

Innovating for billions

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The Emerging Worlds innovation lab in Mumbai is a home away from home for MIT graduate students (l-r) Alicia Chong, Mrinal Mohit, Tristan Swedish, and Shantanu Sinha. Credit: Shriya Parekh

Every 12 years, Nashik, India is the site of the Kumbh Mela, a religious

festival that draws crowds in excess of 20 million to the sacred Godavari River. During this one-month period, Nashik—a mid-sized agricultural center without an airport—temporarily becomes one of the largest cities in the world.

How can a city's infrastructure cope with this sudden influx of pilgrims, and the demands for food, water, shelter, and safety they bring with them? And how can communities worldwide become more resilient and livable? These kinds of questions drive Associate Professor Ramesh Raskar, a native of Nashik, and his Camera Culture group at the MIT Media Lab.

With support from the MIT Tata Center for Technology and Design, Raskar's group is forging a new co-innovation model linking researchers at MIT with energetic students in India to work on problems across key fields such as health care, education, and the environment. They are using Nashik as a proving ground for solutions that can work at massive scale, under the umbrella of an initiative called Emerging Worlds.

This January, the Camera Culture group traveled to Nashik to host a week-long innovation camp, where they mentored teams of students who had traveled from all around India to participate.

"The real world of innovation is not in Boston," Raskar said at the camp's opening session. "You have to get out in the world, collaborate, and apply research. For innovators, Nashik is a perfect starting point."

No one knows this better than Shantanu Sinha, who attended a camp in 2013, when he was an undergraduate at the Indian Institute of Technology Bombay. Now, he's a master's student at MIT and a fellow in the Tata Center. He says that during these camps, they are looking for two things: interesting problems and interesting people.

"We think of these camps as a way to find exciting problem statements and vet solutions in the field," he says. "It's also a way to recruit talented people to work with us long-term."

That's what makes the Emerging Worlds model different from hackathons, incubators, and accelerators, according to Raskar. It goes far beyond the one-week camps; there are now three permanent innovation centers in India (Hyderabad, Mumbai, and the new DISQ Innovation Centre in Nashik) where teams of young researchers collaborate with their colleagues 8,000 miles away at MIT.

Raskar says the new Nashik center will "provide a readymade pilot site for many MIT and non-MIT projects. This way, researchers don't spend unnecessary time finding stakeholders and scheduling meetings. It all happens in an integrated ecosystem."

"The motivation for building these centers, from our point of view, is that we need constant support in India," says Anshuman Das, a postdoc in the Media Lab and Tata Center. "We can't just come twice a year and hope to make a difference. Our efforts need to go on all year."

Collaborating across continents

"Startups, incubators, and entrepreneurship may not be the only venture model for India," Raskar says. He sees co-innovation between universities, governments, and the private sector as a promising avenue for tackling complex challenges.

"Ramesh says innovation is all about people," says Tata Fellow Tristan Swedish, a master's student in the Media Lab. "It's so great to talk to diverse people and understand what their ideas are."

One of Camera Culture's focus areas is affordable, high-impact health

technologies. Innovations like these look to fill the gap for underserved communities in India where primary care doctors and specialists are not readily available. These tools hope to aid frontline health care workers and allow people to screen for diseases at early stages.

Sinha and Swedish's work focuses on early diagnosis of the conditions that cause preventable blindness. Sinha is developing an easy-to-use ocular imaging device to enable out-of-clinic examination of the anterior segment of the eye on a large scale. Swedish is developing a new class of user-centric retinal imaging systems inspired by computational photography and machine learning.

The co-innovation model has made it easier for them to iterate through designs. Working with the LV Prasad Eye Institute in Hyderabad, they are able to confer with doctors on the needs of the patients and design devices based on their input. Pushyami Rachapudi, a master's student at International Institute of Information Technology Hyderabad, has worked with the team since January 2015, and is instrumental in transitioning ideas into clinic-ready devices that have the potential to be deployed through LV Prasad's network.

Raskar's success with the [EyeNetra](#), a mobile eye-test device developed in collaboration with LV Prasad, helped spawn this model.

"Moving from the initial idea to an device is really difficult, so we need someone on the ground who can provide us the right context and design parameters," says Swedish, noting that the Hyderabad and Cambridge labs are in daily communication.

Rachapudi even did a six-month internship at the Media Lab. "We thought it would be a great opportunity to learn from her," Sinha says.

Meanwhile, Das and Tata Fellows Mrinal Mohit and Guy Satat are

exploring a similar approach to ear, skin, and oral imaging, with help from their collaborators in Mumbai.

"It's very efficient to do a lot of research at MIT, where we have great facilities," Mohit says. "Once we nail that down, the collaborations we have in India help us validate the technology."

This method allows Camera Culture to have a fast-moving, iterative prototyping process, with diverse teams of engineers, software developers, and designers working literally around the clock on opposite sides of the globe.

"I am a maker and I love to build things," says Akshat Wahi, who works at the center in Mumbai. "MIT Emerging Worlds gave me an opportunity apply my skills in new ways that I hadn't imagined before."

Wahi and others like him have forgone the chance to earn higher salaries at big corporations, opting to join Emerging Worlds instead. Das attributes it to their desire to "do something bigger than just a job."

Sai Sri Sathya, a software engineer, left Microsoft to join the effort in Mumbai. "The impact I could create at Microsoft was much less than what I can do for Emerging Worlds."

Raskar is hoping that impact will eventually reach billions of people—starting with his hometown.

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