SOUND FACTORY

IN COMPUTER LABS, DEDICATED WIREHEADS GIVE POP MUSIC A DIGITAL MAKE-OVER

BY STEFANIE SYMAN

"The Dashboard Drummer changes your relationship to music," says Vees.

"I HAVE AN ARMADA THEORY OF technology," says Jack Vees, co-director of the Center for Studies in Music Technology at Yale. "Smaller, maneuverable and affordable systems are better, so artists don't get addicted to systems that they can't afford."

In black jeans and a maroon shirt, the slight Vees, 39, is clearly not a headbanger, though he did his time on the rock & roll fringes of Los Angeles, playing for groups like the Ugly Janitors of America, Richie Haas and the Beatniks and an all-bass-guitar group in the late 1970s and early 1980s. On a bright, bitter day, he leads me through a neighborhood of clapboard houses in New Haven, Conn., to his basement garage. There, in his red 1988 Chevy Nova, Vees has set up what he calls the Dashboard Drummer. Through the windshield you can see the tangle of orange, yellow, green and red sensors, which look like oversize lozenges, Velcroed to the dashboard. Wires run from the sensors to an Alesis D4 drum machine secured to the glove compartment in the space usually reserved for passengers' feet.

You can beat out a multicultural spectrum of sounds on the Dashboard Drummer, thanks to the Alesis' sample library. I dial up World Beat, Tribal, Jazz, Industrial and R&B as Vees drives. He props his right hand on the steering wheel so he can use his middle finger to drum on the sensor placed on the dashboard right over the fuel gauge and lays his beat over some old Fleetwood Mac and cheesy hip-hop. But the difficulty of navigating traffic on small city blocks and getting into any sort of a rhythm makes it clear that this is really for U.S. Highway 5 kind of driving – that is, a long straight line in the desert.

Vees' Dashboard Drummer taps into that irrepressible urge to make music from things not musical. For a couple of decades now, dedicated wireheads at places like the Media Lab at MIT, the Center for Computer Research in Music and Acoustics at Stanford University and the CSMT at Yale have tried to coax music out of digital technology. As the cost of microprocessing has plummeted, these code crunchers have filled warehouses with all manner of synthesizers and samplers and have given garage rockers the tools to record their own tunes without a record company or, for that matter, a band. With the prospect of a sweet deal with Yamaha or Microsoft flickering on the horizon, Vees and other 21st-century alchemists persevere, turning silicon and code into music-making devices. Some may produce next year's hot gadget. But besides their desire to turn MIDI – that ubiquitous digital language for music – scores to gold, most of these avowedly modest hackers want to enhance your listening experience safely and legally.

For Vees, who performs with his wife as Chez Vees, this means taking an everyday activity – people stuck in traffic tapping on the steering wheel or dashboard out of boredom – and magnifying it into "an aesthetic gesture." Vees sees the Dashboard Drummer as a way to counteract the passivity that has crept into people's experience of music; it's an installation more than a product prototype. As Vees sees it: "The moment you tap along with the music, and you are creating something with that tap, your relationship to the music changes. You're changing the way you think about music, which is probably more of what I wanted to do than create just a fun thing."

Vees proclaims a distaste for some of the finer points of programming and inherited the technical skills he does have from his dad, who kept three electron microscopes "glowing all sorts of weird different colors" in the family garage, in Voorhees, N.J. Vees constructed the Dashboard Drummer from off-the-shelf parts; Vees Sr. helped him get it running using just a drum machine and sensors powered off the cigarette lighter, with sound feeding into the car's audio system.

To Vees' delight, most of the people who play the Dashboard Drummer break out of their usual steering-wheel shimmy. "People start paying more attention to what they're listening to," he says. One of the drawbacks is that it can interfere with driving. "I guess there are safety issues," says Vees. "But I think it's much safer than people using cellular phones."

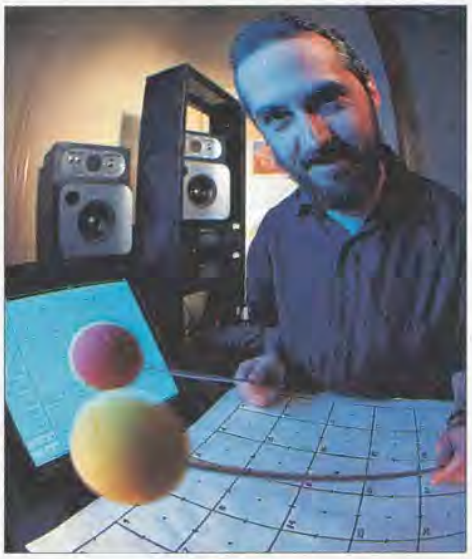
WHERE VEES PREFERS HIS technology off the shelf, Damon Horowitz and his colleagues at MIT's Media Lab built and programmed theirs. Sitting in his office at the Media Lab, in a purple shirt and black jeans, hair pulled into a ponytail that reaches nearly to his waist, the 24-year-old Horowitz is literally boxed in by technology; two computers with four monitors fill his desk, and a Yamaha KX88 keyboard against one wall confines his swivel chair to 6 square feet.

Over about six months, Horowitz, Eran Egozy, 23, and Alex Rigopulos, 25, designed, and Horowitz and Egozy wrote code for, the DBX system – a computer rigged to produce music that you can then modify with joysticks or other easy-to-use controllers. And this system does some-

PHOTOGRAPH BY KAREN KUEHN

thing your average Yamaha keyboard synthesizer doesn't: It generates notes and chords rather than playing preprogrammed sequences. "A Yamaha keyboard kind of provides the band," says Horowitz. "But what it plays is written out beforehand, note for note. And as a result, there's no variety; it can't respond to you. What we're doing is that we have a system that in 24 times a beat, it figures out, 'Gee, what should I be doing at this instant?' "

The hardware for the DBX system is an ordinary Mac Quadra 950 with a Roland synthesizer and joysticks that are hooked up to the computer through the ADB port like mutated mice. In a soundproof room near his office, Horowitz boots it up and sets the program on a Chameleon demo, a strand of a Herbie Hancock song that you can expand on with a jerk of the joysticks. He twists the left one, and a piano march emerges through Hancock's notes.



Lopez-Lezcano programs "scenes" on the Radio Drum.

Horowitz describes this setting as a sort of musical palette: You're given several elements – a line of music and various types of chordal accompaniment – and you can combine them in different ways. He taps some commands into the keyboard and clicks on a couple of lines of text, which configures the software to play a blues progression. When Horowitz starts fiddling with the joysticks, a chaotic piano solo mingles with the basic riff, an improvisation that sounds like the piano section of David Bowie's "Aladdin Sane."

The system works by first analyzing the initial fragment of music and then turning it into a set of parameters, which are fed into a generator. The generator creates more music like the original fragment. With the joysticks, you can modify this DBX-created music in real time in a variety of ways. "If you're interested in changing the chord progression, you can map one joystick so that you say, 'OK, what I'm going to change is where we go harmonically,' " says Horowitz. And joysticks are only one of the possible control devices for transforming DBX-generated music. You can use sensors that you trigger by waving your hand or you can type in words like *faster* or *more metal* to modify the basic fragment.

Not your average propellerhead programmer, Horowitz, who grew up outside of Golden, Colo., has deep roots in music; his mother is an oboist, and he has studied piano and percussion, played in rock and jazz bands and even done a stint on a church organ. Pop music, though, has largely shaped the development of DBX, and Horowitz sees this as more than just an incidental part of the process. He believes that people are really after the sound of a U2 album or Peter Gabriel's ethno-rhythm combinations. "I know that I can quantify aspects of that sound," says Horowitz. "Instead of just six instances of that sound, I can give somebody the power to make new creations within that genre."

Egozy and Rigopulos also feel pop music is ideal for the development of the system because of its structure and accessibility. Indeed, the appeal of DBX for nonmusicians is part of a larger trend at the Media Lab. "We've made a transition from building systems designed for people with lots of musical skill," says Tod Machover, the professor who supervised the group that built the DBX system. "Now we're also interested in systems that allow ordinary people to get their hands into music." Systems like the DBX could satisfy the artistic urges of people who haven't learned how to play an instrument. Rigopulos also sees enormous potential in real-time interactive music experiences – so much that he's currently starting up a company dedicated to developing such systems.

Several companies, including Sega of America, Yamaha, Interval Research Corporation and Hewlett-Packard, sponsored research that led to the DBX system. According to Spencer Nilsen, director of Sega's Music Group, the company is working on musically motivated games for its new Saturn platform, due out in September. Though Sega reveals no specific plans, the DBX software would be ideal for games where, as Nilsen describes it, "characters use music to get their point across." With a DBX-like system, players could control an animated character who plays a guitar. "Millions of teen-age boys know how to use joysticks and will go absolutely nuts over it," says Horowitz. "And instead of just doing three quick kick sequences, they'll be making music. And the amount that they'll be learning about music is really inestimable."

GARY SCAVONE, 28, HAS A MISSION: TO BUILD A better saxophone sound out of zeros and ones. At Stanford's Center for Computer Research in Music and Acoustics, he's perfecting sounds made via a new kind of computer synthesis technique called physical modeling, which duplicates the sounds of real instruments more accurately than traditional forms of synthesis. Last year, Yamaha introduced physical modeling for sound synthesis to the world beyond the walls of the labs with its VL1 Virtual Acoustic Synthesizer. The much-anticipated VL1 prompted *Keyboard* magazine to dub this type of synthesis the next big thing. But the VL1 isn't for Joe Musician – it's an expensive high-end system for pros like Stevie Wonder.

Scavone is a saxophonist with an M.S. in electrical engineering and a B.A. in music. But he comes to the intersection of music and computing from a different angle than Horowitz; he's interested in understanding the acoustical principles behind the sax. Scavone works toward this somewhat academic goal armed with two tenets: Most saxophonists are not really happy with their instruments; and all pianists aspire to be saxophonists.

Creating a better physical model of the sax involves sophisticated digital signal processing, an understanding of the physics of the real McCoy and, for Scavone, a superfast PC running Nextstep software. Ultimately, Scavone hopes his models will improve the lot of guitarists and other musicians who want to play the saxophone through MIDI. But because you can tweak physical models in a bunch of different ways, you have to learn how to play them. "If the instrument on a keyboard or a computer has all the flexibility that a real instrument has, then someone's going to have to spend all the time necessary to learn it," admits Scavone. So if he succeeds, all pianists may indeed realize their dreams of playing the sax, but very few will sound like Coleman Hawkins.

LIKE SCAVONE, FERNANDO LOPEZ-LEZCANO, 38, systems programmer at Stanford's CCRMA, has degrees in both music and electrical engineering. But he shares Vees' interest in interactive performance and improvisation that use existing technology in unlikely ways.

In a pantrylike room of CCRMA, Lopez-Lezcano demos the Radio Drum, originally developed by Max Matthews (a founding father of computer music and professor at CCRMA) for conducting MIDI scores. The Radio Drum consists of a rectangular box a few inches deep. Inside it are five receiving antennae.

Looking professorial in spectacles and a beard, gray sprinkled through his dark hair, Lopez-Lezcano taps on the drum with two transmitting antennae, which look like metal batons capped with bright foam tennis balls. The speakers emit a delicate chiming. He waves the baton over the drum, and the pitch changes; another swish of his wrist and the sound fades out. Of course, there's a microprocessor behind this magic, one inside the drum that figures out where the batons are in 3-D space and calculates their respective positions. This information, sent through MIDI, zips into the computer running Nextstep, which is also hooked up to two Yamaha rack-mounted TG77s. Lopez-Lezcano says that in concerts he feeds the two stereo outputs to front and back speakers for quad sound.

The Radio Drum is, according to Lopez-Lezcano, just a general controller, but it opens up an entirely new way of performing. You start out playing some ambient industrial, and then, with a gentle tap of the batons, you're weaving complicated guitar licks into a jazz session. Lopez-Lezcano says he has played the Radio Drum with Chris Chafe (another CCRMA denizen) on the electronic cello in performances on the East Coast and at Stanford. Richard Boulanger, a professor at Berklee College of Music, has also experimented with one ("Cyberfunk U," RS 666), and New York cabaret performer Josefina Bosch brings the Radio Drum to gigs instead of a band.

Lopez-Lezcano has set up the Radio Drum so that your drumming triggers a MIDI chain reaction. PadMaster Software inside the computer translates data from the drum into a virtual map of the drum surface that appears on Lopez-Lezcano's monitor as a set of squares. These match the 30 numbered squares that Lopez-Lezcano has drawn on a piece of white construction paper that covers the rectangular box. Each square contains a list of notes that it will play – essentially the equivalent of a tracking sequencer. You can program each square separately, and a collection of programmed pads makes up what Lopez-Lezcano calls a scene. He programs some pads to shift the entire set to different sequences. With the batons, you can then control the tempo, pitch or volume of the sequence. You can link tempo to the position of one of the batons in space or to how hard you strike a square. "You can control things in a more continuous way," says Lopez-Lezcano, sweeping one of the batons over the white surface of the Radio Drum. "You can also have kind of a soundscape. For example, one use of this is triggering just one sound." Which in this case is a screeching that sounds like a New York cabby braking midblock for a fare.

Whether or not you'll be able to buy a Radio Drum any time soon, digital technology – which charms a haunting score from a flat surface and some metal and foam or turns a twitch of the joysticks into a blues ballad – will inevitably and irrevocably alter pop music and music making in general. How much remains to be seen, of course. But for those who feel that cranking up the volume just isn't enough, DBX, the Radio Drum, physical models and their descendants promise a leg up on virtuosity and new hurdles for your musical coordination. ❑

PHOTOGRAPH BY JOHN GIPE