

FORBES INSIGHTS

CAN A FITNESS TRACKER SAVE YOUR LIFE?



A generation ago, the idea of walking around with biometric sensors strapped to your wrists, feeding health data to server farms thousands of miles away, would have been met with skepticism.

Today, those sensors are ubiquitous. The market for smartwatches and fitness trackers is expected to near \$30 billion by 2023. This year marks a milestone in the category's short history: the 10th anniversary of Fitbit's commercial tracker, which has since spawned a family of sophisticated wearables that today each contain up to eight sensors and monitor dozens of metrics. And what started as a fitness brand is now beginning to shoot its roots into healthcare; today, Fitbit trackers are integrated into insurance plans and doctor-patient relationships. Physicians have used them to guide emergency responses in the aftermath of seizures, and the company is testing features that could one day help its 27.6 million active users detect early signs of diabetes, heart disease and other life-threatening conditions.

What makes wearable trackers ripe for a healthcare expansion is their almost incomprehensible database of heartbeats, sleeping hours and steps counted. Fitbit used to talk about how many times its users had walked to the moon. "Then that number became too big, so we shifted to talking about going to the sun," says Eric Friedman, who cofounded Fitbit in 2007 and serves as its CTO. "Then it was Pluto, but then that got controversial because — is Pluto even a planet?"

Today, with 175 trillion steps and counting, Fitbit has left the solar system. But its mission is still grounded on Earth. "Data is great at making the invisible visible," says Friedman. "But it's really about how well we can drive behavioral change."

Alongside those trillions of steps, Fitbit counts 9 billion nights of sleep, 600 trillion heartbeats and troves of data around softer measures of human behavior. And the potential of that data — especially in the realm of healthcare — is just now coming to light.

HOW TO HACK A HUMAN

Before it can change a user's behavior, Fitbit has to figure out what that person is already doing. And that's more complicated than it sounds.

Consider step-counting, the most basic feature of any tracker. While the accelerometer inside a Fitbit can generate a reliable movement log, it can't explain exactly what caused that movement. People walking with limps or canes, as it turns out, move similarly to people on city buses. "People assume counting steps is easy," says Friedman. "And on any one person, it is, but on large groups of people, it becomes difficult."

By plugging increasingly granular information into Fitbit's brain, Friedman and his team continue to make their trackers better at reflecting the real world. "We go, 'Oh, this looks like it's an outlier. Do we need to retrain our algorithm, or is this person actually behaving differently?'" he says. It's built on a process he calls "guided machine learning," which uses human experts to make judgment calls on irregularities that the computers detect. The exercise becomes more complicated when you start looking at data coming off of multiple sensors at once. Sleep detection, for instance, relies on both the accelerometer and the photoplethysmogram (PPG) sensor, which is used to measure heart rate.

When Friedman and cofounder James Park launched Fitbit, it was early days for connected devices, and their vision was to apply cloud-based data aggregation to a simple accelerometer. The goal back then, says Friedman, was the same as it is today: to change human behavior. That's largely what drives the decisions around what data to gather, analyze and present on the Fitbit app: What information will people act on? So while some Fitbit trackers measure peripheral capillary oxygen saturation (O₂ in the blood), the user never sees those numbers. Instead, she sees the insights they drive — like her cardio score.

Based on those insights, users also receive actionable suggestions, or "nudges," that depend on Fitbit's ability to tap into not just user movement but also the psychology behind it. When the data team analyzed how people were moving, it found three daily spikes: one for the morning work commute, one at lunchtime and one for the commute

FITBIT BY THE NUMBERS

2-3 PM:

The most sedentary hour in America

25 MIN:

On average, women sleep almost half an hour longer than men do per night.

MAY:

The most active month

TEACHERS:

America's most active professionals, taking an average of 12,141 daily steps.



home. But as the engineers layered in more data, they started noticing smaller spikes throughout the day. “It was unintuitive,” says Friedman. “We assumed more data would smooth things out, but instead we were seeing pronounced spikes on the hour.”

Those little spikes represented on-the-hour meetings and appointments, and the engineers realized that across wide groups of users, life is highly predictable. Fitbit began testing hourly movement nudges, encouraging people to take a few more steps before the hour was over. The nudge that out-nudged them all was built around an hourly 250-step quota and pops up 10 minutes before the hour to remind users exactly how far they have to go to reach their goal. The number is different every time, which makes it hard to tune out, and the goal is relatively small, which makes it realistic.

When the feature rolled out, Fitbit could actually see people moving more throughout the day. “We were driving that holy grail of long-term behavioral change,” says Friedman. “That was when it’s like, ‘Oh, my God. That’s really cool.’”

When it comes to driving bigger changes around health, the principles are the same. But the stakes are decidedly higher.

WHEN SOCIAL ENGINEERING MEETS MEDICINE

One moral question Fitbit faces today is this:

WHAT’S THE RESPONSIBILITY OF A BIOMETRIC COMPANY THAT HAS THE POWER TO INFLUENCE HUMAN BEHAVIOR?

Algorithms used by trackers are growing closer to being able to make predictions about upcoming health events, like heart attacks and depression. But it’s unlikely that they’ll ever be 100% accurate. So how sure is sure enough to sound the alarm that will result in a doctor’s visit?

“If you have an 80% chance of a thing being true, people think, ‘Oh, it’s 100,’” says Friedman. “And if you’re wrong, people stop trusting everything.”

Fitbit is currently working on detection and messaging efforts around sleep apnea and atrial fibrillation (AFiB),

irregular heartbeats that can signal cardiovascular complications. It's also running confidential studies testing other vital health signals with the help of various academic institutions. But for a company that began as a fitness motivator, diving deeper into serious health issues opens it up to extra scrutiny and regulatory red tape.

"The first time we knew a person had AFiB" — with controlled testing, Fitbit detected the arrhythmia with a tracker and confirmed it with an electrocardiogram (ECG) patch — "that was a very wow moment. I can know something about somebody's health before they do," says Friedman. "The sense of responsibility you feel is almost overwhelming."

At least 2.7 million people live with AFiB in the U.S., and in the lab, Fitbit can bring in doctors to explain the implications of a diagnosis. But how exactly would that work for someone sitting on their couch at home, with no expert to provide context? Fitbit has toyed with the idea of adding alerts to signal major health events or using app-based questionnaires to gather more information around symptoms. But if users aren't sure what kind of action to respond with, can feeding them raw health data do more harm than good?

These are questions Fitbit is grappling with — and they're the reason users don't currently find AFiB detection on their trackers. But, in limited cases, doctors have already used the data the devices record to determine the appropriate course of treatment for patients at risk of seizure, stroke and other heart-related complications. And with trackers growing stronger and analytics demonstrating an ability to predict health events, the company anticipates a day when it can use changes in heart-rate data to identify illness before it strikes. One day in the future, trackers may be able to notify you when you're exhibiting early flu symptoms. Or a tracker might anticipate an anxiety attack in time for a user to get somewhere safe.

Fitbit Health Solutions, the company's foray into established medicine, already accounts for 11% of company revenue. And under that umbrella, it recently launched Fitbit Care, a platform through which employers and healthcare

providers can offer virtual care and health coaching. "It's not replacing the medical establishment," says Friedman. "It's extending the medical establishment." A diabetes patient, for instance, might chat virtually with his or her doctor as they review data collected through the tracker and app. If the patient is not exercising as prescribed, for example, the doctor will know. On the other hand, if the patient is doing everything right and their glucose levels are still off, the doctor can adjust the treatment accordingly.

The National Institutes of Health has begun using Fitbit data in government-funded health research that will look at chronic pain, pharmacogenomics (how drugs affect users differently) and other medical mysteries. Wellness companies are using Fitbit devices in diabetes-prevention programs, and insurers are offering eligible users cash incentives for meeting fitness goals.

Will the next generation of Fitbits come with sensors to monitor glucose levels or blood pressure? What about hydration and emotional states? If trackers can one day detect an imminent heart attack, would they automatically call an ambulance or alert an emergency contact to check in with the wearer, saving critical minutes? We know that companies are developing wearable bras to help detect breast cancer, and researchers are looking at sweat monitors that could pick up signs of diabetes and cystic fibrosis. Fitbit's integration into medicine already runs deep, but given that it's a public company in a competitive field, Friedman's not saying exactly what's coming down the pike. You can be sure, though, that it will change the way we behave.

"As these devices become more advanced, there's more data being fed in and more stuff we can do with it," he says. "The question is: How do you get rid of the noise and find the signal underneath?"

The company already answered that question with fitness. Soon, it hopes to answer it with medicine, too. ■