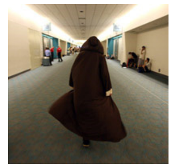
WIRED

Login / Register | RSS Feeds

CULTURE
Internet Endangers Big-City Tradition: The Bike Messenger
14 hours ago



COMIC-CON
Gallery: Scenes From Comic-Con 2008
15 hours ago

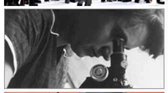
SECURITY
Did the U.S. Army Arrange 'Sweetheart' Deal to Sell Russian Helicopters to Iraq?
7 hours ago

FAKE IT TILL YOU MAKE IT
How to Make Friends With Celebrities
18 hours ago

HOW-TO WIKI
Are You Internet Famous? Get Your Score
18 hours ago

Top Stories GO

ENTERTAINMENT
Review: X-Files Flick Falls Short of Show's Glory Days
2 hours ago



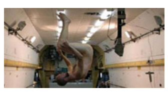
THIS DAY IN TECH
July 25: Four Women Who Made a Difference
14 hours ago

COMIC-CON
Gallery: Comic-Con's Costumed Crusaders
15 hours ago

CULTURE
China Achieves World Domination — in Web Surfing
12 hours ago

BE A HERO
How to Look Good on TV
18 hours ago

HOW-TO WIKI
How to Promote Yourself, Boost Your Geek Cred and Be the Hero
07.23.08



SPACE
Brad Pitts (Note Spelling) Floats Naked in Zero-G
23 hours ago

PORTFOLIO
A Dot-Com Banker Who's Stuck in the Past
4 hours ago

GADGETS
IPhone 2.1 Update to Bring Turn-by-Turn GPS?
7 hours ago

POLITICS
Net Neutrality Gains Traction In '08 Senate Races
12 hours ago

LAW
Senate Introduces IP-Reform Bill Bolstering Enforcement
18 hours ago

COMIC-CON
Jokers, Jokers Everywhere at Comic-Con
20 hours ago

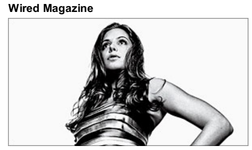
SPACE
Scientists Discover What Makes Northern Lights Dance
23 hours ago

PROMOTE YOURSELF
How to Set Up a Velvet Rope on Facebook
07.23.08

Nuclear History

Gallery: Nuclear Blasts Show Terrifying Power

Wired Magazine



Internet Famous: Julia Allison and the Secrets of Self-Promotion

LATEST BLOG POSTS | MOST POPULAR ARTICLES | HOTTEST WEB LINKS

Wrong! Lossless Formats Will Not Destroy MP3
Rumors of the imminent demise of the MP3 format are exaggerated, and I for one won't stand for it. A recent Dvice article claims that the compressed MP3 is going the way of the Dodo bird because everybody's going to...
07.25.08 From Listening Post

Scientist Builds Visual Circuits to Harness Your Brain's GPU
A cognitive scientist wants to employ M.C. Escher's bag of optical tricks to get your eyes to solve logic problems. More specifically, he suggests that human beings can use their brain's visual processing abilities to solve LSAT-style logic puzzles, simply...
07.25.08 From Wired Science

Attack of the Con - Updated!
The City is in chaos. Superheroes are swarming around like a cloud of bats. Wil Wheaton and Felicia Day are reporting traffic on the 5, and it's not looking good. A scene from the next big-budget thriller? No, it's just...
07.25.08 From Geekdad

E-Gold Founder Pleads Guilty to Money Laundering
Douglas Jackson, the founder and director of the online payment service e-Gold and its parent company Gold & Silver Reserve, has ended a two-and-a-half-year battle with the Justice Department and pleaded guilty to charges pertaining to money laundering and operating an unlicensed money transmitting business....
07.25.08 From Threat Level

Why Won't Google Video Just Die?
No one disputes the fact that Google dominates the online video space. The company controls an estimated 34% of the market, according to comScore, and its closest competitor -- Fox Interactive -- only has about 6% share. The lion's share...
07.25.08 From Epicenter

Review: Nokia E71 is a Legit iPhone Killer — We're Serious This Time
Nokia E71 The E71 looks more like a Blackberry Killer, but don't be fooled, this great white hope from Finland is a smart device that gives the iPhone a run for its money in a lot of different areas (yes,...
07.25.08 From Gadget Lab

Longevity Drug Could Affect Biological Clock
Two new studies have found the molecular link between circadian rhythm and metabolism -- and it turns out to be a protein targeted by resveratrol, a potentially longevity-enhancing drug. Neither of the studies, published yesterday in Cell, tested the metabolic...
07.25.08 From Wired Science

Astronaut Reisman on Colbert Again, This Time With Gravity
Astronaut Garrett Reisman visited the Colbert Report studio last night as an encore to the remote interview he did with Colbert from the International Space Station. Kudos are in order for Reisman. Both interviews were expertly funny and delightfully human,...
07.25.08 From Wired Science

Undersea 'Bot Gets Trial Run
Underwater truly is the final frontier for military robots. It's a question of control: water's the worst medium for transmitting secure control signals between the 'bot and its human handler. That's why even "smart" torpedoes trail a miles-long wire that...
07.25.08 From Danger Room

Five for Fighting 07/25/2008
* Microwave 'sound' weapon would fry your head * Team Blackswift! * Missile crews catch some shut eye (on the job) * Nuclear first strike plan killed * When an F-16 attacks a GMC Suburban
07.25.08 From Danger Room

Most Recent 1-10 of 100 | Page: 1 2 3 4 5 6 7 8 9 10 next » Oldest

Wired.com Photo Contest

Waterfalls Take Over NYC, Show Us Your Photos

Tech Jobs

**PHP/mySQL Developers!
CONSUMERTRACK.COM, EL SEGUNDO, CA/Redondo/Beach
Interactive Producer/Project Manager
Los Angeles, CA
Graphic Design Director
Rapp Collins Worldwide, El Segundo (West Los Angele...
More jobs | Post a job Powered by JobThread

Subscription: Subscribe | Give a Gift | Renew | International | Questions | Change Address

Quick Links: Contact Us | Login/Register | Newsletter | RSS Feeds | Tech Jobs | Wired Mobile | FAQ | Site Map

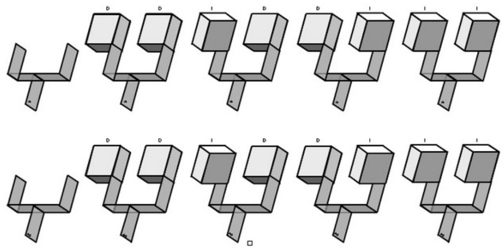
Corrections | Contact Us | Newsletter | Wired Staff | Press Center | FAQ | Wired Insider | Sitemap

Subscribe | Subscription Questions | Renew Subscription | Give a Gift | International Subscriptions | Advertising | Media Kit | Careers

Visit Our Sister Sites: Concierge.com | Epicurious.com | Men.style.com | Style.com | Flip.com | Wired.com | Lipstick.com | NutritionData | YM.com | Allure | Architectural Digest
Brides | Cookie | Condé Nast Portfolio | Domino | Glamour | Gourmet | Lucky | Men's Vogue | Self | Teen Vogue | The New Yorker | Vanity Fair | W

Scientist Builds Visual Circuits to Harness Your Brain's GPU

By Alexis Madrigal July 25, 2008 | 1:16:17 PM Categories: Cognition, Perception



A cognitive scientist wants to employ M.C. Escher's bag of optical tricks to get your eyes to solve logic problems.

More specifically, he suggests that human beings can use their brain's visual processing abilities to solve LSAT-style logic puzzles, simply by staring at images designed to get their eyes to compute. Because this form of visual processing feels so effortless, such problems might be much easier to solve than their written counterparts.

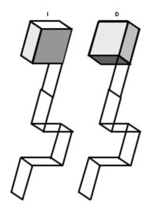
The key, said Mark Changizi, a former Caltech fellow and current cognitive science professor at Rensselaer Polytechnic Institute, is tapping into the incredible processing potential of our visual cortex -- the half of our brains dedicated to converting reflected light into *seeing*. He compared the precociousness of that innate visual-processing capacity, which everyone has, to the "Rain Man"-style abilities displayed by some autistic people.

"Autistic people can't be any smarter than us, but probably what they have is the ability to harness parts of their brains that we can't," Changizi said. "What their amazing powers show is that we have these amazing powers. We totally underappreciate the powers of computation that we use all the time."

In some ways, Changizi is taking the same approach to problem solving as some computer makers, who are starting to tap powerful graphics processing units for more general-purpose computing tasks. In Changizi's case, he's trying to allocate tasks to the brain's GPU that are normally assigned to the brain's CPU. What's more, he's using the brain's visual capabilities to process visual "software" (such as the images in this article) and produce useful outputs. It's a radical concept and one with few precedents in cognitive or computer science.

Here's how the system, published in the most recent issue of the journal Perception, works.

The diagram at the right shows the simplest "wires" in Changizi's system, representing 1 and 0.



By staring at the "1" box at the top of the left circuit, the entire circuit, including the bottom, appears to face towards you. Similarly, by staring at the "0" box, that entire circuit appears to face away from you. In this way, Changizi says, the circuits "transmit" a signal from the top to the bottom.

Starting from these simple building blocks, Changizi built visual operators for AND, NOT and OR by manipulating the transparency of certain lines and fields. These operators function on the same principle as the simpler wires. Take the image at the top of this article. It shows the permutations of the OR operator on the top and the AND operator on the bottom. By parsing the visuals at the top of each circuit, your eyes flip the bottom part either towards or away from you, giving you either a 0 or a 1 -- the correct logical output of the binary operation.

With refinement, Changizi hopes this approach will open up the entire gamut of possible circuits.

"Once you have a NOT, AND and OR you could conceivably do any digital circuit computation," he said.

But the system isn't fool-proof. Even simple circuits can suffer from the Escher problem, as the 1s and 0s flip back-and-forth randomly the longer you stare at them. Changizi hopes that training his Rensselaer students on the system will make them better at this type of logic.

"We all have to learn how to read, so I'm going to be teaching courses where instead of digital logic notation, we teach this," he said. "Once kids are trained up on it, could they get much better at it than someone just walking in off the street?"

Changizi argues that if students could get fluent with the system, they'd have a distinct advantage over their peers in logical thinking. That's because visual perception *feels* effortless, even though our brains have to work hard to do it. Computing with his visual circuits isn't like doing math.

"It's a perceptual walkthrough rather than a cognitive walkthrough," Changizi said. "You just stare at it."

Eventually, he hopes that the correct answer to digital circuit calculations will simply appear to our eyes, like the 3D picture emerging from a stereogram.

"The nicest case would be to stare at some stimulus and see the answer at once," he said.

Changizi knows that day is a long way off. Like the early work being done with DNA-based computation and quantum computing, his visual-processing system is still more proof of concept than a practical solution to computational problems.

But Changizi remains hopeful that his system will be more than a mere curiosity.

"We're fleshing out a whole new domain of computation," said Changizi.

WiSci 2.0: Alexis Madrigal's Twitter , Google Reader feed, and webpage; Wired Science on Facebook.

submit Digg submit Yahoo! Buzz Stumble ShareThis