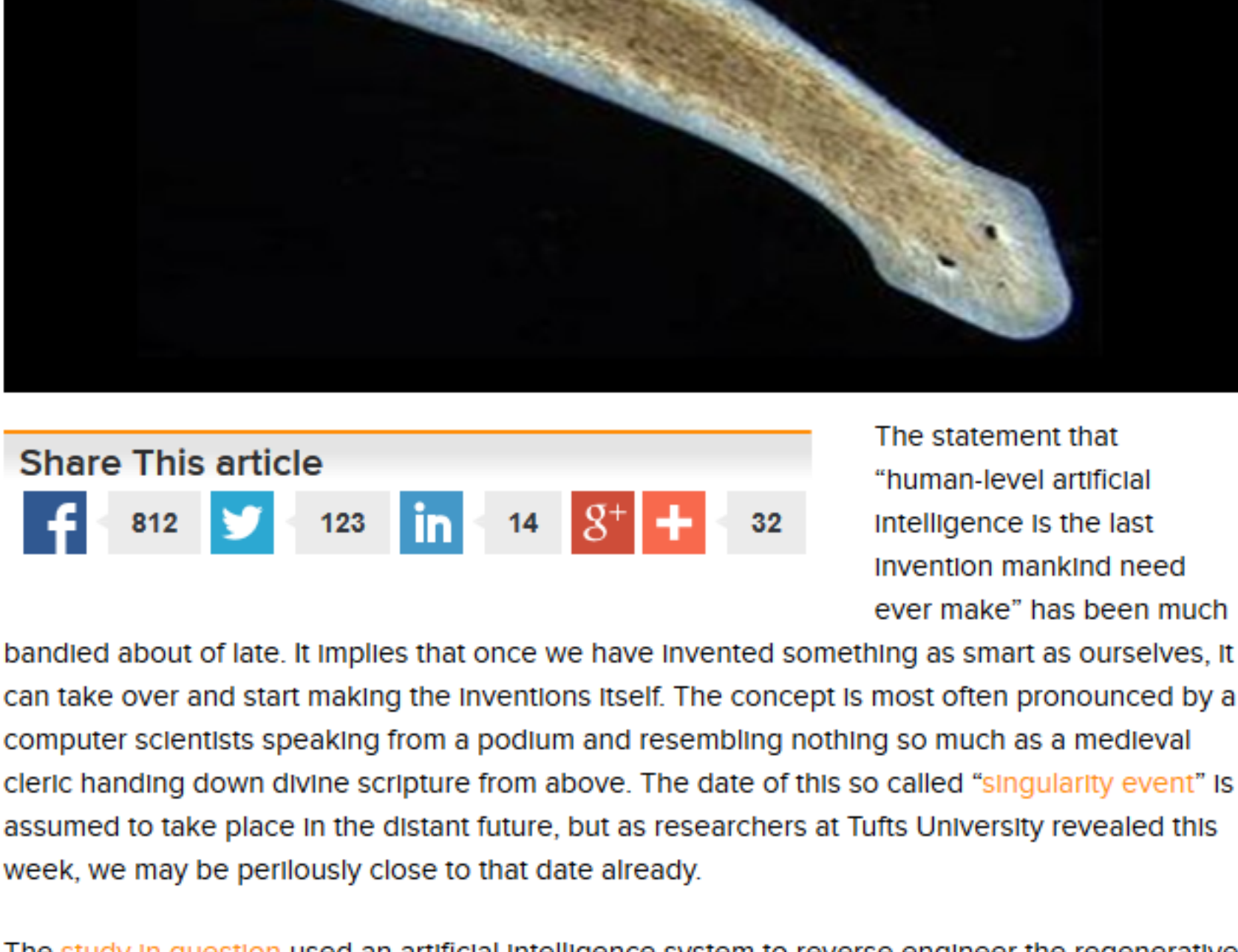


# Mysteries of worm regeneration solved with artificial intelligence

By Aaron Krumins on June 9, 2015 at 1:15 pm 21 Comments



Share This article

f 812 t 123 in 14 g+ 32

The statement that "human-level artificial intelligence is the last invention mankind need ever make" has been much

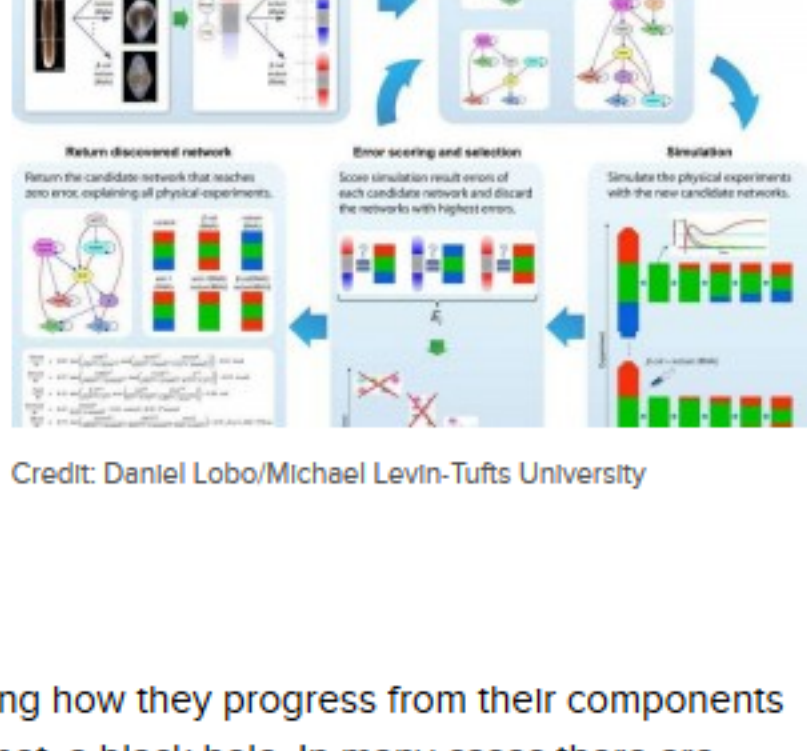
banded about of late. It implies that once we have invented something as smart as ourselves, it can take over and start making the inventions itself. The concept is most often pronounced by a computer scientists speaking from a podium and resembling nothing so much as a medieval cleric handing down divine scripture from above. The date of this so called "singularity event" is assumed to take place in the distant future, but as researchers at Tufts University revealed this week, we may be perilously close to that date already.

The study in question used an artificial intelligence system to reverse engineer the regenerative biology of planarian worms, in what is arguably one of the first examples of "robots" making discoveries where their human counterparts left off.

Biological systems like the planarian worm are in some ways ideal targets for machine intelligence research, precisely because they are so devilishly complex. One has only to glance at the cellular models in question to gain an appreciation for the layers of complexity that comprise something as seemingly simple as the planarian worm. Teasing out all the interactions in such systems has been giving biologists gray hair since before Darwin's time, and for good reason — humans were not evolved to be good at keeping track of twenty or more symbolic elements, each modifying and being modified by other elements in the same hypothetical system. That kind of activity has very little to do with running a gazelle down on the evolutionary savannah in which we took shape. Our brain children, on the other hand, the so-called deep learning artificial intelligence algorithms, are very good at these activities.

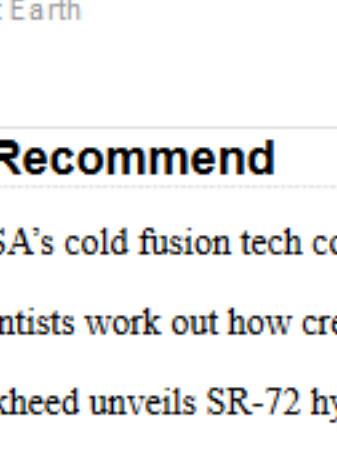
And so it was at Tufts University last week, where an evolutionary algorithm successfully unraveled the mysteries of the planarian worm's regenerative biology. To gain a feel for the science behind this, it helps to understand the difficulty biologists have been facing in regards to worm regeneration. In fields like systems biology, there is often a large gap between an observed biological phenomenon and the component parts like DNA and RNA which build up to the trait in question. What is missing is what happens in between. It is relatively simple to identify the various molecules that must be involved, but understanding how they progress from their components to the observed "phenotype" is, more often than not, a black hole. In many cases there are simply too many possible paths leading from the primary components to the end product. The task of following up every permutation and combination that could lead to the trait would take weeks if not years, at least for a human intelligence.

It turns out that the genius of the Tufts team was in posing the question in such a way that their evolutionary algorithm could loop through thousands of possible cellular permutations to discover the exact combination that would produce the biology of the worm. This marks a big win for both the fields of regenerative medicine and artificial intelligence. However, the day when algorithms starts posing their own research questions and preferring these to the mysteries of worm biology may prove a little more unsettling.

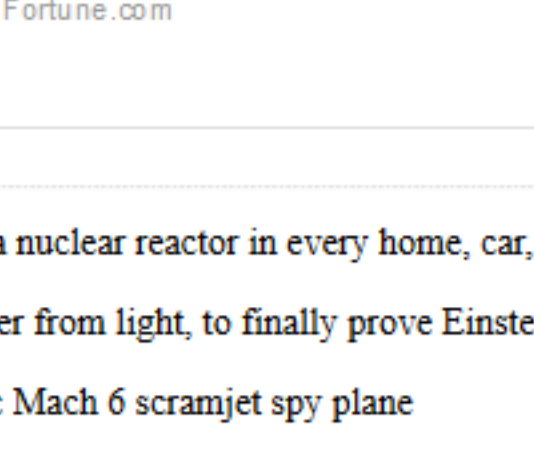


Credit: Daniel Lobo/Michael Levin-Tufts University

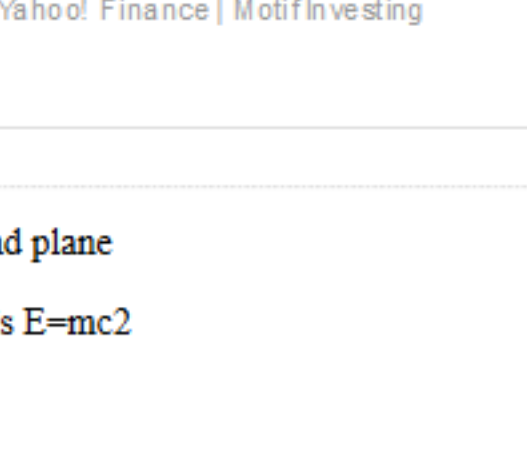
## You Might Also Like



7 Engagement Ring Trends You Need to Know in 2015  
Brilliant Earth



Tesla's Elon Musk just had the worst birthday ever  
Fortune.com



Will This Startup Kill The ETF Revolution?  
Yahoo! Finance | Motif Investing

## We Recommend

- NASA's cold fusion tech could put a nuclear reactor in every home, car, and plane
- Scientists work out how create matter from light, to finally prove Einstein's E=mc2
- Lockheed unveils SR-72 hypersonic Mach 6 scramjet spy plane
- Stephen Hawking's new research: 'There are no black holes'
- NASA tests 'impossible' no-fuel quantum space engine – and it actually works

Sponsored Links by Taboola

Tagged In biology artificial intelligence health medical medical research big data regenerative medicine

Post a Comment 21 Comments

21 Comments ExtremeTech Login

Recommend Share Sort by Oldest

Join the discussion...

**caseyczarnomski** · 2 months ago  
According to the TED talk, we have 5 years until 80% job displacement. Evolutionary biologists, your days are numbered. You don't have to worry as much as I do. I'm going to school for mechanical industrial engineering. By the time I'm done, I'll have maybe 5 years of work before I'm out dated.  
1 ^ | v · Reply · Share

**eonvee375** → **caseyczarnomski** · 2 months ago  
dude you'll be scrap attaching some bionic limbs in no time ^^ deus ex style in some underground black market  
^ | v · Reply · Share

**david** → **eonvee375** · 2 months ago  
hi  
1 ^ | v · Reply · Share

**eonvee375** → **david** · 2 months ago  
sup dude^^ ?  
^ | v · Reply · Share

**dc** → **caseyczarnomski** · 2 months ago  
People just need to go to college and get a good education so they can get a job of the future, one that computers can't do, like being a star football player. While a machine could do this, they aren't qualified under the rules. Other good careers to focus on in college are pro basketball player, pro golfer, pro baseball player, television personality, youtube video maker, blogger (assuming machine blogs don't beat you out of that), rich person, farm owner, robotic factory owner. Those are all good careers.  
4 ^ | v · Reply · Share

**LaughingItOff** → **dc** · 2 months ago  
You forgot porn star.  
1 ^ | v · Reply · Share

**dc** → **caseyczarnomski** · 2 months ago  
on a serious note, just think how many jobs will be lost when self driving cars go live. Millions of truck drivers will lose their jobs. Millions of people who cater to truck drivers, such as truck stop restaurants and the like will lose their jobs. And millions of police officers... yes police officers will lose their jobs. Once traffic is removed from the job duties, both the number of officers needed and revenues from traffic citations will drop precipitously. That will lead to a loss of jobs in industries which support the police, such as automotive, doughnut shops gun makers, uniform makers, etc... I'd put the job losses in the USA alone at 10-20 million. And then there are jobs which cater to the people who used to cater to police and truck drivers... it goes on and will definitely bring down the house of cards causing a world wide depression that will make the "Great Depression" look more like the "Not so bad after all Depression."  
1 ^ | v · Reply · Share

**Artyom Timeyev** → **dc** · 2 months ago  
Oh nol Not the donut makers! Horrible.  
^ | v · Reply · Share

**Storris** → **caseyczarnomski** · 2 months ago  
You never know, in those 5 years it may be you who builds the first sentient robot! Good luck.  
^ | v · Reply · Share

**rahuldey85** · 2 months ago  
Montecarlo simulation?  
^ | v · Reply · Share

**HARRY** → **rahuldey85** · 2 months ago  
miltan  
  
< **The new science of nutritional genetics which is about secret to Zero Belly Diet will be a huge breakthrough Get this for FREE** <http://...> < **Here...**

1 ^ | v · Reply · Share

**S P A C E** · 2 months ago  
The annoying ad under the top page banner doesn't scale - it blocks the articles, so I won't be reading anything from ExtremeTech anymore. No point trying to visit a jumbled up poorly designed web page nobody can read.  
^ | v · Reply · Share

**cholling** · 2 months ago  
"The date of this so called "singularity event" is assumed to take place in the distant future, but as researchers at Tufts University revealed this week, we may be perilously close to that date already" It's a freaking genetic algorithm. It's a random search through state space, and in terms of general intelligence it isn't anywhere nearly as smart as the worm whose biology it helped understand, let alone the people who programmed it. I'm sick of journalists in the popular press making overblown claims about a field they seem almost willfully ignorant of.  
^ | v · Reply · Share

**quantum\_kev** → **cholling** · 2 months ago  
And how is what the AI accomplished any different than the decisions you make regarding which car to buy, or whether to take a certain job or not, or which show you will watch on tv? Can you be so certain that what you consider to be "general intelligence" or consciousness isn't just a more evolved or advanced version of said genetic algorithm...?  
2 ^ | v · Reply · Share

**dc** → **quantum\_kev** · 2 months ago  
it's very different, because the computer is just running a program, one written by a person to perform a specific task. If it were true AI, it would write its own algorithm. It would, in fact, ask it's own question. It could decide what research to do. As it stands, the computer doesn't do any of that. It can't and never will. Left to it's own, a computer will just sit there and never do anything. It has no idea how to research a worm. It has no idea what a worm is.  
^ | v · Reply · Share

**caseyczarnomski** → **dc** · 2 months ago  
It does rewrite it's own algorithm. You should look into what deep learning is. This will help.  
<https://youtu.be/xx310zM3tLs>  
^ | v · Reply · Share

**caseyczarnomski** → **cholling** · 2 months ago  
You are wrong. It isn't just a program written by a person. Deep learning is first written by a person, then rewrites itself continually to increase it's own accuracy. This TED TALK explains it better. Watch the full 19 minutes and see for yourself.  
<https://youtu.be/xx310zM3tLs>  
^ | v · Reply · Share

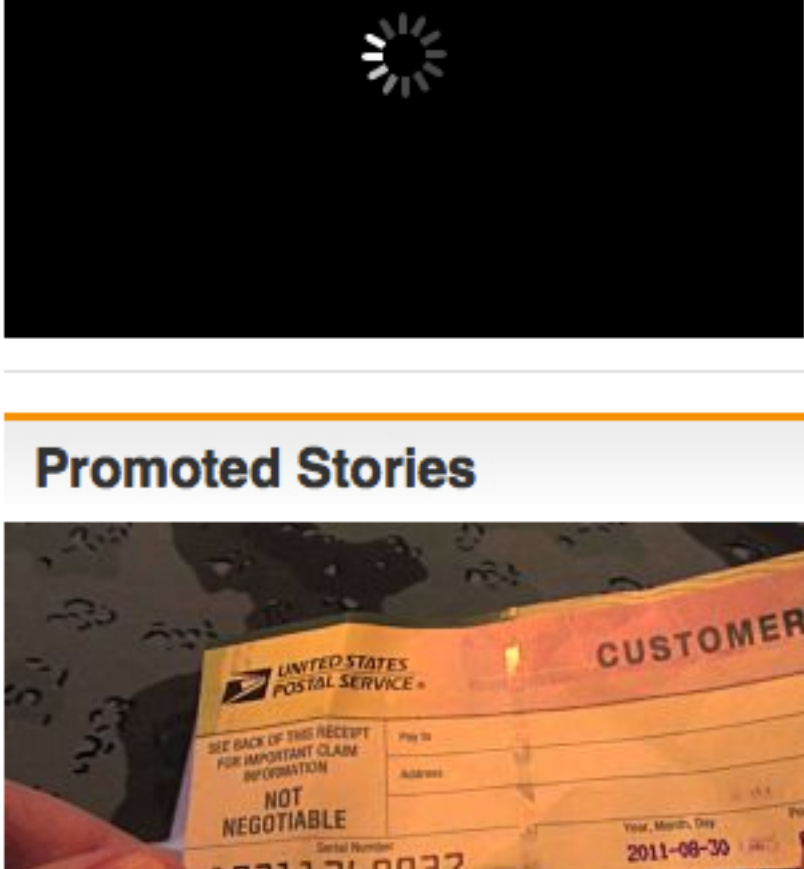
**Exal New Mini Pops** · 2 months ago  
This sort of "AI" has been around for decades, and has been used in different fields of research at least since the 80s. Look up the difference between narrow/weak and strong AI. This sort of scientific breakthrough is more of a function of the doubling of computing power that is happening every ~2 years, and is no indication of being significantly nearer to AGI (Artificial General Intelligence) as the clickbait nature of this article suggests.  
^ | v · Reply · Share

**nodetx** · 2 months ago  
The writing is clearly on the wall. Analysts, customer service, mid management, these are all on the chopping block for AI. The list goes on and on. Then you have the robotics revolution that's going to spawn behind AI. Best to learn how to code AI. Learn how to write in R and brush up on your linear algebra. The free markets days could be numbered. The good news is once the dust settles, we should have strong GDP output, without near as much labour input. That translates into this, "China has the right idea".  
^ | v · Reply · Share

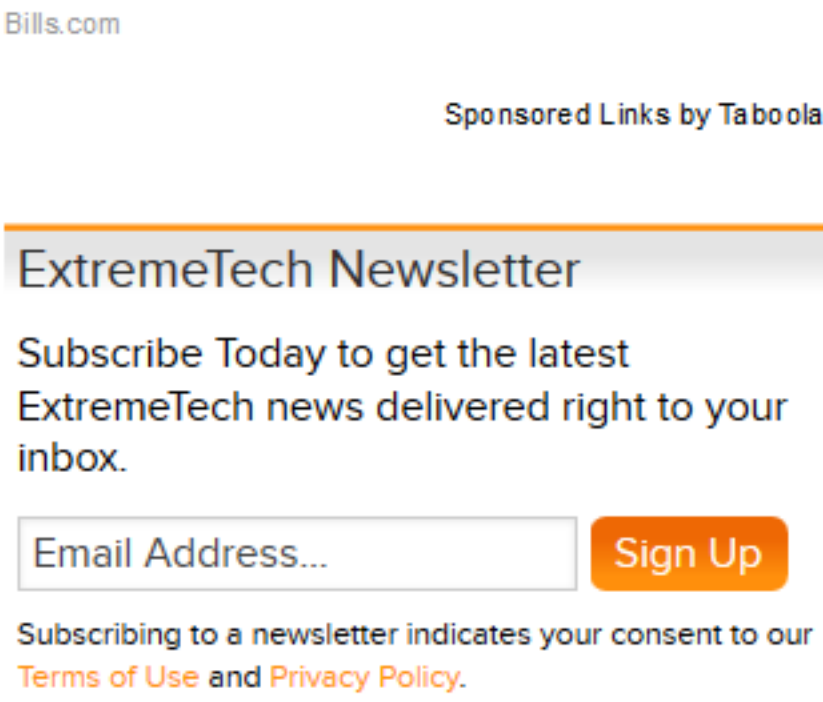
**Storris** · 2 months ago  
The singularity of the Terminator films was a fictional representation which spoke to humanity's fears of the unknown.  
  
Actually creating the singularity will be a process of discovery, dispelling the fears brought about by ignorance.

If it does all go a bit Cyberdyne then at worst we get to live the Terminator films (we win in the end, of course), but if everything works out well, then we may live to witness the end of resource scarcity and the accompanying poverty.  
^ | v · Reply · Share

**Rory** · 2 months ago  
I look forward to the singularity event. I think we're going to hybridize ourselves with artificial intelligence. This is what is going to save our planet, which we are currently burning out from underneath us. This is what is going to save us.  
^ | v · Reply · Share



## Promoted Stories



Jim Cramer's Brilliant Tip on Paying Off Mortgage Bills.com

Sponsored Links by Taboola

## Extremetech Newsletter

Subscribe Today to get the latest Extremetech news delivered right to your inbox.

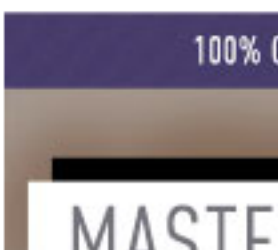
Email Address... Sign Up

Subscribing to a newsletter indicates your consent to our Terms of Use and Privacy Policy.

## More Articles



What is dark matter?  
Aug 20



ET deals: Dell 24-inch quad HD IPS monitor for \$288  
Aug 20



Stanford researchers build fully internal optical brain interfaces  
Aug 20



Supermassive black hole observation made possible by helium hard drives  
Aug 20



Google data center loses data following four lightning strikes  
Aug 19

## GRAND CANYON UNIVERSITY

100% Online, Flexible Start Dates

MASTER'S IN NURSING

Learn More!