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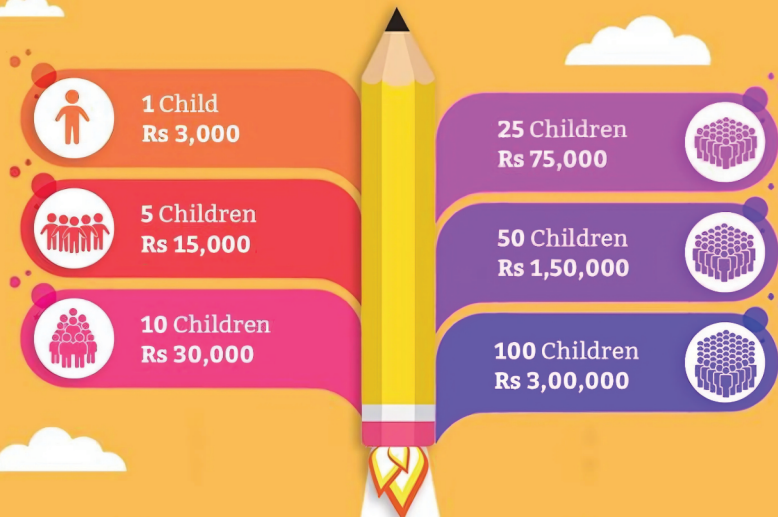
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EESHAN RANADE

"THE HANDS-ON LEARNING IN MY AUTOMOBILE ENGINEERING PROGRAM GAVE ME THE CONFIDENCE TO TACKLE REAL-WORLD CHALLENGES IN THE INDUSTRY."





Editorial | Democratizing Scientific Literature for All

In today's fast-paced world, having access to scientific knowledge is essential. Recently, **U.S. science funding agencies** have initiated new projects that promote free access to journal articles. Consequently, this represents a significant step towards making science knowledge available to everyone. As a result, researchers, students, and curious individuals can now explore **scientific literature** without the burden of high subscription fees. This development allows everyone to engage with science, which in turn helps create a culture of innovation and cooperation.

India's ONOS

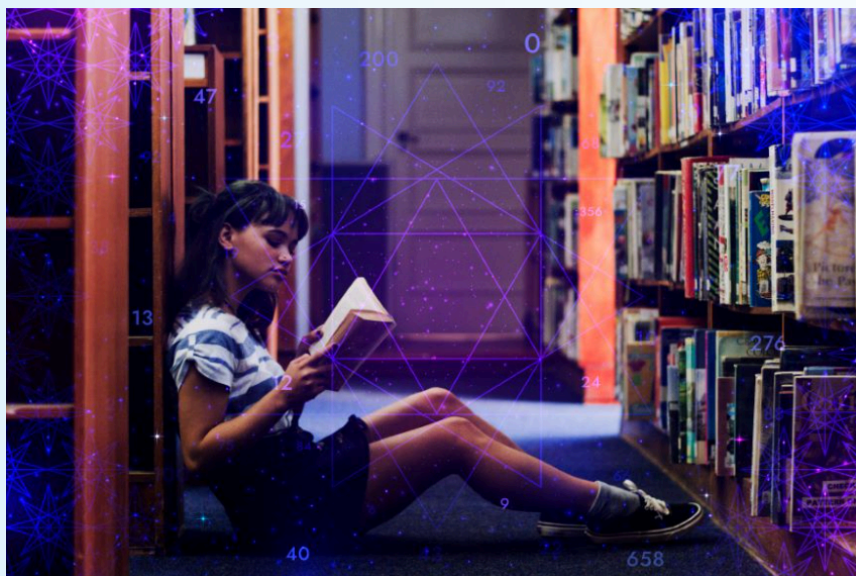


Fig. 1 Science Library for All

Similarly, India's One Nation, [One Subscription \(ONOS\)](#) initiative is a major effort to provide fair access to **Scientific Information** from scholarly journals. Through this initiative, **ONOS** enables 18 million students and researchers to access **13,000** journals via a single, centrally negotiated payment. Thus, it breaks down the financial barriers that often limit access to important research. Moreover, **ONOS** improves educational opportunities and encourages young scientists to contribute to the global scientific community.

Furthermore, these movements towards open access are crucial for nurturing the next generation of thinkers and innovators. When knowledge is **freely** available, it encourages

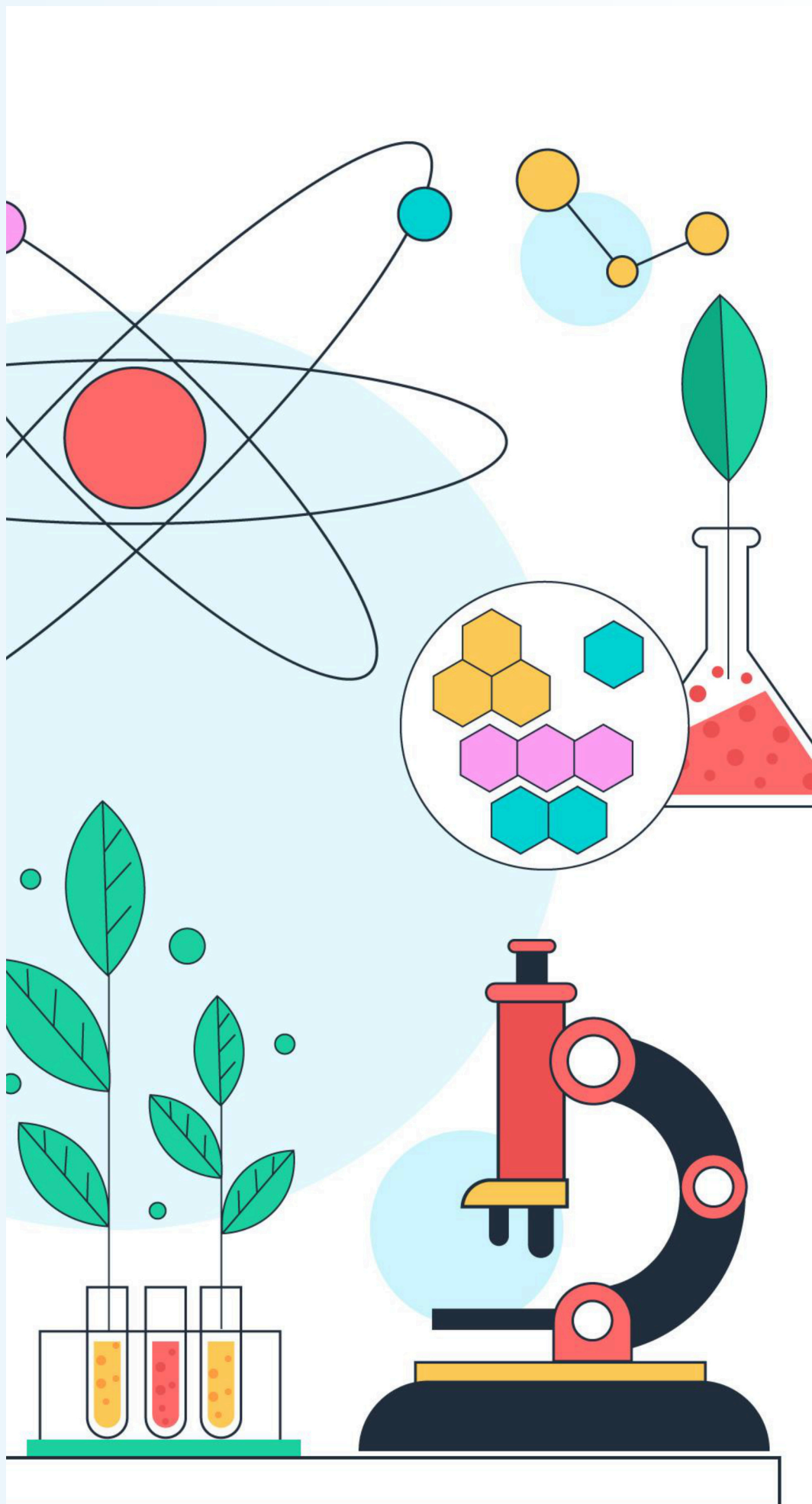
creativity and critical thinking among teenagers. Imagine a world where every student can read the latest research on topics like climate change, technology, or health without worrying about costs. This vision is the future we are moving towards, and it is indeed exciting!

Responsible use of Scientific Literature

As we embrace these changes, we must remember that democratizing **scientific literature** is not just about access; it's about empowerment. In essence, it allows young minds to explore, question, and innovate. With initiatives like **ONOS** and U.S. policies, we are creating a more inclusive and informed society. Let's seize this opportunity to learn, share, and contribute to the world of science together!

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In addition, we offer insights and resources to fuel your **curiosity**. Ultimately, our goal is to inspire your **passion** for new scientific discoveries. Moreover, [ENTECH Online](https://www.entechonline.com) provides everything a teen wants to know for career planning.





Automobile Engineering: My Journey from Passion to Profession

Eeshan Ranade

Cars and vehicles captivated me from a young age, their speed, complexity, and the sheer joy of understanding how they work. After completing my **12th standard**, I knew I would rather not pursue a traditional theoretical engineering degree. Instead, I sought a program that emphasized practical skills and real-world applications. [My B. Tech in Automobile Engineering](#) provided the perfect balance, with 30% theory and 70% practical learning. The program included summer internships and industry-oriented projects, which equipped me with essential skills and hands-on experience. This education helped me tackle industry challenges, innovate solutions, and grow professionally.

The program objectives focused on skill development, preparing us to address real-world problems with innovative solutions. Through hands-on projects and internships, I gained valuable insights into the industry's workings, which significantly contributed to my professional growth.

Imagine a world that operates by public transport in which your ride arrives the moment you need it. You travel directly to your destination — no stops, no transfers — at a fraction of the cost and environmental impact of both individual cars and high-speed trains! The future is here — **Vinod Khosla** on his 'X' handle @vkhosla

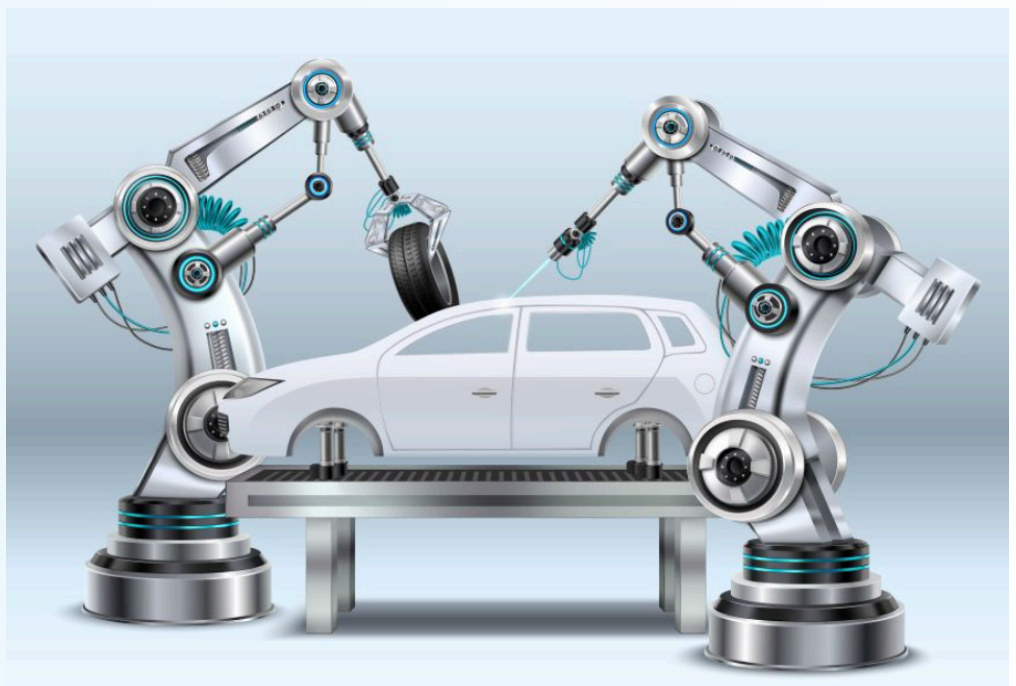


Fig. 1 Automobile Manufacturing



Fig. 2 Car Engine

This blend of passion and practical education truly transformed my career in **automotive engineering**, allowing me to turn my childhood fascination into a fulfilling and dynamic profession.

Automobile Engineering Degree

Automobile Engineering is a captivating branch of **STEM** that combines principles of mechanical, electrical, and materials science to design, manufacture, and maintain vehicles. Let's delve into the core technologies and subtopics that make this domain so exciting.

Automobile Engineering Course

At the heart of automotive engineering lies the integration of various technologies. Modern vehicles are equipped with Electronic Control Units (ECUs) that manage everything from engine performance to safety features. These microcontrollers process data from numerous sensors and ensure optimal vehicle operation. Sensors play a crucial role in monitoring vehicle conditions and surroundings, contributing to vehicle dynamics, which involves the study of forces and motions in vehicles. This



Fig. 3 Communication systems in vehicles CAN (Controller Area Network) and LIN (Local Interconnect Network)

includes understanding how vehicles respond to inputs like steering, braking, and acceleration.

Blending of Applied Electronics Subjects in Automobile Engineering

Communication systems in vehicles, such as **CAN** (Controller Area Network) and **LIN** (Local Interconnect Network), enable different parts of the vehicle to communicate with each other, ensuring coordinated and efficient operation. Mechatronics, an interdisciplinary field combining mechanical engineering, electronics, computer science, and control engineering, is essential for developing advanced systems like automated braking, adaptive cruise control, and electric power steering. Manufacturing engineering involves the design and operation of manufacturing processes to produce vehicles, including everything from assembly line design to quality control and the use of robotics in manufacturing.

Powertrain Engineering

Powertrain Engineering focuses on the design and development of engines and transmission systems, encompassing both traditional internal combustion engines and modern electric and hybrid powertrains. **Chassis and Suspension Systems** involve the design of the vehicle's frame, suspension, and steering systems to ensure stability, comfort, and safety. Automotive Safety

encompasses the development of safety features such as airbags, anti-lock braking systems (**ABS**), and electronic stability control (**ESC**). Lastly, Sustainability and Green Technologies focus on developing eco-friendly vehicles, including electric and hydrogen fuel cell vehicles, in response to the growing emphasis on environmental sustainability.

Thus, **automotive** engineering is a dynamic and ever-evolving field that offers numerous opportunities for innovation and problem-solving. It combines theoretical knowledge with practical skills, making it an ideal choice for those passionate about technology and engineering.

Education Opportunities

Pursuing a career in **automobile** engineering offers a range of formal and vocational educational opportunities. These programs aim to provide students with the essential knowledge and skills needed to thrive in this dynamic field.

Formal Education

Bachelor's Degree (B.Tech/B.E.): Typically a 4-year program, this degree covers core subjects such as automotive electronics, vehicle dynamics, powertrain systems, and manufacturing processes. Students earn credits through coursework, lab sessions, and projects. Assessment methods include exams, assignments, and practical evaluations. Additionally, the internships and industry-oriented projects are integral parts of the curriculum, providing hands-on experience and exposure to real-world challenges.

Master's Degree (M.Tech/M.E.): A 2-year program that delves deeper into specialized areas like advanced vehicle systems, automotive safety, and sustainable technologies. The curriculum includes advanced coursework, research projects, and thesis work. Students often engage in sponsored projects and collaborative research with industry partners.

Vocational Education

Diploma and Certificate Programs: These shorter programs, ranging from 6 months to 2 years, focus on specific skills such as automotive repair, diagnostics, and maintenance. They offer practical training and are ideal for those looking to enter the workforce quickly. Assessment is typically based on practical exams and hands-on projects.

Essentials Skills to Acquire in Automobile Engineering

Students of this program acquire various skills, including proficiency in software tools like **MATLAB**, **Simulink**, and CAD software (e.g., AutoCAD, SolidWorks).

They also learn programming languages such as **C++** and **Python**, which are essential for developing and testing automotive systems.

Certifications

Certifications from recognized bodies, such as the [Society of Automotive Engineers \(SAE\)](#) and Automotive Service Excellence (ASE), can enhance career prospects. These certifications validate expertise in areas like automotive design, diagnostics, and repair.

Research and Internships

Research opportunities are abundant, with many programs offering access to state-of-the-art labs and facilities. Moreover, the internships with leading **automobile companies** provide valuable industry experience and networking opportunities.

Actually, Electric cars are coal-powered cars. Their carbon emissions can be worse than ICE cars — Shrikant Marathe, former director, ARAI

Automotive engineering education is comprehensive, blending theoretical knowledge with practical skills, and preparing students for a successful career in the automotive industry.

Career Path for Automobile Engineering

A graduate of this program can get a diverse range of career opportunities, starting from entry-level positions to advanced roles in research and development. At the entry level, graduates can find positions as automotive engineers, design engineers, or test engineers. These roles typically involve working on vehicle design, development, and testing, with tasks such as creating **CAD** models, conducting simulations, and performing tests to ensure vehicle safety and performance.

The job market for automotive engineers is robust, with



Fig. 4 Automobile Designer



Fig. 5 Automobile Jobs

opportunities in both traditional automotive companies and emerging sectors like electric vehicles and autonomous driving. Likewise, career progression can lead to roles such as senior engineer, project manager, or technical lead. With experience, professionals can move into specialized areas like powertrain development, vehicle dynamics, or automotive electronics.

System engineers focus on integrating various subsystems within a vehicle to ensure they work together seamlessly, while requirement engineers work on defining and managing the requirements for automotive systems and components. Before building physical prototypes, model-based development engineers use software tools to create and test models of automotive systems. Furthermore, engineers who specialize in HIL (**Hardware-in-the-Loop**), SIL (**Software-in-the-Loop**), and MIL (**Model-in-the-Loop**) testing carry out tests to validate automotive systems. In addition, vehicle testing engineers conduct tests to evaluate the performance, safety, and durability of vehicles, while vehicle harness design engineers design and route the electrical wiring harnesses within vehicles. Finally, cybersecurity engineers ensure the security of automotive systems against cyber threats.

Major Employers

Major employers in the automobile industry include OEMs like Tata, Volvo, Mercedes, Mahindra, Volkswagen, and Tesla, as well as suppliers such as Bosch, Magna, Valeo, Tata Elxsi, Tata Technologies, and Forvia. Moreover, the research opportunities are abundant, particularly in areas like electric vehicles, autonomous driving, and sustainable technologies. Many universities and research institutions offer funded projects that allow engineers to work on cutting-edge technologies and innovations.

Automotive engineering is a dynamic field with a wide range of career paths, offering opportunities for innovation and professional growth. Whether you're interested in design, testing, manufacturing, or research, there's a place for you in this exciting industry.

Conclusion

To convert your passion for automotive engineering into a futuristic profession, a well-rounded career planning strategy is essential. Start by reading foundational books on automotive engineering, such as, "Automotive Engineering Fundamentals" by Richard Stone and Jeffrey K. Ball Stay updated with industry trends through journals like "Automotive Engineering" by SAE

International Engage in DIY projects to gain hands-on experience. Building a small-scale model car or working on a vehicle restoration project can provide practical insights. Participate in online courses and tutorials on platforms like Coursera and Udemy to learn about automotive electronics, vehicle dynamics, and CAD software.

Attend workshops and seminars to network with professionals and learn about the latest technologies. Events like the SAE World Congress and local automotive expos are great opportunities. Visiting automotive manufacturing plants and research labs can also provide valuable exposure.

Join student clubs and organizations related to **automobile engineering**, such as Formula SAE or Baja SAE, to collaborate on projects and participate in competitions. These experiences will enhance your skills and make your resume stand out.

By combining theoretical knowledge with practical experience and networking, you can effectively plan your career and turn your passion for **automotive engineering** into a successful profession.

See Also

[Basics of Automobile Engineering: A Comprehensive Guide](#)



The Sound Science of the Devanagari Script

Navin Kabra

The **Devanagari Script**, far from being a random jumble of symbols, is a marvel of linguistic engineering. Its grid-like structure reflects the mechanics of speech production, revealing a hidden elegance. This article will explore this fascinating system, tackling the pronunciation puzzles that have baffled many.

Let's face it, the **Devanagari Script** can seem daunting. Those unfamiliar with it often see only chaos, where others see artistry. But fear not, my friends. Once you understand the underlying **logic** and **patterns** behind it, the seemingly random jumble of letters will transform into a thing of **beauty** and **elegance**. Imagine **someone** shrouding a complex code in mystery for generations.

श and ष exist separately

One of the most common frustrations stems from seemingly redundant letters like श and ष. Are they really the same? Absolutely not! The difference lies in the tongue's position – a subtle detail often overlooked. Similarly, the nasal sounds ङ and ञ, often mistaken for न, possess distinct points of articulation, making them fundamentally different.

Furthermore, the mysterious ॠ is not simply "ri" or "ru", as many believe. Its pronunciation is more nuanced, reflecting a unique tongue position, a fact often lost in modern usage. This fascinating detail highlights the rich history and evolution of the language and script.

Rows and Columns of Devanagari Script

The beauty of this script lies in its structure. The Devanagari script, unlike the English alphabet, organizes its letters in a two-dimensional grid. Each row represents a consistent tongue position (guttural, palatal, retroflex, dental, labial), while each column represents a consistent airflow. This systematic approach makes mastering pronunciation significantly easier. So let's look at some of the rows and columns of Devanagari in Fig. 1.

	Voiceless		Voiced		Nasal
	Unaspirated	Aspirated	Unaspirated	Aspirated	
Guttural (kanthya)	क	ख	ग	घ	ङ
Palatal (talavya)	च	छ	ज	झ	ञ
Retroflex (murdhanya)	ट	ठ	ड	ढ	ण
Dental (dantya)	त	थ	द	ध	न
Labial (oshtya)	प	फ	ब	भ	म

Fig. 1 Devanagari Script Rows and Column

When you read any row horizontally, your lip and tongue positions stay the same; the only thing that changes is how you let air out from your lips, nose, and voice box. When the back of the tongue touches the end of the roof of the mouth (guttural/velar), the whole क row is said. The middle of the tongue touches the roof of the mouth (palatals) for the entire च row. The tongue is bent back in the ट row, and its back touches the roof of the mouth (retroflex). The tongue meets the teeth (dental) in the त row. Moreover, the lips are together (labials) in the प row.

Read any column now and see how they are similar. The answer is clear from the earlier table: only the place of the tongue and lips changes in any column, while the air leaving our mouth, nose, or voice box stays the same.

Saying ड and ञ in Devanagari Script

By now, you should be able to pronounce ड and ञ right. Know the source of the air by first saying न and छ many times. Because they are nasals, air leaves the nose instead of the mouth. Say क ख ग घ several times now to understand the place of the tongue. You can say ड by mixing these two. ड is a guttural/velar nasal sound in phonetics. The same is true for the palatal nasal ञ.

	Voiceless		Voiced		Nasal	Approximant	Fricative	Vowel	
	Unaspirated	Aspirated	Unaspirated	Aspirated				Short	Long
Guttural (kanthya)	क	ख	ग	घ	ङ		ह	अ	आ
Palatal (talavya)	च	छ	ज	झ	ञ	य	श	इ	ई
Retroflex (murdhanya)	ट	ठ	ड	ढ	ण	र	ष	ऋ	ॠ
Dental (dantya)	त	थ	द	ध	न	ल	स	ॠ	ॡ
Labial (oshtya)	प	फ	ब	भ	म	व		उ	ऊ

Fig. 3 Devanagari Vowels

The other letters य, र, ल, व, श, ष, स, ह

Moreover, letters often seen as exceptions, like य, र, ल, व, श, ष, स, ह, actually fit into this grid when looked at through the lens of approximants and fricatives. It's like finding a hidden map! These are usually written after the main grid. They seem like an afterthought and don't seem to fit into the grid.

An approximant is a type of sound. It happens when the tongue gets near the roof of the mouth, teeth, or lips. However, the tongue does not touch them. A fricative is another type of sound. It occurs when the tongue gets very close to the air. This

	Voiceless		Voiced		Nasal	Approximant	Fricative
	Unaspirated	Aspirated	Unaspirated	Aspirated			
Guttural (kanthya)	क	ख	ग	घ	ङ		ह
Palatal (talavya)	च	छ	ज	झ	ञ	य	श
Retroflex (murdhanya)	ट	ठ	ड	ढ	ण	र	ष
Dental (dantya)	त	थ	द	ध	न	ल	स
Labial (oshtya)	प	फ	ब	भ	म	व	

Fig. 2 Approximants and fricatives in Devanagari Script य, र, ल, व, श, ष, स, ह

closeness causes the air to move in a turbulent way. The friction between the tongue and air creates this sound. Now, read any row again and see how the tongue position stays rather steady. The tongue must move a bit to avoid contact in the last two columns, but it stays in the same general area.

You can now see the link between ड and श and च, and so on. Also, you now know the differences in saying between श and ष. The tongue is straight in the first, as in च, and bent back in the second, as in ट.

Notice the link between व and प and फ, and you'll see why the Germans call Volkswagen Volkswagen,

which means "the cheap people's car, or car for the common folk." I should say that ऌ should be next to ॡ. Try saying it like ल, but with your tongue bent back like in ट, if you're not sure how to say it.

The Vowels in Devanagari Script

Since the vowels feel excluded, how about we bring them in?

When the tongue does not touch anywhere during a vowel, the airflow is continuous and smooth. Once more, listen to the rows and convince yourself that अ आ are by using all the rules strictly.

The Elusive ऋ

This also enables us to extend and comprehend ऋ. It is not री or रु. Since र is a retroflex approximant, the curled tongue almost touches the palate. But ऋ is a vowel; thus the tongue is not near the palate. The tongue remains curled up like in र and ट, but it is in the air, allowing for free movement of air. The original Sanskrit pronunciation of ऋ is not used in modern languages anymore. Today, people pronounce it differently. In Hindi, it sounds like री. In Marathi, it sounds like रु. Basically, no one uses the original sound anymore, and Hindi and Marathi have officially replaced it with easier knockoffs.

If you ask is it Krishna, Krushna, or, as ISKCON likes, Kṛṣṇa (which is more closely related to the original Sanskrit), you will never receive a satisfactory response.

Why is it ghazal instead of gazal?

Let me clarify a few more things since you're already here and listening to obscure pronunciation details. In गज़ल, the ग़ is not the typical ग. You are already aware that the rear of the tongue should touch the back of the palate when pronouncing ग. But the Persians introduced ग़, which is a distinct sound. The tongue is not in contact with the palate in this instance. Rather, you attempt to produce the desired sound by tightening your neck. If you haven't done this since you were a child, it is challenging to accomplish without training. In any event, you will begin to notice the difference if you listen to a skilled vocalist pronounce the word गज़ल. Similarly, we do not use the letter "k" to form the words "qayaamat," "qaatil," or "qaazi." These words require a specific sound. They need the "क़" sound, not the "क" sound.

In addition, I've never understood why my American friends found it so funny when I mispronounced the words "wet" (water) and "vet" (doctor). In Devanagari, they are both वैट, although the "v" and "w" sounds in English are entirely different. The letter "w" is pronounced with your lips together, as in "उ" (see?). However, you say "v" with your bottom lip on top of your teeth. To most Indians, both of them sound the same, yet to Westerners, they sound completely different. At first, I didn't think that was possible, but then I understood that the opposite is also true. Arabic speakers frequently say "Bushba" rather than "Pushpa" because they are unable to distinguish between the "p" and "b" sounds ("ro mat Bushba...I hate tears.")

Conclusion

If you start looking through [Wikipedia's phonetic entries](#), you'll find a lot more sounds from around the globe. There are several sounds in Sindhi and Marwadi whose descriptions I also don't understand. There are clicks in African languages. And a lot more. You might learn how the letter "l" is pronounced in Tamil. In Tamil, this letter isn't really the same as "l" in English. This is why the language is spelled as "Tamizh." Kozhikode and other Tamizh terms share the same "zh" sound.

Similarly, if you want to know why "Rama" is not spelled "Ram" check out [my thread on Twitter which recently went viral](#).

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Diet Trends in Gen Z

Dr. Meenal Soman

Generation Z, popularly known as **Gen Z**, is recognized for its internet proficiency from a young age. **Gen Z**, nowadays, shows a significant interest in food, nutrition, and diet to maintain their health and wellness. Let's know about **diet trends** among them. Surprisingly, this generation shows considerable interest in **health and wellness**, embracing trending diets such as intermittent fasting, veganism, **keto**, plant-based eating, flexitarianism, and more. Particularly, characterized by heavy social media usage, **Gen Z** strongly prefers authenticity and transparency in the food and beverage brands they support.



Fig. 1 Functional Food

Furthermore, food trends represent the popular eating habits and preferences that develop within a particular group over time. Specifically, these trends—how and what we eat—are influenced by cultural shifts, health consciousness, technological advancements, and social media. Nevertheless, for Gen Z, food trends emphasize health, sustainability, convenience, and visually appealing foods shared online. Additionally, palatability is a crucial factor.

So, considering their career paths focused on these dietary trends, Gen Z has numerous educational opportunities and potential career options to explore.

Changing Dietary Patterns Among Gen Z

Fig. 2 Vegan Diet

Undeniably, Gen Z has emerged as a unique demographic characterized by elevated awareness of health, sustainability, and the ethical implications of their dietary choices. As digital natives, their diet trends are heavily influenced by social media trends, which often dictate food preferences and dieting norms. Particularly, this article explores the trending diets among Gen Z, focusing on the motivations behind their food choices, popular diet frameworks, and the impact of technology and culture on their eating habits.



Fig. 2 Vegan Diet

Food patterns

1. **Sustainable Eating:** Indeed, Gen Z prioritizes sustainability in their diets. Also, they focus on organic, local, and plant-based foods to reduce environmental impact. Moreover, many of them actively follow vegetarian, vegan, and flexitarian diets, seeking alternatives to meat and dairy products that are both nutritious and sustainable.
2. **Plant-Based Diets:** Unquestionably, plant-based eating has gained traction among Gen Z due to health benefits, ethical considerations, and social media's influence. Unlike vegan or vegetarian diets, plant-based or plant-forward eating emphasizes foods primarily from plants, including fruits, vegetables, nuts, seeds, oils, whole grains, legumes, and beans, while occasionally incorporating meat or dairy in moderation.
3. **Intermittent Fasting:** Intermittent fasting is popular among Gen Z as a strategy for weight management and improved metabolic health. Accordingly, it may help reduce the risk of obesity, type 2 diabetes, heart disease, and other illnesses.
4. **Keto and Low-Carb Diets:** Surprisingly, ketogenic and low-carb diets have appealed to Gen Z recently for quick weight loss and perceived effectiveness. However, the keto diet's limitations and sustainability concerns have reduced its popularity recently.
5. **Health-Conscious Snacking:** Occasionally, Gen Z favors healthier snack options, including protein bars, smoothies, and nutrient-dense foods, as convenient and trendy choices.
6. **Functional Foods:** Overall, Gen Z shows a growing interest in functional foods that offer health benefits beyond basic nutrition, such as probiotics, adaptogens, and superfoods. Surprisingly, these foods may reduce the risk of chronic diseases and provide additional physiological benefits.

Factors affecting Food habits

1. **Social Media Influence:** Social platforms like TikTok and Instagram shape dietary trends with viral recipes. Whereas, influencers drive Gen Z's food choices, some trends may show limited interest in health and nutrition.
2. **Global Cuisine Exploration:** Gen Z's enthusiasm for global food experiences, particularly fusion cuisine, reflects their diverse cultural interests and is often highlighted on social platforms.
3. **Food Accessibility and Affordability:** Economic challenges and food accessibility issues affect Gen Z's ability to maintain trendy diets. Although,

social media provides abundant nutrition information, it also exposes them to fast food and processed snacks, complicating their efforts to maintain a balanced diet.

4. **Mental Health, Eating Habits and Trending diets:** There is a growing recognition of the connection between mental health and dietary choices. Dr. Babina N.M., Chief Medical Officer, highlights the following observations:

Diet and Health

Apart from these **diets trends**, Gen Z prefers fresh, organic, and locally sourced foods over heavily processed items. However, they also adopt meal kits and prepared food options for convenience. Certainly, Gen Z is adventurous in food choices, but generally appreciates traditional foods. Additionally, a quarter of Gen Z strongly agrees that indulgent foods and beverages are essential to a healthy, balanced diet.

Moreover, what we eat or drink daily impacts our physical and mental health. Thus, a good nutrition, combined with regular exercise, helps maintain a healthy weight and reduces the risk of chronic diseases.

Conclusion

Surely, the dietary patterns among Gen Z reflect a blend of health-conscious choices and a love for diverse and photogenic foods. Likewise, these



Fig. 3 Diet Trends Keto

trends show a positive shift towards healthier eating habits. Lastly, as the food industry continues to evolve, understanding and adopting these trends, which may prove crucial in meeting the demands of Generation Z.

Evidently, this research provides insights into the dietary habits of Gen Z and the factors influencing their food choices in a rapidly changing world.

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Redefining Automotive Safety using AI and ML

**Lakshmi Prasad Bhatta
Narasimha (Nara) K**

The evolution of **safety on the road** has undergone a significant transformation, shifting from reactive measures aimed at mitigating crash impacts to proactive systems focused on accident prevention. The integration of Artificial Intelligence (AI) and Machine Learning (ML) into **automotive safety** frameworks powers this shift. By seamlessly blending passive safety features with active safety systems, AI and ML are revolutionizing how vehicles protect both occupants and vulnerable road users.

By leveraging sophisticated algorithms and vast amounts of data, AI and ML are enabling real-time decision-making, predictive analytics, and improved driver assistance systems. This evolution promises to reduce accidents, enhance vehicle reliability, and ultimately create a safer driving experience for everyone on the road.

AI for Enhancing Passive Safety Systems

Historically, designers have designed passive safety systems like airbags, crumple zones, and reinforced structures to minimize injuries during accidents. Today, AI is enhancing the design and testing of these systems, making them more effective than ever.

Through advanced simulations, engineers leverage AI-driven tools to predict crash dynamics with unprecedented precision.



Fig. 1 Designing for Passive Automotive Safety

These virtual crash tests allow for optimized material selection, structural design refinements, and better impact absorption strategies. AI-powered simulations can evaluate thousands of crash scenarios in a fraction of the time it would take using physical prototypes, reducing costs and accelerating the development process.

ML-Powered Active Safety Systems

While passive safety remains essential, the automotive industry is increasingly focusing on active safety systems designed to prevent crashes before they happen. ML algorithms play a crucial role in processing real-time data from vehicle sensors, including cameras, LiDAR, and radar. This data enables systems such as Autonomous Emergency Braking (AEB), Lane Keeping Assist (LKA), and Adaptive Cruise Control (ACC) to make real-time decisions and avoid potential collisions.

Sensor fusion, enabled by ML, combines data from multiple sources to create a comprehensive understanding of the vehicle's environment. This fusion of sensor data enhances the accuracy of detecting obstacles, predicting road conditions, and responding to rapidly changing environments.

AI for Meeting Safety Standards

As AI becomes integral to Advanced Driver Assistance Systems (ADAS) and Autonomous Driving Systems (ADS), ensuring the safety and reliability of these technologies is critical. ISO 8800 establishes standards for managing AI safety in automotive applications, addressing key aspects such as error identification, performance metrics, and lifecycle management. This framework ensures that AI systems meet rigorous safety requirements, which is vital for integration into safety-critical applications.

SCANer from AVSIMULATION

Additionally, NCAP (New Car Assessment Program) safety standards are evolving to incorporate virtual validation in place of, or in combination with, physical crash testing. Given that certain real-world crash scenarios may be too dangerous, expensive, or impractical to simulate physically, virtual validation through AI and ML has become essential. Virtual crash simulations, powered by AI-driven tools, allow for more efficient and comprehensive testing of vehicle safety features while maintaining high safety standards. These advancements enable manufacturers to meet or exceed NCAP requirements while enhancing safety performance.

The Unified Approach to Safety

The future of automotive safety lies in integrating passive and active safety systems into a unified approach. Virtual engineering tools, powered by AI and ML, play a critical role in this integration. Engineers can now analyze how passive safety features complement active systems, ensuring vehicles not only withstand impacts but also prevent them.

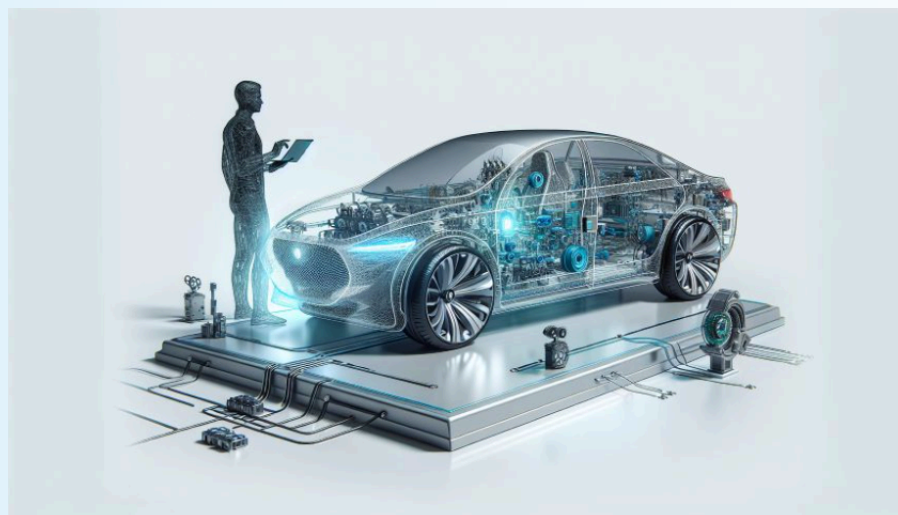


Fig. 2 Changing Future of Road Safety: Integrating AI and ML

For instance, ML models can predict how structural reinforcements interact with real-time ADAS features during near-collision scenarios, ensuring that both crash avoidance and mitigation systems work in harmony. This synergy creates a comprehensive safety strategy that addresses both pre-crash and post-crash dynamics.

Future Prospects

The convergence of AI and ML with automotive safety opens up exciting new possibilities:

- **AI-Driven Edge Case Simulations:** Virtual environments can create situations that are rare but important. Especially, these situations help test how well safety systems work in tough conditions. This ensures that the safety systems are strong and reliable.
- **Predictive Maintenance:** Machine learning algorithms can predict when a system might fail. They do this before the failure happens. Actually, this allows for proactive maintenance, which means resolving problems before they cause damage. By doing this, they help keep safety systems reliable and working well.
- **Path to Full Autonomy:** AI and ML are critical for Level 5 autonomous vehicles. Interestingly, these vehicles operate completely on their own. While, they do not need human help, advanced safety technologies are key for them. Specifically, these technologies help the vehicles handle complex road conditions.

Conclusion

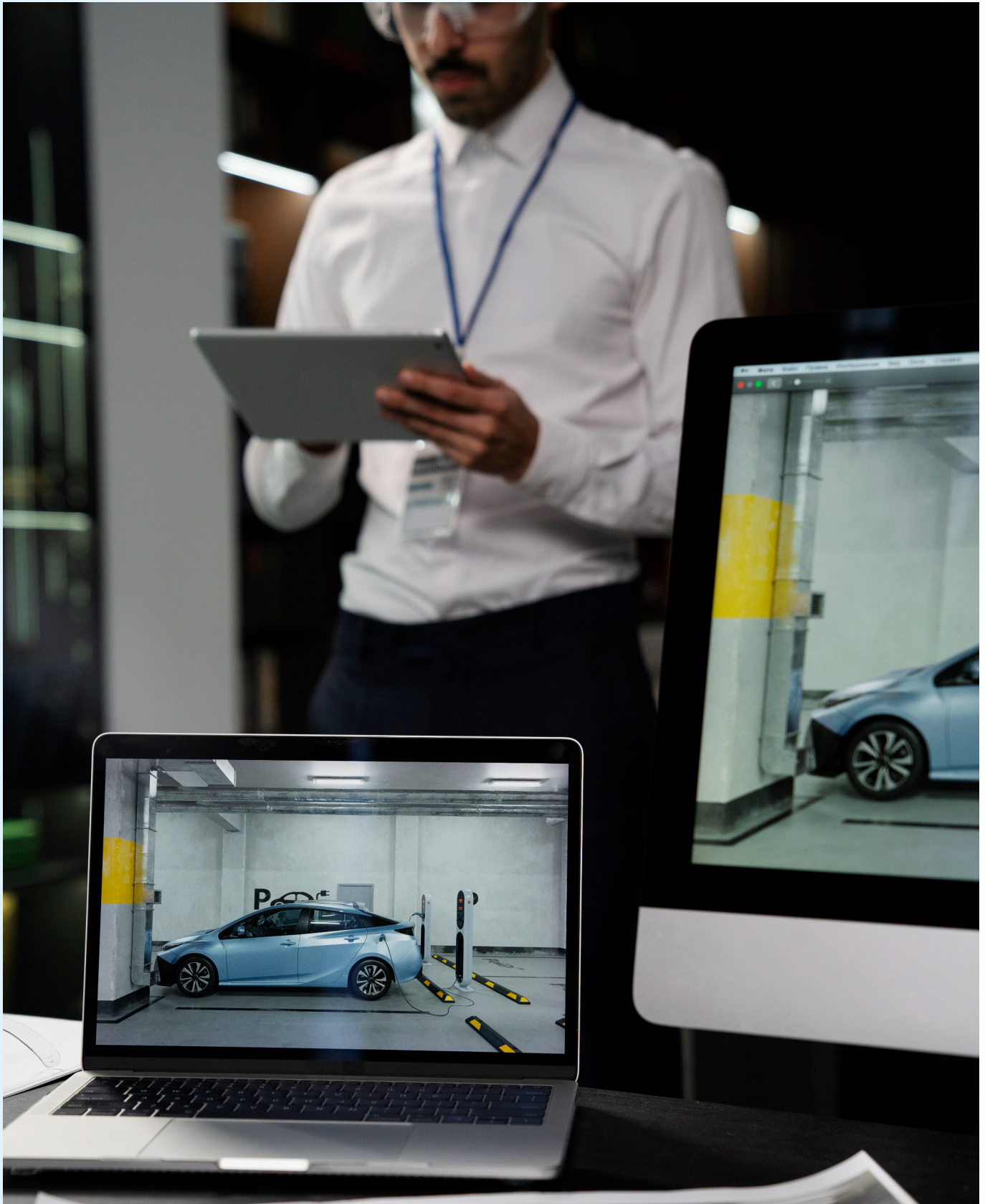
The automotive industry is mixing passive and active safety systems more and more. Moreover, they are using AI (Artificial Intelligence) and ML (Machine Learning) to do this. AI is when machines can perform tasks that usually need human intelligence. ML is a type of AI where machines learn and make decisions on their own. Particularly, these technologies make it easier to reduce the damage from crashes. Amazingly, they also create new ways to prevent accidents before they happen.

Truly, the move from reactive to proactive safety is a big change in car

design. Reactive safety means acting after something happens. Proactive safety is about acting before something happens. Now, cars are built to predict problems, respond to them, and keep people safe. AI developers, car engineers, and regulators need to work together closely. This teamwork is essential to use these new technologies fully. It will make roads safer and move us closer to a time when cars can drive themselves completely.

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AR, VR, XR, and Mixed Reality: The Future of Learning Science

Dinesh Joshi

The technological revolution has paved the way for unprecedented changes in how students engage with science. **AR** (Augmented Reality), **VR** (Virtual Reality), **XR** (Extended Reality), and **Mixed Reality for Learning Science** offer new pathways to education that are immersive and innovative, capturing the imagination and enhancing the *learning experience*. But what do these terms actually mean, and how are they

shaping the landscape of science education? This article explores these immersive technologies and explains how they are influencing tomorrow's educational opportunities.

Understanding Immersive Technologies

There is a revolution taking place in the field of science education. Immersion technologies, which aim to engage and educate students in previously unimaginable ways, are largely driving this shift.

What is Augmented Reality (AR)?

Augmented Reality has turned into a buzzword in educational circles, and for a good reason. AR technology integrates digital information with the real world,

providing an enriched view of the environment. Imagine a biology student viewing a 3D model of a beating heart through their smartphone on a desk. Surprisingly, the model's details adjust as the student moves around the table, allowing them to see, understand, and interact with a concept usually confined to textbooks. According to the extensive research and implementation detailed on platforms such as [STEMROBO](#), AR is not just an add-on but a vital element for enriched learning.

Exploring Virtual Reality (VR)

Virtual Reality takes things a step further by creating an entirely artificial environment. Furthermore, students can directly interact



Fig. 1 Augmented Reality



Fig. 2 Virtual Reality

with and explore complex scientific models in a completely digital world through VR. Specifically, this technology removes geographical and logistical barriers, enabling students to attend a virtual chemistry lab onboard the International Space Station, without ever leaving their homes. Moreover, the platforms like [ClassVR](#) provide resources that make such out-of-this-world experiences possible, truly revolutionizing the way science is taught.

The Role of Extended Reality (XR)

XR, or Extended Reality, blurs the boundaries between AR, VR, and the real world. Actually, this comprehensive umbrella term encompasses both virtual and real elements, allowing teachers and students to utilize the best aspects of both realities. Also, by integrating holograms, real-world interactions, and immersive digital simulations, XR is reshaping educational methodologies.

Defining Mixed Reality in Education

Mixed Reality combines both the physical and digital worlds. Unlike AR, where digital content overlays the real environment or VR, where users are completely immersed in a virtual setting. Thus, **Mixed Reality for Learning Science** creates experiences where physical and digital objectives co-

exist and interact in real time. Additionally, in an educational context, this means biology students can dissect a digital frog right on their lab table or physics students can manipulate a digital particle accelerator while at their school desks. Such mixed insights and interactions are vital, as demonstrated in cases on [Futuclass Education](#).

Revolutionizing Science Education

Immersive technologies are sparking a creative overhaul in science classrooms worldwide. They are not just enhancing traditional methods but rewriting the educational narrative.

From Theoretical to Practical: Learning in a Virtual World

In the field of science education, theory frequently comes before practical application. Eventually, this delay can sometimes hinder understanding, as students may struggle to connect theoretical concepts with real-world applications. Immersive tech fills this gap by enabling immediate practical applications of theoretical ideas. For instance, chemistry students can carry out **virtual experiments** safely, witnessing chemical reactions without the risk of hazardous spills. Platforms like [VRLab Academy](#) demonstrate the potential of these virtual practices, enhancing student skills while also fostering critical safety practices.



Fig. 3 Mixed Reality for Learning Biology

Building Virtual Laboratories for Physics and Beyond

Creating an actual laboratory with high-end equipment can be financially taxing. Virtual labs present a cost-effective and scalable solution. With just a **VR headset**, students can enter a fully equipped virtual lab, conduct experiments, and receive immediate feedback on their results. **VR** labs aren't limited to physics—they span every imaginable field, from synthetic biology to advanced robotics. Implementations such as those shown on [Futuclass Education](#) reveal the diverse opportunities VR labs can offer, bridging accessibility gaps worldwide.

Engaging Students with Interactive Simulations

Interactive simulations breathe life into potentially dull subjects, turning learning into an engaging exploration. With a touch of gamification, these simulations hook students' attention by making education fun and interactive. Programs that utilize realistic physics simulations like the ones detailed under "Real-Time Relativity" enliven subjects such as relativity and mechanics. These interactive modules allow students to not only watch but to play an active role in unfolding complex scientific principles, effectively solidifying their understanding.

Benefits of Using Mixed Reality for Learning Science

While the wow-factor of AR and VR is *unmistakable*, their benefits stretch far beyond merely impressing students. They provide a dynamic way to visualize complex scientific concepts that might be difficult to grasp through traditional methods. By offering immersive experiences, these technologies allow students to explore and interact with abstract ideas in a tangible way. This hands-on approach can lead to deeper understanding and retention of information.

Making Complex Concepts Accessible

AR and VR are revolutionizing how inaccessible or abstract scientific concepts are taught. Molecules, atomic structures, or even galaxies become tangible and visually comprehensible through these tools. By breaking down complex concepts into interactive elements, students build stronger foundational understanding right from the school years. This method ensures a firm grasp of subjects, easing students' way into more complex topics later on.

Encouraging Hands-On Learning

Technologies related to **Mixed Reality for Learning Science** invite students to dive directly into hands-on activities without the need for physical materials. These technologies transform previously resource-dependent and time-consuming tasks, like exploring a digital coral reef or dissecting a human heart model, into engaging experiences. Real-time interactions backed by virtual tools not only boost student *involvement*, but significantly enhance retention rates by promoting active learning.

Personalizing Educational Experiences

Every student learns differently, and **immersive technologies** support personalized learning experiences by allowing choices that cater to varied student needs. These tools provide customization options—students may view complex models from an angle that best suits their understanding, or proceed through learning modules at a *comfortable pace*. This personalized approach is proving instrumental in building confidence among students who may have



Fig. 4 AR, VR, XR, and Mixed Reality for Learning Science



Fig 5. AR VR Technology Integration in Classrooms

struggled with the one-size-fits-all approach of traditional teaching styles.

Challenges and Considerations

Of course, introducing these advanced technologies into education comes with its own hurdles and considerations. Schools must address issues such as the cost of implementing AR and VR tools, which can be significant.

Technology Integration in Classrooms

Bringing AR, VR, XR, and **Mixed Reality for Learning Science** typically involves technical challenges. Issues can range from needing hardware that supports these technologies, to ensuring reliable internet connectivity. Schools must often update their existing infrastructure, which may require both financial resources and time. Yet, as hurdles are overcome, the long-term rewards in terms of student engagement and improved educational outcomes prove substantial. Schools that successfully integrate these technologies often see a marked increase in student enthusiasm and participation. This enthusiasm translates into a more dynamic learning environment where students are eager to explore and experiment.

Addressing Accessibility and Equity Issues

Inclusive education remains a global challenge, and immersive technologies must be implemented thoughtfully to avoid widening the education gap. Ensuring that schools in all areas, including underserved or rural regions, have equal access to **cutting-edge learning** tools is vital. Solutions include partnerships with tech companies, government subsidies, or nonprofit

initiatives focusing on fair distribution of educational technology. Actually, collaborations with organizations can help bridge the gap by providing resources and training to educators in these areas.

Overcoming Initial Costs

Adopting these new technologies often requires significant initial investment. From acquiring VR headsets and AR devices, to setting up the necessary software infrastructure—costs can mount quickly. Nevertheless, schools must consider these investments as foundational, much like computers and the internet were once considered, offering immense dividends by preparing students for a technologically advanced future.

The Future of Mixed Reality for Learning Science

While challenges remain, the horizon is bright as these immersive technologies continue to advance. Additionally, they promise to revolutionize the way science is taught and learned by providing experiences that are not only engaging but also deeply educational.

Innovations on the Horizon

As technology progresses at a breakneck pace, more refined applications are on the horizon. Innovations like real-time language translation during immersive reality experiences are captivating prospects. Another exciting idea is adaptive feedback systems. Certainly, they create a personalized learning path. This path is based on how each person progresses. Besides, the future developments might hold answers to current limitations, pushing the boundaries of what immersive

education can achieve.

Preparing Educators for Future Technologies

For successful incorporation, educators must be effectively trained to use these advanced tools. Consequently, proper training and professional development become imperative to equip educators with the skills to efficiently integrate and leverage immersive educational tools in their curriculum. Indeed, preparing educators leads to better teaching. Besides, it also creates a place where teachers and students learn together. Actually, they work together to understand new technologies. "Nuances" means the small and important details of these technologies.

Predicted Impacts on Learning Outcomes

The potential impacts of these technologies on learning outcomes are promising. Significantly increased engagement levels, improved comprehension of complex topics, and enhanced long-term retention of learning materials are some of the positive trends already being observed. Moreover, as immersive technologies mature, they are anticipated to redefine learning outcomes, making individuals better equipped for future educational and professional challenges.

Closing Remarks

Immersive technologies are not just a passing trend—they represent the future of education. Indeed, their ability to engage, educate, and elevate is ushering in a new age where **learning science** is not just about acquiring knowledge but about experiencing it. Consequently, as we embrace this future, it is crucial that we ensure that it is accessible, equitable, and advantageous for all. Therefore, by prioritizing inclusivity, we can bridge the gap between technology and education, ultimately ensuring that every student has the opportunity to benefit from these advancements.

By fostering an inclusive environment, schools can ensure that students from diverse backgrounds have equal access to these transformative tools. This approach not only democratizes education but also prepares students to thrive in a world where digital literacy is paramount. Schools can implement

strategies such as providing necessary resources, offering training sessions for both students and teachers, and creating partnerships with technology companies to make these tools more accessible.

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Martian Rock Discovery Baffles Scientists!

Hold on to your hats, STEM fans! NASA's Perseverance rover has stumbled upon a Martian Rock so bizarre, it's making headlines across the galaxy (or at least, the scientific community). This isn't just any old rock; it's an arrowhead-shaped beauty nicknamed Cheyava Falls – and it's covered in leopard spots!

Organic Molecules and Martian Rock Minerals

Firstly, this **Mars** rock contains organic **molecules** – the building blocks of life as we know it! However, before you start planning your Martian holiday, remember that these molecules can also form without life. So, it's not quite a definitive we found aliens! moment just yet. Nevertheless, it's incredibly exciting!

Unveiling the Secrets: SHERLOC and PIXL to the Rescue!

The rover's super-powered instruments, **SHERLOC** (Scanning Habitable Environments with Raman & Luminescence for Organics & Chemicals) and **PIXL** (Planetary Instrument for X-ray Lithochemistry), have been working overtime. SHERLOC detected the organic compounds, while PIXL revealed that the mysterious black halos surrounding the spots contain iron and phosphate. These aren't your average rock components!

From Mud to Marvel: A Rock's Wild History

Secondly, scientists think **Cheyava Falls** might have started as mud, eventually hardening into rock. Then, later, fluids flowed through it, creating those striking white calcium sulfate veins and those intriguing spots. One theory suggests these spots are linked to **microbial life**—think microscopic **Martian microbes**! How cool is that?

Olivine: An Unexpected Twist!

But the surprises don't end there. The

veins are also filled with **olivine** crystals, a mineral usually formed from magma. This unexpected finding adds another layer to the mystery, potentially suggesting past volcanic activity. It's a real head-scratcher for the scientists! Furthermore, the **reddish color** suggests the presence of **hematite**, a mineral that gives Mars its signature rusty hue. This rock is truly a palette of planetary possibilities!

Bringing Martian Rock to Earth: The Next Steps

Despite all the information gathered, scientists want to bring a sample of **Cheyava Falls** back to Earth for further analysis. The powerful labs on Earth could unlock even more secrets of this remarkable Martian rock. This is a prime example of why space exploration is so crucial.

This Martian mystery has scientists buzzing. Will this rock finally reveal evidence of past life on Mars? Only time (and further research) will tell. Until then, keep exploring and stay curious! Keep reading ENTECH for the latest discoveries!

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Learn more about Perseverance: science.nasa.gov/mission/mars-2020-perseverance

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Exploring Timeless Awareness: A New Take on Meditation

In our fast-moving world, where time seems to slip away faster than ever, a revolutionary concept of Timeless Awareness has captured the attention of philosophers and scientists alike. Akiko Frischhut's paper, "Awareness without Time," presents a thought-provoking idea: what if you could be completely aware without experiencing time? This concept challenges everything we know about consciousness and meditation.

Understanding Timeless Awareness Meditation

Timeless Awareness meditation isn't your typical relaxation technique. It's a profound state where the usual rush of thoughts and time perception slows down, letting you experience peace without the clock ticking in your mind.

What is Temporality in Meditation?

In the context of meditation, **temporality** refers to our sense of time

passing. Most of us measure our meditation sessions with time—ten minutes here, an hour there. However, those who venture into deeper meditative states report an unusual experience. They feel as though time doesn't exist, yet they're highly aware. This paradoxical state is what **Akiko Frischhut** explores in her paper, suggesting that during deep meditation, individuals experience a form of awareness that is both continuous and timeless.

The Idea of Pure Duration

The concept of **pure duration** in meditation is fascinating. Imagine sitting cross-legged and diving deep into your consciousness. You're aware and present, but time seems irrelevant. According to Frischhut's research, this feeling is not just a fleeting experience but a tangible state called pure duration. This state is characterized by **awareness** without the usual markers of time, like seconds ticking away or hours passing by.

Breaking the Myth of Temporal Awareness

Many people think that being aware requires some perception of time. However, deep meditation challenges this belief. In this unique state, meditators describe an ongoing awareness that is timeless. Surprisingly, this discovery opens new doors to

understanding how our minds work beyond the normal experience of past, present, and future.

Research Insights from Fringe States

Exploring **fringe states** of **consciousness**, like dreams and trances, offers insights into how our minds work on the edge of awareness and sleep. Furthermore, Frischhut's work delves into these obscure areas, shedding light on how they might relate to timeless meditation experiences. Her research suggests that these **fringe states** can help us understand the boundaries of consciousness and how they blur during deep meditation.

How Do Fringe States Affect Consciousness?

Fringe states have a peculiar impact on consciousness. They straddle a line between alertness and non-consciousness, giving us glimpses into alternate perceptions of reality. Understanding these states can help us unravel how they relate to meditative timelessness and consciousness. By examining these states, researchers like **Akiko Frischhut** aim to provide a clearer picture of how consciousness can exist without the typical constraints of time.

A Deep Dive into Akiko Frischhut's Study

Frischhut's study presents a coherent interpretation of timeless awareness, arguing that during the deepest

meditation, individuals experience consciousness without temporal structure. In fact, this concept challenges traditional views of time-bound awareness, suggesting a new realm where consciousness exists without a ticking clock. For further insights into this study, check out the original citation [here](#).

Potential Avenues for Future Research

The world of consciousness is vast and unexplored. Understanding timeless awareness opens up a world of possibilities for research and exploration. Researchers are encouraged to delve deeper into how this might influence other cognitive processes and emotional states.

Uncovering Mysteries of Mind and Time

Scientists and philosophers have long been intrigued by the mysteries of the mind. This study invites them to explore how timeless awareness can reshape our understanding of consciousness. With time no longer a defining factor, what new horizons can we discover about our minds?

The Impact of Timeless Awareness on Consciousness Studies

As we delve deeper into the concept of timeless meditation, its implications could be profound. It challenges conventional understanding and asks us to re-evaluate how we perceive consciousness. These findings might pave the way for breakthroughs in consciousness studies and meditation practices, changing how we view the mind's potential.

In conclusion, the inquiry into timeless awareness presents an exciting frontier in consciousness research. With further exploration, we might just stumble upon the keys to unlocking the full potential of the human mind, revolutionizing how we think about and experience consciousness in our everyday lives.

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A New AI Tool: Decoding Plant RNA

Scientists have developed a groundbreaking new artificial intelligence (AI) tool, PlantRNA-FM, designed to decode the complex world of plant RNA. As a result, this tool promises to revolutionize our understanding of how plants function. Furthermore, it opens up exciting new possibilities in areas like crop improvement and disease resistance.

Decoding the Language of Plant RNA
RNA, or ribonucleic acid, plays a crucial role in translating genetic information into proteins, which are the building blocks of life. However, understanding how RNA works is incredibly complex. **Plant RNA** molecules don't just exist as linear sequences; they also fold into intricate secondary and tertiary

structures that affect their function. PlantRNA-FM tackles this complexity head-on.

A Massive Dataset of Plant RNA

Unlike previous AI models that focused solely on **plant RNA** sequences, PlantRNA-FM, in contrast, incorporates both sequence and structural information derived from a massive dataset, specifically encompassing the transcriptomes of 1,124 different plant species! Consequently, this vast amount of information enables the AI to learn the intricate relationships between RNA structure and function across a wide range of plants.

Predicting Plant RNA Structure

One of PlantRNA-FM's key strengths is its ability to accurately predict RNA structure. This is crucial because the structure directly impacts how an **RNA molecule** functions. Tests show PlantRNA-FM significantly outperforms

other existing AI models in structure prediction, achieving impressive accuracy levels.

Applications of AI tool PlantRNA-FM

PlantRNA-FM isn't just a powerful tool for predicting RNA structure; it also excels at other tasks. Importantly, it helps researchers understand the intricacies of gene regulation in plants, opening up several key research areas.

Translation Efficiency Prediction with AI tool

Moreover, PlantRNA-FM can predict the efficiency of translation – the process of turning genetic information into



proteins. This is especially relevant for the 5' UTR, a crucial region of RNA that significantly influences this process. Understanding the 5' UTR is key to manipulating gene expression.

Discovering Functional Motifs with AI tool

Finally, and perhaps most significantly, PlantRNA-FM allows scientists to identify functional **plant RNA** motifs – specific sequences and structural elements within RNA that control gene expression. By identifying these motifs, researchers gain powerful insights into the regulatory mechanisms that govern plant life. This is a giant leap forward in plant biology.

The development of PlantRNA-FM represents a significant advancement in our ability to understand plant biology. Specifically, its capability to seamlessly integrate both RNA sequence and structural information, along with its superior performance across various downstream tasks, makes it an invaluable tool for researchers worldwide.

Moreover, this innovative AI tool opens up exciting avenues for research, thereby paving the way for advancements in crop improvement, disease resistance, and numerous other areas that significantly impact our world. To discover more about the impact of AI on agriculture, be sure to check out entechonline.com/agriculture/ai-impact.

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One Nation One Subscription : Free Access to 13,000 Journals

Greetings, Scholars and Educators! We are absolutely thrilled to share some incredibly exciting news. Moreover, this groundbreaking initiative marks a significant and transformative step in India's academic journey. Specifically, starting January 1, 2025, the innovative "One Nation One Subscription" (ONOS) initiative will officially commence. Furthermore, this comprehensive plan will provide free and unrestricted access to an impressive 13,000 international academic journals. Consequently, this will open unprecedented new

opportunities for approximately 18 million students, faculty, and researchers. Additionally, these academic professionals are strategically spread across 6,300 institutions nationwide, ensuring widespread impact and accessibility.

What ONOS Means for You Unified Access

ONOS consolidates subscriptions from **30 leading publishers** like Elsevier, Springer Nature, and Wiley into a single platform. This ensures equal access to high-quality scholarly materials for all institutions, regardless of financial resources.

Significant Government Investment

The government has allocated **₹6,000 crore** for the first three years. This shows

its commitment to improving research and education. This effort is in line with the **National Education Policy (NEP) 2020**. The **NEP 2020** aims to transform India's education system. It focuses on making it more inclusive and holistic.

One Nation One Subscription, Fostering Equitable Growth

Furthermore, **ONOS** is particularly and exceptionally helpful for smaller cities, specifically those categorized as tier 2 and tier 3 cities. Indeed, the **One Nation One Subscription** initiative strategically gives people in these traditionally underserved regions substantially better access to comprehensive academic resources. Moreover, this enhanced access significantly helps researchers with complex studies that involve multiple interconnected subjects, commonly known as interdisciplinary research. Consequently and remarkably, the overall quality of academic work in these emerging urban centers steadily improves. In addition, this transformative approach not only bridges existing knowledge gaps but also empowers local scholars to engage with

global academic conversations more effectively.

User-Friendly Digital Portal of ONOS

The Information and Library Network (**INFLIBNET**) will manage the subscription. They will organize it so it is easier to access. There will be a digital portal to use. The Department of Higher Education will supervise this portal. A digital portal is a website that lets you find and use information easily.

Looking Ahead

Undoubtedly, **One Nation One Subscription** project provides researchers with direct and immediate access to academic journals. Moreover, it strategically sets a robust foundation for India to emerge as a potential world leader in cutting-edge research. Furthermore, this innovative initiative could potentially inspire and motivate similar transformative projects in other developing countries. In fact, by democratizing academic knowledge, the program not only enhances local research capabilities but also positions India as a pioneering model for global academic accessibility. Consequently, this approach represents a significant step towards creating a more interconnected and knowledge-driven international academic landscape.



Join the Conversation

We love hearing your thoughts! How do you think **ONOS** will impact our research landscape? Share your views and join us in this remarkable journey of academic advancement!

Connect With ONOS

Stay updated with developments by visiting the [ONOS Website](#). For more academic insights, follow us on social media.

Closing Notes

Your continued passion for learning and research drives initiatives like ONOS. Here's to a future filled with knowledge and innovation!

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Ketogenic Diet for Cancer Treatment

Researchers have uncovered a fascinating link between diet and the effectiveness of CAR T-cell therapy, a revolutionary cancer treatment. A recent study presented at the 2024 ASH Annual Meeting suggests that a ketogenic diet might significantly boost the power of CAR T cells to fight cancer. This exciting development opens up new possibilities for improving cancer treatment outcomes.

Understanding CAR T-Cell Therapy
CAR T-cell therapy involves modifying a patient's own immune cells (T cells) to target and destroy cancer cells. These modified cells, called CAR T cells, are infused back into the patient to fight the cancer. However, some patients don't respond well, highlighting the need for

improvements in this therapy. For more information on CAR T-cell therapy, visit this helpful resource: [National Cancer Institute](https://www.nationalcancerinstitute.org).

The Role of the Ketogenic Diet

The study found that mice fed a **ketogenic diet**, which is very low in carbohydrates and high in fats, showed better tumor control and survival rates when treated with **CAR T cells**. This is because the ketogenic diet increases the levels of **β -hydroxybutyrate (BHB)** in the body. BHB is a ketone body that acts as an alternative fuel source for cells, including **CAR T cells**. This appears to significantly improve their efficacy.

BHB: Fueling CAR T Cell Efficacy

Furthermore, researchers discovered that **BHB**, a key metabolite produced during ketosis, acts as a superior energy source for active **CAR T cells**, compared to glucose. This leads to enhanced **CAR T cell** activity and better cancer control. The study used various **xenograft cancer models** to confirm these findings, showcasing the potential for BHB supplementation to optimize **CAR T-cell therapy**.

Metabolic Modulation and Epigenetic Changes

Interestingly, the researchers also found that **BHB** affects the epigenetics of **CAR T cells**. **BHB** promotes the expression of genes vital for their function, ultimately enhancing their ability to fight cancer. This suggests a multifaceted mechanism through which **BHB** boosts **CAR T cell** effectiveness.

Translational Relevance and Clinical Trials

To further validate their preclinical findings, researchers retrospectively analyzed patient data and found a correlation between higher BHB serum levels and greater **CAR T cell** expansion. Moreover, they successfully boosted the ex vivo production of **CAR T cells** by adding **BHB** to the cell culture media. These findings are paving the way for a first-in-human clinical trial to evaluate **BHB** supplementation during **CAR T-cell therapy**.

The Future of CAR T-Cell Therapy

This research represents a significant leap forward in **CAR T-cell therapy**. **Ketogenic diet** can enhance the

effectiveness of this powerful treatment, scientists are opening up exciting new avenues to improve cancer treatment. This breakthrough underscores the intricate interplay between nutrition and immunotherapy. Learn more about the latest advancements in cancer research by exploring our blog on STEM at entechonline.com. You'll find insightful articles on related topics such as nutrition and health. Discover your passion for STEM and explore potential careers by visiting entechonline.com today!

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Boron Neutron Capture Therapy: Is this the Future of Cancer Care?

In a remarkable scientific development, researchers have discovered a novel approach to Boron Neutron Capture Therapy (BNCT) that could, indeed, revolutionize the treatment of intractable malignant tumors. The key to this breakthrough, interestingly, lies in the synergistic combination of PVA (poly(vinyl alcohol)) and the D-BPA (d-4-boronophenylalanine) enantiomer. Consequently, this innovative method promises to significantly enhance the efficacy of BNCT treatments.

The Challenge of Tumor Selectivity

Traditionally, L-BPA, which stands for L-4-boronophenylalanine, has been the main drug used in **Boron Neutron Capture Therapy**. L-BPA is often chosen because it targets tumors very well. However, L-BPA has some limitations. For example, it does not stay in the tumor for a long time. Additionally, different transporters in the body can recognize it. This recognition, in turn, reduces its ability to select only the tumor cells effectively.

The Potential of D-BPA in Boron Neutron Capture Therapy

Researchers have studied **D-BPA** for a long time, and they thought it could be a suitable alternative. Furthermore, D-BPA might be more specific to the **LAT1 transporter**. This transporter helps move substances across cells. Importantly, **LAT1** is often found in large amounts in tumor cells, which are the ones that grow uncontrollably and form lumps in the body. Unfortunately, **D-BPA** has struggled to accumulate within tumors effectively, making it unsuitable

for practical use.

The Breakthrough: PVA-D-BPA

The game-changing discovery lies in the simple yet ingenious combination of **PVA** and **D-BPA**. By forming a complex with PVA, the researchers have been able to unlock the true potential of **D-BPA**, achieving unprecedented levels of **LAT1-selective tumor accumulation** and prolonged tumor retention.

The Mechanism Behind PVA-D-BPA

The PVA-D-BPA complex enters tumor cells efficiently. Initially, the process utilizes **LAT1-mediated endocytosis**, which means that **LAT1** proteins specifically help pull substances into cells. Consequently, the complex targets tumor cells with great specificity. Once inside, it subsequently moves to the endo-/lysosomes. These endo-/lysosomes are parts of a cell containing enzymes, and furthermore, they have an acidic environment. In this environment, the complex cleaves the boronate esters. This cleaving, in this context, means it splits them apart. As a result, this action releases D-BPA into the cell's

cytosol, which is the liquid inside the cell. Crucially, the inherently low transport efficiency of D-BPA via LAT1 critically prevents its efflux, leading to remarkable intratumoral retention and significantly enhanced BNCT effects.

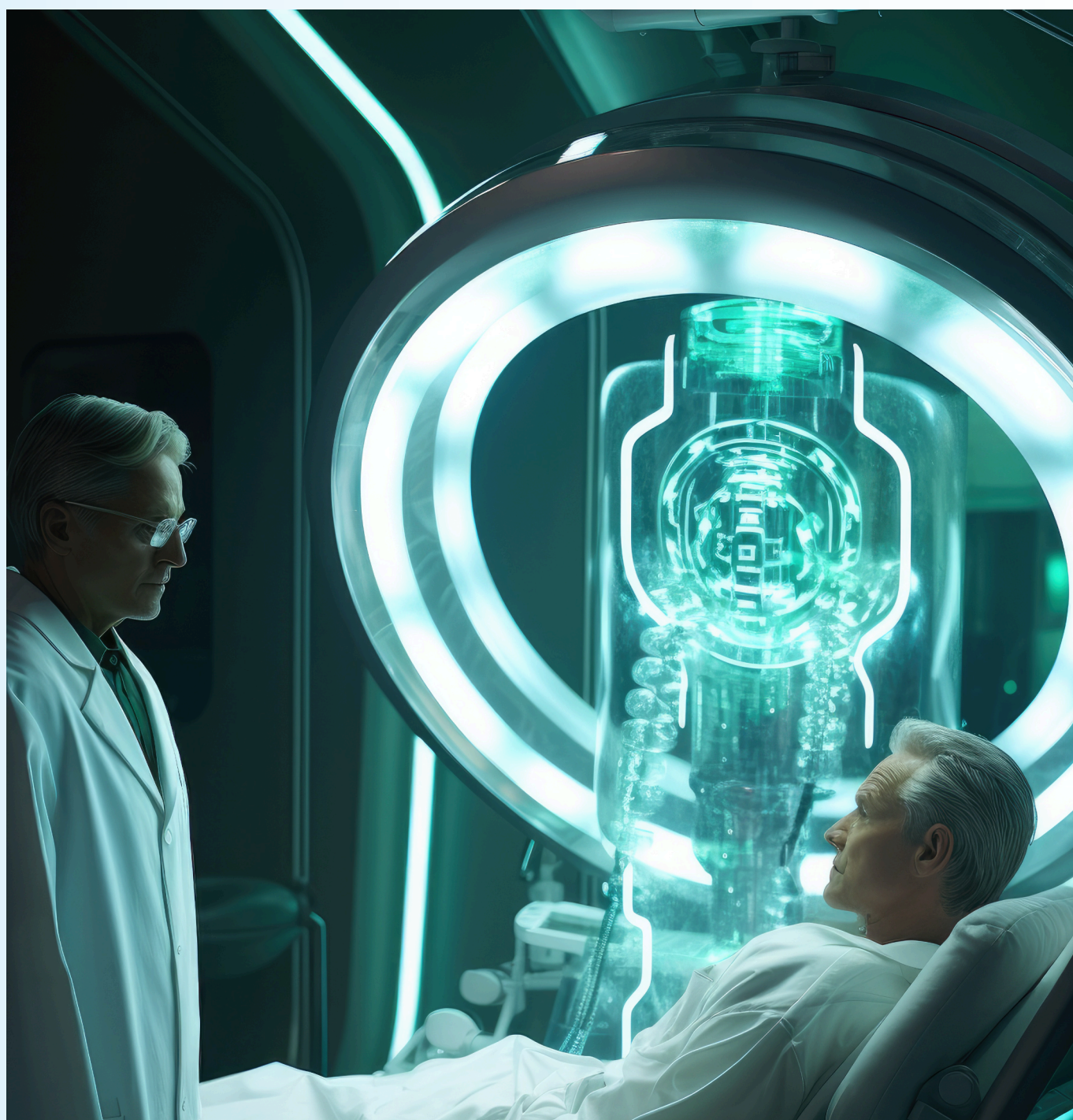
Potential of Seemingly Inert Molecules

The researchers' findings clearly demonstrate the remarkable potential of PVA to unlock the latent effects of seemingly inert molecules. Consequently, this offers a novel approach to drug delivery. This breakthrough, therefore, paves the way for new and innovative methods to improve the selectivity and efficacy of Boron Neutron Capture Therapy, which could potentially transform the treatment of hard-to-treat cancers.

Moreover, this groundbreaking discovery highlights the power of scientific collaboration and the ongoing quest to push the boundaries of cancer treatment. As we continue to explore the frontiers of STEM, the possibilities for improving patient outcomes become even more exciting. Thus, stay tuned to [ENTECH](#) for more cutting-edge developments in the world of science and technology.

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Astronomers Solve Mystery of Largest Galaxies in the Universe

Astronomers Close to Solving Mystery of Largest Galaxies in the Universe

A recent study conducted by astronomers has progressed towards resolving a long-standing mystery regarding the formation of the universe's largest galaxies. The research is led by Dr Annagrazia Puglisi from the [University of Southampton](#). Additionally, it is in collaboration with global experts, & sheds light on how colossal elliptical galaxies, distinct in their shape compared to our flat Milky Way, originated.

Astronomers say they are close to solving an intergalactic mystery about the creation of the **largest galaxies in the universe**, which has puzzled experts for decades. In addition, scientists have discovered the birth sites of **gigantic elliptical galaxies**. This finding not only contributes to our understanding of galaxy formation but also sheds light on the processes that led to their growth and evolution.

They claim this offers new clues about how they were formed. The creation of these ancient galaxies, which look like bulging footballs compared to our flat disk-like Milky Way, remains a mystery to astrophysicists. However, recent research may shed light on this intriguing puzzle.

But now **academics** from the [University of Southampton](#), working with experts across the world, say their new study may finally unravel the enigma.

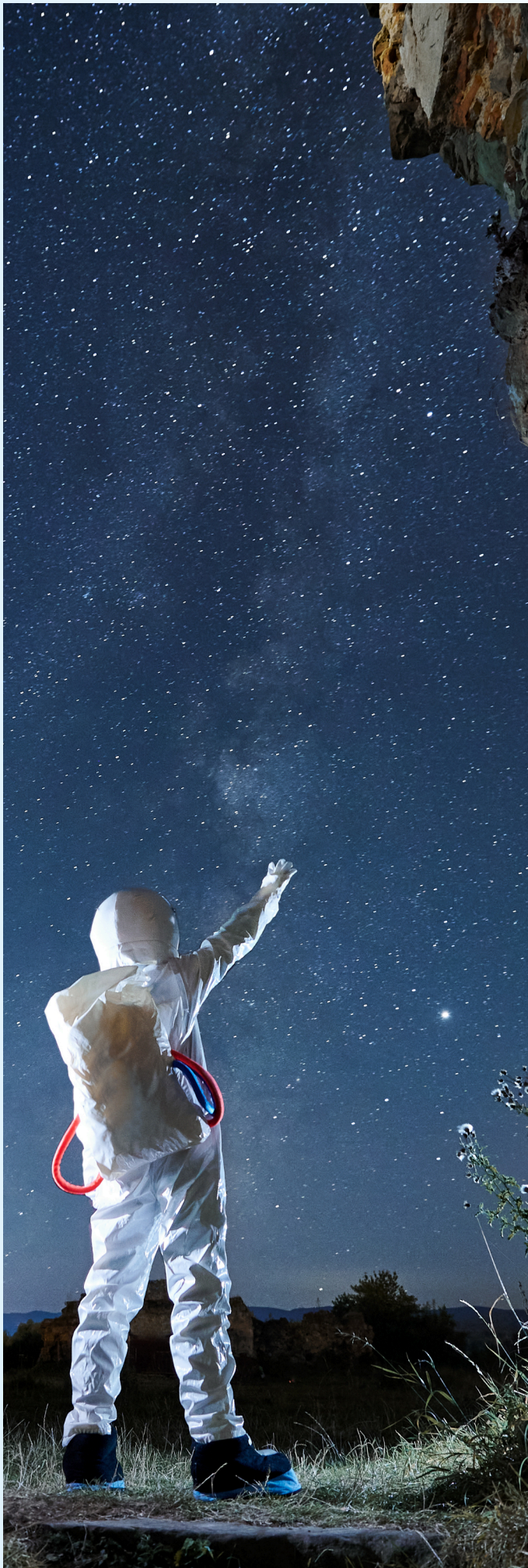
According to Dr Puglisi, the prevalent theory suggests that massive flows of

cold gas and frequent collisions between disk galaxies during the early universe were critical. These events were critical in forming the largest galaxies in the Universe. As two disk galaxies collide, they funnel gas – a vital component for star formation – toward their centers. This leads to an incredible surge in stellar production.

Two disk **galaxies** smashing together caused gas – the fuel from which **stars** are formed – to sink towards their centre, generating trillions of new **stars**, said Dr Annagrazia Puglisi from Southampton.

The study is [published in Nature](#). It was a collaboration between Southampton, the [Purple Mountain Observatory](#) in China and the Chinese Academy of Science, among others.

Experts analyzed more than 100 star-forming galaxies in the distant universe. They used the world's largest radio telescope, known as ALMA, located in Chile's Atacama desert. The scientists



made the discovery using a new technique. Specifically, this technique looked at the distribution of light emitted by distant and highly-luminous galaxies. According to study lead Dr. Qing-Hua Tan from the Purple Mountain Observatory, this innovative approach was instrumental in their findings.

Moreover, the findings indicate that spheroid galaxy formation occurs directly through intense bursts of star formation at galactic cores. In this regard, the evidence opens new pathways for understanding how these gigantic systems, specifically the largest galaxies in the Universe, formed rapidly, as explained by Dr. Qing-Hua Tan.

Additionally, current explorations employ archival data from the A3COSMOS and A3GOODSS projects, which enhance the quality of observations for distant galaxies. Thus, these advancements contribute significantly to our understanding of galactic formation and evolution.. Connecting these observations with future insights from JWST (James Webb Space Telescope) and Euclid satellites will further enrich our comprehension of stellar components within these primeval galaxies. Moreover, these collaborations will offer a deeper understanding of the early universe's evolution.

Ultimately, Dr Puglisi asserts that a more comprehensive understanding of early galaxy formation will deepen our appreciation. This understanding will deepen our appreciation for the evolution of the universe since its inception. For further details on this groundbreaking research, you may read the full article published in [Nature](#).

Explore more about how space exploration is actively pursued by researchers at the [University of Southampton](#).

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Quantum Physics Education: Schools are Making it Easier to Learn

To be honest, when you hear the words quantum physics education, many of us imagine complicated formulas, overly serious researchers, and many scratching heads. But wait! A team of education wizards from Italy, Hungary, Slovenia, and Germany is here to change that. They're showing us how to make quantum physics as exciting as a dog wearing sunglasses. Interestingly, they are developing new teaching methods to make quantum physics more accessible and engaging for students in schools.

No, it's not that cute little creature from your favorite cartoon. A qubit is actually the simplest quantum system that can be used in many situations – like calling it the potato of the quantum world! According to Professor Philipp Bitzenbauer from Leipzig University, qubits can help tease out some of the confusing bits of quantum physics education for students. Think of them as your personal guides on this wild ride through quantum technology.

A Better Way to Learn Quantum Physics

The traditional tactics employed in classrooms often reveal the rich history behind quantum physics education in high schools. While this is important, it can be overwhelming for students. Consequently, it may leave students feeling like they've just watched paint dry. What if we could wrap these mind-boggling concepts inside shiny new boxes? The educators are shifting their focus to the **quantum measurement process**. This method emphasizes understanding how quantum systems behave rather than just memorizing

historical facts. By doing this, students can grasp the concepts more easily and relate them to real-world applications. This is precisely what our hardcore physicist friends are doing by focusing on two-state systems and their link to things like **quantum cryptography** and even **quantum computing**.

The Magic Sauce of Quantum Physics Education

But hold on to your hats because there's more! The researchers have cooked up empirical findings that show teaching methods based around these two-state systems are actually **MORE** effective than the old-school means! It's like upgrading from dial-up internet to superfast fiber optic – once you've experienced the speed of light (or in this case, learning), there's no going back! They'll be presenting their findings at the **APS Global Physics Summit in 2025**. You might want to mark your calendar; it sounds like it'll be more fun than sock wrestling!

Engaging Students with Hands-On Learning

One exciting aspect of this new

What is a Qubit anyway?

So, what's with this fancy term: **qubit**?

approach is the use of **hands-on experiments**. Students will have the opportunity to conduct simple experiments that demonstrate quantum principles. For example, they might explore how light behaves as both a **particle** and a **wave**. These interactive activities make learning fun and help students visualize complex ideas, making them easier to understand.

Why Should Teens Care?

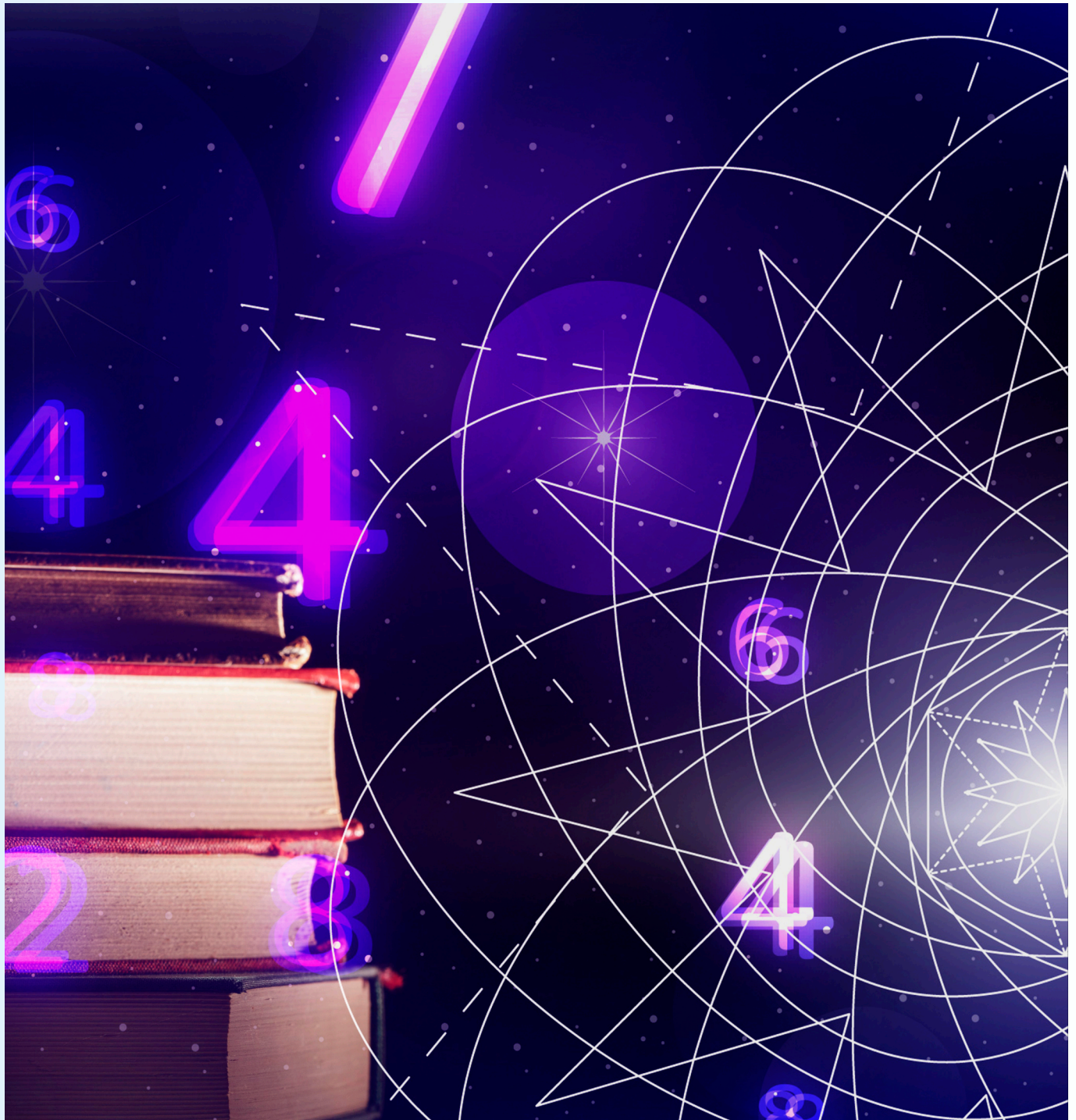
Now, you may ask yourself: Why should I care about quantum physics education? The answer is simple: because it helps us make sense of our high-tech world. With concepts learned through hands-on experience, today's teenagers can unlock doors leading them straight into careers that didn't even exist a few years ago! Careers in science are hot stuff right now—it's time we take advantage!

Get Involved Today!

If you're intrigued by these developments (and why wouldn't you be?), take a dive into more in-depth articles on STEM topics over at [ENTECH Online](https://www.entechonline.com). Discover how to transform your curiosities into careers faster than you can say "superposition"!

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Google Gemini 2.0: Get Ready for the Most Powerful AI Ever!

Get ready for a mind-blowing update in the world of Artificial Intelligence! Google has just unveiled Gemini 2.0, and it's not just an improvement – it's a whole new level of AI capability. This isn't your grandma's AI; this is agentic AI, meaning it can understand the world around it, plan ahead, and even take action (with your supervision, of course!).

Gemini 2.0: What's New?

Firstly, **Gemini 2.0** boasts **native image and audio output**. Imagine an AI that doesn't just understand your questions, but can also respond with images and audio! That's the power of **Gemini 2.0**. Furthermore, it's a multimodal marvel, seamlessly handling text, images, video,

audio, and code. This means it can connect different forms of information to give you even better answers and insights.

Faster than Ever

Gemini 2.0 Flash, the experimental version available now, is lightning-fast. In fact, it surpasses its predecessor, **Gemini 1.5 Pro**, in key benchmarks, and it does it at twice the speed! This makes it perfect for creating interactive apps and tools. For more information on the technical aspects, check out [Google's developer blog](#)

Agentic AI: The Future is Now

But the real excitement lies in **Gemini 2.0's** agentic abilities. It's not just processing information; it's interacting with the world. Google is already exploring incredible applications, including:

Project Astra: Your Universal AI Assistant

Imagine an AI assistant that can seamlessly use **Google Search, Lens, and Maps** to help you with tasks. That's

Project Astra! It's improving constantly, with better dialogue, enhanced memory, and smoother interactions. This is just the beginning of what's possible for the next generation of AI assistants.

Project Mariner and Jules: Expanding the Possibilities

Project Mariner explores a new frontier in how humans and AI interact, while **Jules** is an AI-powered coding assistant designed to help developers. These projects showcase the versatility of **Gemini 2.0** and the potential for AI to revolutionize numerous fields.

Building Responsibly

Google emphasizes responsible AI development. In fact, they're putting **safety** and **security** first, which means ensuring Gemini 2.0 is used ethically and benefits everyone. This focus on responsible innovation is crucial as a result, as AI continues to advance.

Gemini 2.0 is not just an upgrade; it's a complete paradigm shift. This new iteration represents a massive leap

forward in AI capabilities, and as a result, the future looks incredibly exciting. Consequently, stay tuned to [ENTECH Online](https://entechonline.com) for more updates on this revolutionary technology, and in turn, explore your own potential to shape this exciting future. entechonline.com has loads more on STEM careers!

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Google's Quantum Chip Willow : Revolutionizing Computing

Google recently announced a significant breakthrough in quantum computing with its new chip, Willow. This achievement represents a monumental leap towards building practical, large-scale quantum computers capable of tackling problems currently intractable for even the most powerful classical supercomputers. Furthermore, Google's quantum Chip, Willow demonstrates unprecedented success in addressing a longstanding challenge in the field: quantum error correction.

Conquering Quantum Errors: A Milestone Achieved

Fundamentally, one of the most significant and formidable hurdles in quantum computing is the inherent and profound instability of qubits, which

serve as the critical fundamental units of **quantum information**. Moreover, these extremely delicate quantum components are exceptionally vulnerable and highly susceptible to computational errors. Consequently, this intrinsic fragility systematically undermines and degrades the overall computational accuracy, presenting a paramount technical challenge. Indeed, the microscopic nature of qubits means they are constantly prone to environmental disruptions and quantum decoherence. Furthermore, their remarkable sensitivity represents a complex scientific obstacle that demands innovative and sophisticated error mitigation strategies to unlock the full potential of quantum computational systems.

However, **Google's quantum Chip Willow** employs advanced techniques to mitigate these errors. Importantly, Google's results show an **exponential reduction** in error rates as the number of qubits increases. This is a critical milestone, signifying that error correction becomes more effective as the system scales, a phenomenon known as **below threshold**. This accomplishment marks a major step towards building fault-tolerant quantum

computers. For more details on quantum error correction, read our article on [ENTECHonline.com](https://www.enteconline.com).

Beyond Classical Capabilities

To demonstrate Willow's power, Google used the **random circuit sampling (RCS)** benchmark, a widely accepted test for assessing the capabilities of quantum computers. Willow completed an RCS computation in under five minutes – a task that would take even the fastest classical supercomputers a staggering **10 septillion years**. This stark contrast showcases the immense potential of **Google's quantum Chip Willow** in solving complex problems across various scientific and technological domains. This is a “beyond breakeven” demonstration, proving that error correction extends the overall system lifetime.

The Path to Practical Quantum Computing

Notably, the development of Willow represents the remarkable culmination of over a decade of intensive research and pioneering development at **Google Quantum AI**. Furthermore, this extraordinary success emphatically highlights the critical importance of sophisticated system engineering in

Google's quantum chip design and precision fabrication. Indeed, all intricate components, ranging from individual qubit gates to complex measurement systems, must be meticulously and seamlessly integrated to achieve optimal performance.

Consequently, the result is an incredibly significant breakthrough that propels the field forward. Moreover, this groundbreaking advancement marks a transformative step toward building commercially viable **quantum computers**. Additionally, the project demonstrates promising real-world applications across diverse and complex domains, including cutting-edge fields such as advanced medicine, innovative material science, and rapidly evolving artificial intelligence. Ultimately, this development underscores the tremendous potential of quantum technology to revolutionize multiple scientific and technological landscapes.

Looking Ahead

While **Google's quantum Chip Willow** represents a major achievement, it's crucial to remember that building a fully functional, large-scale **quantum computer** remains a long-term goal. Nonetheless, Willow's performance strongly suggests that creating useful, large-scale quantum computers is achievable. Further research and development will focus on scaling up the system's size and improving its performance even further. To learn more about Google's approach to building quantum computers, see [Google's official blog post](#).

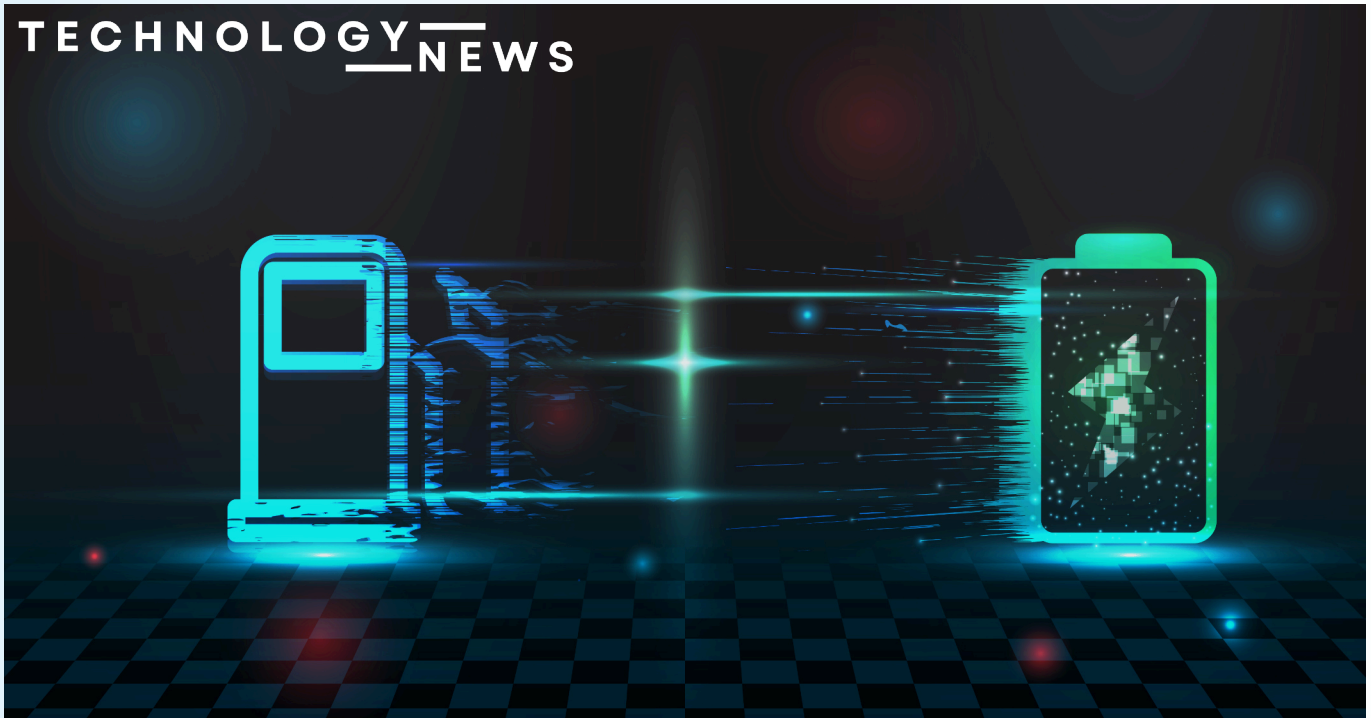
Quantum Supremacy and Beyond

The accomplishment achieved by Willow surpasses the concept of **quantum supremacy**, demonstrating not just that a quantum computer can outperform a classical one, but that it can do so with a considerable margin and with error correction that scales up with qubit numbers. This remarkable achievement opens doors to exploring far more complex problems and unlocking scientific and technological advances previously deemed impossible. To learn more about quantum supremacy, read our in-depth blog on [ENTECHonline.com](#).

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Extending Battery Life using Dynamic Discharge Profiles

Lithium-ion batteries (LIBs) are ubiquitous, seamlessly integrated into everything from smartphones to electric vehicles (EVs). Moreover, did you know that they actually age differently depending on their usage patterns? In fact, a recent groundbreaking study has comprehensively revealed how to significantly extend the lifespan of lithium-ion batteries (LIBs), which are the essential powerhouses behind most of our portable technology and electric vehicles.

Notably, the research demonstrates that dynamic discharge profiles can substantially enhance battery lifespan. Furthermore, this remarkable breakthrough in battery life could potentially revolutionize the entire technology landscape! Additionally,

researchers have conclusively discovered that dynamic discharge profiles can enhance battery lifetime by up to 38% compared to traditional constant current cycling.

Dynamic Charging: The Key to Longer Battery Life

For years, scientists tested batteries using a **constant current discharge**. Think of it like always driving at the same speed – it's simple, but not realistic. In reality, we accelerate, brake, and idle. Similarly, devices and EVs use power in varying amounts. This new research took a different approach.

Realistic Testing, Realistic Results

Researchers tested batteries using **dynamic discharge profiles** – mimicking real-world usage patterns. These included simulating regenerative braking in electric vehicles and stop-and-go traffic conditions. The results were astonishing! They found that using these dynamic patterns, instead of constant current, can improve battery life by up to **38%**!

The Sweet Spot: Finding the Optimal Charge Rate

The study also identified an ideal **C-rate** (a measure of charging/discharging speed) between 0.3C and 0.5C. This balance helps avoid both rapid aging

from constant cycling and slower aging from infrequent use. This finding provides valuable insights for both battery designers and EV manufacturers.

Furthermore, they used **explainable machine learning** (ML) to understand **why** dynamic charging works better. The ML model highlighted the significance of low-frequency current pulses in extending battery life. This discovery offers even more avenues for future research and development!

Beyond the Lab: Real-World Impact

This research has huge implications for our everyday lives. Imagine smartphones that last for days on a single charge, electric cars that travel hundreds of miles further, and even more efficient energy storage for renewable sources like solar and wind power. This is a significant step forward in **battery life**, making cleaner and more efficient technology a reality!

The Importance of Realistic Testing for Battery Life

This study emphasizes the need for **realistic testing** when evaluating battery performance. For too long, the industry has relied on simplified, lab-based tests. This research shows us that mimicking actual usage patterns is crucial for

understanding and improving battery technology. This is a game changer for how we develop and test batteries moving forward!

The Future of Battery Technology

What's next? Further research will undoubtedly focus on optimizing these dynamic charging methods for different battery chemistries and applications. We might also see improvements in **battery management systems (BMS)** to actively manage charging and discharging to extend battery life even further. These advancements could lead to smaller, lighter, and more powerful batteries with drastically extended lifespans.

Want to learn more about the exciting world of battery technology? Check out our blog on [ENTECHonline.com](https://entechonline.com) for more articles on this fascinating field! You can also explore our other articles on entechonline.com focusing on various STEM fields.

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Revolutionizing 3D Modeling software: The Impact of Generative AI

Revolutionizing 3D Modeling with AI

From 2D Images to Stunning 3D Shapes

Creating realistic 3D models is crucial for various applications, ranging from virtual reality and filmmaking to engineering design. However, traditional methods are often time-consuming and require significant manual effort. Generative AI excels at producing lifelike 2D images from text prompts, but struggle with 3D modeling software. This limitation is now being addressed by researchers at MIT.

Previously, a technique called Score Distillation Sampling (SDS) attempted to bridge this gap. SDS leverages 2D image generation models to create 3D shapes, but the resulting models often appear

blurry or cartoonish. MIT researchers, however, have identified the root cause of this issue and developed a simple yet effective solution.

Unveiling the Problem: A Mismatch in Algorithms

The MIT team meticulously analyzed the algorithms used in SDS, comparing them to those used in 2D image generation. Consequently, they discovered a critical mismatch in a key formula responsible for updating the 3D representation. Furthermore, this formula's complexity led to the use of randomly sampled noise, which ultimately resulted in low-quality 3D outputs. As a result, their findings highlight the need for revisions in the algorithm to improve the quality of 3D modeling.

A Clever Solution: Refining Score Distillation

Instead of directly solving the complex formula, the researchers employed an **approximation technique**. This involved inferring the missing term from the current **3D shape rendering**, effectively replacing random noise with more informed estimations. This simple adjustment dramatically improved the quality of the generated **3D shapes**, resulting in sharper, more realistic

models.

Furthermore, they enhanced the process by increasing the **image rendering resolution** and fine-tuning specific **model parameters**. The result? High-quality **3D models** generated using readily available, pre-trained **image diffusion models**, without the need for expensive and time-consuming retraining.

This breakthrough significantly advances the field of 3D modeling. The MIT researchers' technique rivals or surpasses other methods that require extensive model retraining or complex post-processing. Their work not only improves the quality of generated **3D shapes** but also provides valuable insights into the underlying mathematical principles of **Score Distillation** and related techniques.

Future Implications: Co-piloting Design with AI

This advancement has profound implications for various fields. The researchers envision a future where this technology acts as a **co-pilot for designers**, streamlining the creation of realistic **3D modeling**. The technique's efficiency and improved quality make it a promising tool for professionals and

enthusiasts alike. [Learn more about this groundbreaking research from MIT News.](#)

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Bluesky Social Network : Where You Choose Your Algorithm!

Bluesky Social Network is gaining popularity rapidly, with 12 million new users in just two months! This platform offers a unique approach to social media by allowing users to choose their own algorithms. Features include curated feeds for specific interests, giving everyone a voice, even the quiet posters! The platform aims to create a friendlier and more inclusive social media experience. Users can tailor their experience rather than being at the mercy of a single algorithm.

If you've ever felt like your **social media** feed was playing tricks on you—like showing you cat videos when you're clearly in a serious mood—then you might want to check out **Bluesky Social Network!** This fresh new social platform is making waves with its amazing ability to let users pick how they see posts. Yes, that's right! No more being force-fed content that makes you question humanity. You can now curate your own timeline like you're assembling a cheese platter at a fancy party. Cheese or no cheese? You decide!

You Choose The Adventure

This isn't just another boring social network; rather, it feels like stepping into an amusement park where every ride is your favorite! According to **Jay Graber**, CEO of Bluesky Social Network, "We are promoting a **marketplace of algorithms**, rather than one single controlling algorithm." Essentially, it's like choosing between roller coasters that suit your thrill appetite: whether you prefer gentle and slow or wild and fast!

Moreover, you can view posts chronologically (oh, how old school), or alternatively, see what's popular among your friends. You also have the option to join curated feeds for specific groups, such as scientists. Additionally, there's even a setting designed for "quiet posters" who only chip in once in a blue moon yet still have something wonderfully insightful to share! After all, why drown them out when they could be the next Einstein?

The Town Square We All Needed

The days of tumultuous timelines may indeed be behind us. In fact, think of Bluesky as a modern-day town square where people can gather for serious discussions without all the noise from trolls lurking around every corner. Furthermore, it's refreshing to see competitors disappearing into obscurity faster than your New Year's resolutions. Meanwhile, Bluesky shines bright like a diamond ring on an anniversary! The secret of change is to focus all of your energy not on fighting the old, but

Algorithm Playground of Bluesky Social Network

on building the new. — Socrates

FAQs About Bluesky Social Network

1. What exactly is Bluesky Social Network?

Bluesky is a social media platform that lets users choose how they view posts using different algorithms tailored to their interests.

2. Is it really user-friendly?

Absolutely! The interface allows you easier navigation through curated feeds without overwhelming spam—like having your cake and eating it too!

3. Can I block people on Bluesky Social Network?

Yes! You have control over what you see and who you hear from. No more unsolicited opinions that ruin your day.

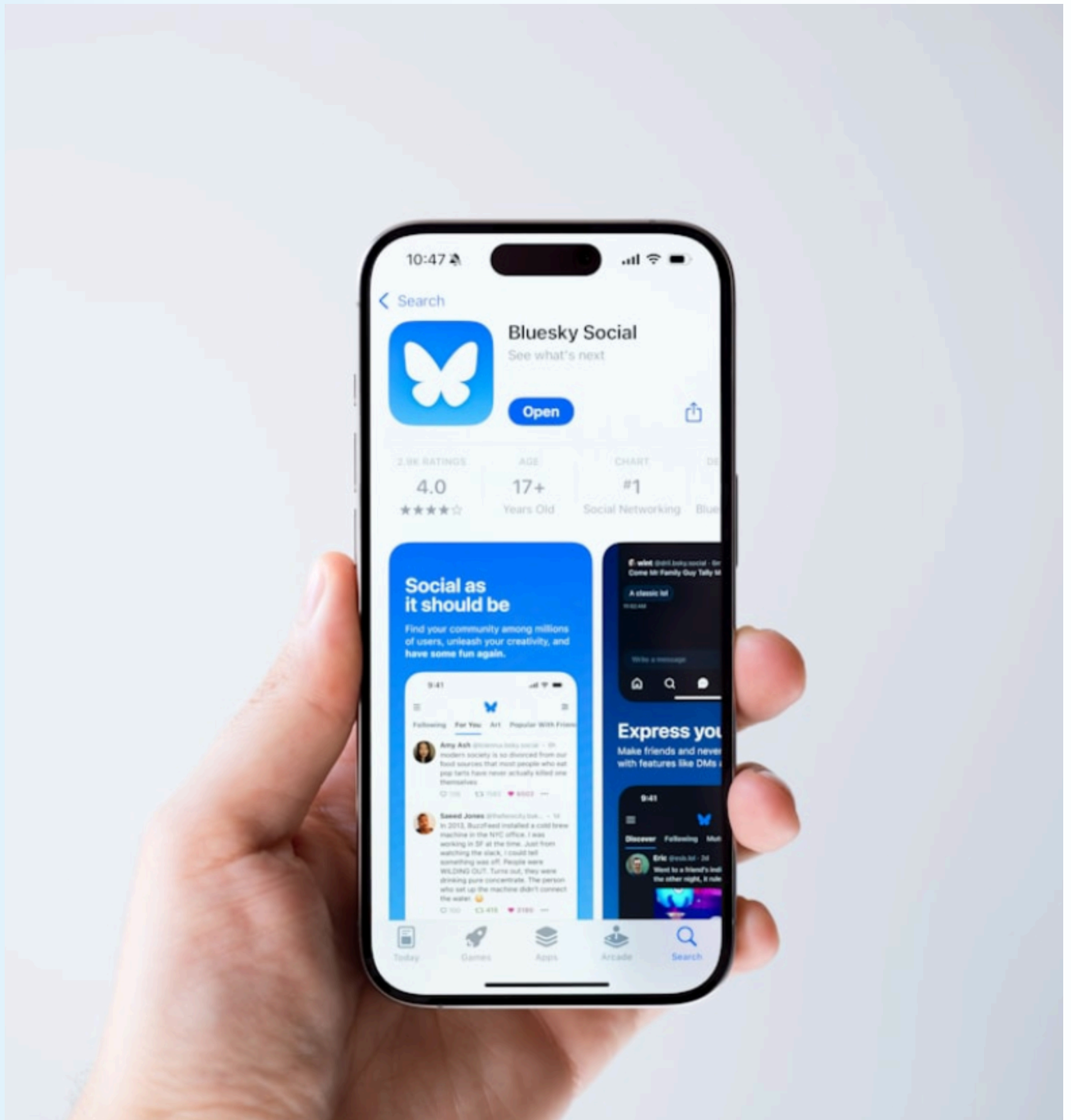
4. Is there room for beginners?

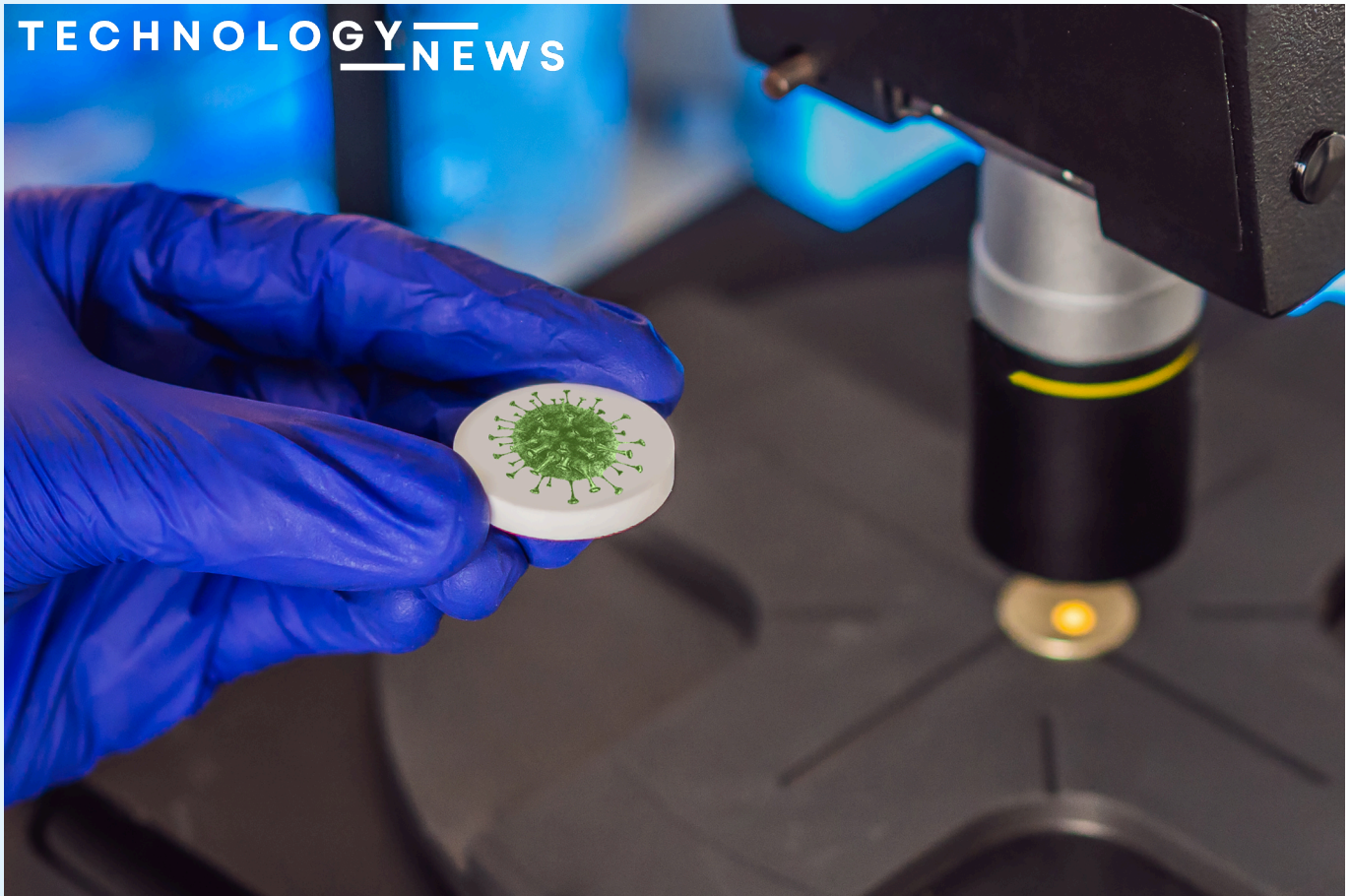
Definitely! Whether you're just starting out or already an expert in niche areas—you'll find something interesting here!

5. How do I sign up?

Visit the official website, [bluesky](https://bluesky.com) for all the details and join this wonderful community today!

If you're curious about everything related to science and technology, don't forget to check out our articles at [ENTECH Online](https://entechonline.com). We're serving up information hotter than fresh cookies from grandma's oven!





Microchips for Disease Detection: A Breathtaking Advance!

In today's world, where health threats such as viruses and drug-resistant bacteria are prevalent, the need for quick and reliable home diagnostic tests is time-critical.

Researchers at [NYU Tandon School of Engineering](#) have made exciting advancements that might change the way we approach disease detection. Actually, they are developing microchips capable of identifying multiple diseases from a single cough or air sample.

The Role of Field-Effect Transistors

This technology relies on **field-effect transistors (FETs)**, which are tiny electronic devices that detect biological

markers and convert them into digital signals. Professor Elisa Riedo explains, "This innovative technology offers an alternative to traditional colour-based chemical diagnostic tests." Unlike simple home pregnancy tests, FET-based sensors can deliver fast results while transmitting data directly to healthcare providers.

Precision Detection with Thermal Scanning Probe Lithography

Obviously, a significant challenge faced by current FET-based sensors is their ability to detect multiple **pathogens** at once. However, researchers are exploring new methods to modify FET surfaces. Researchers can tailor each transistor on a chip to detect different biomarkers. This advancement opens up possibilities for rapid diagnostics across a range of diseases.

How tSPL Enhances Biosensing Capabilities

The introduction of a technique known as **thermal scanning probe lithography (tSPL)** has elevated the potential of

these chips significantly. This method allows for precise patterning on polymer-coated microchips. With resolutions as fine as **20 nanometers**, scientists can functionalise individual transistors with specific bioreceptors such as antibodies or aptamers.

Exceptional Performance in Tests

Evidently, in tests conducted so far, sensors that utilised tSPL demonstrated remarkable capabilities. Indeed, they could successfully detect concentrations as low as 3 attomolar of SARS-CoV-2 spike proteins and distinguish between viral types like **influenza A**. Specifically, this level of sensitivity is crucial for creating portable diagnostic devices usable in various environments — from hospitals to homes.

The Future of Disease Detection

Unquestionably, the collaboration between academia and industry plays a vital role in advancing these technologies. Companies like Mirimus and Lendlease are working alongside NYU Tandon researchers to develop

wearable devices capable of diagnosing illnesses at home or within buildings.

By integrating billions of nanoscale FETs onto microchips, we stand on the brink of widespread biosensing applications that could forever change modern medicine.

Undeniably, this research showcases how innovative solutions can arise from collaboration. Furthermore, it also reflects our drive toward enhancing public health through technology.

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