

# Testing wearable sensors as 'check engine' light for health

WASHINGTON (AP) — A next step for smart watches and fitness trackers? Wearable gadgets gave a Stanford University professor an early warning that he was getting sick before he ever felt any symptoms of Lyme disease.



Steve Fisch via AP

In this photo provided by Steve Fisch, Michael Snyder, professor and chair of genetics at the Stanford University School of Medicine sports wearable gadgets.

Geneticist Michael Snyder never had Lyme's characteristic bulls-eye rash. But a smart watch and other sensors charted changes in Snyder's heart rate and oxygen levels during a family vacation. Eventually a fever struck that led to his diagnosis.

Say "wearables," and step-counting fitness trackers spring to mind. It's not clear if they really make a difference in users' health. Now Snyder's team at Stanford is starting to find out, tracking the everyday lives of several dozen volunteers wearing devices that monitor more than mere activity.

He envisions one day having wearables that act as a sort of "check engine" light indicating it's time to see the doctor.

"One way to look at this is, these are the equivalent of

oral thermometers but you're measuring yourself all the time," said Snyder, senior author of a report released Thursday on the project.

Among the earliest hints: Changes in people's day-to-day physiology may flag when certain ailments are brewing, from colds to Lyme to Type 2 diabetes, researchers reported in the journal PLOS Biology.

Interest in wearable sensors is growing along

with efforts to personalize medicine, as scientists learn how to tailor treatments and preventive care to people's genes, environment and lifestyle. The sensors are expected to be a part of the National Institutes of Health's huge "precision medicine" study, planned to begin later this year.

But a first step is learning what's normal for different people under different conditions.

The Stanford team is collecting reams of data — as many as 250,000 daily measurements — from volunteers who wear up to eight activity monitors or other sensors of varying sizes that measure heart rate, blood oxygen, skin temperature, sleep, calories expended, exercise and even exposure to radiation. That's paired with occasional laboratory tests to measure blood chemistry and some genetic information.

An initial finding: Blood oxygen levels decrease with rising altitudes during plane flights, in turn triggering fatigue. But toward the end of long flights, oxygen begins rising again, possibly as bodies adapt, the researchers

reported.

It was that phenomenon that alerted Snyder, the longest-tested participant, "that something wasn't quite right" on one of his frequent long flights.

Landing in Norway for a family vacation, Snyder noticed his oxygen levels didn't return to normal like they always had before. Plus his heart rate was much higher than normal, which sometimes signals infection.

Sure enough, soon a low-grade fever left him dragging. He feared Lyme because two weeks before going abroad, Snyder had helped his brother build a fence in a tick-infested rural area in Massachusetts. He persuaded a Norwegian doctor to prescribe the appropriate antibiotic, and post-vacation testing back home confirmed the diagnosis.

Also during the study's

first two years, Snyder and several other volunteers had minor cold-like illnesses that began with higher-than-normal readings for heart rate and skin temperature — and correlated with blood tests showing inflammation was on the rise before any sniffing.

In addition, the Stanford team detected variations in heart rate patterns that could tell the difference between study participants with what's called insulin resistance — a risk factor for Type 2 diabetes — and healthy people.

No, don't try to self-diagnose with your fitness tracker any time soon. The findings in Thursday's report are intriguing but the study is highly experimental, cautioned medical technology specialist Dr. Atul Butte of the University of California, San Francisco, who wasn't involved with the research.

## PARENTS TALK BACK Teachers changing and sometimes saving lives

I did not want to die choking on a piece of chicken-fried steak. But there I was, gasping for air in the fifth-grade lunchroom, the eyes of all my peers glued to my contorted face.



AISHA SULTAN  
Parents Talk Back

The noisy cafeteria, filled with more than a hundred students laughing and talking over one another, grew silent as my coughing became louder. That was when Mr. Davis sprang into action. He was sitting at the teachers' table, where I had been staring while I struggled to breathe. I saw him shove the remaining bite of his sandwich into his mouth and sprint over toward me. He wrapped his arms around my small frame, pressed his arms into my stomach and forcefully thrust.

The rubbery bite of steak flew out of my mouth. The crisis averted, my classmates went back to their sandwiches and Little Debbie snacks. I silently wished for a sinkhole to appear in the cafeteria and swallow me into the bowels of the building.

It was years before I could approach chicken-fried steak again. But I've never forgotten Mr. Davis' quick-witted heroism. When I think about my most memorable elementary school teachers, he comes to mind first.

I asked a few dozen people to describe their favorite elementary school teachers. Some of them were decades removed from that era of their lives, others much younger. Yet nearly everyone had an answer pretty quickly. Some of them were like Mr. Davis, who performed a memorable act of kindness. One attorney told me about Mr. Hogan, his kindergarten teacher, who dropped him off at home one day when his mother didn't pick him up after school.

His sister recalled an incident with Miss Rosa, her first-grade teacher. Her parents had invited Miss Rosa to their home for dinner when they heard how nice she had been to their daughter when she refused to eat green eggs and ham on religious grounds during a lesson on Dr. Seuss. After the dinner, her mother mentioned how sweet Miss Rosa was, and made an offhand remark about her appearance.

The next day at school, Miss Rosa asked what her mother had said after the dinner. The young girl innocently replied, "She said you were chubby."

"Miss Rosa died laughing," the woman recalled. "She never got offended."

The most effective teachers, the ones who advance their students'

learning the most, aren't always the kindest, funniest or most charismatic. But they all make a lasting impression on young children.

"Great teaching seems to have less to do with our knowledge and skills than with our attitude toward our students, our subject and our work," wrote educator Maria Orlando in an essay in Faculty Focus.

A study on the traits of exceptional teachers done by Teach For America found that they set big goals for their students, and that they constantly re-evaluate their approaches and techniques in order to improve their effectiveness. They have a relentless focus on improving student achievement, and plan exhaustively and work purposefully toward it. They share the attributes of the most successful students: perseverance and leadership focused on outcomes.

The favorite elementary teachers described to me most often were the ones who made a student feel special, nurtured and valued. Adults talked about the one teacher who encouraged their abilities, helped them see themselves in a different way, or helped them understand a difficult subject. They mentioned kind teachers who managed to be stern and in charge without ever being mean.

Their stories were reflected in the answers my children offered. My son talked about his first-grade teacher, Ms. DePasquale.

"She took everybody's ideas into account," he said. "She was also the most laid-back and funniest, but when she needed to get serious, she was stern."

My daughter said Mr. Kelly, her third-grade teacher, "helped me find new ways of thinking about things." He challenged her.

That was different than what my cousin's wife, Zara, remembered about her favorite elementary teacher. Zara was born in a small town in Pakistan, and her family sent her at a young age to a well-known boarding school to be educated by nuns.

"Sister Mercedes, I remember her so well," Zara said about her first-grade teacher. "I was away from my family, and she was so warm and kind and loving. That was the one thing I needed at that time."

Aisha Sultan is a St. Louis-based journalist who studies parenting in the digital age while trying to keep up with her tech-savvy children. Find her on Twitter: @AishaS.

### Friday Morning

STATION	6 AM	6:30	7 AM	7:30	8 AM	8:30	9 AM	9:30	10 AM	10:30	11 AM	11:30
FOX	11 KFFX	11 AgDay	Hot/ Cleve.	Good Day Spokane			Paid	Into Wild	Steve Harvey		Crime Watch Daily (N)	
FOX	KPTV	3 Good Day Oregon at 6	Good Day Oregon	Good Day Oregon			Good Day		The 700 Club		Rachael Ray (N)	
CBS	19 KEPR	2 News	News	CBS This Morning (N)			Harry		The Price Is Right		Young & Restless	
CBS	KOIN	19 KOIN 6 News at 6 a.m.		CBS This Morning (N)			Let's Make a Deal		The Price Is Right		Young & Restless	
NBC	25 KNDU	6 Wake Up Northwest		Today Show Neil Patrick Harris (N)			Today Show II (N)		Today Show III (N)		Million? Million?	
NBC	KGW	8 KGW News at Sunrise		Today Show Neil Patrick Harris (N)			Today Show II (N)		Today Show III (N)		Portland Today	
ABC	42 KVEW	4 Northwest	Northwest	Good Morning America (N)			Live! With Kelly (N)		The View		Paid	Middle
ABC	KATU	5 KATU News Morning		Good Morning America (N)			AM Northwest		The View		Live! With Kelly (N)	
PBS	31 KTNW	Stretch	W.L.Yoga	SplashB.	Jet Gol	Nature Cat	Peg + Cat	D.Tiger	Thomas	Sesame St.	DinoTrain	SplashB.
PBS	59 OPB	13 Stretch	Jet Gol	Nature Cat	C.George	D.Tiger	D.Tiger	SplashB.	Sesame St.	DinoTrain	Peg + Cat	SuperWI

### AFTERNOON

STATION	12 PM	12:30	1 PM	1:30	2 PM	2:30	3 PM	3:30	4 PM	4:30	5 PM	5:30
FOX	11 KFFX	11 Paid	Pat. Court	Divorce	Divorce	Judge Mathis	The People's Court		2 1/2 Men	Mike&M.	Last Man	Last Man
FOX	KPTV	3 12 O'Clock News		E. Stanton	Teen News	OutSpace	Paid	TMZ Live!	Judge Judy	Judge Judy	5 O'Clock News	
CBS	19 KEPR	2 NameG.	Bold & B.	The Talk (N)		Let's Make a Deal		Dr. Phil (N)	Judge Judy	Judge Judy	News	News
CBS	KOIN	19 News	Bold & B.	The Talk (N)		The Doctors		Dr. Phil (N)			News	News
NBC	25 KNDU	6 Give	Paid	Days of Our Lives		Hot Bench	Hot Bench	Wendy Williams	Ellen DeGeneres		News	NBC News
NBC	KGW	8 KGW New	Paid	Days of Our Lives		T.D. Jakes		Ellen DeGeneres	KGW News		KGW News	NBC News
ABC	42 KVEW	4 The Chew		General Hospital		The Doctors		Rachael Ray (N)	Minute	Minute	Local News	News
ABC	KATU	5 The Chew		General Hospital		Harry		Afternoon Live	KATU News @ 4		News	News
PBS	31 KTNW	Charlie Rose		Ming (N)	Quilt Day	Stretch	C.George	Speaks	WordGirl	Arthur	Odd Squad	Biz Kid\$
PBS	59 OPB	13 Paint This	Mexican	Charlie Rose (N)		Nature Cat	Bob Build	Cat/ Hat	Jet Gol	Speaks	WordGirl	Odd Squad

### EVENING

STATION	6 PM	6:30	7 PM	7:30	8 PM	8:30	9 PM	9:30	10 PM	10:30	11 PM	11:30
FOX	11 KFFX	11 Modern Family "Thunk in the Trunk"	Modern Family "The Storm"	2 Broke Girls	2 Broke Girls	Rosewood "Mummies and Meltdowns" (N)	Sleepy Hollow "In Plain Sight" (N)		FOX News First at Ten	:35 Law & Order: Criminal Intent "Folie a Deux"	:35 Anger Management	
FOX	KPTV	3 6 O'Clock News	Family Feud	Family Feud	Rosewood "Mummies and Meltdowns" (N)	Sleepy Hollow "In Plain Sight" (N)		10 O'Clock News		11 O'Clock News	2 Broke Girls	
CBS	19 KEPR	2 Action News at 6 p.m.	Inside Edition	The Big Bang Theory	Simpsons "I Won't Be Home for Christmas"	MacGyver "Large Blade" (N)	Hawaii Five-0 "Ua Ho'i Ka Opua I Awalua" (N)		Blue Bloods "Not Fade Away" (N)		Action News at 11:00 p.m.	:35 Stephen Colbert
CBS	KOIN	19 KOIN 6 News at 6	Evening News	Extra	Ent. Tonight	MacGyver "Large Blade" (N)	Hawaii Five-0 "Ua Ho'i Ka Opua I Awalua" (N)		Blue Bloods "Not Fade Away" (N)		KOIN 6 News/ 11	:35 S. Colbert
NBC	25 KNDU	6 Local News	Family Feud	Wheel of Fortune	Jeopardy!	Grimm "Trust Me Knot" (N)	Emerald City "Mistress, New, Mistress" (N)		Dateline NBC		Local News	:35 The Tonight Show
NBC	KGW	8 KGW News at 6:00 p.m.		Live at 7	NBC News	Grimm "Trust Me Knot" (N)	Emerald City "Mistress, New, Mistress" (N)		Dateline NBC		KGW News: 35 Tonight at 11	
ABC	42 KVEW	4 Extra	Local News at 6:30	Entertainment Tonight	The Insider	Last Man Standing "Explorers" (N)	Dr. Ken "Jae Meets the Parks" (N)		20/20		Local News at 11 :05 Jimmy Kimmel Live	
ABC	KATU	5 KATU News at 6		Jeopardy!	Wheel of Fortune	Last Man St. (N)	Dr. Ken (N)		Shark Tank (N)		KATU News	:35 Jimmy Kimmel
PBS	31 KTNW		PBS NewsHour	BBC World News	Natural Health	Washington Week (N)	Charlie Rose (N)		Great Performances "Bel Canto the Opera" A gripping contemporary story inspired by the 126-day hostage crisis in Lima, Peru. (N)			
PBS	59 OPB	13 Travelscope	Business (N)	PBS NewsHour		Washington Week (N)	Nuclear Waste		Foyle's War "Elise"		Mastertpiece Mystery! "Sherlock: The Lying Detective"	

STATION	PEN	6 PM	6:30	7 PM	7:30	8 PM	8:30	9 PM	9:30	10 PM	10:30	11 PM	11:30
A&E	52	The First 48 "Trust No One/ Risky Business"		The First 48 "Blood on Bourbon"		First 48: Revenge "Fear Factor/ Fall Guy" (N)		Live PD (N)					
AMC	60	*** Gladiator Russell Crowe.		*** Armageddon (1998, Adventure) Liv Tyler, Ben Affleck, Bruce Willis. A drill rigger and his crew embark on a mission to blow up an asteroid heading for Earth.				*** Pearl Harbor ("01, War) Kate Beckinsale, Ben Affleck.					
ANPL	24	Treehouse Masters		Treesh. "Treehouse Z"		Treehouse Masters		Treehouse Masters (N)		Treehouse Masters (N)		Treehouse Masters	
CMT	43	*** Smokey and the Bandit		The Bandit ("16, Doc) Mike Henry.				Broken Skull Challenge		Roseanne	Roseanne	Roseanne	
CNBC	72	The Celebrity Apprentice (N)				Boss "Gigi's Cupcakes"		Boss "Taylormade"		Boss "Choice Hotels"		Paid	Paid
CNN	68	CNN Special		CNN Tonight		Anderson Cooper 360		CNN Special		CNN Tonight		Anderson Cooper 360	
DISC	51	Gold Rush		Rush "Game Over"		Gold Rush: Pay Dirt (N)		Rush "Lifeline" (N)		The Wheel (N)		Gold Rush "Lifeline"	
DISN	26	Girl M. (N) Bizaard.		Undef.		Good Luck StuckMid		Alexander & the Terrible, Hor...		StuckMid	StuckMid	Jessie	Jessie
ESPN	33	NBA Basketball Boston Celtics at Atlanta Hawks Site: Philips Arena (L)		NBA Basketball Detroit Pistons at Utah Jazz Site: Vivint Smart Home Arena -- Salt Lake City, Utah (L)				SportsCenter		SportsCenter		SportsCenter	
ESPN2	34	Basketball		SportsCenter		SportsCenter		SportsCenter		J & J	NFL Live		Super Bowl
FX	65	*** Kung Fu Panda 2 ("11, Ani) Jack Black.		*** Despicable Me 2 ("13, Ani) Steve Carell.		*** Despicable Me 2 ("13, Ani) Steve Carell.		*** Despicable Me 2 ("13, Ani) Steve Carell.					
GOLF	88	PGA Golf Sony Open (L)		Golf Cent.		PGA Golf Sony Open Site: Waialae Country Club -- Honolulu, Hawaii							PGA Golf
GSN	76	Fam. Feud	Fam. Feud	Fam. Feud	Fam. Feud	Fam. Feud	Fam. Feud	Fam. Feud	Fam. Feud	MindMan	MindMan	MindMan	MindMan
HALL	87	Last Man	Last Man	Last Man	Last Man	Home Imp	Home Imp	Middle	Middle	Middle	Middle	G. Girls	G. Girls
HGTV	62	Bargain	Bargain	Bargain	Bargain	DreamHom	DreamHom	DreamHom	DreamHom	DreamHom	DreamHom	H.Hunt	H.Hunt
HIST	50	American Pickers "Picking It Forward"		A. Pickers "Backroad Barnstorming"		American Pickers "Like Father, Like Daughter"		American Pickers "A Hard Rain's Gonna Fall"		American Pickers "On the Road Again"		:05 American Pickers "Need for Speed"	
LIFE	29	Bring It "Wigging Out"		Bring It! Fan Chat		Bring It!		Bring It! (N)		The Rap Game (N)		The Rap Game	
NICK	27	H.Danger	H.Danger	The Thundermans		Henry Danger		Full House	Full House	Full House	Full House	Friends	Friends
ROOT	37	NPGL Fitness	In Depth	NCAA Basketball Washington vs. Cal Poly		NCAA Basketball UCLA vs. Colorado						ProFootba-ll Week (N)	Poker (N) Night
SPIKE	42	Cops	Cops "In Arizona"	Cops	Cops	Cops	Cops	Boxing Premier Champions				:15 Countdown To "Ortiz vs. Sonnen"	
SYFY	67	*** Jason Goes to Hell: The Final Friday		*** Jason X ("01, Hor) Lexa Doig, Kane Hodder.		*** Freddy vs. Jason Robert Englund.		*** Freddy vs. Jason Robert Englund.					
TBS	59	Seinf. "The Pilot" 1/2	Seinf. "The Pilot" 2/2	Seinf. "The Mango"	Seinf. "The Glasses"	*** Jack the Giant Slayer (2013, Fantasy) Ewan McGregor, Stanley Tucci, Nicholas Hoult.		:15 *** The Hobbit: An Unexpected Journey ("12, Fam) Martin Freeman.					
TCM	56	*** Cleopatra Claudette Colbert.		*** Cleopatra (1963, Epic) Richard Burton, Rex Harrison, Elizabeth Taylor. Queen Cleopatra of Egypt uses seduction to stabilize her power and deal with the Romans.									*** Carry On Cleo
TLC	49	Yes Dress	Yes Dress	Paranormal Lockdown		Paranormal Lockdown		Paranormal Lock. (N)		Alaska Haunting (N)		Paranormal Lockdown	
TNT	57	Bones		Bones		*** Bad Boys II ("03, Act) Will Smith, Martin Lawrence.		*** The Replacements					
UNI	21	Includo	Noticiero	La rosa de Guadalupe		Despertar contigo		Vino el amor		El color de la pasion		Impacto	Noticie.
USA	58	Modern	Modern	Modern	Modern	Modern	Modern	Modern	Modern	Modern	Modern	Modern	Modern
WE	118	Boot Camp: Reali (N)		Marriage Boot Camp		Ghosts in the Hood		Marriage Boot Camp		Marriage Boot Camp		L.A. Hair	
WGN		*** Pirates of the Caribbean: Dead Man's Chest		*** Pirates of the Caribbean: Dead Man's Chest		Johnny Depp.						Mother	Mother
STZ ENC	644	*** 21	:35 *** Kingdom of Heaven ("05, Act) Orlando Bloom.		Black Sails "VII"		Black Sails "VIII"		Black Sails "VIII"		Black Sails "VIII"		*** 21
HBO	518	*** The Martian		Vice News		The Visit ("15, Hor)		:45 *** Sisters ("15, Com) Amy Poehler, Tina Fey.					Movie
HBO2	520	*** The Green Mile ("99, Dra) David Morse, Tom Hanks.				*** Straight Outta Compton ("15, True) O'Shea Jackson Jr..							Fight
HBO3	521	*** Blast From the Past		:10 *** I Love You, Man Paul Rudd.		*** Hail, Caesar! ("16, Com/Dra) Josh Brolin.							*** How to Be Single
MAX	549	:55 *** Jennifer 8 ("92, Thril) Andy Garcia.		:05 *** Leatherheads George Clooney.		*** Ocean's Thirteen George Clooney.							
SHOW	578	*** A Perfect Day		:15 The Affair		:15 *** Burnt ("15, Com/Dra) Bradley Cooper.		*** Gangs of New York					
STARZ	621	*** Pixels Adam Sandler.		:25 *** Hancock Will Smith.		War of the Damned		Sprtacus "Decimation"		Sprtacus		Movie	

### STARZ OWL

STATION	12 AM	12:30	1 AM	1:30	2 AM	2:30	3 AM	3:30	4 AM	4:30	5 AM	5:30
FOX	11 KFFX	11 :05 Friends	:35 Hot In	:05 CR TV								CRTV
FOX	KPTV	3 2 Broke G.	TMZ	Dish	Queens	Raising	Celeb	Paid	Paid	CARS.TV	Paid	Paid
CBS	19 KEPR	2 S. Colbert	:35 James Corden	:35 Paid	:05 Paid	:35 Paid	:05 Spaces	:35 Paid	:05 Traveler	:35 Paid	Morning Saturday (N)	
CBS	KOIN	19 S. Colbert	:35 James Corden	:35 Insider	:05 Paid	OurWorld		Paid		CBS This Morning Saturday (N)		
NBC	25 KNDU	6 Tonight	:35 Seth Meyers	:35 C. Daly	:05 Today Show	Mad Money		1st Look	Fam. Feud	Paid	Sat. Today	
NBC	KGW	8 Tonight	:35 Seth Meyers	:35 C. Daly	:05 Steve Harvey	Mad Money		1st Look	Paid	Paid	Paid	
ABC	42 KVEW											