

What an idea!

From two 12-year-olds to a 54-year-old farmer, to a 40-year-old Computer Engineer who has created a portable device to detect breast cancer quickly, this year, the speakers at the TEDxGateway in Mumbai were all about how some ideas make a generation. SHALINI SAKSENA speaks with some of these innovation-speakers to bring you a report



Wonder cancer detection

A portable device to detect breast cancer? While the idea may have sounded far-fetched given the other devices used to detect the disease, one man proved that ideas can change the medical world.

Forty-year-old Mihir Shah who belongs to a Gujarati Jain family, grew up in Mumbai and migrated to the US in 1996 to pursue BS in Computer Engineering at Drexel University in Philadelphia tells you that the work on the device came after his company, UE Life Sciences, received a major grant (\$878,000) from the Pennsylvania Department of Health to develop a working and validated iBreastExam commercial prototype.

“To date, we’ve received over \$1.6 million in grant funding to develop, commercialise and scale-up device. We’ve also raised \$4.2 million from Dr Ranjan Pai’s Aarin Capital, Kiran Mazumdar Shaw and Unitus Ventures. Our total capitalisation has been over \$6 million,” Shah, who comes from a humble background, says.

“We were never a particularly wealthy family, but my father Bakulesh Shah invested family savings and took on loans to get me through higher education and was the first investor in every entrepreneurial endeavour I’ve pursued. I’ve spent my adulthood in the US since the age of 18. I’m 40 now and live near Philadelphia with my wife and two children,” says Shah, adding that he is yet to recover the cost that has gone into making the device.

The device is an innovative, US FDA-cleared breast examination device that’s enabling early detection of breast cancer in a new way.

It is a tiny device that fits in the palm of hand to provide painless, radiation-free, clinically effective and highly affordable way to identify small lumps in the breast before it’s too late. Over 1,75,000 women have taken the test already in over 12 countries and it is recognised by WHO as an Innovative Health Technology.

The device works by assessing tissue



THE DEVICE WORKS BY ASSESSING TISSUE ELASTICITY. THE CERAMIC SENSOR CAN SENSE THE TISSUE ELASTICITY BY CONVERTING MECHANICAL PRESSURE INTO ELECTRICAL SIGNALS AND BY EVALUATING THE CHANGES IN STIFFNESS, IN REAL-TIME, TO PROVIDE THE RESULTS INSTANTLY ON THE SPOT

elasticity in real time. The patented ceramic sensor in the device can sense the tissue elasticity by converting mechanical pressure into electrical signals and by evaluating the changes in stiffness, in real-time, to provide the results instantly on the spot. The innovative sensors can assess tissue

elasticity in real time. Tumours are harder than normal breast tissue and the sensors in the device can “feel” them out, quickly and without any pain or radiation.

The idea came when Shah with his partners Matt Campisi and Bhaumik Sanghvi saw that many of their friends and family members got diagnosed with breast cancer. “Matt and I have seen our mothers-in-law go through it. One of the key inventors of the device is a breast cancer survivor. This is an extremely personal mission for many of us. Our research showed that breast cancer is highly treatable when diagnosed early and yet most women get diagnosed late in the developing world. We further learnt that this happens because there aren’t enough doctors, breast cancer control programmes built with mammography are very expensive and women really don’t want to get painful and radiation-based tests,” Shah says. The device is not just battery-operated but fully wireless as well.

While there were one too many challenges while developing the device – from building a passionate global team, engineering failures, transferring technology from the US to India while maintaining quality and performance, getting US FDA clearance, clinical validations around the world and obviously funding, what was easy for Shah and his team was to convince women to get themselves checked.

“We have taken the device to women in urban, sub-urban, rural and even tribal areas across India. I’ve been to Gadchiroli where majority of the population is tribal. We didn’t have to convince women to check themselves. All we’ve had to do is educate them about the device and the need for early detection. The fact that it is painless, radiation-free, easy, quick and provides instant results, most women elect to take the test on their own will,” Shah says. He tells you that the cost of the device stands at ₹5 lakh. But his company also offers pay-per-use and leasing models.

Harvest of a fertile shift

Dnyaneshwar Bodke from Maan Gaon in Mulshi Taluka district of Pune may just be another farmer who tills his land but there is nothing ordinary about how he goes about it. Since 1999, he has been practising organic farming for direct home delivery.

The idea to shift to organic farming took shape after he watched his father incurring loss year after year. “My father would suffer a loss worth ₹10,000-₹15,000 a year, so much so that we had to sell our land to pay off the loan. As luck would have it, I read about a farmer’s success story of doing organic farming. I went to meet him and decided to take the organic route,” Bodke says.

He did face some problems. In order to convince other farmers, he experimented on his land. His friends made fun of him. He used compost and cow manure as fertiliser. Much to his delight he made a profit. This inspired other farmers. Today, within a 17 km radius, there are 305 members in his Abhinav Farmers Club.

“In the last 20 years, we have formed a group of 50 members. Thrice a week on Tuesday, Thursday and Sunday, we do home delivery through a pack house facility of 1000 sq feet. Here, all the produce from the farmers comes and on the designated days home delivery is done between 3 pm and 7 pm,” Bodke tells you.

At the warehouse, women are employed to do the packing. They are paid ₹300 for



four-five hours’ of work. The leaders are paid ₹1,200. A total of 1.5 lakh women are employed by his club to work on home delivery

Transportation proved to be a problem as they had to depend on service providers. Bodke encouraged people who didn’t have land to invest in a tempo. These people are paid ₹1 per kg. If they transport 1000 kg, they earn ₹1,000. But they needed more tempos. The club needed their own means of transportation. A proposal was made to the Government which gave the club a subsidy of ₹2 lakh to buy each tempo costing ₹4 lakh. Today, they have 11 tempos.

“Every month, the marketing team decides who will

sow what — be it milk, fruit or veggies. In order to meet the customer demand, the farmers have to produce a fixed produce of 50 kg a day. But if there is a shortage, we do pick up produce from farmers who are not our members,” Bodke says. They have hired a firm in Pune that does the marketing for them.

The success story of the club spread and farmers from Telangana, Madhya Pradesh, Rajasthan, Gujarat and Andhra Pradesh soon joined it. To convince farmers to go back to traditional farming, they are invited to the farm where they are demonstrated how they too can make a profit. “We tell farmers that there is no need to commit suicide. Must follow

the tradition and one will make profit. The problem in India is that farming is taught by people who know nothing about it. Far in should be taught by farmers themselves not by people who have no connect with land,” Bodke, the president of his club, says. He keeps in touch with 357 regional leaders via WhatsApp.

His technique is simple. If a person has an acre of land means 40,000 sq feet land. This is divided into four sections. One part is converted into a poly-house. The aim is to give the farmer a source of income even if there are climate variations. A five-metre high structure is made using polythene and green net. The one-time cost of the house is ₹7 lakh. The Government gives a 50 per cent subsidy here too. The poly-house guarantees a steady income of ₹1,000 a day. “The second piece of land is dedicated to growing tomato, gourd and cucumber. The third we grow cabbage and cauliflower. In the fourth — 8,000 sq feet, we grow green coriander and spring onion. Around 1,000 sq feet has to be dedicated to storage. The remaining has to house at least one cow,” he says.

“In this sense, we are commercial. We keep cows that give milk. We also sell *gau-mutra*. There are other advantages too. The farmer sells milk. This way, he is guaranteed an income of ₹800-₹1000 a day. If a farmer wants to be part of our club, he has to agree to mixed cropping and keeping a cow,” Bodke says.

Young & happening minds make headlines

Haaziq Kazi, a 12-year-old student of Class VII with the Indus International School, Pune, may be busy studying for exams but that doesn’t keep him away from the TEDx Club in school where the students are encouraged to talk about issues close to them. In one of these sessions, students were shown a documentary on how the ocean waste problem was affecting marine life.

One day, on his back home from school, an idea struck — to make a device that would help clean the oceans of plastic waste. The inspiration came when he was washing his hands. He watched the water go down the drain and that is when he knew that he could use centripetal force and that the same could be applied in the oceans to clean up the plastic. But he decided to first experiment in the bathtub using his toys. His idea worked.

So much so, that he was called to give a TED Talk in New York. A year later, TEDx called. And now he is once again set to give a talk at the 10th edition of TEDxGateway at the Dome, NSCI, Mumbai.

His talks concentrate on how his device can be used to clean up the oceans, create awareness among people and how they too can make a difference. He often narrates horrific stories that include how the waste that we dump in oceans is eaten by the fish.

“People eat seafood. So the cycle is complete — we dump waste in the

ocean and it gets dumped back in us,” says Kazi who has had a lot of support from his parents but it is his father who is his go-to person when he gets stuck.

“Of course my teachers helped a lot as well. But my father is the one who helps me the most. He helps me with the talks that I give. I make a draft but he is the one who makes the edits. He also helps me connect with engineers globally and help me with my research,” Kazi tells you. He loves to read, play video games and football and to back the team that is winning.

However, he is not sure what area to pursue since he wants to be an IT person like his father but wants to do research in marine biology or even coding as well.

“I like science as a subject — I enjoy Physics and Chemistry because of experiments; Math is good too but I make silly mistakes. Though I like music, I play the piano, but hate the way it is taught in school,” Kazi says.

He opines that he is too modest to say that he is better than most 12-year-olds that too in his favourite subject English.

Meanwhile, another 12-year-old is making waves on another continent altogether. This Grade VIII student from Denver, Colorado, Gitanjali Rao, recently won the Discovery Education 3M Young Scientist Challenge for her low-cost device which can detect lead contamination in water.



Haaziq Kazi



Gitanjali Rao

The idea to make the device took root when she learnt about Flint and was introduced to the concept of contaminated water in Stem sessions where children are introduced to the wonderful world of water.

During these sessions, Rao realised that water contamination is a huge problem and access to clean water is an issue even though she was privileged to live in a place where water was clean.

“My initial idea was completely eliminating lead, but slowly as I researched the problem thoroughly, I realised that detection is an issue since people did not know that they are exposed to lead and do not know to notify authorities,” she tells you. Gitanjali is curious to know how things work and that is why she chose to study lead contamination.

“Lead contamination is a growing problem. It is prevalent in many countries but people have no way of detecting it themselves. We all have the right to know our water quality just like we would like to know about our health,” Rao tells you whose hobbies include playing the piano and baking. She loves Computer Science, Language Arts, Math and Science subjects because it covers broader concepts that can be applied for any real-world solution.

To create a device to detect lead in water, she had help from Dr Kathleen Shafer and Dr Selene Hernandez-Ruiz who guided her with different aspects of

the device. Despite having two great guides, Rao did face some problems.

“I faced problems in making a low-cost device which everybody could use. The main problem was that I needed to find a safe lab to perform tests with carbon nano-tubes which were the most sensitive and efficient technology to use, and also inexpensive as well. I tried writing emails to many experts and professors requesting space in their lab for a day, but no one obliged. Finally, I got the opportunity to do simulation tests at my school and further accuracy tests on Denver water,” Rao says.

She tells you that, at present, at the R&D stage the device costs around ₹1,300 with disposable cartridges of ₹30. But she is not satisfied and wants to bring the cost down to ₹300 with cartridges at around ₹10.

“Research towards working on this is on track,” Rao says. She wants to be a geneticist and study in the field of epigenetics which is using gene editing techniques such as CRISPR-cas9 to cure diseases and opines that the biggest problem facing the world is a combination of issues related to contamination of natural resources and climate change.

Geetanjali also tells you that since she has been introduced to different cultures and different parts of the world by her parents, it doesn’t matter where her work or her job takes her.

“I would definitely be open to working in India if it fits my passion and goal,” Rao says.