

## A Hands-Free Controller for Video Games



Six years ago, Gyorgy Levay overcame a devastating meningitis infection that robbed him of one arm and one hand. An avid gamer, he was no longer able to play video games like *World of Warcraft*.

"I can play several video games, but not games that require forward, backward, left or right movements," says Levay, a biomedical engineering master's degree candidate. "You need fingers for that."

That's why Levay helped design a new hands-free control system, GEAR, that's worn like a pair of sandals and allows users to execute more than 15 commands with their feet.

Products like feet-controlled button pads exist but can be uncomfortable to operate because they require users to keep their legs positioned in a certain way. GEAR lets users move their legs freely without impacting the controller's performance.

GEAR sprouted out of an assignment in biomedical engineering professor Nitish Thakor's Principles of Design of Medical Instrumentation class.

"What this does is take buttons and put them on your feet," explains Levay, who worked with biomedical engineering grad students Adam Li and Nhat Tran.

At the bottom of each sandal are three pressure sensors that detect movement. Wires relay that information to an Intel Edison microcontroller tucked into the left heel, which then communicates via USB cable to the user's computer. Applying weight on the front right sandal, for instance, causes players to move forward in a game.

GEAR's developers see the controller being used in a variety of computer tasks.

In May, the team won the 2016 Intel-Cornell Cup's \$7,500 grand prize for an innovative application of embedded technology.

The team members worked with Johns Hopkins Technology Ventures to obtain a provisional patent for their invention. They're hoping a company will license GEAR so production of the controller can begin.

**WEB EXTRA: Meet the team that built GEAR by clicking on this article at [hopkinsmedicine.org/insight](http://hopkinsmedicine.org/insight).**

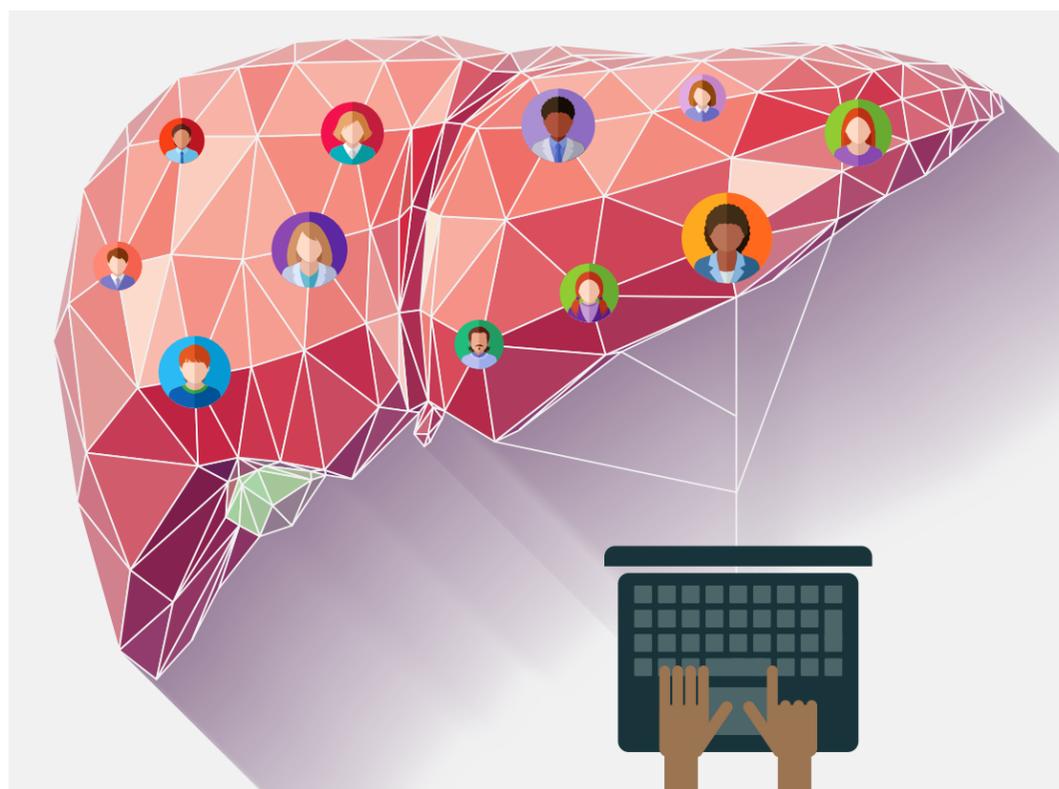


PAUL ZWOLAK / MARLENA AGENCY

## A Virtual Space for Children with Liver Disease and Their Families



For patients suffering from rare forms of liver disease, finding other people with the same illness can be tough. Even doctors studying these illnesses can have trouble finding enough patients for their research.



Liver Space, a new Facebook application led by pediatric gastroenterologist Douglas Mogul, seeks to address these problems by linking both groups through Facebook.

"It's designed to strengthen online communities, serving as a bridge to health care providers and a portal for conducting research," says Mogul.

Two years ago, Mogul realized that many pediatric liver disease patients and their families were convening around liver disease Facebook pages. Colleagues at the Technology Innovation Center told Mogul he could tap into these information-hungry communities by creating an app within Facebook—essentially, a page with added functions, like physician-selected news feeds and the ability for users to directly message questions to Mogul.

Built by the Technology Innovation Center and launched in August, Liver Space is the first Johns Hopkins health app designed using Facebook's

app toolkit. Users sign up by visiting [apps.facebook.com/liverspace](https://apps.facebook.com/liverspace) and creating a profile. Notifications about new Liver Space content are then automatically posted to the user's Facebook account. It also offers self-care tools, like lab results tracking and the ability to connect with others nearby who have the same disease.

In addition, Liver Space allows Mogul to reach out to members with a specific liver disease for study opportunities aimed at improving their quality of life.

"It's an opportunity to reach people who I think are often not part of major research," says Mogul.

The project was made possible by a Gilead Foundation grant, and Mogul has hired a social media coordinator to ensure Liver Space has new daily content. He's now in discussions about building a similar site for people with kidney disease.



A look at innovative developments outside the halls of Johns Hopkins Medicine

## Advances in Telemedicine

**T**hrough its **NYP OnDemand telemedicine platform**, **NewYork-Presbyterian health system is providing patients across the country with digital second opinions in 80 medical specialties.** Rather than traveling to New York City, patients can pay an \$800 one-time fee to receive a second opinion from a NewYork-Presbyterian physician. 📺

**C**leveland Clinic and **CVS Health MinuteClinics in Ohio have teamed up with the vendor American Well to provide online and mobile telehealth technology.** Patients go to their neighborhood CVS MinuteClinic and connect with a Cleveland Clinic expert for help with nonemergency care needs, such as coughs, rashes and infections, as well as ongoing, chronic conditions, such as diabetes. The virtual visits will cost patients \$50, in addition to the regular charge to see the MinuteClinic nurse. 📺

**M**assachusetts General Hospital **TeleHealth's Virtual Visits allow patients to meet Mass General clinicians and community providers via a secure video chat on a computer or tablet.** Patients covered by Blue Cross Blue Shield pay a normal office visit copay of \$25 per virtual visit. 📺

**P**enn State Hershey Medical Center's **LionNet telemedicine program provides "telestroke consultations" to a network of physicians at regional hospitals to greatly increase their efficacy in treating stroke patients.** LionNet aims to treat stroke patients faster and reduce transfer rates from small and rural hospitals. 📺

## Johns Hopkins-Derived Drug Could Transform Heart Failure Treatment



In 2015, two Johns Hopkins researchers and their business partners sold a company they co-founded for \$300 million to Bristol-Myers Squibb. The company, Cardioxyl Pharmaceuticals, was formed around an intravenous treatment for late-stage heart failure that has been in the making for 15 years.

It all began when Nazareno Paolucci, a postdoc in cardiology at the time, told his faculty mentor about a compound called HNO, or Angeli's salt. When Paolucci injected a solution of the salt into dogs, their hearts' pumping power increased, and their veins and arteries dilated, making it easier for their hearts to work.

Paolucci's mentor, David Kass, told him the improvement could have been due to any number of things. So Paolucci repeated his experiment and recorded the same positive results. That's when Kass became a believer.

After publishing papers in 2001 and 2003 on the effects in canines, Paolucci and Kass, along with several pioneers they met in the HNO field, patented the concept in 2004.

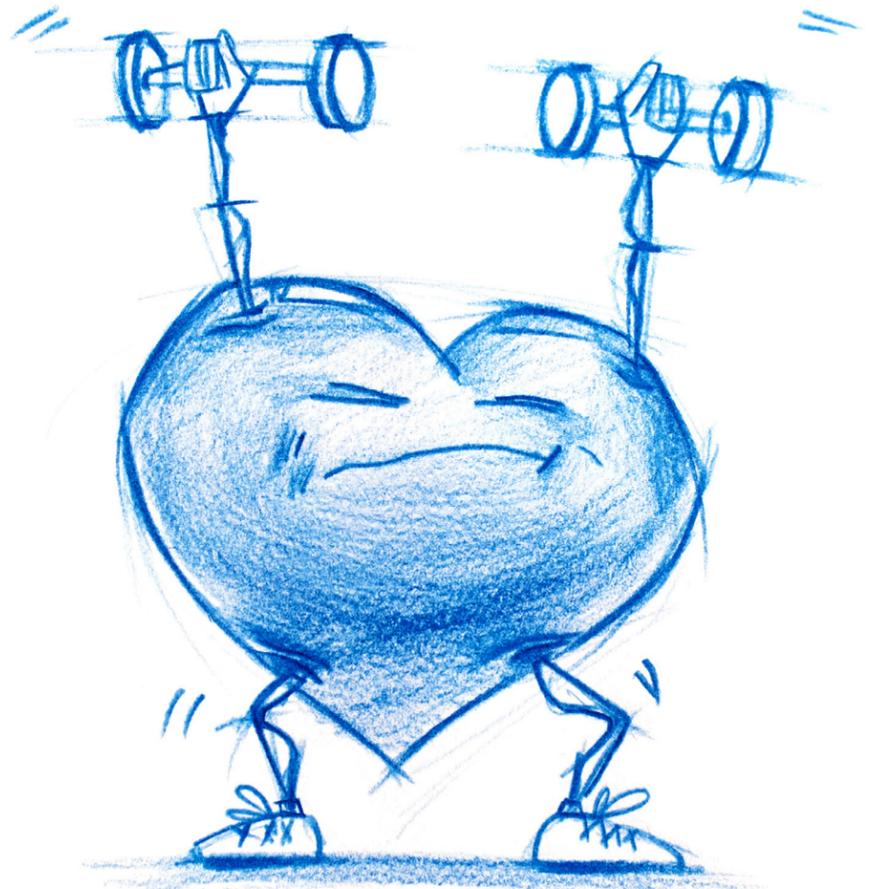
Not long after that, Johns Hopkins Technology Ventures connected the group with a venture capitalist and two pharmaceutical company veterans. As a result, Cardioxyl Pharmaceuticals was born in 2005 to develop a compound for human use.

Venture capital flowed in, and a drug went into clinical trials by 2009. After redness appeared on test subjects' arms at the site of injection, the researchers came up with a new compound. Called CXL-1427, it proved in clinical trials to have a great effect on heart function without any toxicity.

With the trials back on, the group considered its next move. That's when Cardioxyl was sold to Bristol-Myers Squibb.

If the drug proves effective in further trials, Kass says the ultimate goal would be a treatment for heart failure before it reaches

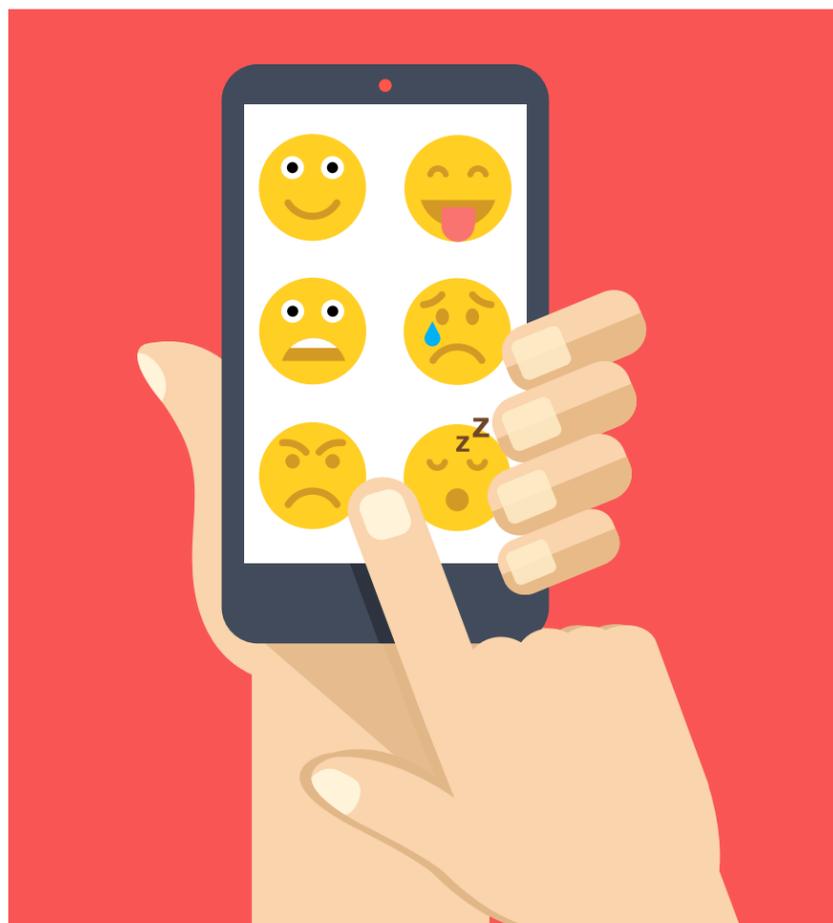
the late stages—something HNO might have the potential to do.



## Technology Licensed from Johns Hopkins Sends Texts to Track Moods



Psychiatrist Adam Kaplin received a phone call from a patient having unpleasant side effects from a new medication for his mood disorder. When Kaplin checked the patient's online mood chart, he noticed the patient was reporting stable moods since he started the drug, compared to the highs and lows of the previous weeks.



Thanks to a system called Mood 24/7, Kaplin finds patient participation in mood charting—rating and recording how they feel each day—skyrocketed from 10 to 90 percent. The traditional paper charts used for mood monitoring are often backfilled while patients sit in the waiting room before their appointment.

"I can't remember what I had for dinner three days ago," says Kaplin. "How can they remember what their mood was like a week ago? Even when it's complete, the traditional chart often delivers bad data."

In 2010, Kaplin met with Remedy Health Media, a health information technology company, and shared his idea for a better system: one that would text patients to ask them to rate their mood each day. People would text a response using a scale from one to 10, and the information would be stored on a HIPAA-secure website.

The company loved his idea. It soon licensed the technology from Johns Hopkins Medicine and built the system. Today, there are more than 15,000 registered users of mood247.com, including patients, doctors and family members. Kaplin says he believes its success comes from the fact that it's based on something people already use—text messages.