

## Ode to E Pluribus Unum for Sunday March 12 2023

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### Dispatches from Mars: Perseverance Rover Sends Images



*NASA's Perseverance Mars rover, using its Mastcam-Z camera system, captured this view of the Martian sunset on November 9, 2021, the 257th Martian day, or sol, of the mission. Martian sunsets typically stand out for their distinctive blue color as fine dust in the atmosphere permits blue light to penetrate the atmosphere more efficiently than colors with longer wavelengths. But this sunset looks different: Less dust in the atmosphere resulted in a more muted color than average. The color has been calibrated and white-balanced to remove camera artifacts.*

*Photo courtesy of NASA | [License Photo](#)*

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### High-altitude Drone View of Mount Everest

Using a drone modified to fly in thin air, photographer Renan Ozturk captured a stunning 360-degree panorama of the roof of the world.



<http://bit.ly/3Kx9iSb>

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## Getting a Pretty Girl High

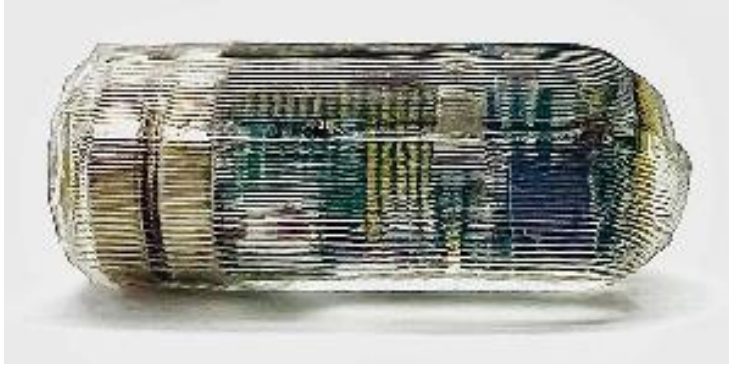


<https://www.youtube.com/watch?v=1m5IPITfMQc>

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## Ingestible Sensor Could Help Doctors Pinpoint GI Difficulties

The sensor sends out its location as it moves through the GI tract, revealing where slowdowns in digestion may occur.



<http://bit.ly/3ErQe3D>

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## **Retired Boeing 737 Transformed into a Private Villa**

\$7,000 will give you a bump-free night's sleep



*This retired Boeing 737 turned private villa will be available to rent in April, with nightly rates starting at around \$7,000.*

<http://bit.ly/3Koa5Vm>

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## **It's Merely a Matter of Perspective.**



I have a friend who reads 2-3 books a week, works out twice a day, has no financial, yet he constantly complains about how much he hates prison.

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## **The High Altitude Dance between India and China**

Is there a way out of the situation?



<https://bit.ly/3m28k6g>

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## **Sea Dragon Dad Glues Brood to His Tail for Safekeeping**

Unlike most vertebrates, male sea dragon parents are the ones who invest time and energy into caring for unhatched eggs.



<http://bit.ly/3EtQOho>

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## Understanding Time Travel and Quantum Physics for Anyone

Here are some of the most popular concepts related to time travel



*Artistic Rendition of a black hole. [credit: Ashley Mackenzie for Quanta Magazine]*

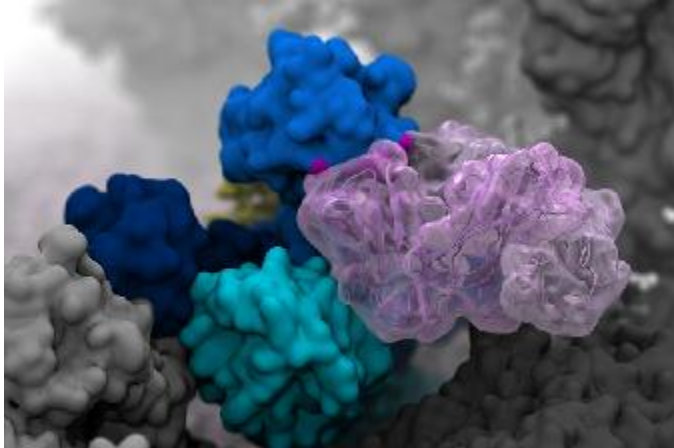
<http://bit.ly/3xIQiZj>

A great guide to enjoying sci-fi movies and shows

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# Computer Model of Influenza Virus Shows Universal Vaccine Promise

Dynamic movement of H1N1 proteins reveal new vulnerabilities

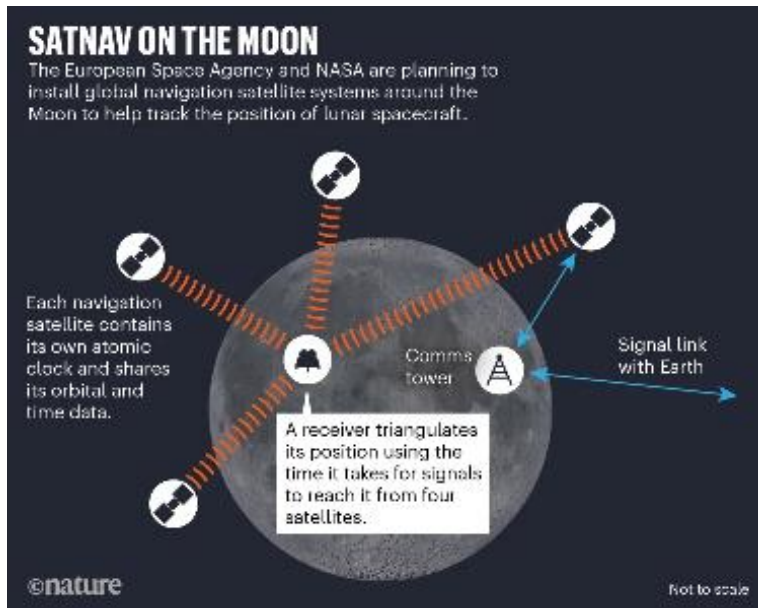


<https://bit.ly/3DX3ugr>

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## What Time is it on the Moon?

Satellite navigation systems for lunar settlements will require local atomic clocks. Scientists are working out what time they will keep.



<https://bit.ly/3HWobuq>

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## **"God Bless America" Flash Mob with The Denver Brass**



<https://youtu.be/CDdY46iAwHI?t=5>

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## **New Prop Design Delivers More Power, Less Noise**

By Russ Niles for AVweb



Researchers at MIT have done some tinkering and may have revolutionized propeller design. Almost on a scientific whim, a team at the Lincoln Laboratory whipped up a few batches of “toroidal” propellers for a drone on a 3D printer and discovered they were not only much quieter than the OEM props but they put out more thrust at the same power level. The new props were a side project to their real job creating an entirely new form of silent aircraft propulsion using an ion drive.

The result is a closed loop design that looks like a couple of opposed inclined boomerangs joined at the tips. Researcher Dr. Tom Sebastian [told New Atlas](#) the prop design was inspired by some obscure “ring wing” aircraft prototyped in the early 20th century. He’s not even sure why they work but theorized their odd shape greatly reduces the noise-creating vortices that come off the tips of regular props.

“The key thing that we thought was making the propellers quieter, was the fact that you’re now distributing the vortices that are being generated by the propeller across the whole shape of it, instead of just at the tip,” Sebastian said in a video. “Which then makes it effectively dissipate faster in the atmosphere. That vortex doesn’t propagate as far, so you’re less likely to hear it.”

He said they haven’t spent much time optimizing the design but it shows promise, particularly for eVTOLs and drones. It also works remarkably well for marine propulsion, and there are already commercially available toroidal boat props on the market that boost power, flatten out the acceleration pitch of boats and markedly reduce noise.

As for Sebastian’s real job, the Lincoln Lab has already flown a small model plane that generates an [“ionic wind” for propulsion](#). The plane has no moving parts and doesn’t use fossil fuels. “This has potentially opened new and unexplored possibilities for aircraft which are quieter, mechanically simpler, and do not emit combustion emissions,” spokesman Steven Barrett said. Again, drones will likely be the first



application for the new power source but Barrett foresees hybrid designs that could create more fuel-efficient airliners and cargo planes.

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## **Boom! Watch Inflatable Space Station Module Explode on Video**



*Artist's illustration of Orbital Reef, a private space station project involving Blue Origin, Sierra Space and a number of other partners.  
(Image credit: Sierra Space/Blue Origin)*

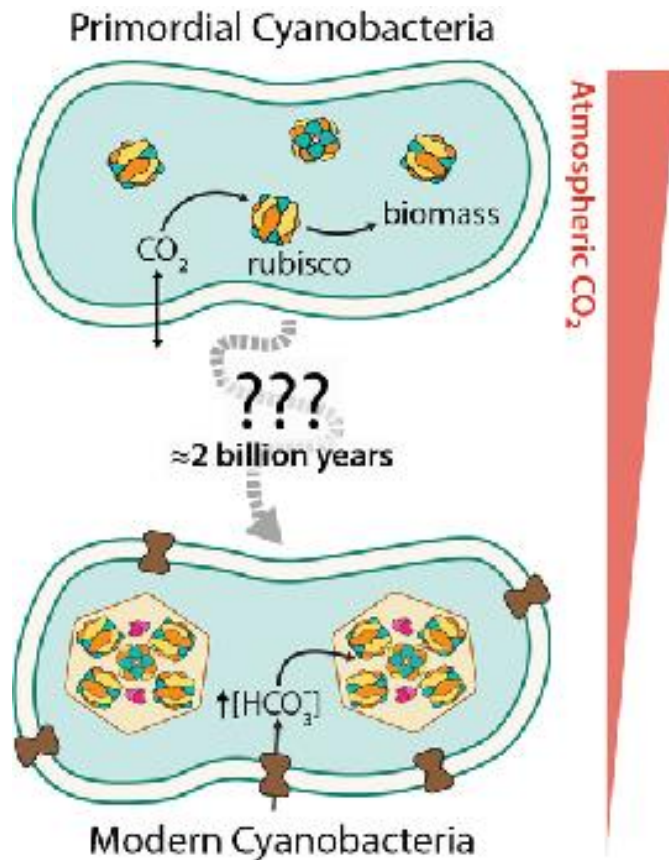
Sierra Space completed this test to prepare for Orbital Reef, a private space complex to replace the International Space Station.

<https://bit.ly/3FAgE2S>

A peek at the testing protocol.

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## **Genetic Engineering Sheds Light on Ancient Life**



Cyanobacteria are single-celled organisms that derive energy from light, using photosynthesis to convert atmospheric carbon dioxide ( $\text{CO}_2$ ) and liquid water ( $\text{H}_2\text{O}$ ) into breathable oxygen and the carbon-based molecules like proteins that make up their cells. Cyanobacteria were the first organisms to perform photosynthesis in the history of Earth, and were responsible for flooding the early Earth with oxygen, thus significantly influencing how life evolved.

Geological measurements suggest that the atmosphere of the early Earth—over three billion years ago—was likely rich in  $\text{CO}_2$ , far higher than current levels caused by anthropogenic climate change, meaning that ancient cyanobacteria had plenty to "eat." But over Earth's multi-billion-year history, atmospheric  $\text{CO}_2$  concentrations have decreased, and so to survive, these bacteria needed to evolve new strategies to extract  $\text{CO}_2$ . Modern cyanobacteria thus look quite different from their ancient ancestors, and possess a complex, fragile set of structures called a CO<sub>2</sub>-concentrating mechanism (CCM) to compensate for lower concentrations of  $\text{CO}_2$ .

Now, new research from Caltech sheds light on how the CCM evolved, addressing a longstanding mystery in the field of evolutionary geobiology. The new study employs genetic techniques to model ancient ancestors of modern-day organisms, enabling researchers to systematically experiment on different versions of bacteria and reveal possible evolutionary pathways.

The study was a collaboration between the laboratories of Caltech professor of geobiology [Woodward Fischer](#) and David Savage, associate professor of molecular biology at UC Berkeley and the Howard Hughes Medical Institute. It appears in the journal *Proceedings of the National Academy of Sciences*.

"This is an emerging way of studying Earth history," says Fischer. "We can take the modern organism and remake it in the lab, allowing us to test the trajectories of its evolution with rigorous lab experimentation."

Cyanobacteria "eat" CO<sub>2</sub> with the help of an enzyme called rubisco. Rubisco is, simply put, not very good at its job—it acts slowly, and tends to react with other molecules instead of CO<sub>2</sub>. This is not an issue for cyanobacteria when in an environment with high concentrations of CO<sub>2</sub>; rubisco can be inefficient and the bacteria can still have enough CO<sub>2</sub> to metabolize. But because atmospheric CO<sub>2</sub> levels have decreased so much over billions of years, modern cyanobacteria have evolved a CCM to concentrate CO<sub>2</sub> within the bacteria's own body and increase the efficiency of rubisco.

CCMs are puzzling to evolutionary biologists because they are so delicate—altering any of the 20 genes that encode for the CCM's various parts causes the entire structure to fail.

"We think of evolution as happening step-by-step, with each new gene adding some new function," says Avi Flamholz, Caltech postdoctoral scholar and lead author on the new paper. "For example, the ancient precursors of the modern human eye didn't have all of the functions of the eye, but could probably detect light in some form. With the CCM, there wasn't a clear pathway indicating how they evolved to their present-day complexity."

In the new study, the team set out to model possible ancient iterations of the CCM structure. To do so, they genetically engineered *Escherichia coli* bacteria to require CO<sub>2</sub> for their metabolism. Because there are established genetic tools for working with *E. coli* in the lab, it is more tractable to work with this model system rather than cyanobacteria themselves. The team then engineered *E. coli* strains with the 20 genes that make up the CCM, and systematically added, removed, and tweaked genes in order to model all possible evolutionary trajectories of the CCM structure.

In this way, Flamholz and his team found that there are in fact several biologically viable trajectories that lead to the emergence of the complex modern-day CCM.

"These results highlight the omnipresent dialog between global change and evolution of Earth's biosphere," says Fischer. "As CO<sub>2</sub> became evermore scarce, cyanobacteria were able to innovate a remarkable biochemical solution."

The paper is titled "[Trajectories for the evolution of bacterial CO<sub>2</sub>-concentrating mechanisms](#)." In addition to Flamholz and Fischer, coauthors are Eli Dugan, John

Desmarais, Luke Oltrogge, and David Savage of the University of California Berkeley; and Justin Panich and Steven Singer of Lawrence Berkeley National Laboratory. Funding was provided by the National Science Foundation, the Gordon and Betty Moore Foundation, the Kavli Foundation, the Schwartz/Reisman Collaborative Science Program, the US Department of Energy, and Royal Dutch Shell Energy and Biosciences Institute.

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## Standard Model of Cosmology Survives a JWST Surprising Find



Reports that the James Webb Space Telescope killed the reigning cosmological model turn out to have been exaggerated. But astronomers still have much to learn from distant galaxies glimpsed by Webb.

<http://bit.ly/3XpQIOI>

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## Ranked: Biotoxins in Nature, by Lethal Dose



*Striated surgeonfish (maitotoxin): It takes 10 Ng/Kg to do you in, far less deadly than Butulinum toxin, an ingredient in Botox where 1 Ng/Kg will accomplish the task.*

*Tell me, is hiding a wrinkle or two worth the risk?*

<https://www.visualcapitalist.com/visually-ranking-biotoxins-in-nature/>

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### **Top 5 Robot Trends 2023**

Artificial Intelligence helps logistics providers and retailers deal with frequently changing products, orders and stock.



<http://bit.ly/3EObsZE>

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## The Gentle Goliaths

Marine scientist and filmmaker Gaelin Rosenwaks writes about the family bonds of sperm whales after researching the species in Dominica.

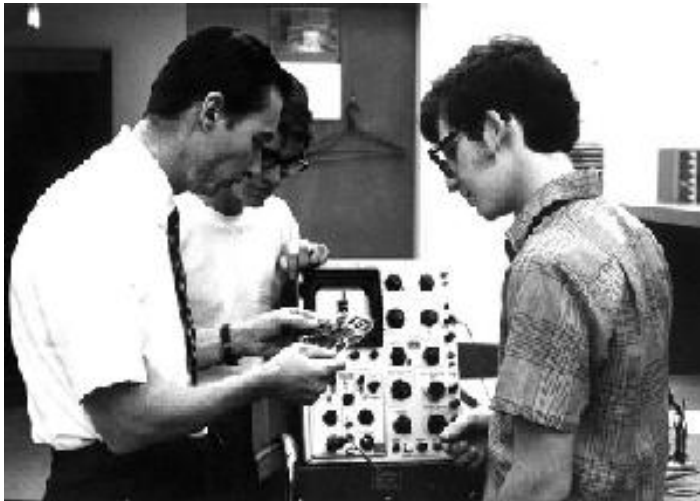


<https://oceanographicmagazine.com/features/the-gentle-goliaths/>

Like many whales, sperm whales are matriarchal with the females staying in their family units their entire lives.

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## How a Small Class Helped Launch a Computer Revolution



*Carver Mead with students in 1971*

*Credit: Courtesy of Caltech Archives*

One of the foundational early advances in computer science that makes our increasingly digital world possible began with a small course taught by Carver Mead at Caltech in the early 1970s.

<http://bit.ly/3J33w8b>

A veritable who's-who in VSLI development.

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## **Satya Maximus: The Battle of the Giant Chatbots**



In 217 BC, the Roman dictator Fabius Maximus conceived a novel strategy in the war with Carthage. His opponent, Hannibal, had won several devastating battles, and the Roman people were ready to try something different.

Fabius knew Hannibal liked to fight and had the military power to do so effectively. Instead of meeting Carthage head on, Fabius studiously avoided large confrontations. He sent small attack units to bait Carthaginian troops into unfavorable situations and then wage havoc by destroying their food supply or by simply finding ways to prolong Carthage's march. That ended up costing Hannibal's large army far more in resources than it did Rome.

They didn't have chatbots in 217 BC, but there are parallels with today's battle between Microsoft Corp. and Google.

The search war has never been much of a competition between the two companies, but it's a profitable one. Executing a web search is fairly cheap, and the ads account for most of Google's \$283 billion in annual revenue. Microsoft managed to turn a profit on Bing, too, more than seven years ago, despite its tiny market share.

Alphabet Inc.'s Google stands to lose a lot more if there were a fundamental shift in how people search for things on the internet. That shift isn't a given. Developing a competent, reliable chatbot is expensive. Potentially even more costly is the ongoing expense of people interacting with the product.

The computational demands of generative artificial intelligence are exorbitantly high. An analysis of open-source software similar to what drives Bing's chatbot or Google Bard estimates the cost of a query at 11¢, according to Alan Ritter, a computing professor at Georgia Tech.

What exactly it costs Google or Microsoft is a secret. They have their own cloud infrastructures that can be optimized to work more efficiently with their proprietary chatbots, said Ritter, who studies natural language processing.

Sam Altman, a Microsoft ally who runs the startup behind ChatGPT, has only said it's "probably single-digits cents per chat." Morgan Stanley estimated the cost of a ChatGPT query at a more palatable 2¢. Even that is a steep premium to a traditional web search, which can be done for a fraction of a penny, Ritter said.

Perhaps a chatbot becomes so accurate that Google or Microsoft will be able to justify a substantial increase in advertising rates. That hasn't happened.

If every web search were to suddenly switch to a chatbot conversation tomorrow, Bing's margins would suffer, but Alphabet's would take an absolute beating. Even in a scenario where Google appears to win, it actually loses.

This is where the Fabian strategy comes into play. For more than a decade, Microsoft's Bing has run a traditional battle plan on Google, with paltry results. Now the hype around Microsoft's chatbot is ratcheting up pressure on Google to match it — likely at a great cost to the company.

Meanwhile, the Bing chatbot is only available to a limited number of people — there's still a wait list — and in a limited way — on a search engine few people use, within a similarly unpopular Microsoft web browser or in an update rolling out to Windows 11.

A creative interpretation of the strategy is that Microsoft isn't competing to be the No. 1 search engine but that it's attempting to reimagine aspects of search in a way that's less lucrative for everyone — effectively luring Google into little skirmishes it won't win. The question is whether Google engages. It has said it'll release its own chatbot but hasn't committed to building it into search results in the way Microsoft has.

It sure sounds like Microsoft Chief Executive Officer Satya Nadella hopes Google takes the bait, though. "They're the 800-pound gorilla," Nadella said in an interview with the Verge. "And I hope that, with our innovation, they will definitely want to come out and show that they can dance. And I want people to know that we made them dance." —



*I found this on Bloomberg.com and think it worth all our attention.*

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## **Oh Go Fly a Kite**



Cambodia <https://www.youtube.com/watch?v=fViEyyR-ADc>

France <https://www.youtube.com/watch?v=fViEyyR-ADc>

India <https://www.youtube.com/watch?v=uhQWUISNd-I>

Wildwood <https://www.youtube.com/watch?v=uhQWUISNd-I>

Top 15 <https://www.youtube.com/watch?v=vh1KquemUFU>

*Where's Charlie Brown when we need him?*

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## **Underwater Photographer of the Year 2023 Awards**

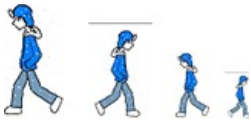
Gorgeous Image of Endangered Pink Dolphin Wins — See More Stunning Shots



<http://bit.ly/3IX3u1T>

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## My Walking Thoughts



For Sunday March 12 2023

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An Evening with Los Romeros Guitar Quartet Plus One



World renowned as the First Family of the Guitar, the Los Romero Quartet came back to its founding place, Santa Barbara's Lobero Theater, to the joy of the jamb-packed audience and the family members as well. I could not do a better job of presenting the scene than Joseph Woodward's review in the Santa Barbara Independent.

<http://bit.ly/3T3aEGt>

*So far this season I've had the thrill of witnessing stellar performances by the Julliard String Quartet, pianist Helene Grimaud, the Los Romeros Quartet, and next month violinist Augustin Hadelich. Not bad for a small town.*

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## **Cheating in Education**

Last week I proposed a challenge that fell flat, eliciting just one comment. So let me share some comments on the subject from the AI expert ChatGPT.

Cheating in education is a serious issue that undermines the integrity of the learning process and can have long-term consequences for the individuals involved. As an AI language model, I do not condone cheating and believe that it is important to address it in a fair and constructive manner. Here are some approaches that could be taken:

Ultimately, addressing cheating in education requires a multi-faceted approach that involves prevention, detection, consequences, and support. It is important to foster a culture of academic integrity and hold individuals accountable for their actions, while also recognizing that students may need support and guidance to overcome the pressures and challenges of the learning process.

**Prevention:** One of the most effective ways to address cheating is to prevent it from happening in the first place. This can be done by creating a culture of academic integrity, educating students about the consequences of cheating, and providing resources and support to help students succeed academically without resorting to dishonest practices.

**Detection:** Teachers and administrators can use a variety of tools to detect cheating, including plagiarism detection software, monitoring of testing environments, and careful review of student work. It is important to ensure that detection methods are accurate and fair, and that students are given due process and the opportunity to defend themselves if they are accused of cheating.

**Consequences:** If cheating is detected, there should be consequences for the individuals involved, such as failing the assignment or course, being placed on academic probation, or even expulsion in severe cases. It is important that consequences are proportional to the offense and applied fairly and consistently.

**Support:** It is also important to provide support to students who have engaged in cheating behavior. This could include counseling, academic support, or other resources to help them understand the consequences of their actions and develop more effective strategies for succeeding academically.

### **What Families Can Do**

Families play an important role in addressing academic cheating by providing guidance, support, and reinforcement of ethical behavior. Here are some ways families can help prevent and address academic cheating:

Establish clear expectations: Families can set clear expectations for academic integrity and communicate the importance of ethical behavior to their children. They can also discuss the consequences of cheating and emphasize the importance of hard work and honesty in achieving success.

Monitor academic progress: Parents can monitor their child's academic progress and provide support when needed, such as tutoring or help with time management skills. This can help reduce the temptation to cheat and encourage their child to develop effective study habits.

Encourage open communication: Families can create an environment of open communication where their child feels comfortable discussing academic challenges and seeking guidance when needed. This can help reduce the pressure and stress that may lead to cheating and encourage their child to seek alternative solutions to academic problems.

Model ethical behavior: Parents can model ethical behavior in their own lives

### **What Teachers Can Do**

There are several ways that high school teachers can incorporate AI into their teaching practices. Here are some suggestions:

- **Personalized learning:** AI can be used to personalize learning for each student based on their strengths, weaknesses, and learning styles. Teachers can use AI-powered tools to assess student progress and adjust their teaching strategies accordingly.
- **Virtual assistants:** Teachers can use virtual assistants like chatbots to answer common student questions or provide additional support for students who need it.
- **Grading and feedback:** AI-powered grading systems can save teachers time and provide students with more timely and objective feedback on their work.
- **Educational games:** AI can be used to create engaging educational games that help students learn and reinforce concepts.

- Predictive analytics: AI can be used to analyze data on student performance to predict which students may be struggling and provide early interventions to prevent them from falling behind.

It's important to note that while AI can be a valuable tool for teachers, it should not replace the human element of teaching. Teachers should still be actively involved in the learning process, providing guidance and support to their students.

As AI-powered tools become more advanced, it's becoming increasingly difficult for teachers to detect when students are using them to cheat. However, there are some steps teachers can take to determine if students have used AI to cheat:

- Monitor student behavior: Keep an eye on student behavior during exams and assessments, especially if they are taking them remotely. Watch for signs that students may be using AI, such as repeatedly looking away from the screen or typing quickly.
- Check for plagiarism: Use plagiarism detection software to check for instances of plagiarism. This can help identify cases where students have used AI to generate or copy content.
- Analyze writing style: If students submit written work, analyze their writing style to see if it matches their previous work. AI-powered writing tools can also help identify instances where students may have used AI to generate content.
- Use technology to your advantage: AI can be used to detect cheating, too. For example, some tools can monitor student activity during exams and flag suspicious behavior.

It's important to note that while AI can be a useful tool for detecting cheating, it's not foolproof. Teachers should still rely on their own judgment and experience when assessing student work and behavior. Ultimately, the best way to prevent cheating is to create a culture of academic integrity in the classroom and educate students about the importance of honesty and ethical behavior.

### **Methods teachers can use to determine wrongful use of AI in completing assignments**

Determining wrongful use of AI in completing assignments can be a challenging task for teachers. However, there are some methods that can help them identify such cases:

- Require students to submit their work in stages: By asking students to submit drafts or outlines of their assignments, teachers can get a sense of their thought process and writing style. If the final assignment is vastly different from the drafts or outlines, it may be a sign that AI was used.
- Check for inconsistencies: If the writing style or tone of the assignment is inconsistent with the student's previous work, it may be a sign that AI was used.

Additionally, if the assignment contains complex vocabulary or ideas that are beyond the student's usual capabilities, it may be an indication of AI use.

- Use plagiarism detection software: Plagiarism detection software can be used to identify instances where students have copied or pasted content from online sources or other students' work. This can help identify cases where AI was used to generate or copy content.
- Monitor student activity: During online exams, teachers can use tools that monitor student activity to identify suspicious behavior, such as frequent tab switching or copy-pasting. Additionally, teachers can use software that analyzes student writing to identify cases where AI was used.
- Educate students: It's important to educate students about the ethical use of AI and the consequences of using AI to cheat. By creating a culture of academic integrity in the classroom, teachers can help prevent the wrongful use of AI in completing assignments.

It's important to note that while these methods can be useful in identifying the wrongful use of AI, they should be used in conjunction with the teacher's judgment and experience.

How can teacher spot wrongful use of ai by students

Detecting wrongful use of AI by students can be a challenging task for teachers, but there are some signs that can help spot such use:

- Unusual writing style: AI-generated content may have a distinct writing style that differs from the student's usual style. Teachers should look for signs of unnatural or stilted language, inconsistent grammar, or use of complex vocabulary that is beyond the student's capabilities.
- Inconsistencies in the content: Students may use AI to generate content quickly, but the resulting work may contain inconsistencies or errors. Teachers should check for instances of repeating ideas, missing or incomplete sentences, or irrelevant content.
- Unfamiliar vocabulary or ideas: If the assignment contains vocabulary or ideas that are beyond the student's usual level of understanding or knowledge, it may be an indication of AI use.
- Plagiarism: AI-generated content may contain plagiarism from other online sources. Teachers should check for instances of copied or pasted content or suspiciously similar phrasing.
- Suspicious behavior: Students may display suspicious behavior during online exams, such as repeatedly looking away from the screen, typing very quickly, or switching tabs frequently. These behaviors may be signs of AI use.

It's important to note that while these signs may indicate the wrongful use of AI, they should be used in conjunction with the teacher's judgment and experience. Teachers should also create a culture of academic integrity in the classroom by educating students about the ethical use of AI and the consequences of using AI to cheat.

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I asked ChatGPT whether it considered cheating, beyond its educational consequences, a large scale threat of our national integrity...our moral posture, but it declined to answer.

*So, I'll ask my question of you:*

Do you feel we're facing a crisis in our moral stance and if so, given the impact of social media on two generations of our youth is there a way to stem the damage?