofumi Uchi, used by permission.

Hirofumi Uchino of the noise band Defektro (1995-) plays home-made instruments carefully crafted from collected metal parts. Uchino often appears with guitar-shaped assemblages such as the *QSG2-1* (2006), in which a large amplified spring takes the place of strings, and is vibrated

by a rotating disk. Other instruments take less familiar forms: the *HBS* (1996) looks like a curling wand, repurposed to create harsh metallic sounds. The *Discharger* (1998)—a portable remake of David Tudor’s *Fluorescent Sound* (1964)—consists of a small fluorescent lamp mounted on a compact electronic box in the style of early tube amplifiers. The electromagnetic frequencies generated by the gas-discharge tube and its supporting electronic parts are amplified and modulated by a built-in equalizer. Uchino’s *Electric Maraca* (1997) resembles an incandescent light bulb, its plastic spherical casing enclosing springs that suggest filaments but are actually pickups played by small phosphorescent pieces of plastic that bump around the enclosure when shaken.⁵



Figure 4 Hirofumi Uchino performing with his *QSG-defektro 3* (2011) at the International Noise Conference at Dirty Shirlow’s, Sydney Australia. Photograph by Veronica Evans, used by permission of Hirofumi Uchi.

Playing with Bodies

Co-author Pia van Gelder’s performance work *PVG sans PCB* (2014–) is not so much an instrument as a potential instrument. The performance begins with a table, a divided box of electronic components, an empty breadboard or two, and a mixing desk. Van Gelder starts by building a CMOS Hex Schmitt Trigger oscillator from scratch (see chapter 13). Sounds emerge as she adds components (capacitors, pots, diodes), gradually becoming denser and more interactive. For example, a photoresistor may be inserted, followed by a strobing LED to “rhythmatize” the synthesized sounds. She also combines conductive objects—a piece of fruit, a cream bun—as variable resistors that can be squeezed and mashed. Often her fingers are integrated into the networks, the conductivity of skin completing electrical connections. A butcher’s glove made of steel mesh acts as a complex switch when oscillators are connected. The

provisional nature of the breadboarded circuit facilitates experimentation, and the instrument is dismantled and returned to the tackle box at the end of each performance.



Figure 5 Pia van Gelder performing *PVG sans PCB* at *Liquid Architecture: Rare Earth, Heavy Metal*, Westspace, Melbourne 2015. Video still, Alex Cuffe, © Pia van Gelder, used by permission.



Figure 6 Alon Ilsar playing his *AirSticks* (2007) at *Trigger Happy 'Visualised'*, 2018, the Old Darlington School, Sydney. Photograph by John Dennis, © Alon Ilsar, used by permission.

Sydney-based musician and composer Donna Hewitt developed a microphone stand, known as the eMic, in 2003 with the help of Ian Stevenson. The performer's gestures are mapped by transducers, and various sensors built into the microphone and stand. This data is then manipulated via digital processing in performance.⁶ Similarly, drummer Alon Ilsar's AirSticks (2007) take air drumming to a new level by exploiting the gestures of drumming and gaming. The instrument is built from off-the-shelf gaming controllers that are patched into a computer to allow Ilsar to trigger sounds and visuals. Artist Michaela Davies inverts these approaches to gesture and circuitry by circuit bending the body using electric muscle stimulation (EMS). In her best known work, *Cyborg String Quartet* (2013), the performers are connected to a custom-built EMS machine that choreographs their actions through direct, sometimes painful, muscle stimulation. They attempt to play their instruments while convulsing, producing spasmodic tunes with "prepared arms" rather than "prepared violins."



Figure 7 Donna Hewitt performing with her eMic (2003) at *Vivid Music Festival*, 107 Projects, Sydney 2017. Photograph by Rhiannon Hopley, © Donna Hewitt, used by permission.

Since 2005 dorkbot Sydney has sponsored presentations and experiments in electronic instrument building with artists such as Dan Stocks (aka Diode Dan) in artist-run spaces such as Lanfranchis⁷. Stocks's *Radar Synthesiser* (2009) uses a salvaged Gunn diode to generate 24Ghz microwaves that can track moving objects or dancing bodies, detecting range and velocity. In dorkbot workshope groups of people gathered to build instruments together. Artist/engineer Aras Vaichas's *Micropatch Synth* (2011), a microprocessor-based, cheap and nasty simulation of a modular synth, provided opportunities for learning about electronics while making instruments. Samuel Bruce's *Ritual Solar Observance Society* (2012) created an orchestra from hacked solar garden lamps, with new sound-making components neatly arranged inside the original housing. Bruce conducted performances at sundown to celebrate the turning of celestial bodies; as the sun set, the instruments dwindled and died, until reactivated by light at dawn.



Figure 8 Michaela Davies performing with her *Involuntary String Quartet* at *Musicircus, John Cage Centenary Celebration* at the Sydney Opera House in 2012. Photo © Michaela Davies, used by permission.



Figure 9 The inside of Danial Stocks' *Radar Synthesizer* (2009). Photo © Danial Stocks, used by permission.

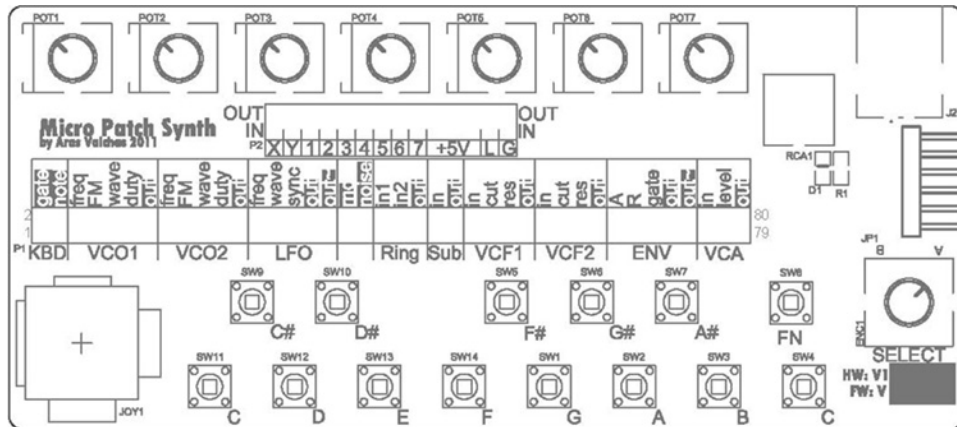


Figure 10 Front panel silkscreen of Aras Vaichas's *Micropatch Synth* (2011). Photo © Aras Vaichas, used by permission.



Figure 11 Sam Bruce and participants performing *RSOS* at *Cementa*, 2015, Kandos, NSW. Photograph by Kate Byrne, © Sam Bruce, used by permission.

Playing with Earth Energies

Media artist Joyce Hinterding, who lives in the Blue Mountains of New South Wales, has been working with electromagnetic waves across the radio spectrum since the 1990s. A reoccurring element in her installations is the antenna, sometimes taking on the familiar shape of TV aerials, as in *Purple Rain* (2004) (with David Haines), but at other times taking unexpected forms, as in her drawings with carbon smudged and smeared with audience interaction. In 2009–2010 Hinterding produced a series of works entitled *Aura* in which images, generated algorithmically and drawn with liquid graphite, act as antennae; they pick up VLF (very low frequency) signals from the atmosphere, and also provide a grounding effect, similar to putting your thumb on the end of a guitar jack. The closed circuit creates a hum, and by moving fingers across the drawing,

viewers raise and lower the amplitude of the hum. Through carbon-based media and transduction, Hinterding makes audible the energies that surround and bombard the space in which her works reside.



Figure 12 Installation view of Joyce Hinterding's *Aura* (2009 -2016) at La Panacée Montpellier, France, 2016. Photo © Joyce Hinterding and Sarah Cottier Gallery Sydney, used by permission.

In Sydney, electronic artist Emily Morandini bypasses the minute, refined components of standard circuitry to build large electrical components out of raw materials. The titles of her sculptural *Components* (2017) series link functions to physical elements: *Inductor: copper, magnetite*; *Capacitor: copper, quartz*; and *Resistor: copper, bushfire carbonised rock*. These works make us aware of the building blocks of electronic components, their geological and industrial histories, usually invisible to consumers thanks to miniaturization and in their encapsulation within the black box.

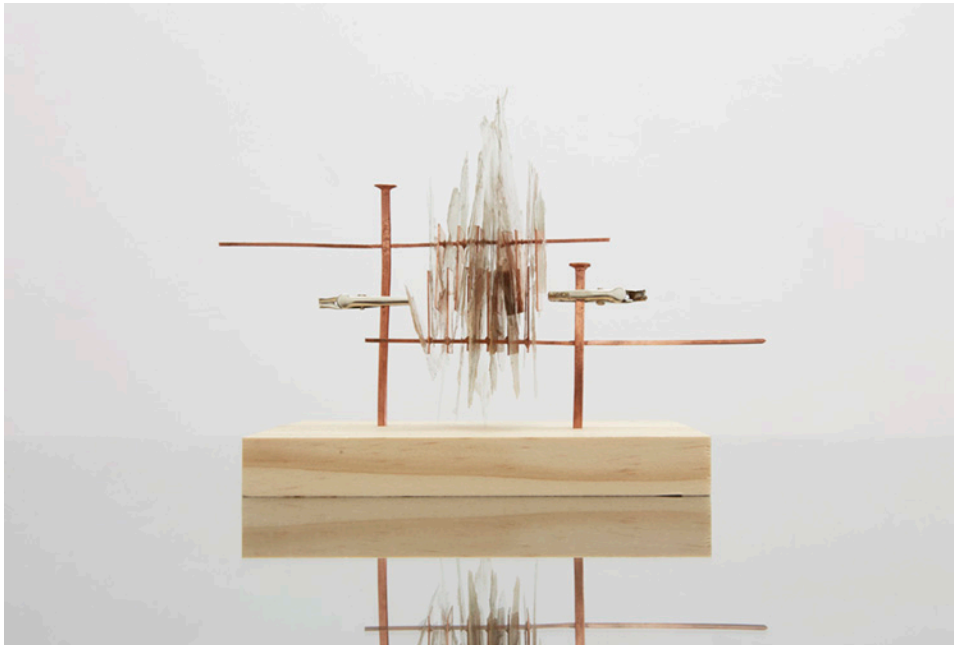


Figure 13 Emily Morandini's *Capacitor* (2017) made of copper and mica, exhibited as a part of her solo show *Components*, Firstdraft Gallery, Sydney (2017). Photo by Zan Wimberley, © Emily Morandini, used by permission.

Artist and musician Peter Blamey assembles feedback systems from discarded and repurposed electronics, including the motherboards of computers dumped on the street. In works such as *Circuit Hut (The future is other people's garbage)* (2012) scavenged e-waste is used to produce computer music that foregoes software. The motherboards are activated by sending a signal through the circuits that are cloaked in an indeterminate fashion by a blanket of thin copper wool. In performance, he coaxes the copper wool across the surface of the boards to elicit various signals. In installations, his systems are run from solar power, but with an implicit critique of the rhetoric of "sustainability": his solar panels are illuminated by mains-powered lights (clean energy is powered by dirty energy—or at least an unknown source of electricity).

The electronic systems of media artist Vincent O'Connor interact with vast forests of pine, a non-native species that is crucial to the Australian wood industry. In *Millionth Acre* (2015) O'Connor records into these state-owned, publicly-operated forests using techniques and equipment derived from both instrument building and forestry. He drills brass screws into the xylem of living pines with a cordless impact driver, clamps piezoelectric microphones onto the

exposed shaft of the screw, and records on compact field recorders. In the high wind areas along little-used forestry roads the sounds resemble those of an Aeolian chordophone.⁸

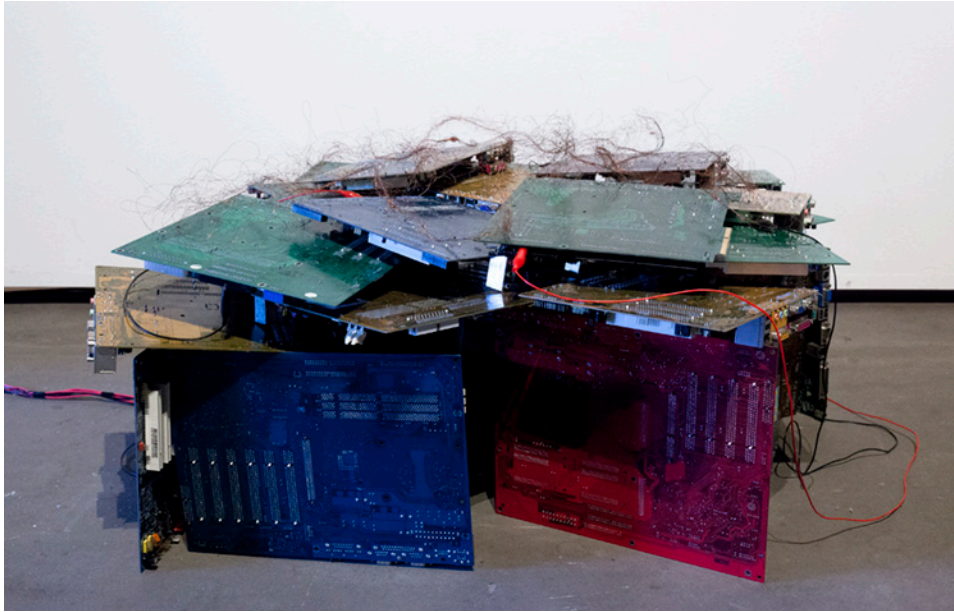


Figure 14 Peter Blamey, installation view of *Circuit Hut (the future is other people's garbage)* (2012) at *Gap Year*, Artspace, Sydney (2012). Photo by Silversalt Photography, © Peter Blamey, used by permission.



Figure 15 Vincent O'Connor's *Millionth Acre* (2015), detail of recording device, Millionth Acre, New South Wales Australia. Photo © Vincent O'Connor, used by permission.

Finale by Carbon Monoxide

After Lucas Abela wrecked his first Volkswagen Kombi microbus on Mount Tambourine, he has the motor and the stereo system transferred into another Kombi body, but this new combi-Kombi seemed to act as a giant contact microphone. When the radio was on, all the vehicle's movements and vibrations were amplified through the speakers, so that closing the door, turning on the blinkers or the windscreen wipers produced distinct noises. Abela's diagnosis was that the stereo system wasn't grounded; instead of fixing the problem, however, he made an album—*A Kombi: Music to Drive-by* (dualpLOVER, 1996), recorded while the car sat stationary at Waverley Cemetery outside Sydney. Abela remembers Sydney's Harbour Tunnel as a kind of echo chamber that became one of his favorite places to play his Kombi. He developed drive-by performances, pulling up to bus stops by for several minutes while the speakers were on full-blast. For van's final performance, it was parked in the back-door entrance of Sydney's Vulcan Hotel, with a microphone in the boot.

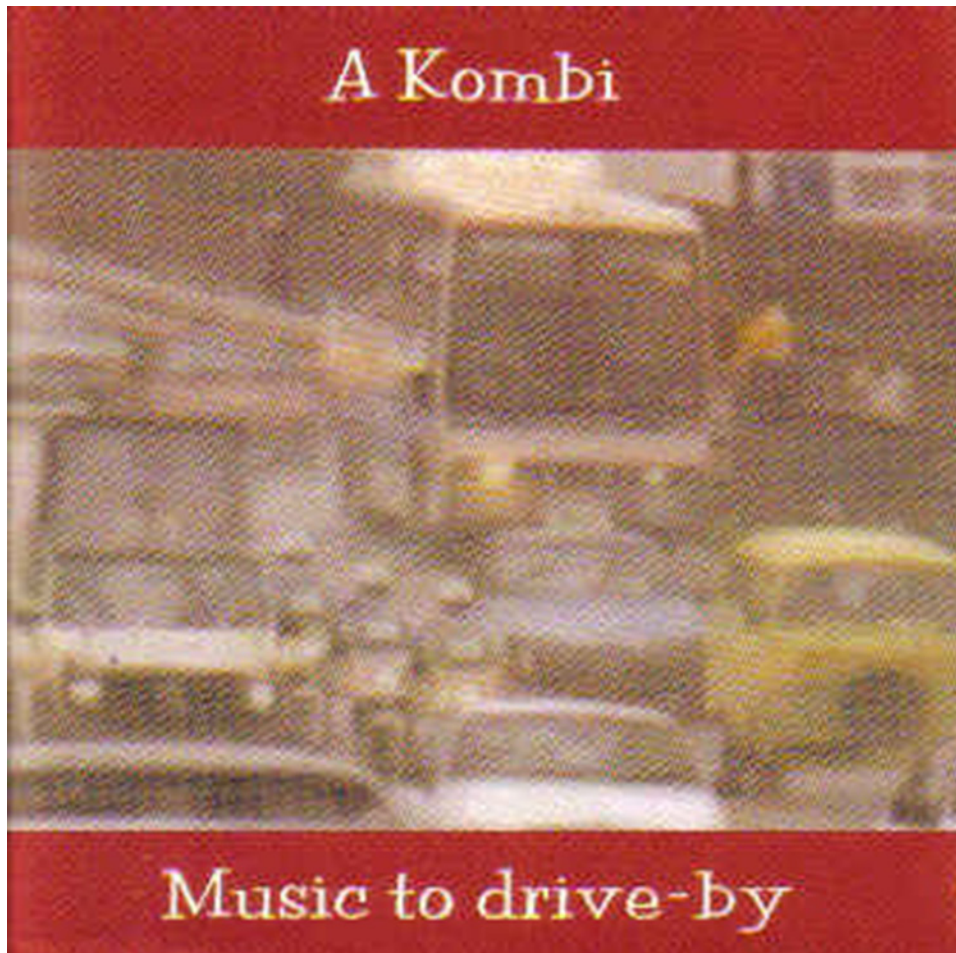


Figure 16 Album cover of Lucas Abela's *A Kombi: Music to Drive-By* (Dual Plover, 1996). Photo © Lucas Abel, used by permission.

¹ For an overview of earlier work, see Gail Priest, ed., *Experimental Music: Audio Explorations in Australia* (Sydney: UNSW Press, 2009).

² Stephen Jones, *Synthetics : Aspects of Art and Technology in Australia, 1956-1975* (Cambridge, Mass: MIT Press, 2011).

³ “Edge of the Wedge” (Sydney: ABC, 1986)

<https://www.youtube.com/watch?v=MX0goKMpB4Y>.

⁴ Alan Nguyen and Ross Manning, email correspondence with Pia van Gelder, May 16 - June 23, 2019.

⁵ “Lastgasp Art Laboratories,” Gallery, accessed June 23, 2019, <http://lalweb.com/defektro.html>.

⁶ Donna Hewitt and Ian Stevenson, “Emic - Extended Mic-stand Interface Controller,” in Thibault, Francois (ed.), *New Interfaces for Musical Expression NIME-03*. (Montreal: McGill University, 2003).

⁷ See Douglas Repetto’s “A brief personal history of dorkbott - NYC” on the website.

⁸ Vincent O’Connor, “Dark Corner,” Rubble Mountain, accessed June 23, 2019, <http://cargocollective.com/rubblemountain>.