

Feeling anxiety? Reverse-engineering the brain could help

May 1 2020, by Janese Heavin



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The anxiety you may be feeling right now in the midst of the COVID-19 pandemic stems back to our prehistoric need to survive. Biologists have explored this principle for decades.

Those [breathing techniques](#) that your mobile app, HR office or best friend might be recommending? They can help—psychology studies have proven this.

But what's happening inside your [brain](#) during those deep breaths? That's a problem for engineering.

And that's where researchers such as Satish S Nair come in. Nair is a professor of Electrical Engineering and Computer Science, director of the Neural Engineering Lab and was one of the first researchers to begin using engineering principles to better understand the complex circuits inside our heads that keeps us functioning.

It's called reverse-engineering the brain, and it's among the National Academy of Engineering's Grand Challenges for Engineering in the 21st Century.

While much is known about the mind from a psychological perspective, science has yet to understand the intricate pathways that communicate behind the scenes, such as when you're feeling anxiety.

"Engineering is now modeling brains as circuits," Nair said. "We need to find out what is going on when those circuits malfunction."

His work involves building computer circuits that mimic the brain to replicate neural processes. As part of a five-year grant from the National Institutes of Health, his team is studying the role of brainwaves in fear and reward circuits in our brain, including possible interventions to prevent anxiety.

Nair also strives to prepare future generations of scientists for the field. He oversees a summer Research Experiences for Undergraduates in Neuroscience program that attracts high-achieving students from other

universities around the country.

The REU was one of the first to focus on interdisciplinary neuroscience. The National Science Foundation this month awarded Nair funding to continue and expand the program. Next summer, participants will spend a week gaining computational skills before conducting research in their respective fields, such as biology, psychology or medicine.

The idea is to get more researchers from a broad spectrum of disciplines to view the brain through an engineering lens, Nair said.

And that may eventually lead to medical breakthroughs. According to the NAE, reverse-engineering the brain could help dementia patients remember. It may help people with [visual impairments](#) see or those who are wheelchair-bound walk.

It could also lead to new, more effective treatments for that anxiety you may be feeling.

For now, though, Nair recommends using tried and true methods, even if we don't understand why they work. Turn off news and stressful TV shows that fire up the survival circuits in your brain. Instead, play a game. Exercise. Meditate. Sing.

"Our grandparents knew the benefits of taking a walk, sitting outside watching the clouds float by and listening to the birds. They just didn't have the data behind it," Nair said. "Even simple techniques like listening to your breathing can help calm you. Find whatever works for you as far as controlling your subcortical fear center—that part of the brain programmed for survival. We don't normally think of it that way. Engineering is showing us that we should by understanding how these activities engage and help rewire our brain."

Provided by University of Missouri

Citation: Feeling anxiety? Reverse-engineering the brain could help (2020, May 1) retrieved 5 May 2024 from <https://medicalxpress.com/news/2020-05-anxiety-reverse-engineering-brain.html>

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