Alumni Features & Awards

Ashar Aziz, '81

Founder, Vice Chairman of the Board, and Chief Strategy Officer
FireEye, Inc.

Growing up in Pakistan, Ashar Aziz at a young age had a goal to be a technologist and an inventor and entrepreneur. When he learned from one of his cousins that MIT was the best engineering school in the world, he decided that would be the best way to reach his goal.

But he didn't actually know how to apply directly to MIT — something that was not common knowledge in his country. "I heard through the grapevine that if you went to a certain school in Turkey [the Middle East Technical University in Ankura, also known as METU], and you did well there, you could transfer to MIT," he said. Fortunately, the information was correct. He applied to METU and went there for two years, transferring finally to MIT in his junior year. Aziz looks back noting about his unusual entry to MIT that it was "a curious journey, but not one that was uncommon in those days."

On completing his SB in 1981 in electrical engineering, Aziz earned an M.S. in computer science from the University of California, Berkeley, where he also received the U.C. Regents Fellowship. He then went to work at Sun Microsystems where, for twelve years, his work focused on networking and network security.

Aziz's first company called Terraspring, Inc., was founded in 1999. A data center automation and virtualization company, Terraspring, Inc. was acquired in 2002 by Sun Microsystems.

Aziz served as Chief Technology Officer until October 2003. Throughout this period he was building patents in the field of cryptography, networking, network security and data center virtualization.

Lessons Learned to Define a New Problem

And, Aziz was setting out to learn from his first startup experience so he could launch into his next. His thinking: "Work backwards from a problem to a novel solution, making the solution easy to deploy and to use, and making it track the problem trajectory much better than existing solutions — making it truly disruptive in the market. These are just some of the lessons I learned during my first startup."

Aziz then began his quest for an interesting and very hard problem to solve — one that the world was going to have to confront. He found the problem description in the U.S. Department of Defense archives — proposals that were soliciting for answers to solve the problem related to highly stealthy self-propagating malware.

"The more I studied the problem, the more I was convinced this would be a defining problem in the 21st century," Aziz says. He also realized on continued examination of this problem, that the fast evolution of the malware threat was going to make all current efforts obsolete.

Aziz determined that the solution was to develop a brand new defensive architecture blueprint. His extensive work culminated in FireEye, Inc. and its product portfolio. "The last 10 years have massively validated the cyber-security problem, the failure of traditional approaches, and the efficacy of the solution I developed!" says Aziz, who founded the company in 2004.

The core of the FireEye platform is a virtual execution engine, complemented by dynamic threat intelligence, to identify and block cyber attacks in real time and across the different stages of an attack life cycle.

Aziz noted in an online interview in 2012: "Our goal is to bolster the security and key infrastructure that is pervasive across financial, government and credit card infrastructure to protect from three very important threats: crime, espionage, and warfare." Aziz noted: "These are not one-off failures in say Google or Juniper or Adobe, it's a systemic fault in enterprise security architecture. The reality is everybody can go down at any point in time, and the majority are [vulnerable]."

Building the Disruptive Technology that works

As Aziz shared with the students in Start6, the IAP workshop for innovators and entrepreneurs held in mid January 2015, finding the disruptive technology that answers a large and growing need makes it possible for even a small startup to gain significant market interest in a short time. As cyber attacks increased and the large incumbent, dominant providers were not coming up with the solutions, the market for a less known

company – but one that could solve the security problems – led to FireEye's recognition and success.

He noted that building the team for a company means finding high-quality talent, which he says is rare. When he built FireEye's team he was fortunate to recruit a technical team that he already knew from his previous startup. What is he looking for in recruiting? "Fire, passion, the desire to make a difference, and not being satisfied with the status quo," he says.

And, he shared with the responsive group of Start6 engineering and management students, advice based on his experience:

"Before you even have an idea, think about how you construct it – backwards – from the problem. Once you have reverse engineered the solution," he continued, "you have to validate it with a potential customer." He cautions that "…it should not be something that represents an incremental change to an existing product – but something out of the box — uniquely addressing the problem in ways that make the solution value proposition significantly better than anything that the incumbent market can offer." From there the job is to get investors. As he puts it, "Raising the money is getting a ticket to the game, but figuring out how to win the game is the most important thing."

He tops off this advice with: "You need to have courage, because when things go wrong, not only will you need to look in the mirror and motivate yourself, you're going to go out there and have to motivate your employees too."

"The last 10 years have massively validated the cyber-security problem, the failure of traditional approaches, and the efficacy of the solution I developed!"

— Ashar Aziz on founding FireEye, Inc.

Robert Blumofe, SM '92, PhD '95

Executive Vice President, Platform Division, Akamai Technologies, Inc.

Robert (Bobby) Blumofe admits that his predecessors did not provide math/science role models. "My father was in charge of production at United Artists and then Director of the American Film Institute West. On the other side, my mother's father was Jack Benny," he notes. But, when his older half brother was an undergraduate at Stanford taking Computer Science courses, Bobby at age 10 picked up programming on his HP calculator and things clicked. Teaching himself Basic, he wrote programs for fun in elementary school. Although he was a tinkerer with radio-controlled airplanes and the like, his programming went on hold until he was an undergraduate at Brown University.

At Brown, Blumofe returned to programming, learning C and more languages, ultimately earning a spot in the graphics research group of Prof. Andreis (Andy) van Dam, the Thomas J. Watson, Jr. University Professor. Blumofe had his first experience with research and writing reasonably large-scale programs and he credits Andy with playing an important role in pointing him in the direction of MIT.

During a year away from Brown, Andy got Bobby a job as a programmer at a local startup in Providence called Cadre Technologies. There, Bobby was taken into the fold, working with the founder, Lou Mazzuchelli and a talented group. "I got a ton of great experience, and I value those friendships to this day," he says. "That turned out to be an amazing experience."

Super-focused on his return to Brown, Blumofe got back into math and theory— including a class taught by Jeff Vitter who taught from manuscripts by Don Knuth for his book *Concrete Math*. Although challenged by this material, with persistence, Bobby gained satisfaction while studying the proofs and solving problems. "There's amazing creativity and elegance in complexity theory and the analysis of algorithms," he notes. He was hooked and continued with theory classes even reading research papers.

On graduating from Brown, Bobby Blumofe was still not set on graduate school or MIT. He could have been happy returning to Cadre Technologies and had little confidence in getting accepted. But, his growing interest in theory and research, was enough to convince him to apply to Stanford and MIT. Accepted to both, Blumofe credits his references, "Clearly Andy van Dam, Jeff Vitter, and Lou Mazzuchelli, wrote some great letters for me, and I'm forever grateful."

What tipped his decision? Blumofe says, "My decision to go to MIT over Stanford was largely driven by what I found in visiting the two. Maybe it was just timing, but at MIT, visiting the theory group, there was an energy, level of activity, and collaboration that I didn't see at Stanford. It was really exciting to think that I could be part of that activity, working with these people, solving problems and writing papers."

Blumofe reflects, "MIT is intense, it's high energy, it's in your face" — not necessarily for everyone — "but more than anything it's the most incredibly talented group of people that I've ever come across."

In fact, he found all these things at MIT and notes that he found it important to balance with another activity—like a hobby or sport. He got into hockey – even though he had never played before — because the theory group had an active intramural team. Tom Cormen, who was just completing his work on the textbook "Introduction to Algorithms" (along with Professor Charles Leiserson), convinced him to start playing.

This turned out to be a good thing, as Blumofe made a number of friendships through hockey — including his now wife Cynthia Breazeal, then a graduate student in the AI Lab. Their friendship blossomed years later and they now have three sons. (Read about Cynthia in this issue, page 74).

He also worked with Charles Leiserson, his advisor as a graduate student in the theory group. He says about him, "Charles is all energy, all enthusiasm, all the time, and I've never met anyone who cares more about the development of his students than Charles. He loves what he does, he loves his colleagues and students, and it shows. When you're working with Charles, it always feels like whatever you're working on is the most important, most impactful, most interesting, and coolest thing that anyone could possibly be working on."

Blumofe notes that Leiserson's attention to detail rubbed off, not only teaching him about research and problem solving, but how to write and present ideas and solutions – skills he uses daily in his professional life — down the road at Akamai Technologies.

Bobby Blumofe joined Akamai in August 1999 when the company was about 10 months old. He says his decision had to do with the people, namely Tom Leighton, Akamai's founder and now CEO and Blumofe's former teacher and reader on his thesis. And, the other people were equal pulls including Charles Leiserson and Bruce Maggs, then VP of Engineering at Akamai. Although he knew Akamai at the time had something to do with large-scale distributed systems, using theory and algorithms to solve large-scale problems, he knew that he wanted to work with this group of people. "I knew that so long as I stayed near these people that great things would happen."

Although he is no longer developing algorithms or proving theorems, Bobby uses the problem solving skills every day as an executive at Akamai. "I learned how to analyze a complex system, find useful abstractions that focus attention on the core elements that drive the system, use those abstractions to develop solutions, and then implement those systems while accounting for all of the non-core elements and real world constraints."

He says that this approach works not only for technical systems for human systems. And, in large-scale systems, the human element is often the most important, so it must be treated as core in order to ensure that the solutions implemented are aligned with the interests and motivations of the people involved.

In fact, Blumofe notes, "If there's been any guiding principle in my career it's that if you surround yourself with great people, then great things will happen, and it's at MIT that I met so many great people." And, applying the same principle, Bobby Blumofe credits his relationships and experiences that got him to MIT — all making it possible for him to be at Akamai, where, he notes "again I'm surrounded by extraordinary, talented people who make my job such a joy."

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>
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Vanu Bose, '87, SM '94, PhD '99

Founder, President and CEO, Vanu, Inc.

Vanu Bose was an MIT child as his father, Amar, was a professor in the Electrical Engineering and Computer Science Department for 45 years, as well as founder of the Bose Corporation in 1964. Every Sunday morning Vanu remembers coming to play badminton with his father and a group of faculty and students – an enduring early vision of what MIT was about. He also has fond memories of the MIT day camp, especially sailing on the Charles River and seeing his father's new office in the brand new, ultra-modern, Building 36.

While at MIT as an undergraduate and then graduate student starting in 1983, Vanu recalls the unique opportunities that he found there to meet and talk to so many famous company founders. "I remember meeting Ken Olsen of DEC, as a grad student when I presented to the EECS Visiting Committee," he notes. His advisor introduced him to the late Teradyne founder, Alex D'Arbeloff, who shared his experiences with Vanu over coffee. Vanu also met Analog Devices Co-Founder and then CEO Ray Stata and was an EECS graduate student with Stata's son Raymie, now CEO of Altiscale. "I think it's a unique part of the MIT experience that there are not only so many great founders around, but that they make themselves accessible," Vanu says.

Creating wireless coverage where it doesn't exist

Vanu Bose founded Vanu, Inc in 1998, pioneering the commercialization of software-defined radio and the first company to receive FCC certification of a software-defined radio in 2004. As CEO of Vanu, Inc., Vanu says about the direction of his company: "We've had to learn the hard way to shift focus from technology to solving customer problems. Our mission is to create solutions for places that don't have good wireless coverage today."

He notes that today's technology works well and is cost effective – where carriers build the coverage. The equipment, however, doesn't get built where it is not cost effective – including inside buildings, in rural areas, in developing areas and on ships. So Vanu, Inc. plies a variety of solutions not just for the communication technology, but also in the business models and power usage to make it viable to provide this coverage.

In a Jan. 29, 2015 interview with Ranjani Saigal for the e-magazine *Lokvani*, Vanu talked about the efforts his company is making to bridge these gaps in wireless coverage in the developing world, in rural areas and world-wide.

Vanu noted that the most common issue in the developing world is lack of power. "If you look at it, there are about 3 billion people in the world today that don't have cellular coverage simply because they don't have electricity." Some areas, he reports, run on up to 4,000 gallons of diesel a year — expensive and environmentally unsound.

So Vanu Inc has developed a compact base station requiring only 50 watts (rather than the traditional 2-3 KW). The product, called Compact RAN and weighing only 12 pounds, is sealed and requires no installation. "At $5,000 per unit, it is the cheapest outdoor base station on the market today," Vanu notes.

Further, for areas in Africa where cell phones are used and need to be charged, this unit— the Compact RAN, in combination with a 20 meter pole specially rigged with solar panels can provide GSM cellular and Wi-Fi hotspot coverage with a cell phone charging station at the base of the pole. "So now, you can charge your cellphone, you can use cellular, and you can access the Internet all from this one little kiosk in the middle of the village," Vanu says.

In the rural US, Vanu says his company has created a business model and network architecture by launching a wholesale network through a subsidiary company. "We don't have subscribers; we're not a carrier. But any carrier can connect to our network and pays us a rate-per-minute and megabyte that's transferred over our network," Vanu said.

In fact, worldwide, Vanu hopes to provide complete coverage in roughly five years. As for developing world impact, he notes to Ranjani Saigal for Lokvani, "I strongly believe that a good business model is needed to make a viable impact that sustains over time." He adds, "Of course it is always nice to see the social impact that comes as a by-product."

Creating Entrepreneurship Opportunities

Vanu Bose has taken an interest in helping MIT EECS students gain more access to entrepreneurship opportunities both through involvement with EECS faculty, serving on the board of the Gordon-MIT Engineering Leadership Program and as a member of the MT Corporation, as well as offering his time as a panelist and moderator for the EECS Department's workshop on entrepreneurship and innovation, Start6. He notes, "Entrepreneurship is by nature a grass roots effort – often during efforts that others think are crazy. In fact," he continues, "if you are doing something that everyone thinks is a good idea, then it's not innovative, it's obvious."

Vanu suggests: "MIT has a great grass roots entrepreneurship community. The MIT Venture Mentoring Service (VMS) is a tremendous resource, as are various student groups and clubs. But, I don't think anyone, at any university, has figured out how to really create a more formal process for fostering entrepreneurship and that is the challenge."

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— Vanu Bose

Cynthia Brezeal, SM '93, ScD '00

Founder and Chief Scientist, Jibo, Inc.

Cynthia Breazeal speaking at the Women in Innovation and Entrepreneurship Networking Reception on January 22 at the MIT Media Lab.
Photo credit: John Gillooly, Professional Event Images, Inc.

At age 10, Cynthia Breazeal, was really inspired and influenced by the movie Star Wars. "I was fascinated by the droids, R2D2 and C3PO." Breazeal felt robots were not only intelligent and capable, but also social and emotive — with rich personalities and capable of forging meaningful relationships with people. "Robots for me should always have intelligence with heart, and they should engage with us like devoted sidekicks, instead of just tools or slaves. Our experience with technology should reinforce what we love about the human experience, not dehumanize us." This is her enduring vision.

When it came time for her to think about her future, she first wanted to be a doctor – typical at that time for girls who were serious about their futures and interested in science. In terms of gender issues, she notes, "I am fortunate that I have not encountered roadblocks on my career path because of my gender. It starts at home," she says, where she was raised with the expectation and confidence that she could do anything that she set her mind to. Both her parents were career scientists.

Being aware of the great job opportunities in STEM-related fields, her parents encouraged her to pursue them. So she worked summers at the Lawrence Livermore National Lab, where her mother worked.

As an undergraduate at the University of California, Santa Barbara, Breazeal realized – with some parental encouragement — that majoring in engineering would keep her options more open than premed. Later, she decided she wanted to be an astronaut – a mission specialist, which meant getting a PhD in a relevant field. Space robotics was a natural choice and she applied for graduate programs accordingly.

At the time that she was accepted to MIT to work in the Artificial Intelligence Lab with Rod Brooks in the early 90s, he had just published his seminal work advocating for small, autonomous micro rovers for planetary exploration — Fast, Cheap and Out of Control: A Robot Invasion of the Solar System. "Rod's ideas

about autonomous microrovers," she notes "were very influential for NASA's sojourner program, which came about in 1997."

Reality hit Breazeal when she arrived at Brooks' AI Lab. "I remember my first day walking into Rod Brooks' lab and seeing all the autonomous robots scurrying about (or not)— all inspired by insect intelligence," she recalls. "It was as if my first moment of watching Star Wars on the big screen came flooding over me all over again. At that moment, I knew that if we were ever going to see real robots like R2D2 and C3PO, it was going to happen in this lab." From that point on, Breazeal didn't want to be an astronaut; she wanted to make the dream of her childhood, robots a reality.

Rod Brooks' support ranged from intellectual and creative freedom to credit that helped build her reputation in the field – even while she was a graduate student. "Rod is the one who taught me how to be a thought leader and a visionary," she notes. He told her that no matter how big the field, people get stuck in a rut – making the same assumptions. He recommended: "Find that rut, change yourself and change it, and create a new movement" — which she is doing with Social Robotics.

In fact, she credits Rod Brooks for his support of the women in his group. When she first joined his group, women actually outnumbered the men. "Few people know what a strong proponent Rod has been to women in the field. Look at the women leaders in robotics today — many were either Rod's former students, or students of his students," she notes.

Breazeal also credits Anita Flynn, who was a staff research scientist in Rod's lab when she first joined the group. Breazeal describes her as one of the most high energy, positive thinking, creative, tech-savvy people she knows. She says "For [Anita], robotics was a 'family sport' — everyone pitches in, everyone helps everyone else because that's what a family does." Breazeal has emulated her positive impact by setting the same culture in her own group the Personal Robotics Group in the MIT Media Lab where she is Associate Professor.

At the time of this writing, Breazeal is on professional leave from MIT, and is founder and Chief Scientist at her new company Jibo, Inc. The company is dedicated to bringing social robots to the mass consumer market. Toward that goal, they are developing the first open social robotics platform and the world's first family robot named Jibo. In fact, as she gave the keynote for the first Women in Innovation and Entrepreneurship networking reception held in connection with Start6, the EECS IAP workshop for entrepreneurs and innovators, she announced that she had just closed a series A funding of $25.3 million (the press announcement was the day before on Jan. 21, 2015) for her company. "The world will be a better place with more women entrepreneurs," she shared to an enthusiastic group.

She says, "Jibo is the 'meta' of my work at MIT and of the field of Social Robotics." Her insight is that while most people think of robots doing physical things, her research and labs worldwide have shown that social robots are a powerful technology for human engagement — making greater emotional and social impact than current flat-screened, gadget, data-driven technologies. In creating Jibo (and most likely successors) she believes that people will be open to a technology that engages them in a humanized way; that this will exert a real and positive impact on human behavior and performance.

"The provocative thing," she says, "is that research in my lab and others around the world is showing that people can actually learn better with social robots, adhere to a behavior change protocol better, feel greater psychological involvement and empathy via telepresence, etc."

Breazeal, who is also the mother of three boys and married to Robert Blumofe (see page 70), relates her perspective on the growth of social robotics.

"The dream of robots has been with us for a very, very long time. Think of our myths and legends. Then think of the evolution of ancient automata. The digital computer was invented in the 1930s, and in 1950 Alan Turing wrote his seminal article "Computing Machinery and Intelligence" — where he argued for robots! It is a long and profound human quest. We've been dreaming about, building and iterating on the dream of robots longer than computers, smartphones, the Internet…because robots speak to the philosophical question: 'what does it mean to be human?' We have a connection to robots unlike any other technology."

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— Cynthia Breazeal

Mike Evans, '99, MEng '00

Co-Founder and COO, GrubHub Seamless; blogger, writer

Mike Evans has known about MIT for a long time — since his older brother applied to MIT when he (Mike) was in the sixth grade. "I distinctly remember sitting in the back seat of our car listening to my mother talking to him about it. She said, 'If you go to MIT, you can do anything in the world.'" Growing up, Evans noticed that MIT was often part of movies he watched and in science fiction books. Once on campus, he was fascinated by the idea of combining disciplines from the impressive number of top-rated programs – such as the interface of mechanical and electrical engineering and computer science.

Evans' MIT "light bulb moment" hit in a Science, Technology, and Society class. He realized, "Never before, in the history of humanity, has a single individual been so in control of the means of creating value as a software developer in 1997." The heady idea that he could bring ideas all the way to market entirely based on his own skills and efforts came to him during the dotcom boom. And, in his last semester when he studied acoustics with Dr. Amar Bose, the final sequence of lectures that focused on the financial engineering behind the Bose Corporation became for Evans an inspiring reality check in successful management.

In 1998 and 99, Evans notes, almost the entire campus was thinking about entrepreneurship. The 50k competition had just launched, at the AI lab, Akamai had just been founded and the Media Lab was just getting going. "There was a lot of entrepreneurial energy. Rather than making a big course correction, however, the Institute treated this as the newest incarnation of a long history of innovation. Engagement looked much like it had for years: individual professor and individual students meeting in an ecosystem that encourages experimentation and risk-taking."

After graduating Mike worked for three years as a software developer — as the dotcom bubble burst. While his technical skills developed, he fed his craving to understand how management in a larger company handled its employees. He saw how his boss, who valued and protected his people, created an effective team dynamic. Evans also noticed how HR worked to limit liability rather than maximize employee potential.

All the while, his engineering mind kept asking, "Can this be done better? How would I break the challenges of

creating a culture into smaller pieces and tackle them individually?" This thinking was supported by an engineering lesson he had learned: a key principle of engineering is questioning things that have always been done that way.

Also during this stretch, Evans says, his actual hunger such as ordering pizza downtown began to bug him. He was coding late at night and wanted to order food online. He wondered why it could be featured in the movie The Net in 1995, but not exist in 2004? So MIT-trained in the art of "all-nighters", he wrote the first version of GrubHub. The following morning, his co-founder Matt Maloney sold a restaurant and by that afternoon, Evans had quit his job. By day 10, they had signed up eight restaurants. When a restaurant owner asked Evans if they had coupons on the site, he said yes… and proceeded to pull another all-nighter to write the coupon functionality, signing up two more restaurants with the coupons the following morning.

He notes, "Today, this methodology is called the "Lean Startup" movement." At the time, he just thought of it as an engineering problem to be solved: Step 1: Build a product., Step 2: Sell it. Step 3: Profit.

Evans and Maloney bootstrapped their business for three years before taking venture capital. When they did take VC, they took it as much to learn from institutional investors as to finance the growth of the company. Evans says about this time: "Each stage of growth brought challenges, and each round of VC brought new expertise to help us meet those challenges. Internally, we added

experts in fields I had never encountered before: sales, marketing, operations, and customer service. I learned as much from our employees as I did from our investors."

From the first day Evans and Maloney were solving challenging problems at GrubHub. Each solution led to another opportunity to create a better discover, ordering, and fulfillment opportunity. Sometimes they used technology, other times process optimization, still other times education of restaurants and customers. Each innovation represented change, but throughout all of that change one thing remained constant: making delivery better for the customer.

Following the GrubHub IPO in spring 2014, Evans decided to hand over the company reigns. This was a time, he describes, as critical to centering himself following the intensity of the previous 10 years at GrubHub. It was also a time he used to figure out what would come next.

Although he says he totally failed at that goal — more like letting it gel — he did splash his bicycle tire in the Atlantic (at Virginia Beach) and ride 4,500 miles across the country reaching the Pacific 75 days later. He describes this journey and more on his blog: http://mikeevans.co/.

He said for this feature, "I succeeded in an unexpected way: I discovered that people are amazing. Across 4,500 miles, and over a thousand interactions with people on my trip, I overwhelmingly experienced kindness, graciousness, and generosity." In a characteristic engineer's approach he notes that "if the 24 hour news cycle was representative of how people actually act, we'd be watching 23 hours and 58 minutes of acts of kindness, with 2 minutes of all the other garbage."

Besides listing himself as writer and photographer, Mike Evans has decided to write a science fiction novel. He notes that there is a good chance that MIT will be mentioned in there somewhere. [We're on the waiting list Mike!]

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>
> *— Mike Evans*

Mike Evans dipping his bicycle in the Atlantic (at Virginia Beach) and 4,500 miles later on day 75, in the Pacific, at Florence, Oregon.

Yoky Matsuoka, SM '95, PhD '98

Pursuing a serial curiosity while improving people's lives

Yoky Matsuoka has always liked math and physics, but, she says, "...those interests were dwarfed by my pursuit to be a professional tennis player." Since her earlier years in her native Japan and then in California by age 16, she loved tennis. Spending about 30 hours per week training, she realized two things: "I didn't know much else besides tennis and my career as a high-earning top tennis player was not going to be a reality [due in part to injuries]."

That's when she thought she could study robotics since she loves math and physics. She would build herself a tennis buddy. "It needed to have two legs, a torso, two arms and a head." And, that was not all, "It needed to run around on the other side of the tennis court and play physical and mental games against me," she says.

Admitting that she was never interested in computer science—though she liked problem solving—she realized computer science might be another tool to help in her quest to build a robotic tennis partner. So she went to UC Berkeley where she worked with robotics professors Ron Fearing and John Canny. Working in both of their labs she got a feel for robotics and even worked with a graduate student to build a robotic leg.

On graduating from UC Berkeley in 1993, with a BS in Electrical Engineering and Computer Science, Matsuoka had decided that pursuing her dream to build a sophisticated robot to play tennis with would require much more education. She applied to four schools considered tops in robotics at the time — MIT, CMU, Stanford and UC Berkeley — getting accepted by them all. She fell in love with the ambitious humanoid project at MIT led by Professor Rodney Brooks. "It was a good combination of physical embodiment with mechanical systems and neural/cognitive coding with electrical/computer engineering," she explains. She got her SM working with Brooks on the development of a humanoid hand.

"What kept me at MIT?" she asks. "One of the best things about MIT was that I was able to pursue my 'serial' curiosity."

As she worked with Rod Brooks on robotics and neural networks, she realized that artificial intelligence would not allow her to achieve human-level intelligence – still part of her quest to create a robotic tennis player. "I realized we don't even understand how our brain controls movements to play tennis," she says. So she looked around for the best research groups in the world to study how the human brain controls movements. She found it just two blocks away (in building E25) – where Professor Emilio Bizzi, then chair of the MIT Department of Brain and Cognitive Sciences was conducting research in this area. She settled in and completed her PhD – but not without getting very curious as well about entrepreneurship and business in general. Although she recognized then that the best place to study technical entrepreneurship was another block away from E25, she was dissuaded by Boston's (winter) weather.

Matsuoka has recognized since she was a young girl that she's pretty intense. "My lab had a motto that was 'work hard, play hard.' And, that's what I did." She let her curiosity and intensity drive her — but at the same time she felt the need to hide her intensity towards academic endeavors — to avoid being perceived as a nerd, or worse.

At MIT, Matsuoka found that she could be herself. "This is the place where I met people who are all trying to learn beyond any boundaries." she says. And, the MIT culture allowed her to come out of her shell.

Over the years Matsuoka's drive and curiosity has carried her through many careers. Developing the microcode for the Barrett Hand as chief engineer at Barrett Technology in 1996, she moved on to academia, first as an assistant professor at Carnegie Mellon. By 2006, as an associate professor of Computer Science and Engineering at the University of Washington, she directed the Center for Sensorimotor Neural Engineering — an effort that brought hundreds of people and large financial support to achieve interdisciplinary research that wouldn't have been possible otherwise. In 2007 Matsuoka was named a MacArthur Fellow with the citation [top right]:

"Her work transforms our understanding of how the central nervous system coordinates musculoskeletal action and of how robotic technology can enhance the mobility of people with manipulation disabilities."

By 2009, recognizing the need to see her energy and learning put to practical use in people's lives, Matsuoka turned to industry, first to become one of the three founding members of Google X, where she worked with the early Google Glass team and developed Google X's portfolio in medical space. In late 2010, Matsuoka then moved on to become VP of Technology at Palo-Alto-based, and Google-owned Nest Labs, where she led the development of the company's first product, the Nest Learning Thermostat.

She says about this phase of her work: "This trust of technology is a risky thing. Nest asked for people to trust us and let us into their homes, to make their lives better. And, it is working." The work saved over 2 billion kWh with these devices while letting people carry on with their lives. She discusses this work in a Technology Review video, in which she describes the ying-yang relationship between human learning and machine learning. "I absolutely believe that the combination of them makes humans whole," she said. See her discussion at: http://www.technologyreview.com/emtech/14/video/watch/yoky-matsuoka-internet-of-things/

Recognizing her evolutionary career path, Matsuoka notes: "I have never left a position because I was unhappy — I always had to make a choice between something exciting and another thing that's exciting. Life is short and there are a lot of people's lives I want to improve because of things I can contribute in a way that's different from others. And there is a lot to do."

Matsuoka is also raising four children – with her husband who is a computer vision specialist. She notes, "Raising four children makes me realize how lucky I am and what's really important every single day." She says it makes her use her time productively so she can be with them and, as she notes, "...learning from them how to live and who I am (expressed through genetics that I could never articulate for myself)."

"This [MIT] is the place where I met people who are all trying to learn beyond any boundaries."

— Yoky Matsuoka

Jaime Teevan, PhD '07

Senior Researcher, Microsoft Research in Context, Learning and User Experience for Search Group

Jaime Teevan is a Senior Researcher at Microsoft Research in the Context, Learning, and User Experience for Search Group, an Affiliate Assistant Professor in the Information School at the University of Washington, and a graduate of the MIT EECS Department. She enjoys doing research because she thrives on exploring open-ended unanswered questions. She says, "One trait that I have found advantageous is a willingness to jump headfirst into things — be it starting a new line of research or helping my son publish a book."

When Teevan decided to attend MIT for her graduate work, she chose the school because she "connected at a gut level with the quirky, adventurous, smart people she met when visiting" – including the faculty, graduate students, and her future advisor David Karger. These connections grew while she was at school, with her advisor playing a particularly important part in her graduate experience. "David provided an excellent model of how to tackle hard problems with his supernatural ability to ask deep, insightful questions when presented with something new."

Teevan is also a mother of four boys (ages 6 to 10), three of whom were born while she was at MIT. She appreciates the support that Karger, the lab and MIT provided, and believes this allowed her to establish a pattern for combining work and family that has become routine for her as her children grow. Her oldest, Griffin, attended daycare in the Stata Center, where she joined him for lunch every day. When the two of them visited MIT last year, they were thrilled that his teacher, Diana, recognized him with a huge welcome.

Teevan is known for her integration of parenting with a research career that includes a lot of travel. "My children force me to allocate my time productively, prioritize sleep, and approach problems creatively," she says, and "escaping" to the office sometimes gives her an out from "the noise, mud and chaos at home." She has written several articles about traveling with children to conferences and worked with conference organizers to provide additional assistance for attendees who are also parents.

Teevan admits that having children while in graduate school made her experience somewhat unusual. As she wrote her thesis, she says her twins kept her company "in utero". Though on bed rest by the time of

her defense, her doctor gave the ok to go ahead. The defense went well, but she is pretty sure the questions were limited so she could get back to bed. She notes that during the time between the births of her first child and the twins, MIT became one of the first graduate programs to implement a maternity leave policy.

To support women pursuing top-level careers in computer science, Teevan urges institutions "to create diverse paths to excellence while rewarding long-term outcomes and seeking broad representation." She suggests that institutions study and address the challenges women face, build opportunities for women to contribute and support environments where everyone is heard. And she suggests her own mantra for women and men who want to do big things in computer science: "Relentlessly pursue the problems you find interesting. Be brave, jump at opportunities and then see them through."

Teevan was one of MIT Technology Review's TR35 in 2009 for her work in improving personal search results based on personal search histories. She developed the first algorithm used by Bing to personalize search result ranking and is still actively doing research to push the field forward. "As our ability to capture online behavioral data expands, so does the opportunity to create tailored information experiences," she says.

Although web searchers expect search engines to return results instantaneously, Teevan is interested in figuring out how to support search tasks that extend over time. She knows this will take a carefully designed approach, as research suggests that people perceive results that are delivered quickly as higher quality and more engaging than those delivered more slowly.

"People already engage in slower, in-depth search experiences when they do things like ask questions of their social networks," she says. (See her 2012 TEDx talk on question asking. https://www.youtube.com/watch?v=-gZ-FD-HzxQ). She wants to slow down the search experience to allow searchers to take the necessary time to learn as they search, gather information from multiple sources and explore tangents. "During this process," she notes, "high quality, personally relevant information can be identified via algorithms that are slower than traditional search engines." A general overview of the work she is doing in this space can be found in this CACM article (http://aka.ms/slowsearch).

In fact, Teevan believes we are in the middle of a revolution in how people perform information work. "Research shows that concrete plans with actionable steps enable people to complete their tasks better and faster," she says. In her work, a new way has been devised to algorithmically break complex tasks into microtasks that take as little as a few seconds each. By breaking information tasks down, Teevan explains, it becomes possible to pull out the repeatable subcomponents from these tasks to be performed by the task owner (i.e., selfsourcing) or the crowd (i.e., crowdsourcing).

The transformation of information work into microwork will change when and how people work, Teevan notes, enabling individuals and automated processes to efficiently complete tasks that currently seem challenging. A summary of Teevan's current research focused on supporting this transition can be found in this co-authored article (http://aka.ms/selfsource).

In 2014, Jaime Teevan received the Anita Borg Early Career Award. Reflecting on the award, she says, "We spend almost all of our time in research looking into the future. I am always thinking about what I want to figure out next or what I want to help make happen. Receiving this award encouraged me to also pause and reflect a little on the past. It was surprising to realize that I actually have already accomplished a lot, and it makes me even more excited to keep pushing forward."

Read more on her blog: http://slowsearching.blogspot.com/

Jaime Teevan's sons aged 6 - 10, from left, Dillon, Cale, Griffin and Brier. Information on Griffin's book can be seen at: http://slowsearching.blogspot.com/2013/05/making-mara-kan-ways.html

"My children force me to allocate my time productively, prioritize sleep, and approach problems creatively."

— *Jaime Teevan*

Some Alumni Awards and Recognition

Three EECS alumni were selected for the **2014 Technology Review's TR35** list of 35 innovators under 35. These three were selected in the category of inventor.
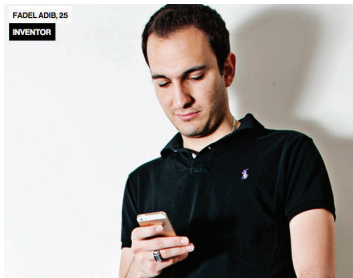
Fadel Adib, SM '13 and currently a PhD student in CSAIL designs and develops wireless technologies that can see through walls, track human motion, and monitor human's vital signs by relying purely on wireless signal reflections.
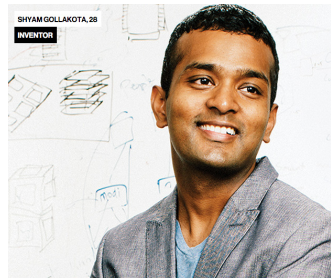
Shyamnath Gollakota, PhD '12 and University of Washington professor, was honored for his research using RF as a human gesture detector and his innovative work on ambient back-scatter.

David He, SM '08, PhD '13, cofounder and the Chief Scientific Officer of Quanttus, where he is working on new ways for wearable sensors, algorithms, and data insights to transform personal health, specifically heart health. He was also named for *Forbes' 30 under 30* in 2015.
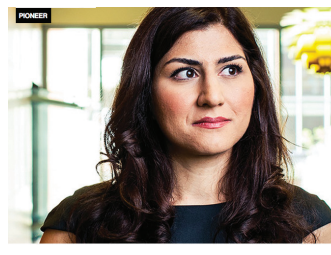
Maryam Shanechi, SM '06, PhD '11, is part of the Obama Brain Initiative, working at University of Southern California to build a closed-loop system to revolutionize treatments for neuropsychiatric disorders, such as PTSD and depression.

On Oct. 8, 2014, Advanced Micro Devices, one of the world's biggest chip-design companies appointed **Lisa Su**, '91 SB, SM, PhD '94, as its president and chief executive officer. She is the first female to head the 45 year old company and the latest female top executive at a major Silicon Valley tech company. Now in her third year with AMD, Su told VentureBeat that as CEO her focus is to build the right products and look at opportunities to streamline and improve AMD's business operations. Prior to her work with AMD, Su worked first at Texas Instruments and then at IBM (for 13 years since 1995), where she advanced quickly as an executive, starting Emerging Products that focused on low-power and broadband semconductors as well as biochips. In 2007, Su worked as senior vice president and general manager for Networking and Multimedia at Freescale Semiconductor, Inc.

Alumni elected to the National Academy of Engineering in 2015:

Thomas M. Jahns '73, SM '74, PhD '78, Grainger Professor of Power Electronics and Electrical Machines, and professor of electrical and computer engineering, University of Wisconsin, Madison. For advancement of permanent magnet machines and drives for transportation and industrial applications.

Radia Perlman '88, PhD, fellow at EMC Corporation, Hopkinton, Mass. For contributions to Internet routing and bridging protocols.

Harry Van Trees, ScD '61, professor emeritus and director emeritus, Center of Excellence in Command, Control, Communications, Computing, and Intelligence, George Mason University, Fairfax, Va. For contributions to detection, estimation, and modulation theory and leadership of defense communication systems.

Please share your awards and recognition news! Send to the alumni updates contact form at: www.eecs.mit.edu/people/alumni/alumni-please-share-your-news