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COMPUTER MUSICIAN CHRISTINE SOUTHWORTH |
MEETING THE MINDS

The Boston Globe

Dancing to the beat of a robot drummer

By Kimberly W. Moy, Globe Correspondent | January 23, 2006

Shortly after she graduated from college with a minor in music, Christine Southworth found herself composing tunes no one could play.

So the MIT alumna took the next logical step: She had a friend invent a robot that could perform her polyrhythmic, Indonesian-inspired compositions.

On Wednesday at the Museum of Science, Southworth, now a student of computer music, will show off her ensemble's compositions and her latest robotic instruments -- which lie at the nexus between science and art. The relatively new Bot(i)Cello, whose \$1,000 in parts include fans, strings, a wooden bowl and three windshield-wiper motors, will play alongside fellow robots, real-life Balinese gamelan players, and more-traditional instruments, such as a guitar, a violin, a bass, and a lyricon (a vintage wind instrument).

"My music, I just want it to be pretty and rhythmic," Southworth said. "I like music that you can dance to, if you want to. A lot of music you think of as robotic is ugly, like robots making their own music."

Southworth, 28, who majored in math at the Massachusetts Institute of Technology, said it took her a long time to find her voice as a composer/inventor. She liked jazz and African music classes but struggled to write her own pieces.

"I definitely hadn't found any sort of voice. The music was pretty bad."

Then she took a class in gamelan, a traditional Indonesian instrumental ensemble of percussion instruments like the xylophone, gong and cymbals. Forced to play by ear instead of relying on Western music theory, Southworth felt liberated. She focused her senior math thesis on the tuning of the gamelan, traveling to Bali to do research.

Once she knew what she wanted to write, she had to figure out a

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way to play it, which is where robotic instruments come in. She was still working out the robots' kinks as of last week, though, carving new spools for Bot(i)Cello's three strings, which are attached to bows on one end and motors on the other. The strings change pitch when the motors reel them in and out and are plucked by fans, producing sounds like an electric guitar, she said.

Unlike typical electronic music, "a robot is an actual physical being," said Evan Ziporyn, Southworth's music professor at MIT, who composed two of the pieces to be played Wednesday. "It gives you the possibility of what electronics can do -- in terms of precision and playing impossible rhythms -- but it's an actual acoustic sound."

But while a robot has advantages, computer programming doesn't get around the difficult physics of creating ear-pleasing sounds with mail-order parts.

"You'd think it'd be straightforward," said Giles Hall a computer programmer working with Southworth. But in the case of the ensemble's first robot, Heliphon: "For the longest time it sounded like a slot machine," Hall said. Then he pulled an all-nighter writing computer code to allow the robot to vary its volume. The Heliphon "actually sounds like an instrument now," he said. [Continued...](#)

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