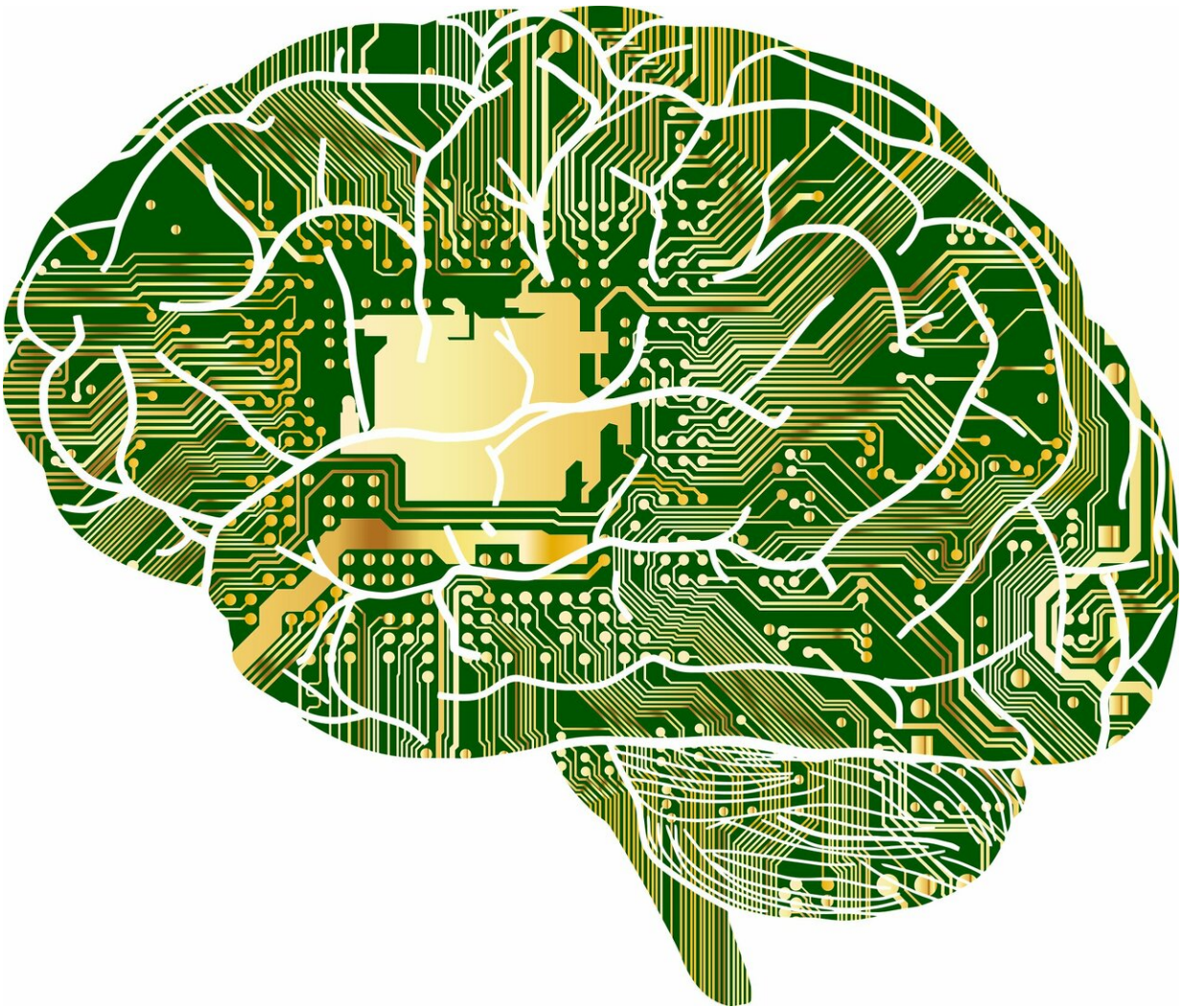# How intelligent workstations will use AI to improve health and happiness

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Credit: CC0 Public Domain

Statistics show that if you're reading this at work, you're likely indoors at a table or a desk. If so, pause for a moment: How's your posture? Is the room temperature comfortable? Lighting OK? In the U.S., 81 million office workers spend at least 75% of the day at a desk, and logging long hours in front of screens has been linked to significant health conditions, including heart disease and diabetes. There has to be a better way of doing work.

Shawn C. Roll of the USC Mrs. T.H. Chan Division of Occupational Science and Occupational Therapy—along with a team from USC and global design and engineering firm Arup—was recently awarded a $667,000 grant from the National Science Foundation to design a workstation that uses artificial intelligence. More than a smart desk that interacts with connected technology like a smartphone, this intelligent workstation will learn and adjust to worker preferences and patterns with the goal of improving overall well-being.

"The idea behind the workstation is not only to provide a comfortable work environment, but to move an individual toward healthier conditions," explained Roll, an associate professor and director of USC Chan's Ph.D. in Occupational Science Program.

The project has three parts, he added: lighting, temperature and "my focus—ergonomics, injury prevention and productivity and performance."

Health and well-being improvements via intelligent workstations

Burcin Becerik-Gerber, who is working alongside Roll, will be focused on thermal and visual comfort, two factors that can impact your health more than you might think.

"The current design of heating, cooling and lighting systems don't accommodate the differences we have in our preferences," said Becerik-Gerber, associate professor of civil and environmental engineering and Stephen Schrank Early Career Chair in Civil and Environmental Engineering at the USC Viterbi School of Engineering. "They're designed for specific standards."

For instance, she said, people with narrow thermal comfort ranges are more prone to type 2 diabetes, heart disease and obesity, and indoor lighting can create headaches and fatigue.

"And that can impact job satisfaction—and our lives," she noted. "We spend 86% of our time indoors. Our team wants office workers, including myself, to have the benefits of an intelligent workstation, because health and well-being is directly linked to your happiness in work."

Now six months into this three-year project, the researchers are currently working on using sensors to best understand a user's comfort level, including posture, lighting, ambient temperature and other environmental factors.

"The goal is for the machine to learn about the worker: Are you warm or cold? Do you prefer to be warm or cold? Do you have a headache and need dimmer lighting today? Are you getting tense and need to stand?" Roll explained.

To examine these social aspects of human–machine interaction, Becerik-Gerber and Roll are collaborating with Gale Lucas, research assistant professor of computer science at USC Viterbi and the USC Institute for Creative Technologies. The team is currently collecting focus-group input about how the workstation should offer prompts, including the degree of automation users are comfortable conceding. If the desk

senses that a user is positioned in such a way that might trigger back pain, should it make automatic adjustments with the user's health in mind? Or will people prefer having the final say over their workstations?

"I think it likely depends on the person," Roll said. "But I'm guessing if you're in the middle of something, you don't want your desk to start rising and tell you to stand up, if it's interrupting your workflow."

Computer workstations: An uncomfortable history

Since the widespread introduction of computer workstations in the 1990s, long office hours have been tied to a myriad of health- related conditions.

"At first, we saw a huge uptick in carpal tunnel because we were suddenly typing all the time, and where monitors needed to be positioned was causing neck problems," Roll said.

Yet as entire segments of the economy have become wholly dependent on digital tools, so too have workstations changed in ways that ultimately impact productivity and well-being. "A lot of us are multitasking, with multiple monitors and tabs," he explained. "Our workstations aren't always setup for that, which causes different types of musculoskeletal and eye strain."

Another unfortunate side effect of more automated systems and advanced technology is more sedentary behaviors, which can cascade to further chronic health conditions.

"Our lives are tied to this tech; more people are staring at their computers all day," he said. "We're seeing the relationship between office work and diabetes, heart problems and weight issues."

Recent trends of sit-stand desks, treadmill desks and adjustable chairs and monitors are useful, but, as Roll noted, people aren't always taking the initiative to adopt and use them.

"You can teach someone to modify their workstation in a healthy way, but unfortunately, people quickly fall back into their routines and habits," he explained. "That's what's really unique about these intelligent workstations: We're creating something to support that behavioral change in individuals."

For workstation design, form follows function

Ideally, the workstation could eventually learn to evolve based on different parameters and users' goals. That could mean maintaining fitness for healthy individuals, improving habits for workers who want to be healthier or adjusting to somebody's specific physical impairment or disability.

"We aim to design a workstation that can sense all of these things, process that information and provide feedback, so we can improve wellness and performance across all of these different categories," Roll said.

Additionally, employees who feel better will perform better, boosting productivity for companies.

"I think the benefits are tremendous," Becerik-Gerber said. "If people want to use their spaces and feel better while at work, things like absenteeism, work-related injuries and conditions will decrease. If we can help people become healthier and more productive, that would be a huge benefit to employers."

Every good designer knows that form follows function, meaning that the

eventual shape of the intelligent [workstation](link) of the future remains to be seen.

"It goes beyond a desk; that's where it gets a little sci-fi and Star Trek," Roll said. "It might include the surrounding walls and heaters; it may become an entire capsulated bubble that's completely connected to one person and their individual needs."

Provided by University of Southern California