



**WILES**  
MAGAZINE'S  
**2014**  
**HOT LIST**

# Elizabeth Croft

MECHANICAL ENGINEERING, ROBOTICS



"I believe, and research shows, that diversity matters – and leads to better teams and better solutions," said Elizabeth Croft, a tenure professor at the University of British Columbia who specializes in robotics.

Croft's research in robotic behavior reaches towards bettering the future by constructing the "robot assistant of the future."



"My research investigates how robotic systems can behave and be perceived to behave, in a safe, predictable, and helpful manner," she said. "Applications of this work range from manufacturing assembly to healthcare and assistive technology."

In 2010, Croft founded Westcoast Women in Engineering, Science and Technology (WWEST) that she said was started with the intent to "attract, recruit, and retain women in engineering and science careers."

WWEST's pursuit is to engage and increase the participation of women in science, engineering and technology (SET) thorough national, regional and local levels. Their initiatives spread towards "multilateral partnerships spanning community, academic, and private sector partners."

# Nermin Fawzi Sa'd

FREELANCE ENGINEER AND SENIOR MECHANICAL  
ENGINEER AND CEO FOUNDER OF HANDASIYAT.NET



Nermin Fawzi Sa'd is a freelance engineer and it's through her experiences in the Kingdom of Saudi Arabia (KSA) that she found her true calling.

"My freelance experience in KSA was an-eye opener and indeed a-life changing step," said the University of Jordan graduate about the country where she spent 12 years in.



Secretary of State John Kerry, Malaysian Prime Minister Najib Razak, and U.S. Commerce Secretary Penny Pritzker

Her time in KSA inspired her to start her own company, Handasiyat.net, through which she supports Arab females in engineering fields by allowing the opportunity for "Arab Female Engineers to use their qualifications since men are dominant in this field and women are restricted with different kind of social rules," said Fawzi Sa'd.

Handasiyat, meaning "things related to engineering" and "at" referring to women in Arabic, is a virtual Engineering Company setup that aims to offer engineering support services that don't require "presence at the office via a customized remote platform," said Fawzi Sa'd.

“I discovered that there are lots of Female Engineers who find it difficult to work outside their homes,” she said.

“Handasiyat is an engineering spring for Arab Female Engineers who can use their qualifications flexibly working efficiently from their own homes with their own terms.

Fawzi Sa’d’s father, a mechanical engineer, inspired her to pursue her career in engineering.

“My whole life I just wanted to be like my father,” she said. “I didn’t consider the gender as a barrier to be like him. My mother always taught me to have very high goals and then set a plan to reach those goals. That’s what I exactly did.”

Fawzi Sa’d used the best of her

circumstances to produce the success that she’s created today.

“After graduation, I got married and I went with my husband to Saudi Arabia where I was not allowed to work as an engineer in companies. This was the first time that I felt that my gender as a barrier,” she said.

Her passions continued to evolve, so she used the resources around her including: her husband, the Internet and her phone to contact engineering firms to work with them virtually.

“Now after fourteen years,” said Fawzi Sa’d, “I have built a very good base of customers in Saudi Arabia where I have participated in designing many projects with many reputable companies.



Prince AbdulAziz

One of the most challenging aspects is a man’s perspective towards a woman’s capabilities and qualifications.”

This gender diminishing regard presses the females to work harder, said Fawzi Sa’d. She even created her company’s slogan to be, “Do It Right From the First Time.”

Fawzi Sa’d’s advice to women pursuing a career in engineering is to “don’t wait to be empowered and discovered,” she said. “Start by empowering yourself.” Her secrets to achieving success in a male dominated field are simple. The first step is to do and submit the best of the best. “The results will always be positive,” promised Fawzi Sa’d.

Secondly, she said, “Don’t compete with men! Don’t do the perfect work just to prove that you’re better than men or that you’re willing to do things that men do. Just do your best to be the best of you!”

# Alexandra Boltasseva

ELECTRICAL ENGINEER



“Physics was my first love,” said Alexandra Boltassava of her established career working with plasmonics, focusing on the interaction between electromagnetic field and free electrons in metal, and nanophotonics, light manipulation at a nanoscale level. She received her Ph.D. in electrical engineering from the Technical University of Denmark and is now an assistant professor at Purdue University teaching Electrical and Computer Engineering.



“In my work we change the way we see and use light and develop devices that impact everyday lives, from solar batteries and medical test systems to smart phones,” she said. Boltasseva grew up educated by her father’s stories of the Big Bang and the theory of multiple universes. These stories encouraged her to seek out the science of it all herself. In her childhood eyes, the “mystic world” of her father’s “colorful resistors and oscilloscopes seemed so enchanting.” There was one pinnacle moment when she knew she would be pursuing a career in science and engineering: the Olympics in physics during her school years “I never felt out of place in my male dominated research community,” she said. “Here, men and women are not from different planets and we speak the same language. It’s not about being a male or a female, it’s about passion for science of light.”

# Heather Knight

ELECTRICAL ENGINEER AND SOCIAL ROBOTICIST



Heather Knight is the robot whisperer. She knows how they function, how they perform with the tasks they're set to do and how to make them appear more humane. It's her job.

As a social roboticist, Knight designs a robots' behavior system to match the way humans communicate with each other. This includes: posture, the timing of motion, speech and the reaction to other people. She creates the simple human day-to-day activities that often go unnoticed, but yet are important to perfecting robots' interactions.

"The benefit of such systems is that they enable bystanders and interaction partners to understand and interact with robots without prior training," Knight she wrote in her article titled "**How Humans Respond**

**to Robots.**" "This opens up new applications for embodied machines in our everyday lives—for example, guiding us to the right product at Home Depot."

Heather Knight has been working with robotics for the past 12 years, through which she has accomplished robotics and instrumentation at NASA's Jet Propulsion Laboratory, interactive installations with Syyn Labs (including the award winning "This too shall pass" Rube Goldberg Machine music video with OK GO), field applications

field applications and sensor design at Aldebaran Robotics. Knight is an alumnus from the Personal Robots Group at the MIT Media Lab and a PhD candidate at Carnegie Mellon. However recently, she's much more. She's the founder of the annual Robot Film Festival, a one-off Cyborg Cabaret and Marilyn Monrobot Labs in New York City, which performs comedic entertainment by Data the Robot.

"I've been particularly exploring how acting and theater methodology might be able to

bootstrap our development of charismatic machines," she said. "Along that path I've created a robot comedian that's gone on tour, started a Robot Film Festival that just completed its 4th edition, and published research papers in international robotics conferences.

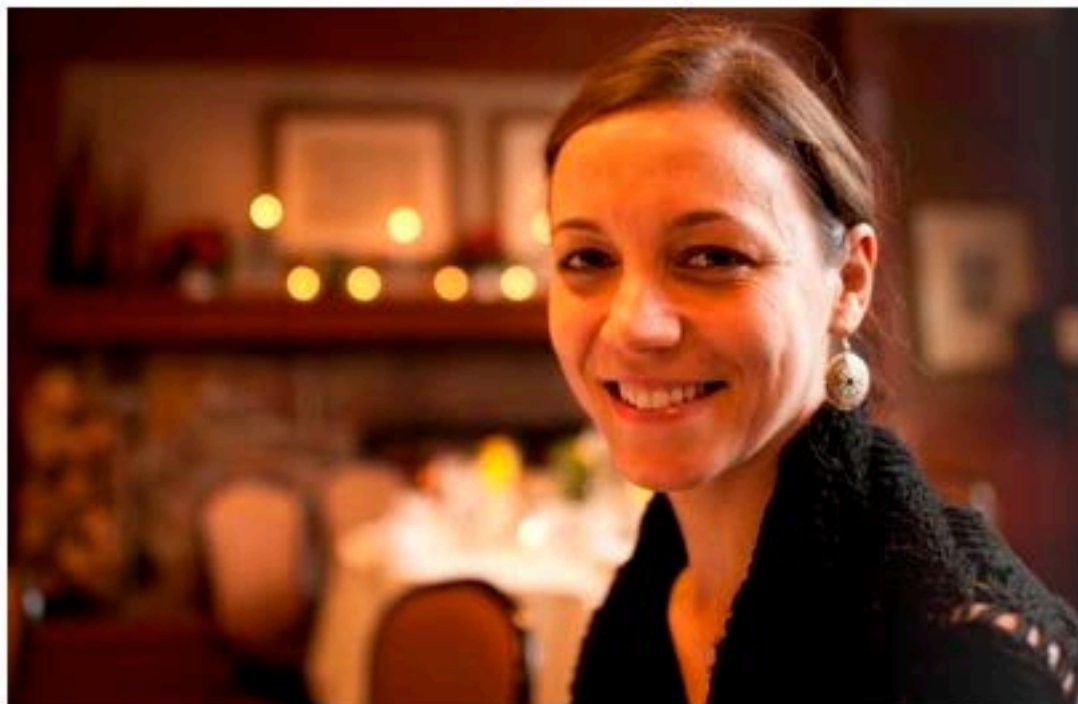
Her passion for robotics started from childhood when she'd watch her father build and create. "I always idolized my dad as a child and I loved making things from stories, to piles of leaves to clay sculptures," she said.



To Knight, working in a male-dominated field isn't an obstacle at all, it's her comfort zone. "I feel very comfortable working with a lot of guys, but at the same time, there are so many fantastic women in robotics these days, more and more each year. It's important to have mentors, be a mentor, to share one's experiences. There's a joke that men make robots because they're jealous that they can't have children. I guess women make robots because they're awesome."

# Maya Cakmak

MECHANICAL ENGINEERING, ROBOTICS



Maya Cakmak has her doctorate from Georgia Tech in Robotics and she knows exactly what she plans to do with her robots: change the world of human quality care. Although her pursuits can't directly compare with the empathy and care humans can provide, she's working on developing robots that can help with ordinary everyday tasks.

"Just like Rosie the robot from the Jetsons," said Cakmak. "Such robots can empower older adults to age in place, give independence to people with physical disabilities, and improve the quality of our lives."

However, Cakmak said that it's hard to prepare a robot for every particular user and the environment the robot is placed. Instead of preparing a robot for consumers as a whole, she personalizes each robot to each user.

"So the users would, for instance, take the robot home and give it a tour of the house, tell it how they want things organized and teach it how to use different tools," said Cakmak. "This is something that skilled roboticists can do today by writing and modifying complex software; my students and I work on making it possible for everyday people to do the same through intuitive interfaces and natural interactions with the robot."

"I deeply hope that my work will impact the lives of individuals with physical and mobility impairments," said Cakmak. "By allowing anyone to program robots, I believe that my research can bring independence to thousands of users with unique disabilities and needs."

Working with robots has its adventures, excitements and thrill, but there's something that means more to Cakmak: inspiring young women in computer science and robotics.





"The best thing about my job is the opportunity to show young women that they can do it too and inspire them to pursue a career in computer science and robotics," said Cakmak. She had parents and teachers who encouraged her to pursue her own path, but she says that there's stereotypes about women in engineering that often deter American women from pursuing that field. Her objective is to push young women beyond that mindset. "Young women in US can have misconceptions about the stereotype of "someone who would be good at robotics" and doubt their own abilities," said Cakmak, "even though their first reaction is always "robots are cool!" So my challenge is often in helping them overcome this intimidation and creating a culture of encouragement and support among both genders."

# Missy Cummings

AERONAUTICAL/AEROSPACE ENGINEER



When it comes to professionally and successfully rising in a male dominated field, Missy Cummings is its reigning queen. She's opportunely worked her "entire professional career," as she said, in male-dominated worlds, which include her time in the United States Naval Academy, her position as one of the Navy's first female pilot and the assistant program manager at a Navy industrial engineering plant.

“My motivation in starting the laboratory came from experience as one of the US Navy’s first female fighter pilots,” said Cummings. “While I technically flew the F/A-18 Hornet fighter/bomber, the computer did the bulk of the work and I realized that within a short period of time, I would be out of a job since the computer could fly either as well, or better, than me. So that is why I went back to school to become a researcher in this area.”



Sometimes it can be very frustrating,” admitted Cummings about working in male-dominated fields. “Women who are willing to step up and be leaders are still often stereotyped as bossy and pushy. However, my entire career shows that women really can achieve amazing heights, even in the face of adversity.”

As the current Director of Duke University’s Humans and Autonomy Laboratory (HAL), Cumming’s research is focused on the “multifaceted interactions of human and computer decision-making in complex automated sociotechnical system,” she said. “Autonomous systems today, and even more so in the future, require coordination and teamwork for mutual support between humans and machines for both improved system safety and performance.”

Cumming’s research is bridging our world into a new age. It’s bringing a world of human and computer decision making as one. “The goal of HAL is to identify ways in which humans and computers can leverage the strengths of the other to achieve superior decisions together,” said Cummings.

# Deborah Grubbe

CHEMICAL ENGINEERING



“My profession gives people mobility, information, housing, clothing and food,” said Deborah Grubbe about her extensive career as a chemical engineer. This field brought her to a 27-year run at the American chemical company DuPont, the multi-national oil and gas company BP and a former board membership on

19 NASA’s Aerospace Safety Advisory Panel.

Grubbe is currently the President and Owner, Operations & Safety Solutions, LLC., a consulting firm that offers strategies, operational safety improvements and guidance towards their of chemical, oil and gas, and aerospace companies.

“I partner with oil and gas companies all around the world – to help them reduce the chances and the effects of explosions, fires, spills and injuries,” said Grubbe.

It was after her positions that took her all over the world, that Grubbe finally decided to start her own business. Work done

through her company includes: working with “the US Army to demilitarize the US Chemical Weapons stockpile, with the US Department of Defense to reduce non-combat-related deaths, with the Canadian National Energy Board to improve oil transport safety, and with NASA to help keep our astronauts safe,” said Grubbe.

Grubbe proves that her work as an engineer does indeed have its impact on the world. “Engineers improve the quality of life for many, and my business supports keeping employees safer while they work. It’s been a wild ride,

# Ira Kemelmacher-Shlizerman

COMPUTER SCIENCE ENGINEERING



Think of that computer software that takes an image of a baby or child and ages them to 10, 20 or even 50 years beyond their age. This technology, a face modeling technique, is not only accurate, but can be utilized to find missing children.



This revolutionary software was developed by Ira Kemelmacher-Shlizerman's, an Assistant Professor in the Department of Computer Science & Engineering from the University of Washington, and her team.

Dr. Kemelmacher-Shlizerman's research seems simple, but it's more intricate than it appears. She studies billions of photos taken from the Internet and enables the "universal modeling of human faces and revolutionize face modeling applications in science, engineering, and commerce," she said.

Her research takes many forms through which she is able to use computational tools that model, visualize and analyze the photo collections.

# Evelina Ögren

FOUNDER OF FEMALE LEADER ENGINEER



The chosen career path of being a successful female engineer with strong potential capabilities does not go unnoticed. Female Leader Engineer prides themselves on awarding female engineering students attending the KTH Royal Institute of Technology in Stockholm, Sweden for their excellence in problem solving and management with people.

Evelina Ögren is one of the founding members of Female Leader Engineer and an engineer at KTH. She is a graduate of KTH and is a Future Female Leader awardee herself.

The Future Female Leader Award is one way that Ögren encourages young female engineers. She and other awardees fought to keep the award alive after it was announced that the award would no longer be given.

Ögren is an advocate for encouraging females to reach beyond the male stereotype within engineering fields and to follow their passions. “I would say that one thing you notice is that many informal networks are male dominated or male only,” she said. “Men have the senior positions and those positions are assigned mainly through contact. On the other hand, if you do a great job you are very visible in the company, as one of only a few women.”

"We believe that while most of the reports and studies show a positive trend regarding women in leadership positions, it is clear that the pace of development is too slow and that there is still a large difference between being a man or a woman in business," said Ögren.

She continued saying, "The need for further work was the driving force behind founding the non-profit association Female Leader Engineer and launch the award of the same name. The association is run by winners and finalists from the former FFLA award."

Female Leader Engineer's main priority is to increase the number of women in "senior positions in business, make female engineers visible as role models in leadership and identify high-performing female students for leadership roles in the future," said Ögren.

It's clear that although the number of existing female engineers is slim, the need, desire and initiative to encourage women to pursue fields outside of their stereotype still exists. In fact, it's one the highest priorities.

# Dr. Beth Holloway

MECHANICAL ENGINEER



"Did you know that only 14% of engineers in the United States today are women," asked Dr. Beth Holloway as she spoke on March 7, 2014 at TEDxPurdueU, Purdue's self organized event that is intended to produce an experience similar to TED talks.

“Women like me aren’t exactly a common occurrence,” she continued. Holloway is a rarity in her field of mechanical engineering, but being one of the few women in her field hasn’t held her back. She worked for nine years as a research and development engineer at Cummins Inc., and is a past president of the Women in Engineering Programs and Advocates Network (WEPAN) who serve by using research-based strategies to advance and educate women in engineering. Holloway is currently the director of the

Women in Engineering Program (WIEP) at Purdue University where she received her B.S and M.S in Mechanical Engineering and her PhD in Engineering Education. WIEP is dedicated towards encouraging pre-college girls and current Purdue students to explore, discover and grow in their interest in engineering fields.

Holloway’s own interest in engineering sparked from a question she asked her father at a young age, as she told through a story in her TEDx Talk.

“Dad, what is an engineer?” she asked.

“His response was, ‘I have no idea,’” she said. She continued his words saying, “But I do know this, if you want to make decisions about what gets made, how it gets made, who it gets made for or what it looks like, you have to be an engineer.”

“I thought, cool,” said Holloway, “Engineering is how out I get my ideas out in the world.”