

The Northwest CYBERARTIST

The Newsletter of Northwest CyberArtists

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Number Three

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Defined
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Future Human Interfaces

by Bob Moses

For the past few months our monthly meetings have provided us fascinating discussions about three-dimensional audio, biofeedback, and motion sensing technologies. These subjects are more than just interesting pieces of technical trivia. They represent the basic building blocks of future systems.

The following paragraphs are excerpts from an article I wrote for an upcoming issue of MIX Magazine. The article discusses the increasing roles these futuristic technologies will play in future computer controlled sound systems. I would like to thank MIX Magazine's Sound Reinforcement editor: David (Rudy) Trubitt, and MIX Magazine, for giving Northwest CyberArtists permission to (p)reprint this article.

The Evolution of the Human-Computer Interface

We generally interact with our natural world by looking at things with our eyes, manipulating them with our hands, and communicating with our body and spoken language. We communicate with computers by staring at a motionless two-dimensional CRT display, and typing cryptic textual messages into a keyboard that was specifically designed to slow us down. Let's face it — we interface with computers in their world. Computers control us, and the more functions we build into them, the more perplexing they are to operate. We must bring the human-machine interface closer to our world. In particular, computer-controlled sound systems should allow human operators to focus on the creative side of their art, not the logistics of forcing equip-

ment to behave. How can we communicate with computers more effectively? Which tasks can we offload to computers to handle? How can we fit into computer controlled sound systems more naturally?

Human factors researchers at institutions such as the University of Washington's Human Interface Technology (HIT) Lab are trying to answer these questions by inventing new ways to interact with computers. These new interface components mimic the way we interact with our natural world. The resulting technology is often called "Virtual Reality" (VR). Although VR has been hyped to death, underlying all the trendy new computer games and Hollywood silliness lurks a powerful new human-machine interface paradigm. Computer controlled sound systems have the opportunity to utilize new VR technologies, to provide a more natural and intuitive environment to their human operators. I would like to introduce you to some of these new technologies.

Eye Tracking

Vision is one of the primary means we use to interact with the world. We almost always stare at whatever we focus our attention to. Eye tracking devices are now available which give a computer precise measurement of where a person is looking. Such devices provide a very natural means of selecting something from a group of options.

Eye tracking technology is conceptually very simple. An infrared light beam is aimed at the cornea, and a small TV camera monitors the eye. By tracking the position of the pupil (the big black spot in the video image) with respect to this fixed-position light beam, the computer is able to follow eye movement. So, a computer could present you several options on a display, or know where real physical devices are located in space,

and recognize which ones you look at. To select an option, you just look at it! How much more natural could this get? Forget typing in those cryptic commands or dragging tiny cartoons across a flat screen. Just look at things.

Imagine how this would affect live sound systems. Engineers could select performers just by looking at them, and adjust their parameters on a simple universal controller. Look at another person, and the controller reassigns itself to them. Whomever the engineer looks at, their parameters are instantly mapped to the controller. No sea of knobs. Just the minimum assortment necessary to con-

...continues on page 2

Last Meeting

- Our thanks to David Schoenbach and the talented dancer Anna Rust of the "Strong Winds, Wild Horses" dance company for their VERY impressive demonstration of a practical application of the Rokebytizer Video-to-Midi Controller.

Next Meeting:

- April 5, 7:30 pm at the Art Institute of Seattle, Room 611/612, 2323 Elliot Avenue, Seattle.
- Einar Ask and Paul Wynia will be demonstrating portable MIDI setups for the performing musician. They request you bring any portable gear of your own to the meeting and join in on the fun!

A Look Ahead:

- The guest for our upcoming May meeting will be revealed in the next CyberArtist. We will have one of two potential guests, both jam packed with useful information. Look forward to it!

continued from page 1...

trol anything you can look at. This could make touring systems much smaller, lighter, and easier to operate.

Transparent Head Mounted Displays

We focus our vision on whatever we are concentrating on. If we want to do several things at once, it is necessary to see all these things in one place. This wasn't possible before transparent head mounted displays (THMD) were invented. A THMD projects an image over the real world so you can see both at once. Imagine how this would benefit live sound. Sound engineers are usually doing many things at once: adjusting mix levels, watching meters, adjusting signal processors, watching performers for visual cues, and so on. It is not possible to watch the mixer, signal processors, and performers simultaneously. But if a sound engineer wears a THMD he can see everything. Imagine staring at your rack of signal processors with an overlaid video image of the stage. You could watch the performers AND adjust your signal processors at the same time. Pretty cool, huh? Or, you could stare at the stage with images of your equipment projected in front of you.

Motion Sensors

I have a friend named David Schoenbach who has an amazing grey box called a "Rokebytizer". The Rokebytizer was made in Toronto by a man named David Rokeby. It accepts a video image from a TV camera and characterizes the nature of the motion in the picture. It keeps track of 16 different objects that are moving in the image. It knows how the motions of these objects change over time. It reports everything it sees to a Mac which maps the motion data to MIDI data. David points his camera at dancers, and the dancer's subtle movements control MIDI instruments. It's magic.

Just imagine what will happen once computers are able to watch us and react to our movements. We won't have to poke our finger tips at ugly little grey buttons anymore. Our body movements will become part of the language we speak to computers.

What a rush it would be to run lights at a show by dancing to the music while the Rokebytizer translates our motion into DMX (lighting control protocol)

messages. Or we could aim the camera at the audience and let the rhythm of the crowd drive the music.

Six-degree-of-freedom position trackers are another type of natural input device. These devices track linear and rotational motion on the X, Y, and Z axis. They can be mounted on your head to track the direction you're looking, on your hand to follow its movement, or just about anywhere else. Imagine what you could do with one mounted to a guitar. You could map signal processing parameters to movement in any of the 6 degrees of freedom. Lean back and turn up the sustain. Tilt the neck up and get a piercing lead.

Bio Feedback

Bio feedback technology interfaces a person's basic body signals to a computer. These body signals reveal our movements and feelings. Computers can monitor our heart rate, breathing rate, core temperature, skin temperature, skin conductance, even the frequency of our brain waves. This information can be used many ways. By monitoring the response of your body to different stimuli, a computer could learn what pleases or distresses you and adapt it's human interface to your personality. Bio feedback has incredible applications in performances. Imagine what you could do with bio feedback from the audience. It gives a whole new meaning to "interactive media". Future computer controlled sound systems might interact with us on a level more personal than we've ever shared with another person. Your computer might become your mentor.

Epilogue

In summary, many of the technologies we've studied at Northwest CyberArtists meetings are right on the cutting edge. I believe they will be important components in future sound systems. In future meetings, we'll hopefully get to see some of the other devices I mentioned (6D position trackers, head mounted displays, and so on). And ultimately, we CyberArtists have the responsibility (and privilege) to bring this stuff into the world.

■ Bob Moses is Senior Digital Audio Engineer at Rane Corporation, a Chairman in the vast Audio Engineering Society International Standard Committee bureaucracy, a prolific writer, a lover of the outdoors, and a dreadful

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10802 47th Avenue W
Mukilteo, WA 98275-5098

John Hokenson, *Editor*
CompuServe: 71673,1464

Steve Tunidge, *President*
Newsletter Layout
CompuServe: 72250,3205
Internet: stevet@rane.wa.net

Bob Moses, *Production Manager*
Internet: bobmoses@pan.com

Einar Ask, *Librarian*
CompuServe: 71774,640

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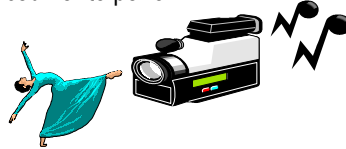
From The Editor

by John Hokenson

As I sit in front of the computer and contemplate this month's editorial, I am listening to a copy of the tape **Einar** distributed at the March meeting. I find it brings to mind images of a musician working late at night to breathe heart and soul into a stack of electronic equipment. Over the course of weeks, I have listened to that same tape several times. Each playing is a new experience as I discover different things I had overlooked previously.

It strikes me that a musician creating music with mechanical devices must overcome the tendency for these mechanical devices to influence the outcome of the music itself. In other words, if a piece of equipment makes it difficult for the musician to produce the specific sound or desired technique, it will influence how that musician makes music — whether consciously or unconsciously. A specific example of this: At one time I owned a drum machine that was difficult to program. Consequently, I was forced to figure out work-arounds to avoid programming said drum machine.

In light of this common failing of technology — to make doing something harder and more unnatural than it was before — I watched with glee as **David Schoenbach's** video-to-MIDI controller was put to good use by a professional dancer at the March meeting. Here was a prime example of technology being used the *right* way. The controller allowed the dancer, **Anna Rust**, to produce music and rhythms based on the way she *felt*, not the way the equipment forced her to perform.



While I recognize there are many constraints limiting the existing technology — the skill of the programmer (David Schoenbach in this case), the ability of the device to register body movements and intent, resolution, et cetera—I also recognize the potential for *freedom of expression*. Likewise, **Bob Moses'** article this month, *Future Human Interfaces*, points out similar problems and solutions for lighting and sound control.

The major drawback to all of this is pointed out succinctly in Einar's column — the cost. For those of us with limits on the amount we can justify (or afford!) spending on studio/performance equipment, a lot of this "cutting edge" technology is simply out of reach. Therefore, alternatives must be explored.

Earlier, I mentioned work-arounds. If a particular sequencer, drum machine, synth, sampler, et cetera makes a particular technique or working style difficult (or impossible), think — how else could I achieve the same result? If your sequencer does not allow for automatic arpeggiation, what about a sequencing program for your PC? Could you get the sound you are looking for by programming the computer sequencer—then download the information to the memory in the hardware sequencer? Or the other way around!

The point I am trying to make here is not to be blinded to options by the limitations of the technology. Do **NOT** allow the problems the manufacturer designed into the equipment to prevent you from producing the music you hear in your *mind*.

Our Working Definition of a CyberArtist

by Steve Turnidge

- A CyberArtist...
is a local universe problem solver.

This is a term coined by Buckminster Fuller (inventor of the geodesic dome, among many other things) to describe our reason to be. This means identifying problems locally and solving them. This includes finding areas in which you *personally* can help to facilitate solutions. Soon the world will be a better place made up of many local universe problem solvers.

- A CyberArtist...
stays aware of new technologies.

This is a key ingredient of accepting reality: knowing the tools available to affect it. This list of tools and ideas is increasing exponentially as we transform into an information based society. Even if we can't afford or use the latest ad-

vances, they can spark ideas we can use!

- A CyberArtist...
does not take the present for granted.

We are *now* living in the future that we've read about. Now is the time to craft all those "We'll do it someday.." ideas!

- A CyberArtist...
becomes an expert with tools already at hand.

Before you buy or desire the next big thing or new technology — have you mastered your existing assets to their maximum utility?

- A CyberArtist...
desires to share information.

What you know is vital, valuable information. Those around you have different information. As we share together we are all enriched.

- A CyberArtist...
maintains a mental state of ignorance.

Alternatively, we could proclaim we already know everything and just go home.

- A CyberArtist...
seeks and learns new forms of communication.

With many avenues of communication, our choice is from a greater palette of expression. We can use all of these to get our message across. When you only have a hammer, everything looks like a nail!

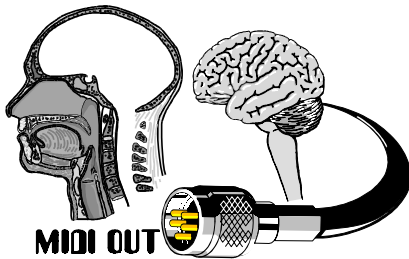
- A CyberArtist...
is willing to add new dimensions to their work.

Try collaborating with others in different fields, and see what you come up with!

M D I O n M y M i n d

by Einar Ask

Hi! By the time you read this my wife will have had our second child and I will probably be caught somewhere between wishing I could sleep and fighting to stay awake. Those of you with children know what I mean. Fortunately, I am most creative when I'm very tired. Unfortunately I'm very clumsy and forgetful as well. I wish my brain had a MIDI out – maybe even a video send for dreams –



Ah, well...

Video to MIDI really blows my skirt up. I enjoyed seeing an ANALOG, traditional artist sync in with some high tech. It gave another dimension to an already dynamic artform. As someone who spends a lot of time working with MIDI key-

boards, I was suddenly hit with realizations of why the alternate controllers that Craig and Brian have mentioned at meetings are so important. I had never heard the result of a MIDI instrument being played through means other than a keyboard. Fascinating and inspirational.

But not affordable.

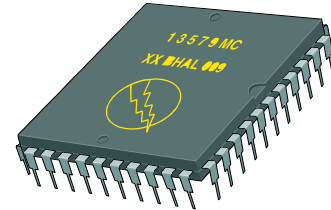
The April Meeting...

Which brings me to the subject of the April meeting. Sorry, but all the portable MIDI equipment within our reach would not make an adequate follow-up to the Video to MIDI show! So the focus has broadened. I will still have my portable devices, and I still encourage anyone with small devices or controllers to bring them in. The subject of the demonstration is now "The portable and AFFORDABLE MIDI studio". We will have both PC and Mac based sequencers, Keyboard workstations, rack mount stuff, both analog and digital synths and effects, etc...

Paul Wynia will be with me and we will demonstrate our setups individually. I hope that anyone who has ever wanted

to build their own home studio will come loaded with questions for us. Considering the people I have seen attending these meetings I think I can say that any MIDI question you have ever had could probably be answered on the spot.

I also hope that this will bring back some of the electronic musicians in this group. I paid to join NEMUS so that I could talk tech and art with other elec-



tronic musicians in our area. I guess I want to get that back.

So, no matter where you stand with MIDI – DSP engineer or poet – I hope that there will be enough toys to allow everyone a chance to jam together on Monday night. If you think you have something you would like to bring in, please do. Call me if you have any questions at 481-3483, or reach me through CompuServe at 71774,640.

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Northwest CyberArtists

10802 47th Avenue West
Mukilteo, WA 98275-5098

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