

NEWSMAKER: NIMMI RAMANUJAM | DIRECTOR | CENTER FOR GLOBAL WOMEN'S HEALTH TECHNOLOGIES

Engineered creativity

Her low-cost diagnostic device could transform women's health in poor countries, but the engineer says she drew on her musical skills for inspiration too

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Nimmi Ramanujam, professor of biomedical engineering and global health at Duke Global Health Institute, is an innovator, teacher and an entrepreneur. But much more than that bare-bones CV, she is a woman with a mission — to develop practical, effective and affordable technologies for women's health.

That quest now brings the Indian-origin American into contact with India. She has designed a low-cost colposcope (an instrument used for screening cervical cancer) that has been recently tested at the All India Institute of Medical Sciences (AIIMS).

In India's resource-starved health landscape, this is a big deal. Data shows that 80 to 85 per cent of the deaths from cervical cancer are reported from low- and middle-income countries principally for lack of or poor diagnosis. In India, it is the second most common form of cancer among women. Yet, this is one of the few cancers that can be treated easily if diagnosed early. But doing so is out of the reach of most women in countries like India. The device Ramanujam has designed costs around \$500 (₹35,000 or so) compared to a conventional colposcope, which costs roughly around \$15,000 (₹100,000 or more).

For Ramanujam, there is as much an element of serendipity as of science embedded in this device. That's because, far from engineering, Ramanujam had imagined a career in music. As a child growing up in Malaysia, she was introduced to the *veena* by her mother.

"I was really good at this

ILLUSTRATION: AJAY MOHANTY

instrument," Ramanujam says in a profile piece published on her university website. "I was performing on the radio. I was performing on the road! I never read music, ever. I could listen and recreate pieces—that's how I learned from my mother."

But she also owes her career in engineering to her mother. It was she who insisted that her daughter took up engineering, and Ramanujam, now in her fifties, eventually channelled her creative energy into technology, graduating from the University of Texas, in Austin.

Not that the musical impulse was buried. Later, as a mother herself, she took up the piano. In her

interview, Ramanujam says that she sees reflections of her approach to music in her engineering practice.

"One could be just training your mind to solve problems in different

ways, another could be the meditative experience of focussing on the music and nothing else, another could be the joy and sense of fulfilment of listening to the music I've created," she is quoted as saying in the piece.

Ramanujam, director of the Center for Global Women's Health Technologies,

a partnership between the Pratt School of Engineering and the Duke Global Health Institute, and her team have been working since 2012 in developing and testing the

portable colposcope called the "pocket colposcope". The aim was to increase access to cervical cancer screening in primary care settings. In early 2017, around 20 of these devices were produced to be distributed to international partners.

AIIMS has recently completed trials of Ramanujam's pocket colposcope. Dr Neerja Bhatla, professor of gynaecology at AIIMS, who conducted the trials, sounded elated with the results. "The images taken are of very good quality and is perhaps even better than a conventional colposcope. It is ideal for use in district hospitals from where the healthcare professional can transmit the images to a remote location if needed for a trained gynaecologist to evaluate them," Bhatla says.

What's more is the portable nature of the device makes it easy to store and carry. The device is designed like a tampon, which is connected to a screen. Once inserted into the patient's body (in the manner a tampon is inserted), it projects the images it sees onto a screen.

Bhatla feels that with the government's focus on improving access to breast and cervical cancer screenings at district levels, the pocket colposcope is likely to play a key role in India.

Globally, an estimated 500,000 new cases of cervical cancer are reported annually and it is considered as the fourth most common cancer in women. Bhatla says that in 2018 in India 62,000 deaths occurred due to cervical cancer and around 96,000 new cases were reported.

The Human Papilloma Virus is the most common cause of cervical cancer and is associated with almost 80 per cent cervical cancer cases. However, not all HPV infections lead to cancer. There is a vaccine available for HPV. Large portions of our population are not covered by it and effective early screening is perhaps the best bet to fight the disease. Ramanujam's innovation could represent a great leap forward for women's health in India.

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