

SPECTRUM

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

SPRING 2013

Music Resounds

**Leading new technologies, criss-crossing disciplines,
transcending bias, and leaving us resonating with ourselves,
each other, and the cosmos**





Gustavo Dudamel, music director of the Los Angeles Philharmonic, conducted the MIT Symphony Orchestra when he was the Institute's McDermott Award winner. Vern Evans

SPRING 2013

THE MIT SPECTRUM

is a newsletter distributed without charge to friends and supporters of the Massachusetts Institute of Technology by MIT's Office of Resource Development.

on the cover

Barker Engineering Library, under MIT's great dome, was recently renovated. Restored was the rotunda's original architecture, along with its 27-foot oculus, which was blackened during World War II to prevent enemy planes from spotting light in MIT's dome. On this day, natural light in the reading room falls on members of the MIT Wind Ensemble and MIT Symphony Orchestra, whose music resounds at the Institute.

4 In One Voice

Music resounds — leading new technologies, criss-crossing disciplines, transcending bias, and leaving us resonating with ourselves, each other, and the cosmos.

10 Portrait of the Artists

The MIT community is alive with the arts.

11 Art and Innovation

MIT alumni and friends agree that the arts give engineers and scientists an edge.

12 Jazzing Up

Dylan Sherry '12, who played tenor sax before a crowd of 9,000, is jazzed about music and artificial intelligence.

13 Composing and Consciousness

Dustin Katzin '12 composed an orchestral piece that premiered last spring and brought the audience to their feet, stomping, cheering, and whistling.

performing arts

14 Theater Quality

Jay Scheib, a sizzling director, playwright, actor, and videographer was recently named Best New York Theater Director.

15 The Sonic Environment

In a world of rising noise, composer Keeril Makan starts with silence.

design

16 Creativity Within Constraints

J. Meejin Yoon creates large-scale, public art installations, including *White Noise/White Light*, which she designed for the 2004 Athens Olympics.

17 Natural Design

Neri Oxman launched a new research initiative — material ecology — that merges architecture, engineering, computation, and ecology.

visual arts

18 'Shifting Mental Spaces'

Visual artist Renée Green recently designed the Media Lounge at New York's Museum of Modern Art.

19 In the Holocene

Joao Ribas, curator of MIT's List Visual Arts Center, discusses a recent exhibition that explores art as a speculative science.

back page

20 With A Little Help From My Friends

Alex Rigopoulos, a former music major, and Eran Egozy, an engineer, married their talents and were named among the 100 most influential people in the world.

THE ARTS AT MIT

In 1980, the year I arrived in Cambridge to join the Course VI faculty, MIT launched the Media Lab. It was a daring new venture intended to push the boundaries of human expression, to combine disciplines in unexpected ways, and to imagine new possibilities for the arts and technology. Even for a newcomer, it was easy to sense the excitement; MIT was committing itself in a whole new way to amplifying the connection between technology and art.

In the decades since, I have seen the creative brilliance and inventive spirit of this community find expression everywhere — not only at the Media Lab but in our science and engineering, in our architecture

and entrepreneurship, and through the arts in every form. For instance, our Music section offers MIT students conservatory-level training, while the List Visual Arts Center ranks among the nation's most significant university collections of contemporary sculpture, paintings, prints, and photographs. And each incoming class deepens and renews MIT's creative enthusiasm: Today, unprecedented numbers of incoming students—80 percent—arrive at MIT with deep experience in the arts, especially in music.

In that context, the arts have never been more integral to the life of MIT nor more deserving of our focus and attention. As an example, in keeping with MIT's passionate tradition of learning-by-doing, we believe that our students and faculty in the performing arts deserve their own “laboratory,” an inspiring space for experimentation, collaboration, apprenticeship, and performance. To make this dream come true at last, we are exploring a number of options, from re-imagining an existing building as a performing arts center to building an entirely new space on campus. As we refine these plans, we will certainly seek support and guidance from the many friends of the arts at MIT.

The world counts on MIT to help invent the future. This limitless assignment requires the ability to visualize things no one has seen before, to create unexpected combinations, to listen to different voices and find new harmonies together. Serious invention depends on science — but it is itself an art. And it is nurtured by the same creative community that fuels the rich world of expressive art at MIT.

Sincerely,

L. Rafael Reif



Phone (617) 253-3834

Spectrum Online spectrum.mit.edu

Email spectrum@mit.edu

Giving Online <http://giving.mit.edu/>

Vice President for Resource Development Jeffrey L. Newton

Executive Director of Communications David J. Gibson

Executive Editor Liz Karagianis

Contributing Writers Laurie Everett, Kathryn M. O'Neill, Elizabeth Thomson, Sarah Wright, Leda Zimmerman

Communications Assistant Jason Ruback

Design Yellow Inc.

Copy Editor Evanthia Malliris

Photography Richard Howard, Len Rubenstein, Andy Ryan

Cover Photography Andy Ryan

This paper is made with 30% post-consumer

waste and responsibly managed sources

IN ONE VOICE

*'Music is sound. Sound is acoustics...
music is math and science.'*

Amelia Carver, who majors in music, says when she heard Yo-Yo Ma play Dvořák's Cello Concerto, "I walked out of that auditorium tingling all over. I felt like I was vibrating at a higher frequency. Music," she says, "is the process of being in sync, a metaphor for finding your own rhythm with the world."

Who goes to MIT to major in music?

Ask Alex Rigopoulos '92 '94, a former music major, who along with Eran Egozy '95, an engineer, founded Harmonix Music Systems, which produced two of the hottest music video game series of the decade, amassing billions in sales.

"Many scientists and engineers have a deep affinity for music," Rigopoulos says. "I suspect it's because both science and engineering are rooted in trying to comprehend deep and hidden structures. The appeal of uncovering those hidden structures is part of what draws many who love science and engineering to music as well."

Music resounds at MIT. Eighty percent of this year's incoming class participated in the arts in high school, while 69 percent arrived at MIT with musical training. This year, nearly 1,900 students enrolled in music and theater arts courses. In fact, music is the fifth most popular of the Institute's 42 minors. More students minor in music than in energy.

"MIT students speak the language of math and science. Music is sound. Sound is acoustics. In a sense, music *is* math and science," says Evan Ziporyn, who heads MIT's Music and Theater Arts Section, and who is a composer, clarinetist, and the Kenan Sahin Distinguished Professor of Music.

"All over the Institute, music is practiced; it's not preached," says Philip Khoury, associate provost with responsibility for the arts. "In fact, so many science and engineering professors are also musicians, we could put together a terrific orchestra just from our faculty."

Like much of MIT's music faculty—who has appeared at Carnegie Hall or performed for the Pope—violinist Marcus Thompson, artistic director of the Boston Chamber Music Society, has an international reputation. "People are still surprised to find out that there's music at all at MIT, and it's not only good, but it's great."

Known for its symphony orchestra, wind ensemble, jazz ensemble, two choirs, Senegalese drumming group, Balinese gamelan, and dozens of chamber music groups, MIT also hosts a world-class music library, and the Emerson Scholars, a program for students who are conservatory-level performers.

"Many MIT students are qualified to have gone into a conservatory, but they come to MIT, because frankly, they—and their parents—know they're going to be gainfully employed," says David Deveau, senior lecturer in music. "If you're on the cutting-edge of biological engineering or neuroscience, you're assured a good career, whereas if you can brilliantly play Rachmaninoff's Second Concerto, there are 3,000 other pianists in the U.S. who can play it too. In music, getting a job is much more a roll of the dice."



Composer Elena Ruehr says: "If you can see a pattern in music, suddenly it can shift a paradigm in

CHANGING AUDIENCE

Fifty years ago, says Evan Ziporyn, "those who flocked to the symphony were older people, the professional class — doctors, lawyers. Now the audience," he says, "is the new intelligentsia — computer programmers, engineers, people in information technology."

In addition to their ability to afford it, what's beginning to happen, Deveau explains, "is younger ones keep coming. People are too busy. They need refuge from the number crunching, the deadlines, the problems at work. People really need a time where they can't answer their cellphone, where they can just sit and close their eyes in a beautiful space and let their thoughts wander."

Deveau, a world-class concert pianist who programs and



another discipline.” Andy Ryan

presents 30 concerts a year as artistic director of the Rockport Chamber Music Festival, says that music is energy and needs to be exchanged between living people. “There’s something sterile about a recording. All the bloopers are edited and you’ve got a perfect product. In concert, anything can happen. It’s like a live, high-wire act. And that’s the excitement and the electricity for the audience and the performers.”

Increasingly, the university is becoming an inviting home for the performing arts, says Khoury, the Ford International Professor of History. As high costs cause museums, symphony halls, and operas to struggle, “we need to make sure that the young everywhere are having access to the arts.”

A performing arts facility is now a priority at MIT, says President L. Rafael Reif. “Our students and faculty in the performing arts deserve

their own quality space that is as inspirational as their work. This has been a longtime need — and a dream — for many at MIT, and we are exploring how to make this possible,” he says, adding that options range from reimagining an existing building such as Walker Memorial as a performing arts center to building an entirely new facility on campus.

LEAP INTO UNKNOWN

Faculty and students say that in addition to bringing balance to academic life, studying music teaches discipline, discernment, and problem solving. Composer Elena Ruehr, a lecturer in music, says it also enables us to leap into the unknown.

Composer Tod Machover is writing a symphony for the Toronto Symphony Orchestra and invited the whole city to collaborate with him. *Andy Ryan*



“It’s hard to write a string quartet in the style of Haydn that’s beautiful. *How* is it beautiful? You need to make an intuitive leap. Studying music is like lifting weights,” she says. “It makes your mind more fluid and gives you the ability to shift perspective, to see the same thing from many angles. If you can see a pattern in music, suddenly it can shift a paradigm in another discipline.”

Before he cofounded Harmonix and zoomed to success, Alex Rigopulos was a grad student at MIT’s Media Lab. Studying music, he says, was a great way for a young person to search for his own voice and find it. “Music has this incredible power to unearth our inner emotional lives and force us to confront them,” he says.

“Like many college students, I was doing a lot of soul searching about what I wanted to do with my life. MIT’s music program saved me as a person. After years of feeling adrift, I had this moment of clarity where I realized that I needed to devote my life to music in some way, and I was lucky enough to be in this special environment where I could study science and engineering at a serious level, but at the same time, I could also pursue music with great intensity. MIT provided an unusual environment where I could explore the intersection of both worlds.”

NEW MEDIA INTEGRATION

Integrating our interests, we integrate ourselves. And some say, we are now being called to integrate ourselves in a new way, with new media and new technologies.

“We live in a world of complete compartmentalization,” Ziporyn says. “From preschool, we tell our children, here’s your math class, art class, history class. But how do you develop an organic, holistic life? It’s not just that it would be cool to bring your interests together but one kind of thinking begins to affect another, creating a holistic mind. With new media and new technologies, this integration is essential, because we’re now living in a society where this kind of innovation is what’s driving everything.”

Eran Egozy, an engineer and concert-level clarinetist who along with Rigopulos was named by *TIME* among the 100 most influential people in the world, is a pioneer in new media. “The kind of technologies that people are building today, opposed to 20 years ago, is much more connected to how people interact in social aspects of our culture, like Google, Facebook, or Twitter. At first, computers were super technical. Now technology and humanity are deeply interlinked. It’s actually really important for people graduating with a technical or scientific degree to be immersed in the arts because it’s so much more relevant to today’s products and innovations.”

Tod Machover, who is among the most innovative composers of his generation and has invented many new technologies for music, including hyperinstruments for Yo-Yo Ma and Prince, is the Muriel R. Cooper Professor of Music and Media at the Media Lab.

“All of a sudden, music is listened to in a whole new way,” he says. “The song of a famous artist is now just a seed and a whole community reacts to it. Audio becomes like clay. Kids now make their own version of an artist’s song, modify it, and share it electronically.”

“Right now, I’m writing a symphony for the Toronto Symphony Orchestra, and I’ve invited the whole city of Toronto to collaborate with me. It’s a team of a million people. Partly, I send out music for the community to modify; partly we collaborate face-to-face or via Skype. The resulting symphony this spring will test a new balance between democracy and excellence. MIT is an unparalleled place to explore the technology, sociology, and musicality of new areas.”

BLURRING THE BOUNDARIES

Now more than ever, students and faculty say, boundaries are blurring across disciplines. It’s not just music anymore. It’s music and science. Music and engineering. Music and technology. Your

mind may be lit with the Moonlight Sonata, but now, we must consider music in concert with computer science, brain science, or linguistics.

Michael Scott Cuthbert, a pioneer in digital musicology, recently collaborated with computer programmers to develop music21, musical analysis software. Computational musicology is the idea that if you turn huge numbers of songs into data and analyze it with a computer, you can learn things about music otherwise impossible to know. Like, say, what makes French music French? “It’s a new way of thinking about how to understand problems and perplexing moments in music,” says Cuthbert, associate professor of music and the Homer A. Burnell Career Development Professor, who predicts “our students are going to be the ones who will develop new theories of how people interact with technology as art, and art as technology.”

David Pesetsky is the Ferrari P. Ward Professor of Modern Languages and Linguistics. Recently, he and grad student Jonah Katz examined the structure of music. What they determined was that no language uses tones like music, and no musical system uses words like language. But once you acknowledge that the components of language and music are different, the ways that those components are combined and recombined, appear to be alike. “Our claim is that music and language might actually be the same cognitive system,” says Pesetsky, adding that “progress in new fields inevitably will be made by those who cross the boundaries.”

Music and science may seem like an unlikely melody, but some at MIT suggest they’re part of the same lovely song.

Pawan Sinha, professor of brain and cognitive sciences, is creating music from brain waves. His pioneering work on how the brain extracts meaning from sights and sounds made it possible to restore sight to the blind. Now, he has developed *Brain Jukebox*, an algorithm that reconstructs sound sequences from the mental patterns of listeners and plays it back. One day, he predicts that without listening to an external piece of music, someone could imagine Beethoven’s Fifth Symphony, then record their brain activity and play it back. “It’s like reconstruction of a person’s thoughts. Essentially, it would be tantamount to making explicit the internal thinking of a person,” Sinha says, adding that the insights could be used to treat neurological disorders.

UNITY BEYOND DIVERSITY

Not only does music transcend disciplines but also seems to transcend bias. Some say that barriers between people are in our minds, and music helps dissolve them.

Patricia Tang, an ethnomusicologist, cofounded Rambax, MIT’s Senegalese drumming group. Twice she escorted Rambax students to Senegal to perform. “What happens is students are learning not just about the drumming; they’re learning about Senegalese culture,” she says, adding that the music draws people together across cultures and can be peacemaking. “There’s something wonderful about being in a sea of 40 drummers playing in perfect unison. When you’re in rhythm with other people, it’s a feeling of community.”

Evan Ziporyn agrees. Founder of MIT’s Balinese gamelan, Ziporyn says with its cross-cultural message, the music took on greater significance after 9/11. “A message of that time was keep your culture out of our culture. It suddenly seemed to me that the message of this music was there’s intrinsic value in having an intense encounter with people from other countries.”

Michael Scott Cuthbert, who has studied music from the Plague in 1348 to music of the past 40 years, says: “We’re no longer limited to the music of our geographical region. People working on Chopin also listen to music from Indonesia or to Japanese pop. We begin to see that our assumptions about music are not necessarily universal truths. We have a campus environment that is stronger with diverse viewpoints. I believe we’re creating the next generation of engineers who will see these moments of bias.”

IN SYNC WITHOUT WORDS

Perhaps above all, music is a way to seek union. Talk to any music expert at MIT and they will tell you making music is magical. Perhaps it is the merging of our energy, but when you resonate with others, they say, something marvelous happens. Where we are one, there is only harmony.

“When you sing in a chorus and it all just clicks, you feel as if you are all one big voice,” says Elena Ruehr. “There’s this sense of oneness. Instead of being 50 people all singing a piece of music, you’re one big, superhuman sound. In the moment, you just feel elated and empowered. I don’t know,” she wonders, “is there a word besides love?”

“Relationships musicians develop with each other are more than collegial, more than friendship. They’re familial. In a certain sense, they’re like love relationships,” says Evan Ziporyn. “A violinist and pianist playing together in rhythm get in sync without words. It’s very intimate. There’s an ecstasy that you reach.”

Eran Egozy believes that his gigantic success with music video games *Guitar Hero* and *Rock Band*, came because he and Alex Rigopulos designed the games for people to feel this very feeling.

“It’s hard to describe, but if you have a tight group making music together, you really feel like you’re penetrating into their souls. It’s nonverbal, but the communication is very deep. There’s a wonderful magic, this awesome feeling that music is part of all of us. And it’s so mysterious.”

Marcus Thompson, the Robert R. Taylor Professor of Music, is aware of the mystery. “It starts any time you’re performing,” he says. “You’re in a totally different mental space. When you go into this state, you’re exalted. You’re in another reality. It’s like an out-of-body experience. You have transcended your mind and whatever it is you are doing. It’s spiritual. And the experience is sublime. In some ways, you prepare for it but you don’t feel responsible for it. It really is about something greater than yourself.”

PYTHAGORAS AND STRING THEORY

It has been suggested for centuries, since Pythagoras, that this ecstasy has to do with resonance. It’s literally good vibrations. The whole basis of tuning, from Pythagoras on, has been resonating bodies. That’s what makes an instrument or chord sound good,” Ziporyn says.

Pythagoras believed that the mathematical order to music was an example of the principle of number which underlies the universe. Music, he thought, is an aural representation of relationships between numbers and that all musical consonance is based on ratios of adjacent numbers.

“What I find interesting,” Ziporyn says, “is Pythagoras had these ideas thousands of years ago, and now, what is string theory? It’s the idea that at the most microscopic level, what converts energy into mass is these kind of vibrating strings. There’s got to be a connection.”

Pythagoras also believed in Harmony of the Spheres, an ancient concept that regards proportions in the movement of the planets, moon, and sun as a form of music, not necessarily actual, audible music, but rather, a harmonic or mathematical concept.

“Let’s just say, I hope he’s right,” says Institute Prof. John Harbison, a Pulitzer-prize winner who has composed music for the Metropolitan Opera and Boston Symphony. “Because without some Pythagorean theory about the universe, the best music I know, like Bach’s music, after a certain point, I would have no way of explaining from where the music came, because not only is it so good but it is so far-beyond-explanation good.”

“I think that with all great art, there is a divine order,” says David Deveau. “If you listen to Bach, it is like the musical embodiment of what Pythagoras thought. There’s a perfection and a logic to it. Bach’s music is all about order. It’s the universe in sound.” ~ LIZ KARAGIANIS



Violist Marcus Thompson says: “When you go into this state, you’re exalted. You’re in another reality. It’s like



an out-of-body experience." Andy Ryan

PORTRAIT OF THE ARTISTS

Jerome Friedman, MIT Professor Emeritus, Nobel Laureate in Physics, Painter • Salvador Luria, Founder of MIT's Center for Cancer Research, Nobel Laureate in Biology, Sculptor • Sidney Altman '60, Nobel Laureate in Chemistry, MIT Dramashop • Richard Feynman '39, Nobel Laureate in Physics, Drums • Erik Demaine, MIT Professor, MacArthur Fellow, Origami • Tim Berners-Lee, MIT Professor, Founder of the World Wide Web, Singer • Donald Sadoway, MIT Professor, Actor • Jay Keyser, MIT Professor Emeritus, Jazz Trombone • Charles Zhang '94, Chairman and CEO, Sohu Musical Theater Guild • Alex Dreyfoos '54, Co-founder, Photoelectronics Corporation, Oscar for Technical Achievement • Amar Bose '51 '52 '56, Founder, Bose Corporation, Inventor of the Bose Sound System • Mahendrajeet "Miki" Singh '86, Co-founder, Art Technology Group, Rock Singer, The Singhs • Alex Rigopoulos '92 '94, Co-founder, Harmonix Music Systems, Gamelan Gala Tika • Eran Egozy '95, Co-founder, Harmonix Music Systems, Clarinet • William Warner '80, Founder, Avid Technology, Recipient of Oscar and Emmy • Ben Bernanke '79, Chairman of the US Federal Reserve Bank, Saxophone • Tom Scott '66, Sound Engineer, Recipient of Academy Awards for Sound Mixing • Ronald McNair '77, Astronaut, Saxophone • Cady Coleman '83, Astronaut, Flute • Carlos Prieto '58, World-class Cellist • Tom Scholz '69 '70, Rock Guitarist, Founder Boston • John Underkoffler '88 '91 '99, Science and Technology Advisor to Steven Spielberg • Gerald Katell '62, President, Katell Productions, Actor and Producer • Pardis Sabeti '97, Geneticist, Rock Singer, Thousand Days • John Miller '64, Minnesota Orchestra, Bassoonist • Andrew Silver '64 '67, Filmmaker • Eliot Mack '96, Lightcraft Technology, Inventor, Prevision Virtual Studio System • Rajesh Mehta '86, Founder, ORKA-M Singapore, Hybrid Trumpet Player, Ensemble Leader • Ray Jackendoff '69, Co-director, Center for Cognitive Studies, Tufts, Clarinet • Mary Farbood '01 '06, Creator of Hyperscore, Harpsichord • Stephanie McGuire '96, Marshall Scholar, Professional Opera Singer • David Breitman '76, Director, Historical Performance Program, Oberlin Conservatory, Piano • Elaine Chew '98 '00, Founder and Director, Music Computation and Cognition Lab, USC, Piano • Jose L. Elizondo '95, Nuance Communications, Composer • Michael Good '79 '81, Founder of Recordare LLC, Inventor of MusicXML, Tenor • Kenneth E. Goodson '89 '91 '93, Associate Professor of Mechanical Engineering, Stanford, Baritone, Cello, Vocal • Michael Koerner '49, President, Canada Overseas Investments, and Chancellor, The Royal Conservatory of Music, Piano • Peter Godart '15, Mechanical Engineering, Jazz Piano, Organ, A Cappella • Emily Jackson '12, Chemical Engineering, Flute • Nathaniel Atnafu '14, Electrical Engineering and Computer Science, Bass • Rebecca MacRae '14, Brain and Cognitive Sciences, Piano • Latifah Hamzah '12, Mechanical Engineering, Violin • Vineet Gopal '14, Electrical Engineering and Computer Science, Flute • Shu Zheng '13, Electrical Engineering and Computer Science, Piano • Tochukwu Okoro '14, Electrical Engineering and Computer Science, MIT Rambax (drumming) • Chelsi Green '13, Brain and Cognitive Sciences, Alto, MIT Chorallaries •

art and innovation



Michael and Sonja Koerner Matthew Plexman

MICHAEL KOERNER '49 is President of Canada Overseas Investments Limited and Chancellor of The Royal Conservatory of Music in Toronto. A life member of the MIT Corporation, he and his wife Sonja support the arts at MIT. His second date with Sonja was to the Hubbard and Dowd instrument shop in Boston's South End to see a harpsichord restoration. There he played the last three movements of Bach's B-flat Partita, impressing Hubbard and Dowd, though he admits he was really out to impress Sonja. He has collected harpsichords for 40 years.

"I began playing the piano at age six. In my senior year at MIT in 1949, I played Mozart's C-Minor Piano Concerto with the MIT Symphony Orchestra in Walker Memorial. As I recall, the acoustics were awful. It was great fun, as we were all 'gifted amateurs.' It is important to give students at MIT an opportunity to participate in music. MIT is competitive, and when you're studying mathematics or physics you're working hard. How do you cleanse your mind? One of the best ways I know is joining a group and playing music. There is a humanizing effect for engineers and scientists to be involved in the arts — it could be music, visual arts, sculpting, painting, dance, anything. I think we'll develop better engineers and scientists because of it." ~ LAURIE EVERETT

BRIT D'ARBELOFF SM '61, has been involved with the arts since she was 14 and traveled on Saturdays to the Art Institute of Chicago for painting lessons. She joined the Council for the Arts at MIT in 1997, the year her husband, the late Alex d'Arbeloff '49, was named chair of the MIT Corporation. Recently she stepped down as Council chair. A Life Member Emerita of the MIT Corporation, she supports the arts at MIT.

"The arts are important to MIT because that's how you make a good engineer. Good engineers are creative, and the arts open your mind to possibilities. If an engineer or scientist can take time to enjoy a concert or visit an art show, when they get back to work they're looking at things with a different eye. Maybe instead of making another app, they'll decide to redesign the whole phone. I'm tired of people saying, 'MIT has arts?' Eighty percent of our students come to MIT as freshmen with some arts background, and MIT has one of the top 10 public art collections of any university in the country. The Council for the Arts provided the Institute with *The Great Sail*, MIT's first piece of public art, and it also provided the Student Loan Art Program that allows students to borrow original works of art. We have a vision of engineers that they're kind of one note, that they just keep pushing and that they're not creative. A good engineer is very creative, and the arts just give you that extra edge."

~ ELIZABETH THOMSON



Brit d'Arbeloff Richard Howard

JANE PAPPALARDO, chair of the Council for the Arts at MIT, graduated from Boston University with a degree in music education. Her husband, Neil '64, once sold pints of his blood to buy her a piano. Today she and Neil support arts organizations in Boston, in addition to Boston University and MIT.

"It was our first wedding anniversary, and Neil wanted to give me a piano because I had majored in music and was a pianist. We had that piano for 30 years, and it was the best one I ever had. My mother was a pianist and her father was a musician. Now we have two granddaughters who are gifted on the piano. We have concerts in our house often, and all of our grandchildren come over to hear live performances. I like contemporary classical music — from the 20th and 21st century — and music that's edgy and has a feeling of innovation. It astounded me when I became aware of the amount of art, music, and theater at MIT. The students are so well prepared, many having more stage experience in music than students going to conservatories. They have been encouraged to live their dreams to become physicists, for example, but they still love music. Encouraging and applauding them is why I'm on the Council for the Arts, to make sure the arts are a big part of the MIT experience. When you have that kind of passion for the arts, it is the soul within you. I think music is what my soul is."

~ LAURIE EVERETT



Jane Pappalardo Richard Howard



JAZZING UP

O*b when the saints go marching in*
Ob when the saints go marching in

Some play the song like that. But Dylan Sherry plays it like this:

Ob when the saints
Ob when the saints
Go marching in
Go marching in

Hear the difference?

“I like a Dixie-New Orleans style, because it’s exciting and a lot of interesting, unexpected things can occur,” says this 21-year-old tenor saxophonist. When Dylan was a baby, his father, a jazz bass player, lulled him to sleep every night with the sounds of Count Basie, Duke Ellington, and Dizzy Gillespie. “By the time I was nine, the sounds stopped sounding like a random jumble and began to really cohere,” says Sherry, who for years attended his father’s gigs and continued to listen every night to music of the jazz greats.

Now a grad student in electrical engineering and computer science, Sherry, who graduated in 2012, is a four-year-member of the MIT Jazz Ensemble and six times won MIT music awards for outstanding achievement. Trained in the classical style, Sherry has performed with the MIT Symphony Orchestra, MIT Wind Ensemble, and during MIT’s 150th celebration, he performed an improvised solo before a crowd of 9,000. He also is a guest artist on *Echoes of the Prophet*, a commercial CD he made with Sam Sherry, his Dad.

Dylan Sherry is jazzed about music and artificial intelligence. Len Rubenstein

“I love jazz. It’s spontaneous, always different, can’t be easily defined, and there are endless possibilities,” says Sherry, who at MIT was an Emerson Scholar, a scholarship for private instruction for top students who each year perform before a live audience. If you’ve ever heard of the Beatles — and if you like to feel good — listen to a song from his recent performance. web.mit.edu/shass/multimedia/listening_room/2011/sherry-grossman-lennon-mcartney-monk.mp3

WORK IN HARMONY

“I want to work in artificial intelligence but I’ll never give up music. I’m planning my career and my music career to work in harmony,” says Sherry, who currently feels jazzed about working with a group to develop a cloud-backed, massive-scale platform for evolutionary computation.

“There are similarities between music and artificial intelligence,” he says. “Music has a deep relationship with the human mind and that could inform the field. In artificial intelligence, there’s a branch of research directed at how people represent ideas and concepts in their minds. For musicians, many of the structures they create are sufficiently complex to require great intellect; being able to grasp and understand such structures is a skill of the human mind and is probably the same one that allows computer scientists to manipulate software objects mentally or allows engineers to shuffle parts of designs around in their heads. I think there’s a great parallel there.”

MIT’s music program was a “gigantic factor” in Sherry’s decision to come to MIT and not to go to a music school, he says. “Conservatory programs are transforming musically, but MIT is transforming personally, professionally, and also musically. No other science and engineering school is like it. Real music is happening here.”

~ LIZ KARAGIANIS

emerson scholars

COMPOSING AND CONSCIOUSNESS

Listen to this music.
spectrum.mit.edu/katzin
 Honest. You'll love it.
 I'll wait.

Dustin Katzin composed this piece — *Schrödinger's Cat: a Musical Journey into the Strange World of Quantum Physics* — which premiered last spring by the MIT Symphony Orchestra, and which brought the audience to their feet, stomping, cheering, and whistling.

"My heart was pounding. I was so excited. That night was an experience I'll always remember and was one of the most defining moments of my life," says Katzin, whose dream is to compose film scores for major motion pictures, like his idol, John Williams. "There's a magic in his music that gives me chills. That emotion is what I strive for," says Katzin, whose own music, many say, carries a feeling that gives you goosebumps.

Katzin, an MIT Emerson Scholar, a program for top conservatory-level performers, graduated in 2012 with a double major in physics and math and a minor in music. This year, he's at Cambridge University where his mind is on a master's in applied mathematics, but his heart is on his next big chance and a dream to compose soundtracks for Steven Spielberg movies.

"Music is fundamentally math and physics. It's waves and frequencies," says Katzin, whose

landmark piece, *Schrödinger's Cat*, tells the story of a famous thought experiment devised in 1935 by Austrian physicist Erwin Schrödinger.

The experiment reveals the apparent conflict between what quantum theory says is true about the nature of matter on a microscopic level and what we observe to be true. "The paradox comes from taking the principles of quantum physics and treating large things as if they were subatomic particles. You can't naively apply the principles of the theory at all scales and sizes."

In the experiment, a cat is put into a box in a sealed room with radioactive material. Over time, that material may release cyanide gas or not. "If you misapply the theory, you could say that the cat was dead and alive at the same time, until you open the box. When you see the cat, it would either be alive or dead, with equal probability."

Katzin wrote two endings for the 25-minute piece — sad, if the cat dies; happy, if it lives. When the piece is performed, the conductor flips a coin to determine which outcome. On the night of the premier, the orchestra played the sad ending, followed by the happy one as an encore.

HAPPY BEGINNING

At age three, Katzin saw *The Lion King* and that night played the film's entire theme song on a toy keyboard. At eight, he composed his first piano piece for a third grade talent show

and won a gold medal. At 11, he heard *Anakin's Theme* from a *Star Wars* movie and replayed the song all day and night. "I was in a state of awe."

Mesmerized by the melody, he joined the school band, marching band, and jazz band. He played clarinet, bassoon, tambourine, bongos, and cymbals. ("It's much harder to play cymbals than it looks.") "From the beginning, I was interested in large-scale, orchestral composing," says Katzin, who has perfect pitch. "But I never thought in a million years I'd ever be able to compose anything like this." Three years ago, Katzin composed the film score for *Solar*, a film made by classmate David Dahan '12. Listen. video.mit.edu/watch/solar-4619/

On this day, Katzin is saying that for him, creativity transcends rationality.

"The composition process for me is unconscious," he says, adding that the sound reveals itself. "And I jot it down. It's like my brain does the work, and I take a back seat and let it go by itself."

"I am aware of a moment when there's a choice, like I make a choice to open myself up to learn what's next. And the music just comes. Sometimes I feel I can direct it. I'll think, I want a specific emotion right now, and then the subconscious part of my brain does the work. I just feel like I am channeling someone who is telling me how the music goes."

- LIZ KARAGIANIS

Dustin Katzin's friends say he is an Academy Award just waiting to happen. Marc Longwood



performing arts

THEATER QUALITY

Jay Scheib just staged Beethoven's *Fidelio* in Saarbrücken, Germany, put on a ballet in Hong Kong, and brought home an Obie (off-Broadway's highest honor) for a production in New York that lit up critics' radar screens. So why, with a burgeoning international reputation, and simultaneous projects writing, designing and directing, has Scheib decided to call MIT home?

"There was a time," Scheib admits, "when I thought, 'What? There's a theater program at MIT?'" But today this associate professor and newly appointed director of the Theater Arts Department regards his move to Cambridge from Berlin nine years ago as "one of the great decisions of my life — the start of an incredibly fruitful relationship."

Scheib, a 2011 Guggenheim Fellow, vaulted onto the global stage in his early 20s, directing, designing, writing plays, and adapting screenplays. Along the way, he picked up video and film production, and earned an MFA at Columbia University. Recently named Best New York Theater Director by *Time Out New York*, Scheib says he brings the "challenges of the field, and the experience of grappling with them" into his undergraduate studio classes. "Building on those kinds of journeys hand in hand with students, as a day-to-day artistic practice, has been enriching," he says. The benefits flow both ways, since these students collaborate with Scheib, contributing ideas at the earliest stages, and later,

becoming directly involved in productions.

The kinds of questions that fascinate Scheib, discussed in the classroom and made manifest in his productions, connect to work emerging from MIT's science and engineering departments. He attends talks by MIT colleagues on such topics as robotics and advanced prostheses. "Their language makes its way into my thinking," Scheib believes. "It's important for me to take science and technology as central considerations in whatever I do, whether operas, plays or ballets."

OTHER WORLDS

He finds the notion of human exploration of other worlds, whether in outer space, or digital, particularly resonant. *Untitled Mars*, the first drama of a three-part trilogy, was sparked by a proposal from Joseph Gavin, Jr., an MIT aero/astro graduate and a lead in U.S. lunar exploration, that astronauts should travel to Mars with the understanding that they would never return. "The idea for me was hugely shocking, but when I asked my class if they would go on a one-way mission, they all said yes." Says Scheib, "I totally get that adventurous spirit."

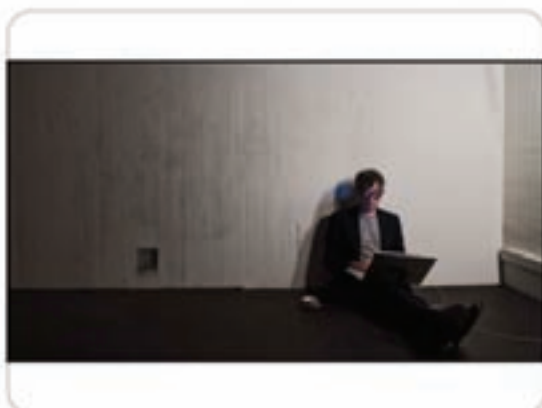
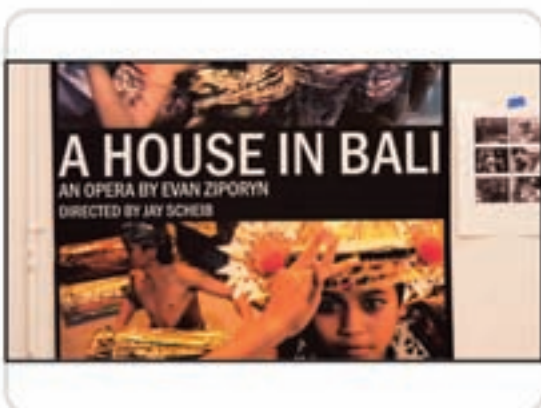
Scheib is also "very engaged in finding ways to incorporate different technologies, whether video, or sensors or microphones, into live performance." These are not intended as whiz-bang fillips to a production, but as

strategies for "reflecting on the world we live in." Scheib's off-Broadway theater piece, *World of Wires*, was conceived at MIT, and tells the story of a scientist who is surprised to find himself living inside the computer simulation he is designing. To convey this complex duality, Scheib includes a live, uncut video view of the action (he mans the camera himself for the single 90-minute shot during performances). "I want to find ways to work with these tools such that they are deeply embedded in the action," he says.

After a brief vacation at his childhood farm in Iowa — "I plan to drive around in a pick-up truck" — Scheib takes up a packed agenda, which includes helping to reshape MIT's theater arts curriculum. While undergraduates frequently choose theater as a "companion piece" to a course of study in architecture or physics, says Scheib, he hopes MIT "will emerge as a destination for students seeking to concentrate in performance and scenography."

The ultimate multiplexer, Scheib will also be developing a production for the New York City Opera, and designing a Chekhov performance as a live, drive-in movie sited next door to the Pinwheel House, a winner of MIT's \$1K House initiative — an effort to bring supremely affordable and sustainable homes to the world's poor. "I'm happy to be doing a lot all the time," he says. Plus, there is a "pitch and energy to MIT that I find energizing." ~ LEDA ZIMMERMAN

Jay Scheib was recently named Best New York Theater Director. Len Rubenstein



"The idea for me was hugely shocking, but when I asked my class if they would go on a one-way mission (to Mars), they all said yes."



In a world of rising noise, composer Keeril Makan is an advocate of silence. Len Rubenstein

THE SONIC ENVIRONMENT

The physical reality of sound is composer Keeril Makan's starting point for examining the mystery of how emotion can be expressed through music. He places the body, hands, and breath at the forefront of the creative process in every one of his critically acclaimed musical pieces.

"My work explores the continuum between noise and purity of sound, between abstraction and references to known ideas or bodies of work, and between the awareness of pulsation, which marks time, and the dissolution of temporality," Makan says.

Winner of a 2012 Guggenheim Fellowship and a 2008 Luciano Berio Rome Prize for his cutting-edge compositions, Makan is a tenured associate professor of music who came to MIT six years ago. Widely respected and highly prolific, he maintains a pop-star's pace: His compositions were performed 53 times in seven countries in one recent year, and he has been an artist-in-residence in the US, France, Germany, and Italy a half-dozen times over 10 years. Makan recorded two full-length CDs, *In Sound* (Tzadik, 2008) and *Target* (Starkland, 2012). *The New Yorker* describes him as an "arrestingly gifted young American composer."

Makan is an advocate of silence as a musician's

tool in a world of rising noise. His composition students start with silence: In one introductory class, they spend 24 hours completely unplugged — no iPods, no netbooks, no apps, no cells, no texts. "It's torture for them," admits Makan, who owns neither a car nor a TV. (He does have a Kindle.) "But the students begin to appreciate the auditory world they live in, and hone their ears. It's like an architecture student sketching a pre-existent building. Through drawing they learn about their way of seeing, and see more than they did at first. For my students, removing their control of their sonic environment teaches them about how they are hearing, or not hearing, what is all around them. And they also learn to hear more than they did at first. It is through creative listening that music comes into being."

When he composes, Makan draws on silent meditation, 25 years of classic training, and his own form of artistic research. "If I'm writing for the oboe, I'll play it in every way I can imagine. I record, listen, write down what I like. It's a constant process of discovery," he says.

Makan uses Finale, a notation program, for experimenting with time and modeling, and a digital audio workstation for analyzing the frequency components of pre-recorded sounds, en route to creating new ones. MIT students,

he says, would master these tools quickly — too quickly. So, after exploring silence, each student designs a "soundwalk," a set of instructions that tells someone where to go, what to listen for and possibly, what to do. One event may be a dripping gutter after a rainstorm; another may be air whistling through an unsealed crevice — any such sound may spark ideas for compositions. And while that "sparking ideas" method isn't initially comfortable for some MIT students, Makan's young composers meet the challenge together. "They openly encourage one another to take risks, to innovate, and to share their work," he says.

Which leads to Makan's second passionate belief — the necessity of physical presence to creative development. The best music education, he says, goes beyond solo experiments, no matter how intriguing, into a collaborative studio space — ideally, one that includes both the faculty professionals and fellow students.

"As music faculty, we are role models. We can show how we approach our own projects, how we work as professionals with commissions, recording, criticism. We can model the balance between solitude and collaboration," Makan says.

~ SARAH WRIGHT

design

CREATIVITY WITHIN CONSTRAINTS

J. Meejin Yoon, an award-winning artist, architect, and designer, is best known for creating large-scale, public art installations — including *White Noise/White Light*, which was featured at the 2004 Athens Olympics and later at MIT's inaugural festivities for President Susan Hockfield.

She is also an associate professor of architecture at MIT and the co-founder of Höweler + Yoon Architecture. In 2005, she won the prestigious Rome Prize for design, an award that thrusts architects and artists onto the world stage. Recently her firm completed a 60,000-square-foot exhibition hall in Chengdu, China, earning the 2011 Annual Design Review Award for cultural buildings from *Architect* magazine.

"I love architecture because it forces a level of creativity within constraints, and I love doing public art installations because you can make your own constraints," she says.

In her public installation work, Yoon uses sound and light to transform public areas. *Light Drift*, for example, draws visitors to the waterfront with an array of glowing orbs. Created for the city of Philadelphia, *Light Drift* was featured at MIT's 150th anniversary Festival of Art, Science, and Technology (FAST), which Yoon curated. The piece invites visitors to sit on orbs arrayed onshore and discover that their actions create patterns of light on a river through wireless communication with a matrix of floating orbs.

The piece is a technological feat, but Yoon's primary interest is not technology. "A lot of interactive art plays up the role of technology," she notes. "However, my interest is in defamiliarizing contexts to create spaces of wonder and new forms of public interaction around them."

In fact, Yoon had no background in computer-aided fabrication or interactive technologies when she began teaching at MIT in 2001. To

become more comfortable, she took an MIT class *How to Make (Almost) Anything*, which proved transformative — introducing her both to the technologies she uses today and to many of the collaborators who help her develop her installations. That's one of the reasons MIT is an ideal place to work in design, she says. "MIT is a special place, because here people still make things...Design is tied to the physical world."

And the physical world presents its own challenges. Yoon had to wait three weeks for the wind speeds to pick up to power *Wind Screen*, an installation of 400 wind-powered LED lanterns that she hung on MIT's Green Building for FAST. "[But] then the wind went crazy and it was perfect," Yoon says. The wind spun each of the microturbine lanterns, and the result was a shimmering curtain of light. "That's what inspires me to keep doing it."

Yoon developed her first light and sound installation for the Athens Olympics after winning an international design competition. "I thought it would be interesting to capture the ephemeral movement of people through a field in this ancient city — to introduce a temporary unfamiliar landscape in a timeless one," she says. She created a responsive field of thin fiber optics that lit up and emitted sound when people passed by, and "imagined it to be very serene."

The reality was quite different — *White Noise/White Light* drew huge crowds and was occupied 24 hours a day. But Yoon discovered she loved watching people interact with the piece trying to guess how it worked. "That's the whole point of my interactive installations. They should get people to talk and interact with each other," she says. "It's about creating an experience."

~ KATHRYN M. O'NEILL



J. Meejin Yoon (left front) created this light and sound installation in Phoenix. Len Rubenstein



Neri Oxman is shown before a prototype for an environmental screen, Fibonacci's Mashrabiya, work inspired by fractal patterns found in nature. Len Rubenstein

NATURAL DESIGN

A native of Haifa, Israel, where “my grandmother’s garden was the world,” Neri Oxman, assistant professor of media arts and sciences, grew up fascinated by nature. She even considered becoming a doctor, but after three years of medical school, she took up architecture.

“There is a productive synthesis between my love of medical science and nature, and the world of synthetic design. I definitely see design as a field where those two brains interact,” says Oxman, whose multidisciplinary background has enabled her to launch a new research area at MIT — material ecology — that merges architecture with engineering, computation, and ecology.

Oxman received an MIT PhD in architecture just two years ago, but her digitally fabricated creations have already been exhibited at the Smithsonian Institution in Washington, D.C., and included in permanent collections at the Centre Pompidou in Paris, and the Museum of Modern Art in New York. For the MoMA exhibit, *Design and the Elastic Mind*, Oxman adapted natural forms from beehives, bone, and butterflies to create objects capable of reacting to light, pressure, and heat — work that could one day lead to environmentally adaptive building materials.

“What is important to me is the design approach, and how we translate principles from the natural to the synthetic world,” she says. The idea of material ecology is to computationally program properties at the macro and micro scale, designing material systems and structures to serve multiple purposes, as they do in nature.

Design is moving into a new “age of biology” — and MIT is leading the way, says Oxman, who founded and heads the Mediated Matter Group at the Media Lab and is the Sony Corporation Career Development Professor of Media Arts and Sciences. “The Media Lab was founded on the ideal of the designer as an experimentalist,” she says. “I can’t think of another place on earth that would support, promote, engage, and encourage the experimental spirit of design and design technology [to the same degree].”

Oxman creates prototype materials and objects using a digital 3-D printing technique of her own invention — variable property printing. Among her explorations are the creation of a therapeutic glove, which provides custom support to individuals with carpal tunnel syndrome by distributing hard and soft materials to suit the patient’s needs and anatomy; a prototype building “skin” that supports

structural load; and the well-known work *Beast*, a reinvention of the chaise longue that provides form-hugging support for the human body.

The classic chaise longue, developed in the 1920s by the modernist Le Corbusier, used metal for structure and leather for comfort. A prototype created in collaboration with Prof. W. Craig Carter of MIT’s Department of Materials Science and Engineering and Objet Ltd., a 3-D printing company, *Beast* employs a single continuous surface both as structure and skin.

“Modern design celebrated the discrete assignment of properties by function” — a by-product of industrialization, Oxman says. Advances in technology have opened new avenues for design. “Today, automating variation is as cheap as stamping out carbon copies. Because of that, we can more effectively mimic nature’s language.”

Will architects one day grow buildings like trees? Oxman has said as much, but admits the concept is more fantasy than literal prediction. “It’s often the stuff of science fiction that determines [our] vision and enables us to realize it,” she says. “But growing buildings is the signature of a design revolution that is coming our way.”

~ KATHRYN M. O’NEILL

visual arts

‘SHIFTING MENTAL SPACES’

Renée Green, an internationally known artist and filmmaker and director of MIT’s Program in Art, Culture + Technology (ACT), describes her career as an “artistic and cultural exploration of what has been done and what can now be made or imagined in a transcultural world.”

Incorporating books, fabrics, photographs, historical objects, audio, video, and other technologies, Green’s work has been surveyed in two solo retrospectives and is in the Museum of Modern Art’s (MoMA) permanent collection. For 25 years, she has received steady critical praise in the US and Europe for her installations, digital media, architecture, and sound-based works, and for her published writing on art, culture, and technology.

In a review of Green’s gallery installation, *Partially Buried Shed* (2000), *The New York Times* praised the multimedia environment as a “surround of still and moving images...shifting mental spaces [that show] individuals contributing to, acting against, and lost within the flux of history.”

In 2010, MoMA commissioned Green to produce a “Media Lounge” — a new space that would give visitors individual

access to the museum’s growing film and video archive and provide MoMA with flexibility to move the Lounge to accommodate large exhibitions or events.

The commission became an “exploration of impermanence — of how people relate to spaces that can be temporarily inhabited,” Green says. “Viewers come and go. The Lounge might end up in a hallway or under the stairs. It’s a migratory system.”

The Lounge looks like a cluster of colorful voting booths, each one equipped with two chairs and an iPad. The moveable booths adapt easily anywhere in the museum, a design that reflects Green’s interest in human adaptation across cultures, time, and place.

FINDING ART IN CULTURAL FLUX

Critics have long praised Green’s individual artworks for their conceptual or philosophical power. But her skill in combining transmedia elements to communicate transcultural experience does not arise from theory: She has lived it, traveling extensively throughout the US, Mexico, and Europe, teaching and producing artworks that delve broadly into materials and ideas that unify multiple perspectives.

Her early works evoked pairs of conflicting

perspectives — colonizer and colonized; black and white; male and female — to be experienced simultaneously.

For *Mise-en-Scène: Commemorative Toile* (1994), Green designed toile, a 17th-century patterned French cloth, as a white background on which pink flowers alternate with pink vignettes of black Haitian revolutionaries hanging French officers. *Toile* installs as a formal parlor with matching chair, lamp, wallpaper, and a shapely female manikin wearing a suit. A visitor to this little stage may feel both attracted to its “civilized” coziness and appalled at its cruel imagery.

In recent years, Green has increasingly designed environments where history, culture, memory, and technology seem utterly fluid. Works now in progress in the MoMA Media Lounge to be developed in phases are: film essays, and editing *Other Planes of There*, a book of her writing on artistic practice, culture, and other topics.

Green came to MIT in 2011. The Institute is “unlike any other place in the world — a research university that specializes in science and has a historic commitment to visual studies,” she says. “It’s an environment that encourages curiosity, empirical testing, and creative exploration.” ~ SARAH WRIGHT

Renée Green is shown before an image from her feature film, *Endless Dreams and Water Between*. Len Rubenstein





IN THE HOLOCENE

Joao Ribas is curator of the List Visual Arts Center. Len Rubenstein

Discussing *In the Holocene*, a recent exhibition at the List Visual Arts Center, curator Joao Ribas invoked Bach's Goldberg Variations, the work of philosophers John Dewey and Paul Feyerabend, poet Paul Valery, and MIT Nobel laureate in physics, Jerome Friedman. This diverse pantheon of thinkers attests to Ribas's longtime fascination "with how art relates to and informs other disciplines." It was a preoccupation which recently was on rich display at the List. *In the Holocene* was an effort, says Ribas, "to bring art and science together in a way that shows what kinds of questions each are concerned with, and how they might complement each other."

The exhibition featured visual art and objects from the late 19th century through current day, along with film and music presentations, all supporting the notion, suggests Ribas, that "art and science share an interest in finding out about the world, in knowledge and observable phenomena, while subject to different logics, principles of reasoning, and conclusions." A few samples of *In the Holocene's* wide range: children's building blocks devised by Friedrich Fröbel (the German educator who invented kindergarten), which illustrate how color, shape, and form all abet learning; and "Aesthetics as a Way of Survival," in which Germaine Kruijff documents the elaborate mating rituals of bowerbirds, whose males construct elaborately and colorfully decorated arbors to attract females. A neon Fibonacci sequence by Mario Merz adorned the exterior of the Center, which also hosted screenings of films depicting an alternative model for life on earth, and performances of Iannis Xenakis's mathematically derived music.

Ribas has a special fondness for the historical convergences of science and art, revealed in such exhibit displays as Georges Vantongerloo's 1940s-era representation of matter and the movement of particles. Ribas notes

that while both science and art might inform each other, and advance by way of disruptive insights, artists are not bound by the methods of scientific experimentation and deploy "a different set of criteria" for investigating such things as matter, time, perception, consciousness, and personhood. Art may function as a "space for a kind of speculative form of science," he says. One example in the exhibit: an original edition of playwright Alfred Jarry's turn-of-century work on "pataphysics," the playful name for a science beyond physics and metaphysics.

In a sense, the entire exhibit worked as speculation, Ribas says, taking its theme from the 1979 Max Frisch novel, *Man in the Holocene*, which chronicles the preservation of present-day artifacts in the face of a world-ending deluge. "We've become the dominant agent on earth, even though our time of occupancy has been so very short...What will the record of human presence look like?" asks Ribas. In the exhibition, artist Trevor Paglen answered this question bleakly: space junk in orbit.

While Ribas hopes *In the Holocene* amply demonstrated the contributions art makes to investigations of the physical and natural world, it was no academic exercise. Rather, Ribas wanted to offer List visitors an experience that resonated, and would spur viewers to "think richly and critically about the relationship between art, science, and technology."

This wasn't a stretch at MIT, he imagines, an "environment in which people are not only at the peak of their curiosity, but also at the passionate center of their own interest in finding out why, or how, or what. That to me describes an artist as much as a scientist, or the brilliant students I've met at my time at the List."

~ LEDA ZIMMERMAN

SPECTRVM

600 Memorial Drive W98-300
Cambridge, MA 02139-4822



Non-Profit Org.
U.S. Postage
PAID
Cambridge, MA
Permit No. 54016

Address Service Requested

spectrvm online

spectrvm.mit.edu



@MIT_Spectrum



facebook.com/Spectrum.MIT

giving online

<http://giving.mit.edu/>

WITH A LITTLE HELP FROM MY FRIENDS



Alex Rigopoulos and Eran Egozy say anyone can feel like a rock star. Len Rubenstein

Eran Egozy '95 admits that as a teen he jumped around on his bed playing an imaginary guitar, pretending he was a rock star.

An electrical engineering and computer science major and a concert-level clarinetist, he met music major Alex Rigopoulos '92 '94 when both were grad students at MIT's Media Lab. Soon after, the pair founded Harmonix Music Systems, a company that in 2005 released *Guitar Hero*, which became one of the hottest music video games of the decade. The game came with a plastic guitar and let anybody pretend to play the lead in a rock band.

"That day the world changed," Egozy says, adding that they were flooded with press requests as the game flew off store shelves. Eventually, sales from the series topped more than \$2 billion. Later, the pair was named by *TIME* among the 100 most influential people in the world.

"Suddenly to be cast in the spotlight after more than 10 years of no one paying attention to what we were doing, it was hard for us to believe it was happening," Rigopoulos says.

Guitar Hero was about just guitar. *Rock Band*, which launched in 2007, was about the whole band — guitar, bass, drums, and vocals right in your own living room.

"Your mind fools you into thinking that you're the one actually playing. That's what makes it so powerful," Egozy says. "You're doing all the actions exactly in sync with the music. When you're playing *The Who* or *The Beatles*, it's those musicians who are actually playing but it feels like you are playing those guitar or drum solos. You actually feel like a rock god."

Egozy's own guitar hero is Paul McCartney and John Lennon. "You can't separate them," he says, adding that when he and Rigopoulos developed *The Beatles: Rock Band*, even Ringo Starr and Paul McCartney played the game and wanted to be involved.

"It was surreal," Rigopoulos says. "Suddenly to collaborate with them was just dumbfounding." Egozy adds: "Can you *imagine*? You feel like you've reached the top. What else is there to do?" ~ LIZ KARAGIANIS