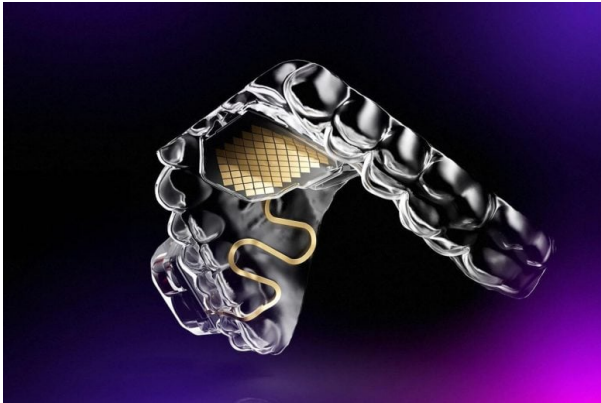


# Paralyzed Users Can Now Interact with Computers

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Courtesy of SynEvol  
Credit: Augmental

Tomás Vega created the MouthPad through his firm, Augmental, to allow people with disabilities engage with technology using just their tongues and head motions. His journey from a technology-enthused child to a creative CEO demonstrates his dedication to improving the lives of persons with physical disabilities.

When Tomás Vega was five years old, he began stuttering. The event taught him to appreciate the challenges that come with having a disability. It also showed him the power of technology.

"A keyboard and mouse were outlets," Vega explains. "They let me be fluent in the things I did. I was able to overcome my restrictions, therefore I became preoccupied with human enhancement and the concept of cyborgs. I also developed empathy. I believe we all have empathy, but we apply it based on our personal experiences.

Since then, Vega has been enhancing human capacities through technology. At twelve, he started learning to program. He assisted individuals with disabilities such as multiple sclerosis and hand impairments while he was in high school. Vega developed innovations during her student years, first at MIT and then the University of California, Berkeley, which enabled individuals with disabilities to lead more independent lives.

Vega is currently the CEO and co-founder of Augmental, a firm that uses technology to enable individuals with movement disabilities to easily engage with their personal computers.

The MouthPad, which enables users to operate their computer, smartphone, or tablet with tongue and head movements, is Augmental's debut product. The pressure-sensitive touch pad of the MouthPad rests on the roof of the mouth and uses two motion sensors to convert head and tongue motions into real-time Bluetooth cursor scrolling and clicks.

According to Vega, "we have a large portion of the brain that is devoted to controlling the position of the tongue." There are eight muscles in the tongue, and the majority of them are slow-twitch, meaning they don't tire out as rapidly. I reasoned, "Why don't we take advantage of all of that?"

The MouthPad is already being used daily by people with spinal cord injuries to enable independent interaction with their favorite devices. Living with quadriplegia, one of Augmental's users says the gadget has made it easier for her to write math formulas and study in the library—use cases where prior assistive speech-based devices weren't fit. The user is a math and computer science major in college.

Vega claims, "She can now play games with her friends and take notes in class." She is increasingly self-reliant. Getting the MouthPad, according to her mother, was the most important thing she had done since being hurt.

Enhancing the accessibility of technology that have become a vital part of our lives is Augmental's ultimate goal.

According to Vega, "our goal is for an individual with a severe hand impairment to be able to use a phone or tablet just as competently as someone who can use their hands."

While in his first year at UC Berkeley in 2012, Vega got to know Corten Singer, who would later co-found Augmental. He informed Singer that year that he was committed to enrolling in the Media Lab as a graduate student. Four years later, he succeeded in doing so, joining the Fluid Interfaces research group led by Pattie Maes, the Germeshausen Professor of Media Arts and Sciences at MIT.

"I applied to the Media Lab as my only graduate program," Vega states. "I believed it to be the sole location where I could achieve my goal of enhancing human potential."

Vega studied electronics, signal processing, and microfabrication at the Media Lab. In addition, he created wearable technology that helps people better sleep, control their emotions, and access online information.

"I was able to apply my background in engineering and neuroscience to build stuff at the Media Lab, which is what I love doing the most," Vega adds. "The Media Lab is like Disneyland for makers, in my opinion. I could just play and explore without worrying about anything.

Though Vega had always been drawn to the concept of a brain-machine interface, an internship at Neuralink changed his mind and led him to look for an alternative.

"I saw a lot of obstacles that prevented me from working on it right now, but I believe a brain implant has the greatest potential to help people in the future," Vega adds. "The first is the protracted development schedule. Over the years, I've made a lot of friends who were in desperate need of help yesterday.

He made the decision to develop a system at MIT that would have all the benefits of a brain implant but none of its drawbacks.

Vega constructed what he refers to as "a lollipop with a bunch of sensors" during his final semester at MIT in order to evaluate the mouth as a medium for computer interaction. It performed flawlessly.

"I think this has the potential to change so many lives at that point," Vega recalls, calling her co-founder Corten. "It might also alter how people use computers in the future."

Vega made advantage of MIT resources such as the MIT I-Corps program, the Venture Mentoring Service, and vital early funding from the MIT E14 Fund. At the end of 2019, Vega received her degree from MIT, marking the official birth of Augmental.

Every MouthPad design is created by Augmental using a 3D model that is derived from a mouth scan. After that, the team uses dental-grade materials to 3-D print the retainer and adds the electronic components.

Users of the MouthPad can move their tongues left, right, up, and down. Additionally, they may left-click by pressing on their palate and right-click by making a sipping motion. People with stronger neck control can utilize head-tracking to move the cursor on their screen, while others with less control over their tongue can employ alternative movements like bites and clenches.

"We aim to develop a multimodal interface that allows you to select the mode that best suits your needs," Vega explains. "We aim to accommodate all circumstances."

Several of Augmental's users now suffer from spinal cord injuries, which prevent them from moving their hands or heads. The device has been utilized by programmers and gamers alike. The MouthPad is used daily for up to nine hours by the company's most active users.

According to Vega, "it's amazing because it means that our solution has really seamlessly integrated into their lives and they are finding lots of value in it."

Over the next year, Augmental hopes to receive approval from the US Food and Drug Administration to enable users to operate robotic arms and wheelchairs, among other things. Additionally, users' insurance reimbursements will be unlocked by FDA clearance, increasing the product's accessibility.

The next iteration of Augmental's system, which will react to whispers and even more delicate movements of internal speech organs, is already under development.

As many of our early client segment have lost or have reduced lung function, that is critical, according to Vega.

The advancement of AI agents and related hardware also bodes well for Vega. According to Vega, Augmental has the potential to be a useful tool for everyone, regardless of how the digital world develops.

One day, according to Vega, "we hope to provide an always-available, robust, and private interface to intelligence." "In our opinion, this is the most expressive, wearable, and hands-free input system ever designed by humans."

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