smh.com.au

Larry Smarr is the poster boy for wearable devices and the quantified self

Ariana Eunjung Cha

12–15 minutes

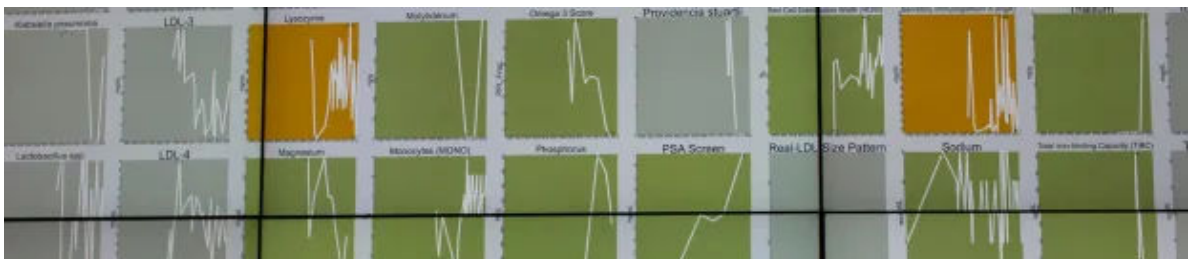
By Ariana Eunjung Cha

Updated May 10, 2015 — 10.36pm

- Wearables: full coverage

From the instant he wakes up each morning, through his workday and into the night, the essence of Larry Smarr is captured by a series of numbers: a resting heart rate of 40 beats per minute, a blood pressure of 130/70, a stress level of 2 per cent, 87kg, 8000 steps taken, 15 floors climbed, 8 hours of sleep.

Smarr, an astrophysicist and computer scientist, could be the world's most self-measured man. For nearly 15 years, the professor at the University of California at San Diego has been obsessed with what he describes as the most complicated subject he has ever experimented on: his own body.





Quantifying himself: Larry Smarr, a professor in computer science and engineering at the University of California, San Diego.*Credit: Earnie Grafton/The Washington Post*

Smarr keeps track of more than 150 parameters. Some, such as his heartbeat, movement and whether he's sitting, standing or lying down, he measures continuously in real time with a wireless gadget on his belt. Some, such as his weight, he logs daily. Others, such as his blood and the bacteria in his intestines, he tests only about once every month.

Smarr compares the way he treats his body with how people monitor and maintain their cars: "We know exactly how much gas we have, the engine temperature, how fast we are going. What I'm doing is creating a dashboard for my body."

One weekday afternoon in his lab, Smarr studied his life on an 5.5-by-2.5-metre monitor that spans most of the room. On the board were 150 key variables about his body over a 10-year period, displayed in coloured rectangles. Most were green, meaning they fall within the expected, healthy range. But some were yellow (one to 10 times outside the healthy range), and a handful were red (10 to 100 times outside the healthy range).

Once, Smarr was most renowned as the head of the research lab where Marc Andreessen developed the web browser in the early 1990s.

Now 66, Smarr is the unlikely hero of a global movement among ordinary people to "quantify" themselves using wearable fitness gadgets, medical equipment, headcams, traditional lab tests and homemade contraptions, all with the goal of finding ways to optimise their bodies and minds to live longer, healthier lives - and perhaps to discover some important truth about themselves and their purpose in life.

The explosion in extreme tracking is part of a digital revolution in health care led by the tech visionaries who created Apple, Google, BlackBerry, Microsoft and Sun Microsystems. Using the chips, database and algorithms that powered the information revolution of the past few decades, these new billionaires now are attempting to rebuild, regenerate and reprogram the human body.

In the aggregate data being gathered by millions of personal tracking devices are patterns that may reveal what in the diet, exercise regimen and environment contributes to disease.

Could physical activity patterns be used to not only track individuals' cardiac health but also to inform decisions about where to place a public park and improve walkability? Could trackers find cancer clusters or contaminated waterways? A pilot project in Kentucky, for example, uses inhalers with special sensors to pinpoint asthma "hot spots" in the city.

"As we have more and more sophisticated wearables that can continuously measure things ranging from your physical activity to your stress levels to your emotional state, we can begin to cross-correlate and understand how each aspect of our life consciously and unconsciously impacts one another," Vinod Khosla, a co-founder of Sun and investor in mobile health start-ups, said in an interview.

The idea that data is a turnkey to self-discovery is not new. More than 200 years ago, Benjamin Franklin was tracking 13 personal virtues in a

daily journal to develop his moral character. The ubiquity of cheap technology and an attendant plethora of apps now allow a growing number of people to track the minutiae of their lives as never before.

James Norris, in his 30s and an entrepreneur in Oakland, California, has spent the past 15 years tracking, mapping and analysing his "firsts" - from his first kiss to the first time he saw fireworks on the Mall in Washington, D.C.

Laurie Frick, 59, an Austin, Texas, artist, is turning her sleep and movement patterns into colourful visualisations made of laser-cut paper and wood.

And Nicholas Felton, 37, a Brooklyn data scientist, has been publishing an annual report about every Twitter, Facebook, email and text message he sends. More than 30,300 people are following his life on Twitter.

Most extreme are "life loggers," who wear cameras 24/7 , jot down every new idea and record their daily activities in exacting detail. Their goal is to create a collection of information that is an extension of their own memories.

Even President Barack Obama is wearing a new Fitbit Surge, which monitors heart rate, sleep and location, on his left wrist, as a March photograph revealed.

Tech firms are eagerly responding to the human penchant for self-perfectability by inventing more devices that can collect even more data, which the tech titans foresee as the real gold mine.

At the 2015 Consumer Electronics Show in January, new gizmos on display included a baby bottle that measures nutritional intake, a band that measures how high you jump and "smart" clothing connected to smoke detectors.

Google is working on a smart contact lens that can continuously measure a person's glucose levels in their tears.

The Apple Watch has a heart-rate sensor and quantifies when you move, exercise or stand. The company also has filed a patent to upgrade its earbuds to measure blood oxygen and temperature.

In the near future, companies hope to augment those trackers with new ones that will measure from the inside out - using chips that are ingestible or float in the bloodstream.

Some physicians, academics and ethicists criticise the utility of tracking as prime evidence of the narcissism of the technological age - and one that raises serious questions about the accuracy and privacy of the health data collected, who owns it and how it should be used. There are also worries about the implications of the proliferation of devices for broader surveillance by the government, such as what happened with mobile phone providers and the National Security Agency.

Critics point to the brouhaha in 2011, when some owners of Fitbit exercise sensors noticed that their sexual activity - including information about the duration of an episode and whether it was "passive, light effort" or "active and vigorous" - was being publicly shared by default.

They worry that wearables will be used as "black boxes" for a person's body in legal matters. Three years ago, after a San Francisco cyclist struck and killed a 71-year-old pedestrian, prosecutors obtained his data from Strava, a GPS-enabled fitness tracker, to show he had been speeding and blew through several stop signs before the accident. More recently, a Calgary, Canada, law firm is trying to use Fitbit data as evidence of injuries a client sustained in a car crash.

More sophisticated tools in development, such as a smartphone app that analyses a bipolar person's voice to predict a manic episode and

injectables and implants that test the blood, offer greater medical benefit but also pose greater risks.

Des Spence, a general practitioner in the United Kingdom, argues that unnecessary monitoring is creating incredible anxiety among today's "unhealthily health-obsessed" trackers.

"Health and fitness have become the new social currency, spawning a 'worried well' generation," he wrote in an opinion piece in the April issue of BMJ, the former British Medical Journal.

"Getting the data is much easier than making it useful," said Deborah Estrin, a professor of computer science and public health at Cornell University.

Constantly measuring someone's heart rate may be helpful for someone heavily involved in sports or someone at risk of a heart attack. "But it's unclear how important and meaningful it is for the everyday person," she said.

After all, Estrin and other experts argue, Homo sapiens have survived for about 130,000 years without such technology because the human body already has a number of alarm systems built into it. Any mother who has been woken in the wee hours by a crying child knows that a gentle press of the back of the wrist to a forehead is fast, free and eerily accurate in diagnosing a fever.

Until about three years ago, it was nearly impossible for ordinary people to get a readout about the state of their bodies on a regular basis.

Now dozens of biosensing wearable technologies with names such as the Fitbit Surge, Misfit Shine and Jawbone UP have exploited the miniaturisation of computer components and the ubiquity of smartphones to create an industry that is expected to reach $US50

billion in sales by 2018, according to an estimate by Credit Suisse.

The research firm Gartner forecasts that 68.1 million wearable devices will be shipped this year. A growing percentage are being purchased by employers including Bates College and IBM as perks for their workers. A survey by Nielsen last year indicated that 61 per cent of those aware of wearable technology for tracking and monitoring medical conditions use fitness bands.

In March, when Apple announced its ResearchKit initiative to allow people to share their information with researchers working on projects in asthma, heart disease, diabetes, breast cancer and Parkinson's through various apps, more than 41,000 people volunteered within the first five days.

It's unclear whether young adults' open attitude toward sharing their data will remain when the next generation of more invasive biotrackers becomes commonplace.

Ginger.io, which was developed by data scientists from MIT, has created an app that can alert a provider if something is "off" - signalling the possibility of depression or a manic episode - based on how much a patient moves around or how many people they talk to that day so that counselling or other intervention can be offered.

Silicon Valley-based Proteus Digital Health has developed a prototype of an ingestible chip the size of a grain of sand that can be embedded in a pill. When the pill is swallowed, the chip sends a signal that's logged on to central servers that you - or a loved one or doctor - can access on your phone or desktop.

The life sciences unit of Google X, the search company's secretive research lab, is working on building a nano-size particle that will travel in the bloodstream. The particles would circulate throughout the body and

attach to particular types of cells, such as cancer cells, or to enzymes given off by plaque in the arteries before they are about to rupture or cause a heart attack or stroke. If the particles found questionable cells or enzymes, they would send a signal to a device worn outside the body that would transmit the information to the patient or to a physician.

The innovation is outpacing the scientific and legal framework for testing and regulating such devices. The US Food and Drug Administration in January indicated it would regulate devices that are invasive but take a lighter touch on wearables.

According to the agency's draft guidelines, a wellness product crosses into the territory of a medical device, which requires a rigorous FDA review that is expensive for manufacturers, when its intended use refers to a specific disease or condition, or it presents an inherent risk to a user's safety. That would essentially leave hundreds, if not thousands, of "low-risk general wellness" products - a category that presumably applies to the current incarnation of Fitbits - free from extra scrutiny under federal food and drug safety laws.

They would still be subject to monitoring by the Consumer Product Safety Commission, which has the power to recall products to protect the public against unreasonable risks from injuries or death from consumer products. In 2014, after thousands of users complained of skin irritations from Fitbit bands, the CPSC worked with the company on a recall that affected more than 1 million devices.

How the data that is generated from the devices is protected and shared is also murky.

Federal patient privacy rules under the Health Insurance Portability and Accountability Act don't apply to most of the information the gadgets are tracking. Unless the data is being used by a physician to treat a patient,

the companies that help track a person's information aren't bound by the same confidentiality, notification and security requirements as a doctor's office or hospital. That means the data could theoretically be made available for sale to marketers, released under subpoena in legal cases with fewer constraints - and eventually worth billions to private companies who might not make the huge data sets free and open to publicly funded researchers.

The Washington Post

Most Viewed in Technology

Loading