EGERTER, Computer Music, 2/29/88

John Chowning
pls check for accuracy, sign, and give to Patty ASAP. Thanks, Dave Egerter

Computer music comes of age

Peter Hermann Rollemann Habicht looks like a tuba player. In fact, when the gangly, six-foot-five-inch Stanford freshman opens his mouth to speak, you half expect him to say, "Ompah." Habicht takes his tuba seriously--he plays in four campus groups, the infamous and incomparable LSJUMB, the Symphony Orchestra, the Concert Band, and a brass quintet. You might describe Habicht and his tuba as inseparable. But now, Habicht is learning to play a new instrument...the computer.

Habicht and 16 other students gather every Thursday afternoon in the ballroom of the Knoll, a 1916 Italianesque mansion with eight chimneys. This striking building overlooks the campus from a small hill behind the Florence Moore student housing complex, close to Lake Lagunita. Built originally as the president's residence, the Knoll is familiar to most of us as the former home of the music department. Four years ago, when the music department moved to the newly-built Braun Center, the Knoll received a $1.2 million facelift and, eventually, new occupants. The Center for Computer Research into Music and Acoustics (CCRMA), perhaps the world's leading center for computer music and acoustical research, has called the Knoll home for two years now. Both the fancy on-campus digs and the presence of the undergraduates in the ballroom testify to the fact that CCRMA (pronounced "karma") and computers have become very much a part of the 20th century musical scene.

Habicht and his fellow students are the first to take

advantage of a CCRMA course offering undergraduates a hands-on experience in making computer music. The course, taught by Chris Chafe, ~~associate professor of~~ Research Associate in music and technical coordinator of CCRMA, is formally listed as an "Introduction to music synthesis and programming using MIDI-based systems," but is informally known simply as "the MIDI class." MIDI stands for "musical instrument digital interface," computer jargon for something that sounds complicated but actually isn't. Agreed upon in 1983 by the leading synthesizer manufacturers, MIDI is the standard link-up that allows synthesizers to communicate electronically with each other and with computers. If all this sounds very new, don't worry--it is. Chafe says much of the equipment the students work with in the MIDI class didn't exist three short years ago.

Take, for instance, the four Yamaha DX-7 synthesizers standing around the ballroom. The DX-7s look like piano keyboards that are missing the rest of the piano. They may lack the piano, but somewhere inside these black boxes hides an orchestra. You can play your favorite piano tunes on the DX-7, and it will sound ~~just like~~ similar to a piano. However, if you're feeling adventurous, you can flip a switch and find out what your favorite piano tunes sound like played on the organ, trumpet, flute, guitar, or the 20-some other instrument "voices" that come preset in the DX-7. And if the instrument you want isn't already in the DX-7, you have two options. The voice may exist in a small cartridge that you simply plug into the synthesizer. Or, using a personal computer like an Apple Macintosh, you can build

your own ~~instrument~~ voice. With the DX-7 and a Macintosh, you can make "a set of kettle drums you can actually lug around in the trunk of your car," says Chafe. "You've got a box that's capable of being reprogrammed at the touch of a button to sound like hundreds of different instruments." This versatility underlies the computer's great gift to music--only the musician's imagination limits the sound it can provide.

A decade ago, computers with similar capabilities cost hundreds of thousands of dollars, filled rooms, and were cumbersome to program and play. Today, the minature orchestras embodied by the DX-7 can be bought at most music stores for around $2,000. The four in the ballroom are on long-term loan from Yamaha, according to Patte Wood, CCRMA's administrative director. CCRMA's relationship with Japan's Yamaha Corp. is a cozy one. Professor of music and CCRMA director John Chowning invented the algorithm on the computer chip at the heart of every Yamaha synthesizer and Stanford holds the patent rights. Each time Yamaha sells a synthesizer, Stanford, the music department and Chowning share the royalties. The patent has become one of the most profitable for Stanford--in fact, Yamaha royalties paid for much of the Knoll renovation costs.

Except for the high-tech equipment scattered about--much of it, like the DX-7s, provided by Yamaha--the ballroom, with its ornamental moldings and 12-foot ceiling, would make a good setting for a baroque cotillion. Several Macintoshes sit on low tables along the windowed side of the room. A profusion of wire and computer cable snakes between the various pieces of

equipment. At one end of the room, in back of the 16-track mixing device, stand four ten-foot high, one and a half foot in diameter, carpeted columns. On either side of this row of disguised speakers, uncamouflaged huge black speakers, which would look right at home on stage at a rock concert, hang from the ceiling. In addition to the well-equipped ballroom, the refurbished Knoll contains three specially-constructed, sound-proof recording studios. Every room is wired for sound. In short, CCRMA is the audiophile's ultimate fantasy realized.

In the center of the ballroom, on this particular Thursday afternoon, Habicht and his classmates slouch in several rows of folding chairs facing the monster speakers. Individual projects--there are no written tests--determine each student's grade and today the students are demonstrating their mid-term projects in an informal, kind of modern-day recital. By this point, Chafe says, the students should have each come up with a new voice that they've created. One by one the students move to the front and pop their discs into the Macintosh. They explain the motives behind their creations, and seat themselves at the DX-7.

The first student up, Joe Belfiore, a sophmore who says he'll probably be a computer science major, explains that he had a "mad kick to come up with a voice to go with the song 'Greensleeves.'" He plays the song. The music sounds sort of like an organ, but it also has a violin-like quality. Belfiore describes his voice as "a little bit mysterious" and "cathedralesque." The next student, Greg Cohen, also an

undeclared sophmore, says he "wanted an electronic sound," and in the midst of his experimenting, "something happened, and I got this cool organ sound." He calls it "fuzz organ." After playing a few riffs, Cohen says the voice could be used in hard rock music, and the class agrees. The others take their turns. We listen to several more variations of organ voices, a synthesized version of a 450-year old renaissance musical instrument called the crumb horn, a musical "wail," and the sound of a propeller airplane flying overhead. One student, Carl Wescott, a junior math major, says he "started out with a guitar, but ended up with more of a cosmic sound." Someone in the class points out that it sounds "like a musical saw." Throughout all this, Chafe listens carefully and offers suggestions. For several of the voices, a few changes typed into the Macintosh make noticable improvements.

Finally, Habicht the tuba player moves to the front. As we might have expected, he informs us that he "wanted a sound like a horn." Like a big horn, we all think. But, he informs us, while he was working on the finishing touches, his "disc screwed up." So, miffed at the computer gods, Habicht says he decided he "wanted something that would sound really irritating." He nonchalantly presses several keys on the DX-7. A bizarre and disturbing, whirling and alternating high and low pitched noise like a cross between an alarm and a siren, emanates from the speakers. "Ooooh!" someone says, "Sounds like the outer limits." "The pitch gets nasty real quick," observes Chafe. As Habicht retreats to his seat, Chafe points out that computer-synthesized sound has utility in other applications besides music. "You

could make a great burglar alarm," he says.

Interesting sounds lurk everywhere in the CCRMA-occupied halls of the Knoll, not just in the ballroom. But then, experimentation with sound is what CCRMA is all about. CCRMA's roots go back to the early 1960s when John Chowning was a music composition graduate student at Stanford. Intrigued by the computer's musical possibilities, Chowning and others at Stanford, notably music professor Leland Smith, began working with computer music in 1964 using programs and help from Max Matthews of Bell Telephone Laboratories in New Jersey. Matthews, because of his important contributions to the field, is popularly known as the "father of computer music." In 1966, Chowning joined the music department faculty and continued his computer music bent. In 1975, CCRMA was born with funding provided jointly by Stanford, a gift from philanthropist Doreen B. Townsend (for whom CCRMA has been officially named "The Townsend Center"), and grants from the National Science Foundation and the National Endowment for the Arts.

Until the move to the Knoll, CCRMA occupied the old DC Power Laboratory on Arastradero Road in the Stanford foothills, also the original home of Stanford's renowned Artificial Intelligence Project. Wood says the old lab, which has been described by some as an "abandoned starship," had no heat and "was basically falling apart." Initially, the possibility was discussed that CCRMA would move into the Braun Center with the rest of the music department. But Chowning says he's happy about the way things turned out. "This is quite comfortable and ideal," he says. "I

like having old music in the new building and new music in the old building." As the crowning touch, Matthews, who calls Chowning "an old friend of mine," retired from Bell last year and has joined Chowning and the 40-some others at CCRMA as a professor of music.

Both Matthews and Chowning sometimes find it hard to believe that computer music has come so far so fast. "The real-time immediacy in performance and the inexpensiveness of the equipment far exceeds my wildest dreams," says Matthews. Says Chowning, "I knew it was interesting and I guess I knew it would be important, but how important, I had no idea as to the dimensions. It's amazing that so much has happened."

Computer music has brought about substantial changes in both the commercial and art music worlds. "It's become kind of the jingle factory," says Chafe. "A lot of the work being done commercially right now consists of one guy with a studio full of electronic equipment and computers and synthesizers." Matthews estimates that computers probably create more than half the music the average person listens to today. "Already the soundtracks for the majority of films and television programs are made using synthesizers," he says.

As far as art music is concerned, "there's no doubt that computer music has become a part of the late 20th century compositional scene," says Chowning. "Computers are widely used in contemporary art music--not always a big system and a tape, but a real-time keyboard or a module that's controlled by a personal computer that's interacting with a performer...I mean

it's just all over the place now."

Computer music has come of age. As demonstrated by Habicht and his classmates, it is an accessible and performable medium--it's no longer just an eccentric and expensive laboratory plaything. As Wood puts it: "It's not an ivory tower type of thing anymore. It's hit the streets."

But Habicht the tuba player and his classmates largely take the recent advancements for granted. They're having a lot of fun making music in a way that was impossible not long ago. For Habicht, playing the tuba is easy. But most of us can't play the tuba simply because the instrument is so heavy-we can't even lift it. Now, thanks to CCRMA, even the daintiest among us who dream of playing the mighty tuba can do so--on the computer.