



Momentum:

Research & Innovation

Cover Story

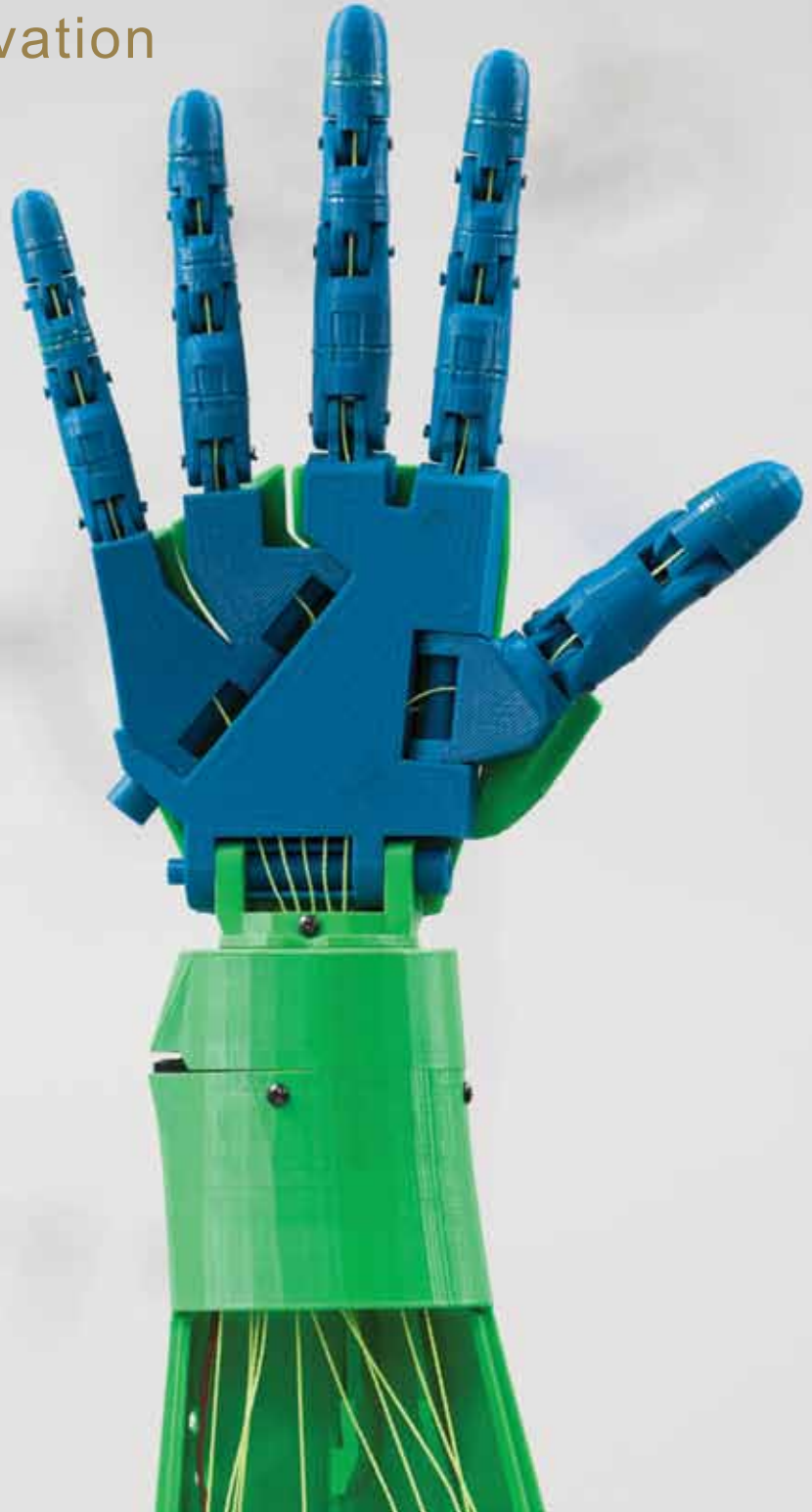
THE SKY IS THE LIMIT FOR
WEARABLE TECHNOLOGY
PAGE 4

Featured Inside

INTERACTING WITH ART
PAGE 8

WALKING ON THIN ICE
PAGE 46

fall 2017



A RANGE OF 'MUSICAL' POSSIBILITIES

written by **CHRIS BARRET '08**



When Eliane Aberdam took the stage to present her musical composition, conspicuously absent were the singers, musicians and instruments. A computer sat center stage to play her piece no musical instruments produce.

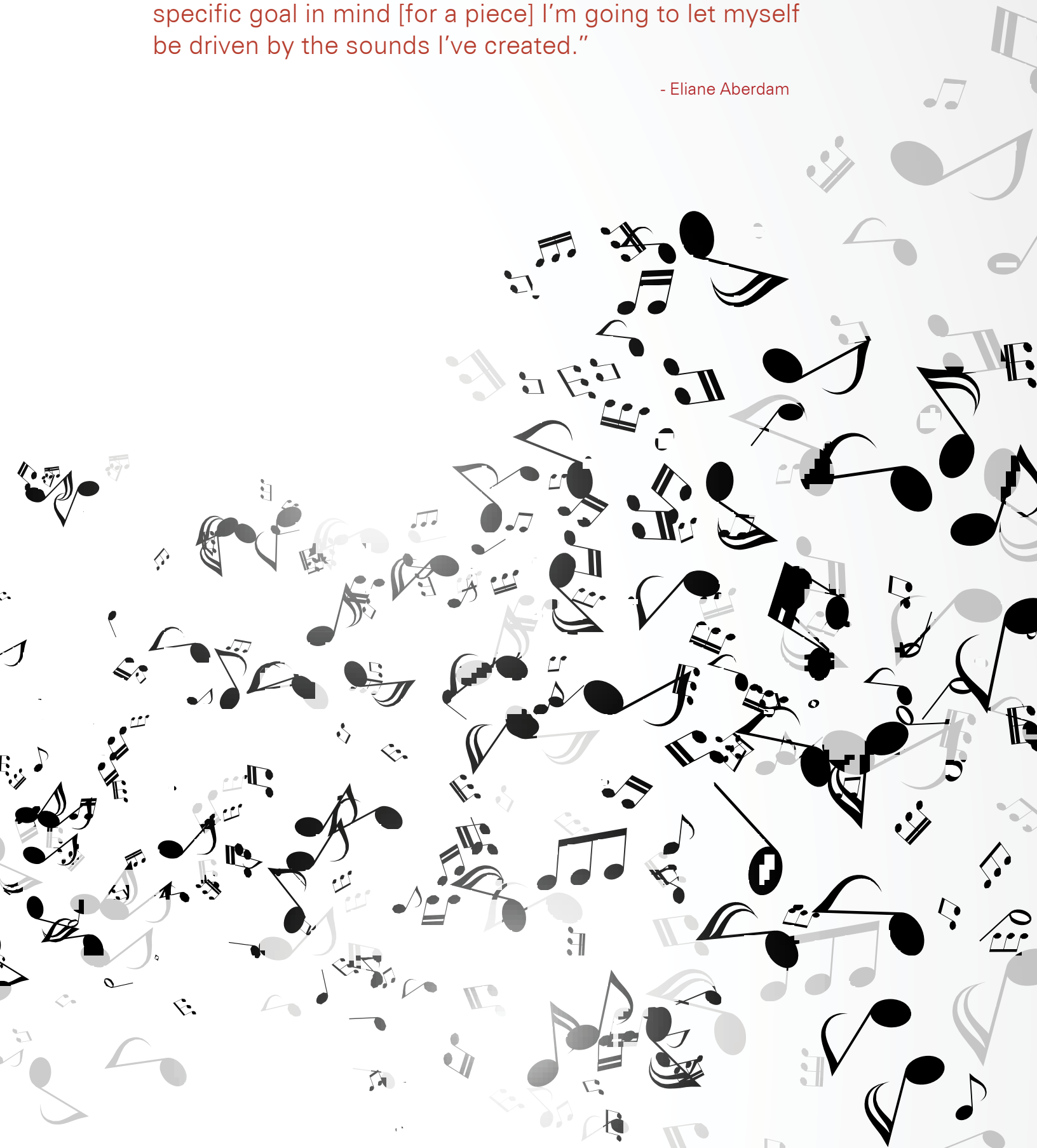
The University of Rhode Island (URI) music professor invents sounds found nowhere on Earth. With the assistance of computer software, Aberdam builds

sounds and assembles them into full-length pieces. But this is no ordinary synthesizer. A typical synthesizer produces sounds from oscillators and uses samples of real instruments Aberdam creates one-of-a-kind sounds like the pluck of a 6-foot-long violin bow or a gong's ring that resonates an improbable 20 minutes.

"The sounds themselves are unique because you get hybrid sounds between, say, a sound of a bell that ends

“Instead of being inspired by something and having a specific goal in mind [for a piece] I’m going to let myself be driven by the sounds I’ve created.”

- Eliane Aberdam





up sounding like a string when it resonates,” Aberdam says. “You can have infinite combinations.”

The software utilizes algorithms to reproduce the acoustic and harmonic characteristics of instruments. The program physically models the instrument to consider the physical characteristics of the virtual instrument such as its size, form and material, including thickness, stiffness and elasticity. It can also model the exciters such a virtual bow, a plectrum or a mallet that cause the sound.

Without the constraints of the typical array of instruments – piano, drums, guitar, etc. – or the musicians required to play them, Aberdam holds an unlimited orchestra at her fingertips. Indeed, the normal rules do not apply.

Traditionally composers place notes neatly on the staff on lines or spaces. Musicians around the world understand this universal language but the defined intervals limit the number of possible notes. Software eliminates the boundaries and the human factor. Microtones, as Aberdam likes to call them, allow much more fine-tuned sounds. These virtually infinite sound possibilities allow Aberdam to flip the classical approach to composition on its head.

“Instead of being inspired by something and having a specific goal in mind [for a piece] I’m going to let myself be driven by the sounds I’ve created,” she says.

Ultimately, Aberdam’s compositions sound slightly unnatural, a little unnerving because normal analogies do not apply. How does one describe, exactly, a cello that sounds like an oboe? The thought alone leaves some classically trained composers scratching their heads and others charging blasphemy.

The tension is not lost on the classically trained, piano-playing Aberdam whose parents sent her to a grammar school tailored for musicians. (The school took its charge so seriously that potential students sat for a hearing test to ensure they could detect subtle differences in pitch.)

“There’s something for both sides,” Aberdam says. “The tension can exist between purist-you-need-an-instrument and people relying on synthesizer sounds.”

Aberdam, who grew up listening to Bach on LP vinyl records in France, says humans play a vital role in music composition. Humans may rely on computers to generate sounds – or even generate an entire piece – but machines lack the discretion and backstory humanity so strongly desires.

For example, a computer may produce a sound all on its own. But ask it to identify the segment most captivating or unique to a human ear and it will likely stumble. Plus, in a world where humans love stories what becomes of a computer and its personality-less software?

“I think there’s a certain way we organize elements in life, whether it’s the ingredients in a recipe or ingredients in music, that are intrinsically human, not robotic,” Aberdam says. “You want to say something and there’s a perception you want to transmit and to be perceived by an audience or diner... There’s a story behind the music or food, even if it’s not fully organized or conscious.”

Humans crave meaning. Part of what attracts listeners to music is the belief that the piece represents something: perhaps a personal loss, conquest, political belief or life milestone. Live performances draw crowds hoping to connect with the singer, conductor or musician. Try connecting with a bland laptop that Aberdam shunts between home and her office. To humanize the process, Aberdam offers an explanation of the software, her approach and her rationale before presentations.

Her composition process starts weeks or months before a presentation with Aberdam experimenting, fiddling and exacting hundreds of sounds in the Genesis software. Appearing a bit like CAD models on the screen, her cursor can form different shapes with specified masses to create objects that emit tones on an infinite scale. No piano, pencil or paper required. Her graduate students are floored.

“I think they like the idea of the novelty of it,” she says. “I’m not even thinking of a composition that’s going to be fast or soft or exciting. I’m actually going to have sounds and lay them for their own sake and see how they are making sense in relation to each other.”



Eliane Aberdam
professor of music

“The sounds themselves are unique because you get hybrid sounds between, say, a sound of a bell that ends up sounding like a string when it resonates. You can have infinite combinations.”

- Eliane Aberdam

Incidentally, it was her time as a college student that inspired Aberdam write music rather than perform pieces written by others. Upon arrival at the Rubin Academy of Music and Dance in Jerusalem, Aberdam found administrators accidentally placed her in the music composition track rather than the piano and music performance concentration. Yet Aberdam excelled during the imagination exercises in music theory classes and found composition suited her.

After earning a master’s degree at University of Pennsylvania and a doctorate at University of California at Berkeley, Aberdam arrived at URI in 2001. And despite the years of training and practice, she bristles at the implication she’s done learning to compose.

“I always strive to try something new in my music: different ensembles, different sources of inspiration, different literatures from over the world, different topics,” she says. “I do not think of myself as being a composer. I am becoming a composer each time I write a new piece.”

