

# Ready, set, think! Mind-controlled drones race to the future

22 April 2016, by By Jason Dearen



from Intel Corp. Organizers want to make it an annual inter-collegiate spectacle, involving ever-more dynamic moves and challenges, and a trophy that puts the brain on a pedestal.

"With events like this, we're popularizing the use of BCI instead of it being stuck in the research lab," said Chris Crawford, a Florida PhD student in human-centered computing. "BCI was a technology that was geared specifically for medical purposes, and in order to expand this to the general public, we actually have to embrace these consumer brand devices and push them to the limit."

In this April 16, 2016 photo, a University of Florida student uses a brain-controlled interface headset to fly a drone during a mind-controlled drone race in Gainesville, Fla. For more than a century science has been able to detect brainwaves, but recent advances in cheaper equipment like the electroencephalogram, or EEG, headsets worn by the drone racers is moving the technology out of the lab. (AP Photo/ Jason Dearen)

Wearing black headsets with tentacle-like sensors stretched over their foreheads, the competitors stare at cubes floating on computer screens as their small white drones prepare for takeoff.

"Three, two, one ... GO!" the announcer hollers, and as the racers fix their thoughts on pushing the cubes, the drones suddenly whir, rise and buzz through the air. Some struggle to move even a few feet, while others zip confidently across the finish line.

The competition—billed as the world's first drone race involving a brain-controlled interface—involved 16 pilots who used their willpower to drive drones through a 10-yard dash over an indoor basketball court at the University of Florida this past weekend. The Associated Press was there to record the event, which was sponsored with research funding



In this photo taken April 16, 2016, University of Florida sophomore Michael Lakin, 19, uses a brain-controlled interface headset to fly a drone during a mind-controlled drone race in Gainesville, Fla. For more than a century science has been able to detect brainwaves, but recent advances in cheaper equipment like the

electroencephalogram, or EEG, headsets worn by the drone racers is moving the technology out of the lab. (AP Photo/Jason Dearen)

Scientists have been able to detect brainwaves for more than a century, and mind-controlled technology is already providing for medical breakthroughs, helping paralyzed people move limbs or robotic prosthetics. But only recently has the technology become widely accessible. The electroencephalogram headsets the competitors wore can be purchased online for several hundred dollars.

Here's how the technology moves from abstract thought through the digital realm and into the real world: Each EEG headset is calibrated to identify the electrical activity associated with particular thoughts in each wearer's brain—recording, for example, where neurons fire when the wearer imagines pushing a chair across the floor. Programmers write code to translate these "imaginary motion" signals into commands that computers send to the drones.

Professor Juan Gilbert, whose computer science students organized the race, is inviting other universities to assemble brain-drone racing teams for 2017, hoping to push interest in a technology whose potential applications seem to be limited only by the human imagination.

to Richard Tursi, 19, who is undergoing therapy that uses a brain-controlled technology to help improve his motor functions at the University of Miami Miller School of Medicine in Miami. Tursi was in a motorcycle accident when he was 16 which left him a quadriplegic. Now he has the limited use of his arms and legs. The therapies have improved his brain function, allowing him to stand and move his arms. (AP Photo/Lynne Sladky)

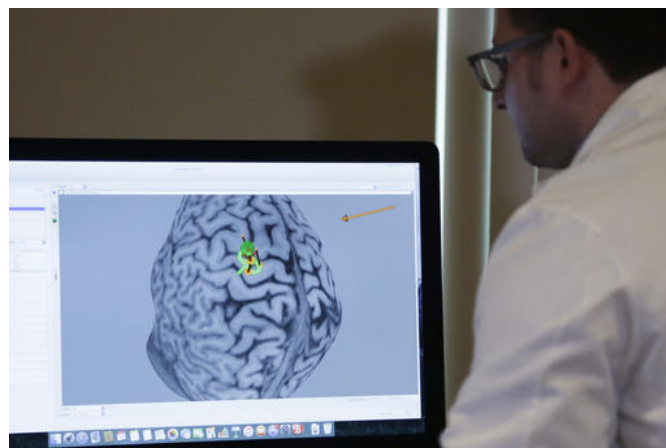
So far, BCI research has largely been about helping disabled people regain freedom of movement. Recently, an Ohio man using only his thoughts was able to move his paralyzed hand through a chip implanted in his brain. In Miami, doctors using BCI are helping a 19-year-old man stand on his own after losing the use of his legs in a motorcycle accident.

While implanted devices are more powerful, non-invasive brainwave readers are now much less expensive. Emotiv and NeuroSky are among the startups marketing EEG headsets for hundreds of dollars, with varying levels of quality. The models used by the Florida racers Saturday cost about \$500 each.

As our lives become increasingly reliant on Internet-enabled devices, a concept known as the Internet of things, Gilbert and his team want to know how mind-controlled devices could expand and change the way we play, work and live.



In this photo from April 13, 2016 Dr. Monica Perez talks



In this April 13, 2016 photo, Dr. Mike Urbin views highlighted areas of the brain while working with patient

Richard Joseph Tursi at the Miami Project to Cure Paralysis at the University of Miami Miller School of Medicine in Miami. Tursi was in a motorcycle accident when he was 16 which left him a quadriplegic. Now he has the limited use of his arms and legs. The therapies have improved his brain function, allowing him to stand and move his arms. (AP Photo/Lynne Sladky)

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"The progress of the BCI field has been faster than I had thought ten years ago," He said. "We are getting closer and closer to broad application."

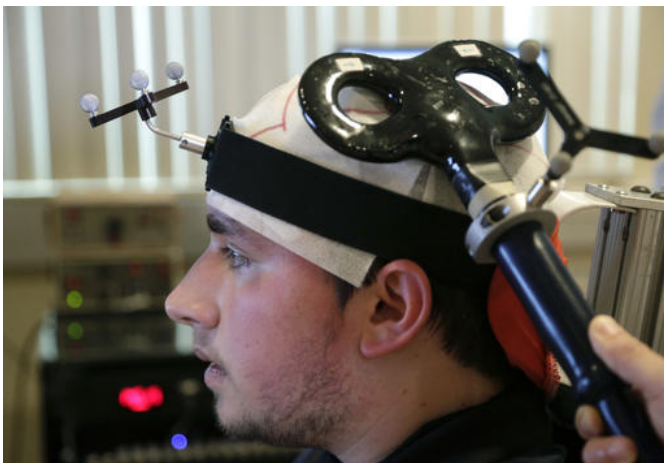
You might use your mind to unlock your car, or explore a virtual world, hands-free. It could be applied for real-time monitoring of our moods and states of consciousness. Researchers are studying whether they can use a big rig driver's mind to trigger a device that will tell him when he's too tired to drive.

But as the technology moves toward wider adoption, ethical, legal and privacy questions remain unresolved.

"One day you could wear a brain-controlled interface device like you wear a watch, to interact with things around you," Gilbert said.

The U.S. Defense Department—which uses drones to kill suspected terrorists in the Middle East from vast distances—is looking for military brain-control applications. A 2014 Defense grant supports the Unmanned Systems Laboratory at the University of Texas, San Antonio, where researchers have developed a system enabling a single person with no prior training to fly multiple drones simultaneously through mind control.

The idea of collegiate brain-drone races pleases Dr. Bin He, a biomedical engineer at the University of Minnesota who first demonstrated a mind-controlled drone in public in 2013.



In this photo from April 13, 2016 Richard Tursi, 19, undergoes therapy that uses a brain-controlled technology to help improve his motor functions at the Miami Project to Cure Paralysis at the University of Miami Miller School of Medicine in Miami. Tursi was in a motorcycle accident when he was 16 which left him a quadriplegic. Now he has the limited use of his arms and legs. The therapies have improved his brain function, allowing him to stand and move his arms. (AP

In this April 15, 2016 photo, University of Florida PhD student Islam Badreldin, 31, practices driving a brain-controlled vehicle that he modified to work wirelessly in Gainesville, Fla. For more than a century science has been able to detect brainwaves, but recent advances in cheaper equipment like the electroencephalogram, or EEG, headsets worn by Badreldin is moving the technology out of the lab. (AP Photo/Jason Dearen)

In the this system, instead of the pilot thinking certain thoughts to move the drones, she looks at a screen with flickering signals, triggering brain

activity that translates into specific movements. "It can accommodate lots of commands, much more than imaginary motion can," UT scientist Yufei Huang said.

But enthusiasts should think carefully before they hand over their brainwaves for purposes that have yet to be conceived or contained, said Kit Walsh, a staff attorney at the Electronic Frontier Foundation with a degree in neuroscience from MIT.

"EEG readings are similar to fingerprints: once I know what the readings look like from your brain in a certain situation," she said. "I'll be able to recognize you by that pattern again later on."

**More information:** Brain Drone Race:  
[braindrone.com/](http://braindrone.com/)

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