

EXPRESSIONS OF the New Body Language

In the next decade, as computational power and connectivity are built into virtually everything, reconfiguring our personal technologies will be as simple as putting on a jacket or removing a pair of shoes.

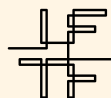
At a technical level, this is the story of an emerging world of body area networks, where devices in, on and around the body can be reconfigured throughout the day to enhance our experience of any situation.

At the personal level, the transformation brought on by these technologies will be more intimate and profound. We will see the rise of an entirely new kind of body language, mediated by a constantly evolving suite of personal technologies. Ranging from passive to wildly aggressive, this new body language will shape how we use wearable and implantable technologies to express our deepest social, cultural, and individual aspirations.

The expressions of our technology-infused bodies will shift constantly and vary for different people and contexts. Body area networks will amplify both our natural commonalities and create countless variations of Human+Machine Symbiosis.

the **new body**
LANGUAGE

the future of wearables, wireless, and body area networks



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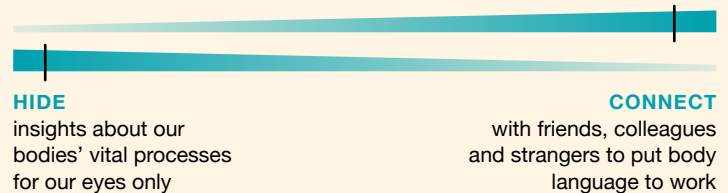
TECHNOLOGY HORIZONS 2015

EXPRESSIONS OF the New Body Language

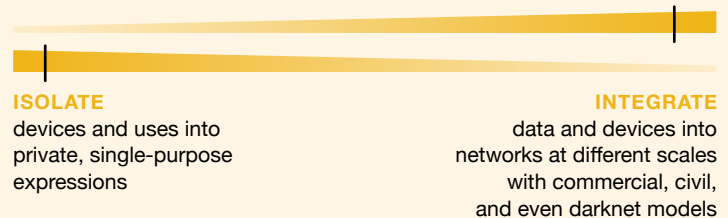
The intentions that will drive the New Body Language come in polar pairs that we will balance in different ways to create a wide variety of expressions—personal and cultural, consistent and contradictory. To understand the expressions that will emerge, we must first understand the tensions across these polar pairs. Together they provide a tool for making sense of the diverse ways we'll relate to personal technologies—and a framework for identifying innovation opportunities that meet users in relevant, personal, and contextually appropriate ways.

BALANCING OUR INTENTIONS

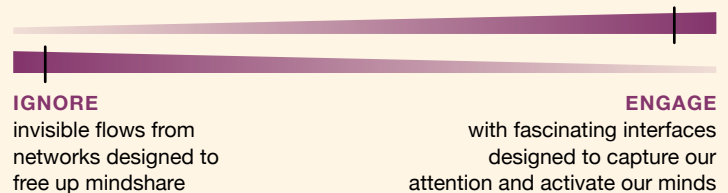
By hiding intimate details about our own bodies and selves or connecting with others in new ways, we will **build our social identities while learning about ourselves.**



By buying into branded ecosystems or keeping body area networks fragmented, we will control privacy and **adopt varying levels of integration into larger ecosystems.**



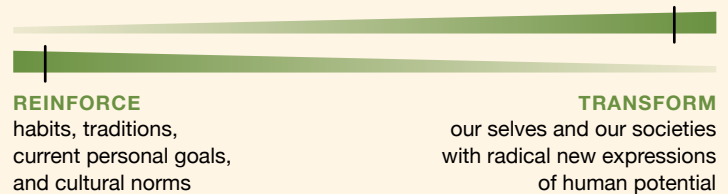
By allowing the mediated flows to disappear under our skin or engage our attention with fantastical interfaces, we will explore new ways to **manage our attention and awareness.**



By varying the upgrade cycles of our body area networks, we will be able to **change the expressions of our technology-infused bodies** from minute to minute.

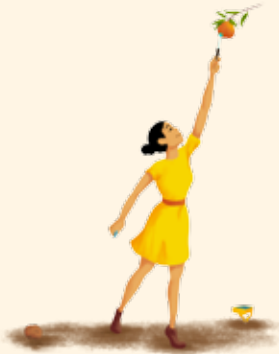


By reinforcing or transforming our everyday actions, body area networks will help us **make and remake society**, altering what it means to live a good life.



SIX ARCHETYPES

Meet the expressions of the New Body Language: six archetypal people who have each configured technologies in, on, and around their bodies to strike a balance of different intentions. Here's what you'll learn about each expression:



What they're equipped with:

Devices and systems this person has configured. They range in complexity and effort required by the user. Some will be off-the-shelf services, while others require a bit more creativity. All of them help that person express their new body language.

What underlying technologies make it possible:

Technologies that enable the New Body Language. We've highlighted these as some of the most important to track over the next decade. See page 10 for more affordances of these technologies.

How they strike a balance of intentions:

As people implement body area networks, they will strike different balances of intention. These will vary greatly based on motivation, aspiration, and context.

THE ATHLETE

A multi-million dollar piece of machinery **optimized for performance** and **fan engagement**, being an athlete is now more competitive than ever, and is monitored down to each muscle-powering mitochondria. The Athlete is on a strict, **data-driven, predictive maintenance** schedule to **reduce injuries** and improve his mental clarity during the game. Across the league, performance is up (and he keeps breaking his own personal records every month). Annual drafts are hugely suspenseful spectacles. He's getting nervous about next month's salary negotiations; he's heard rumors that the league's systems can predict future declines in performance.

Accelerometers, gyroscopes, and RFID tags provide ultra-precise tracking

Livestreaming 3D cameras let distant fans join in via virtual reality

Heart monitor and analytics make training a precise science

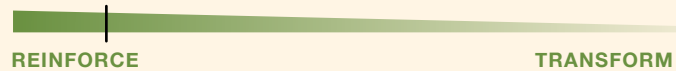
Muscle monitors translate haptic feedback to fans

Team dashboard supports game-time optimization by coach

ENABLED BY:

- Sensors
- Human-machine interfaces
- Distributed computing
- Machine learning
- Inference engines

To strike this balance:



Reinforcing iconic stardom by optimizing and keeping focus on performance



Hiding potentially damaging movements from analysts before they manifest as injuries to deliver predictive maintenance



Integrating real-time muscle-level biometrics to augment fan interactions in immersive media

THE FAN

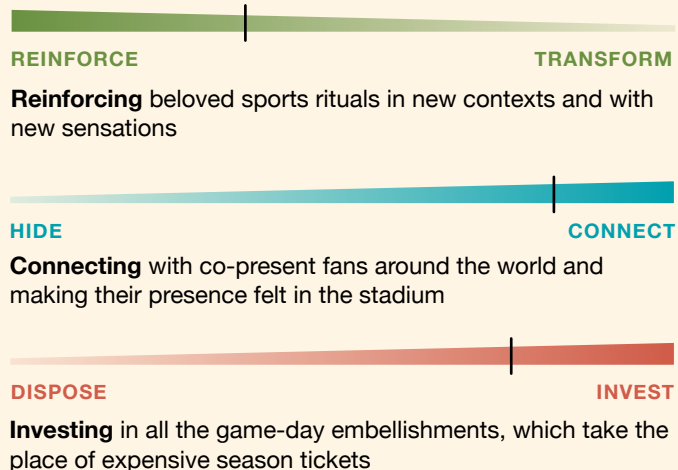
It's almost 1 a.m. in London, but that doesn't mean The Fan can't **join live** for tonight's Sunday Night Football game in Pittsburgh for a **distributed shared experience**. She gets up to grab a snack when, OOF... she staggers and catches herself on the doorframe. Someone just got tackled on the field, and her haptic feedback jersey surged a quick signal that made her diaphragm spasm. The sensation disappears, and she grins—it's pretty fun having the wind knocked out of you from 3,000 miles away. **It's like you're actually there**. She lets out a loud "WOOHOO!" that registers on her AwayGame app for **co-present engagement**. If the collective roar of either team's remote fans gets loud enough, their cheers will be pumped over loudspeaker into the stadium.



ENABLED BY:

- Auditory recognition technologies
- Natural language processing
- Human-machine interfaces
- Sensors
- Distributed energy and batteries

To strike this balance:



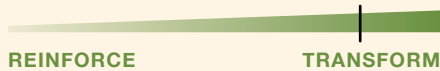
THE EATER

The Eater was the kid with “weird” lunches in the cafeteria: miso soup or pickled *umeboshi* plums. Then for the 5th grade science fair, her class sampled their gut microbes, and suddenly she was the leader of the fermentation fad, **revealing connections between body and food**. She got her whole family in on the experiment, and now she uploads weekly microbial diversity results to a display in their kitchen. The Eater sees everything through the lens of food—**pioneering new forms of computer-food interaction**. She learned Arduino programming in engineering class and built an “umami meter,” so she can **measure the deliciousness** of the afterschool snacks she concocts for her friends. Look, she’s out in the backyard now with a handheld spectrometer, analyzing her peaches for peak-ripeness! If she has too many, she’ll put them up on a public database for community food coordination—she’s on a mission to **reduce food waste**.

ENABLED BY:

- Inference engine
- Computer vision
- Sensors
- Graph theory
- Distributed computing

To strike this balance:



Transforming friends’ and family’s experience of food with creative inquiry and a higher-resolution lens



Connecting with friends, family, and community through shared food and shared information



Engaging fully with the entire food experience, from soil to table to intestines, by quantifying subjective experiences

Food waste tracking system compares her family to the neighbors

Open source map of fruits and vegetables available for forage supports zero-waste goals

Handheld spectrometer alerts her to pick foods at their peak ripeness

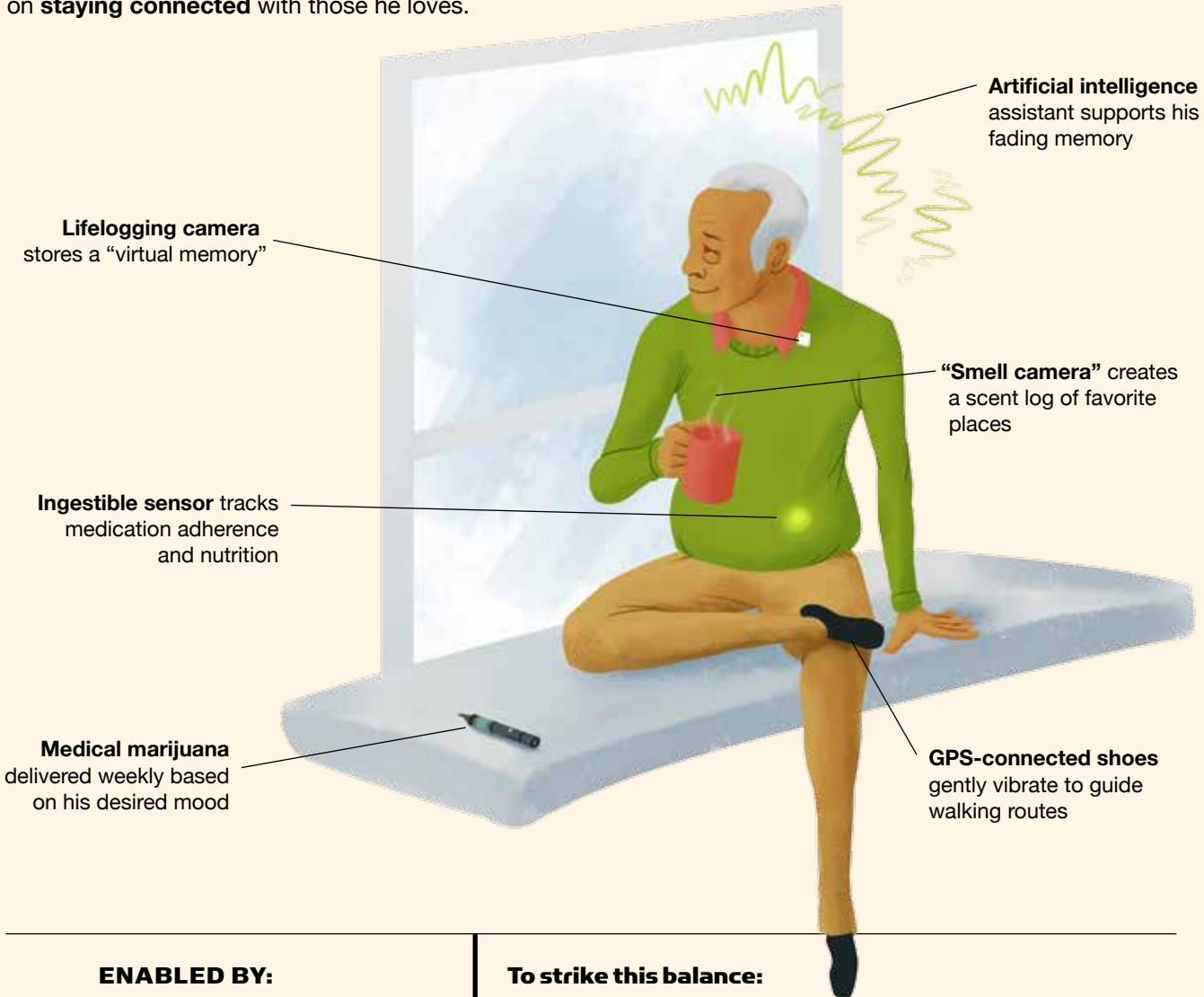
Monthly gut bacteria samples and analysis take nutrition to the scale of microbes

Arduino-powered “umami meter” quantifies flavor before she tastes

Soil sensors support backyard-scale precision agriculture

THE UNWELL

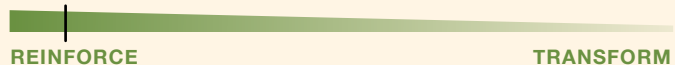
First it was the coffee pot. He just couldn't remember how it worked. Then even as his quick wit and eloquent vocabulary slipped away, the Unwell assured his kids, "I'm 53, too young for Alzheimer's." But everyone knew something was different. The Unwell would never call himself that. He has rigged together an elaborate system to **keep things feeling normal**. He can ask his artificial intelligence assistant to jog his memory without feeling embarrassed. It makes **sure he takes his meds**, eats enough, goes out for walks without getting lost, and **automates daily therapy**. He just read about a procedure to implant a prosthetic hippocampus. Still, he might just accept that things are different now and focus on **staying connected** with those he loves.



ENABLED BY:

- Computer vision
- Sensors
- Natural language processing
- Machine learning
- Robotics

To strike this balance:



Reinforcing the Unwell's baseline sense of identity and well-being by preserving relationships and favorite activities



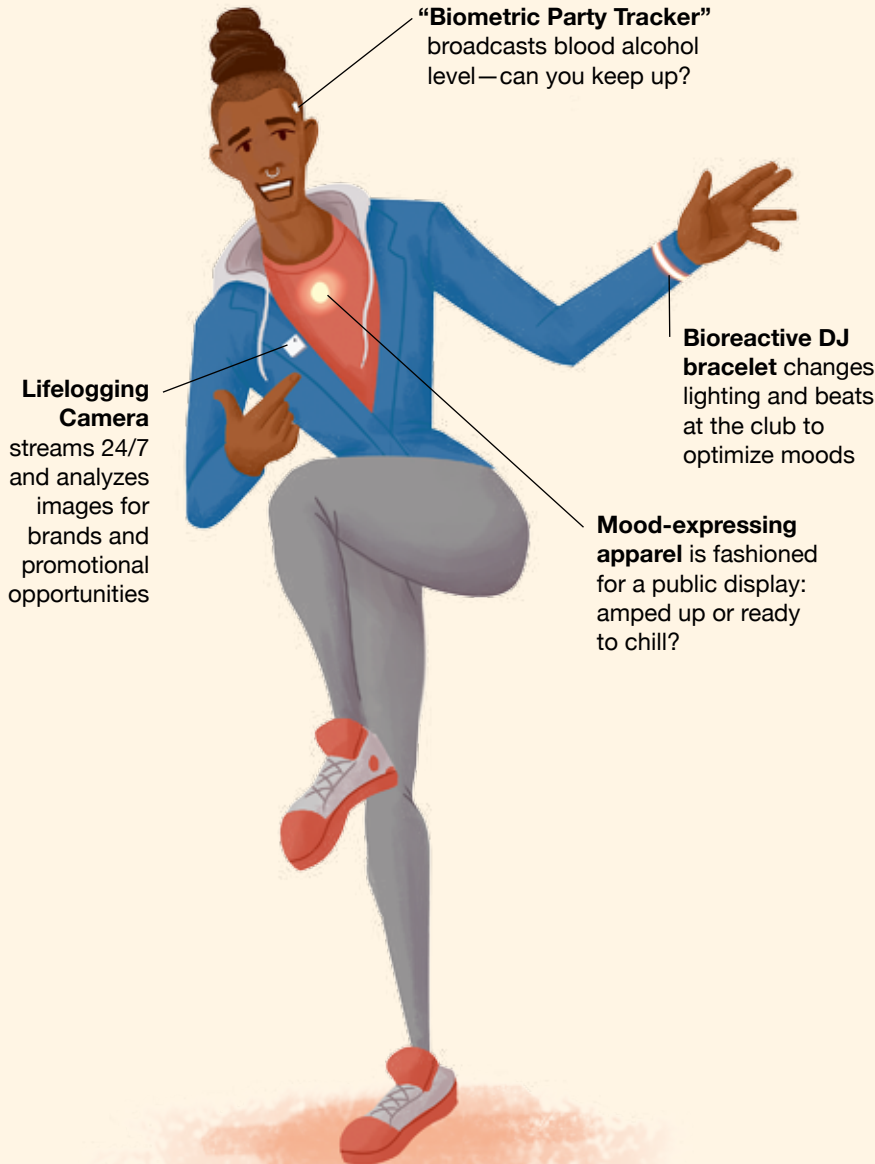
Hiding subtle changes from his family while keeping himself informed and sending the important data to his doctor



Engaging with his devices and even automated systems to keep his mind sharp in the present

THE PARTIER

We all have that friend, the one who is a little too loud and posts way too often on Instagram but always has the coolest parties. Deep down, you want to be tagged in his pictures that get thousands of likes. The Partier is a living, breathing, media channel, **tracking social influence**: a carefully crafted vision of a lifestyle tricked out with high fashion tech right off the runway. His body area network takes **self-expression** to the next level and it instantly broadcasts for **brand promotion**, his own and his sponsors, to **connect with his friends and fellow partiers**. Best of all, drinks are always on him—companies are clamoring for him to promote their brands.



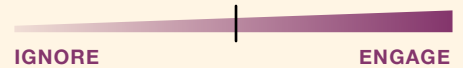
ENABLED BY:

- Sensors
- Human-machine interfaces
- Distributed energy and batteries
- Graph theory
- Blockchain technologies

To strike this balance:



Connecting openly with everyone with radically transparent self-expression as his brand



Ignoring the constant noise while still **engaging** his many friends and fans—a delicate balance that's necessary to prevent burnout



Prominently displaying buzz and mood with **disposable** branded accessories—always willing to try a new one if the price is right

THE LABORER

Everyday, the Laborer’s body performs heroic **feats of strength**. But after 15 years on the job, even a small imbalance in her tool belt leaves her lower back screaming. She’s trying her company’s new integrated **safety system**: a lightweight exoskeleton that redistributes weight to protect her joints, while biometric sensors **prevent exhaustion**. It also integrates coordination and **project management**. Now she’s in the zone, 500 feet up on scaffolding, following the augmented reality instructions streaming to her safety goggles. She’s thankful for the new helmet that drowns out the noise pollution from jackhammering a few stories down. After her son’s friend unlocked the proprietary AR device, she can now stream her favorite comedian’s stand up—**integrating entertainment** while she takes a break.



ENABLED BY:

- Robotics
- Computer vision
- Distributed energy and batteries
- Human-machine interfaces
- Graph theory

To strike this balance:



Connecting with project manager’s dashboard for real-time stats on worker’s performance or fatigue



Integrating personal media streams into professional systems to improve user’s experience, when it’s safe to do so



Investing in a robotic extension of self for greater strength and safety—plus customized 3D-printed parts that can be melted down and remade for a new user

OVERVIEW

Each Expression of the New Body Language strikes a different balance of intentions. These intentions are complex and dynamic, and will change drastically based on time and place. A set of technology affordances and enablers, explained on the next page, make expressing all of these intentions possible.



THE ATHLETE

Reinforcing athlete's iconic stardom by optimizing and keeping focus on performance. **Hiding** potentially damaging movements from analysts before they manifest as injuries to deliver predictive maintenance. **Integrating** real-time muscle-level biometrics to augment fan interactions in immersive media.



THE FAN

Reinforcing beloved sports rituals in new contexts and with new sensations. **Connecting** with co-present fans around the world to make their presence felt in the stadium. **Investing** in all the game-day embellishments, which take the place of expensive season tickets.



THE EATER

Transforming our understanding of our bodies and environments with creative inquiry and higher-resolution lenses. **Connecting** with friends, family, and community through shared food and shared information. **Engaging** fully with the entire food experience—from soil to table to intestines—by quantifying subjective experiences.



THE UNWELL

Reinforcing his baseline sense of identity and well-being by preserving relationships and favorite activities. **Hiding** subtle changes from his family while keeping himself informed and sending important data to his doctor. **Engaging** with his devices and automated systems keeps his mind sharp in the present.



THE PARTIER

Connecting openly with everyone, radically transparent self-expression is his brand. **Ignoring** the constant noise while still engaging his many friends and fellow partiers is a delicate balance that's necessary to prevent burnout. **Disposing** of the accessories that track his buzz and mood. They always prominently display a brand—and he's always willing to try a new one if the price is right.



THE LABORER

Connecting with project manager's dashboard shows real-time stats on worker's performance or fatigue. **Integrating** personal media streams into professional systems improves the wearer's experience. **Investing** in a robotic extension of self makes the Laborer stronger and safer, while customized 3D printed parts can be melted down and remade for a new user.

AFFORDANCES AND ENABLING TECHNOLOGIES

Body area networks offer new capacities to both individuals and organizations. Across use cases are bigger picture technology affordances, each one connecting enabling technologies to specific opportunities and applications. In the spring, IFTF launched the research map *The Automated World*, which developed a series of five technology building blocks underpinning the future of automation. These building blocks lend amazing affordances to the New Body Language. They enable human expressions and form the connective tissue of body area network technologies.

CONTINUOUS CAPTURE AND SENSE-MAKING

Advances in sensors, transmission, data storage, and analysis capabilities will enable body area networks to provide a wealth of real-time data. As connected devices in and on us multiply, privacy becomes more challenging. We'll increasingly have to choose between the insights we want and the exposure we'll tolerate.

SIMULATING COMPLEX DECISIONS

Body area networks will bring new clarity to complex questions of personal health and well-being. From microbiotic sensors in our gut to clothing that senses every muscle, decisions of personal health will be simulated based on broader and more accurate inputs than today. How our behavior interacts with environmental health influencers will take decision support to another level.

ON-DEMAND INTELLIGENCE

Body area networks make vast amounts of data instantly available to us anywhere throughout our connected world. Artificial intelligence and supercomputing will be available not just in the palm of our hand, but inside our bodies, too.

EVOLVABLE HARDWARE

The fusion of software into hardware is transforming the way we think of performance upgrades of our devices, our machinery, and, in the future, our bodies. This means that body area network technologies will not be static, but constantly adapting to our demands for self-expression, functional needs, and regulatory guidelines.

ENCODED JUDGMENT

As intelligent machines make their way into the fabric of our lives, humans will start to encode boundaries into the behavior of automated devices. These boundaries will ensure human safety and also guide us towards our best intentions—or those of marketers.

ENABLING TECHNOLOGIES

Auditory recognition systems and computer vision will greatly expand the comfort and convenience of biometric data capture

Blockchain technologies will make transactions triggered automatically by our bodies more secure and private

Distributed computing will bring big data processing and analysis to even the smallest objects

Distributed energy and batteries will free our devices from inconvenient recharging

Graph theory will marshal human input and machine intelligence to offer creative solutions

Human-machine interfaces will make touch and gestures the primary interface of body area networks, making devices “disappear”

Inference engines will take complex biometric data to turn large, messy data into insight and prediction

Machine learning will ensure that as adoption increases, decision support will get more personal

Natural language processing will make the boundaries and suggestions of machine intelligence more accessible

Robotics will be an extension of our bodies through exoskeletons and prosthetics, while nano- and micro-scale robots may heal us on the molecular level

Sensors will use light, magnetism, and other non-invasive methods and tiny labs-on-a-chip to generate biological data in everyday life

SARAH SMITH

is a researcher and designer at IFTF, visualizing complex systems and provoking people to think about well-being futures in new ways.



With Miriam Lueck Avery, Andrew Trabulsi, and the Technology Horizons Team.

ABOUT THE
INSTITUTE FOR THE FUTURE

The Institute for the Future is an independent, nonprofit strategic research group celebrating 45 years of forecasting experience. The core of our work is identifying emerging trends and discontinuities that will transform global society and the global marketplace. We provide our members with insights into business strategy, design process, innovation, and social dilemmas. Our research generates the foresight needed to create insights that lead to action and spans a broad territory of deeply transformative trends, from health and health care to technology, the workplace, and human identity. The Institute for the Future is based in Palo Alto, California.

TECHNOLOGY HORIZONS PROGRAM

The Technology Horizons Program combines a deep understanding of technology and societal forces to identify and evaluate discontinuities and innovations in the next three to ten years. We help organizations and communities develop insights and strategic tools to better position them for the future. Our approach to technology forecasting is unique—we put people at the center of our forecasts. Understanding humans as consumers, workers, householders, and citizens allows IFTF to look beyond the technical capabilities and identify the value in new technologies, forecast adoption and diffusion patterns, and discover new market opportunities and threats, as well as anticipate how we will live, work, and connect with one another in the coming decade.

For more information on the
TECHNOLOGY HORIZONS PROGRAM

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