# Tracking patients' progress with radio signals and machine learning

Novartis researchers leverage in-house startup initiative to begin digital technology research collaboration.

By Elizabeth Dougherty | Jan 29, 2018

In 2016, Jason Laramie attended a talk at the Massachusetts Institute of Technology (MIT) about a device that can see through walls. It can detect people, track their movement and breathing, and even see their hearts beating.

Laramie, an Executive Director in Translational Medicine at the Novartis Institutes for BioMedical Research (NIBR), was taken aback. He wasn't alone. "An audible buzz rippled through the auditorium when they showed a person's heartbeat detected wirelessly from across the room," he says.

Laramie saw a potential for the technology to be used in clinical trials to continuously assess the health of patients. Like other researchers at Novartis, Laramie is always on the lookout for new digital technologies that can be harnessed for drug discovery and development. He also had a line on funding he could use to explore this potential through a new in-house program at Novartis called Genesis Labs, which aims to give researchers the support they need to explore high-risk but possibly high-reward new ideas.

What Laramie saw in the MIT device was its capacity to make it easier for patients to participate in clinical trials by reducing the number of times they need to be examined by a physician. It could also modernize the way scientists assess whether or not an experimental drug is working.

"We want to figure out how to use this technology in our trials," says Laramie. "Wireless monitoring has the potential to help us measure a number of health indicators passively at home, which could reduce the burden on the patients who participate in our trials."

When Laramie explained his idea to the system's inventors, MIT professor Dina Katabi and her team at MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) in the US, they immediately recognized the value of collaboration. Katabi's team has the technological expertise, but Novartis understands drug development. "They were interested in thinking about how to change the way clinical trials are done," she says. "It's a great match in terms of thinking big."

## From idea to action

Conversations like the one between Laramie and Katabi happen frequently, but the excitement often fades when the participants return to their offices. Right around the time of this conversation, however, NIBR announced Genesis Labs.

The initiative called on all employees to bring forward big ideas for improving the work of drug discovery and development. Employees with the most innovative ideas would be given time, space and funding to develop their idea in-house, like a startup with venture capital. Digital drug discovery and development projects like Laramie's are of particular interest.

“We wanted to create a place where people could free themselves from their day jobs and immerse themselves in their own ideas,” says Ian Hunt, leader of NIBR’s Genesis Labs initiative. “Genesis Labs is a space for exploring high-risk, but potentially high-reward disruptive concepts.”

Laramie applied for Genesis funding to do the research required to learn more about how Katabi’s technology could be used in a clinical trial. The technology consists of a device, about the size of a wireless router, which mounts on the wall of a living space. It transmits radio waves similar to but less powerful than Wi-Fi signals throughout the space, covering about 1 500 square feet (140 square meters).

> Wireless monitoring shows us what people do in their day-to-day environment. Free-range people. Not people in artificial situations.
>
> **Ronenn Roubenoff**, Head of Translational Medicine for Musculoskeletal Diseases at NIBR

The signals bounce off of walls, chairs and people, and ricochet back to the device, where antennae pick them up and feed them into a computer. The computer estimates locations of objects and differentiates things that don’t move, such as walls and chairs, from things that do, such as people and pets. The computer then uses customized machine learning algorithms that mimic learning in the human brain to extract important signals, such as human breathing, heartbeats, movement and sleep patterns.

“What’s really cool about these wireless signals is that they are a way to reach the human body without actual physical touch,” says Katabi.

## Free-range people, quantified

Current measures of a patient’s ability to move around aren’t so hands-off. Patients enrolled in clinical trials related to mobility must travel periodically to a clinic to take a six-minute walk test. A doctor observes with a stopwatch as the patient walks the halls.

Because patients in trials of drugs designed to influence mobility are often elderly, frail or chronically ill, the experience can be stressful. Further, if the patient is taking a drug designed to make him or her stronger, breathe easier, or move more freely, the test provides a limited window into those changes.

“Wireless monitoring shows us what people do in their day-to-day environment,” says Ronenn Roubenoff, Head of Translational Medicine for Musculoskeletal Diseases at NIBR. “Free-range people. Not people in artificial situations.”

In practice, the system will be used only with the informed consent of the patient and the health indicators collected are protected by medical confidentiality restrictions.

Laramie’s Genesis Labs proposal to use MIT’s wireless monitoring in clinical trials was among five selected to receive funding. Work has since begun to test and develop the technology over the coming 18 months.

Meanwhile, the Genesis Labs team will soon make another call out to Novartis employees to bring forward the next round of proposals, with particular emphasis on ideas that involve external collaboration.

“Genesis brought together two very different technology spaces in this project, with internal and external investigators who have very different questions in their minds,” says Hunt. “That, along with an entrepreneurial spirit, makes these projects incredibly fertile.”

*Main image: Jason Laramie and computer scientist Dina Katabi have big ideas about how digital technologies could reshape medicine. Photo by PJ Kaszas.*

Learn how Novartis researchers are harnessing wireless technology to improve clinical research.

## Research careers at Novartis

The Novartis Institutes for BioMedical Research (NIBR) is the innovation engine of Novartis.

Learn more

---

**Source URL:** *https://prod1.novartis.com/stories/tracking-patients-progress-radio-signals-and-machine-learning*

**List of links present in page**

1. https://prod1.novartis.com/stories/tracking-patients-progress-radio-signals-and-machine-learning
2. https://prod1.novartis.com/tags/category/discovery
3. https://prod1.novartis.com/tags/authors/elizabeth-dougherty
4. https://prod1.novartis.com/research-and-development