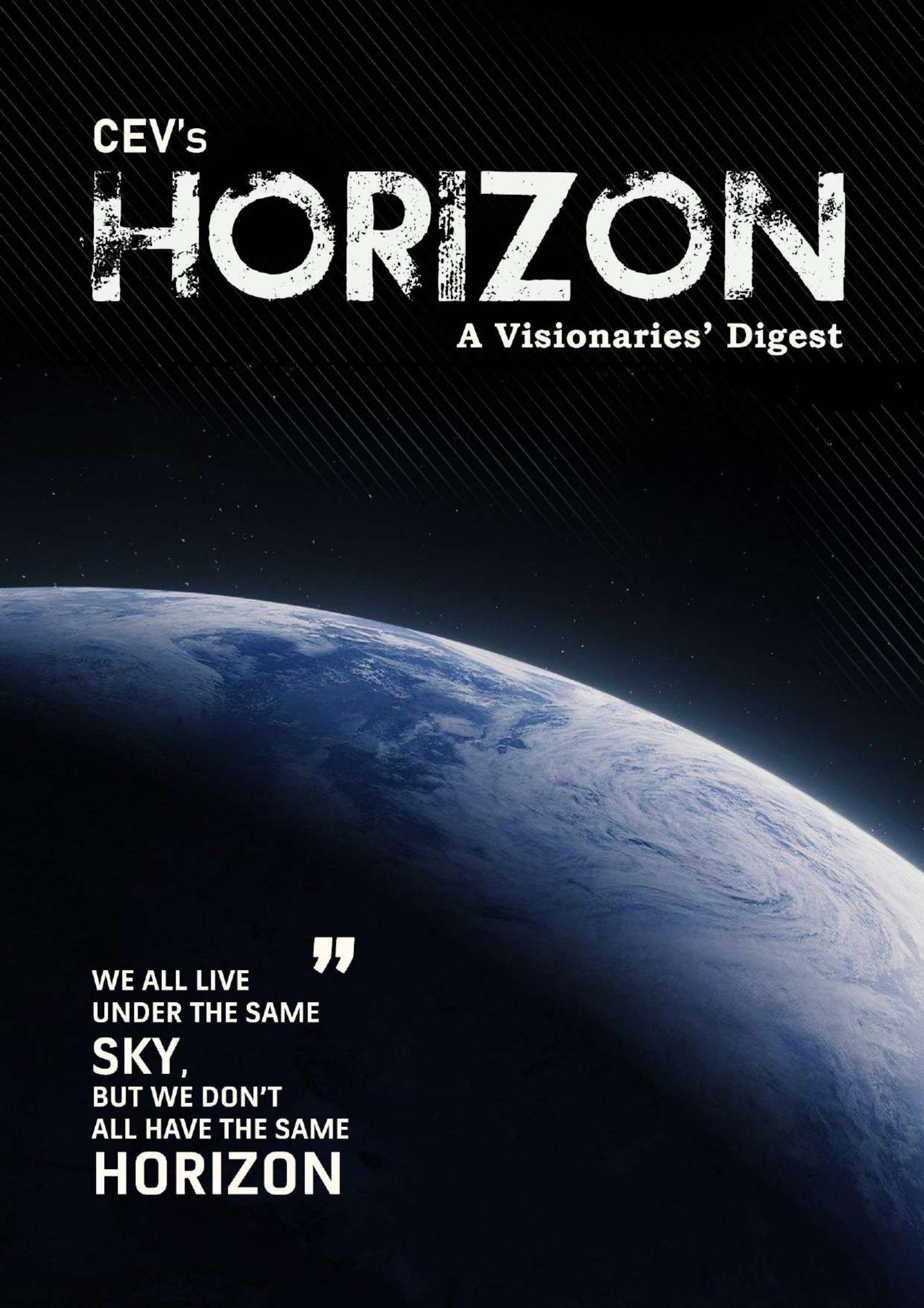


CEV's

HORIZON

A Visionaries' Digest



WE ALL LIVE
UNDER THE SAME
SKY,
BUT WE DON'T
ALL HAVE THE SAME
HORIZON

”



Ad meliora

This Latin phrase correlates with multiple things happening around the world, and its literal meaning is “**Toward better things.**”

The human race is still engaged in battle with COVID19, and even after nine difficult months of perseverance, there is still no light at the end of the tunnel. Nevertheless, we shall never lose hopes as we have overcome much more difficult problems in the past and will continue to do so in the future as well.

The CEV HORIZON team is back again with its second edition. Last time it was focused on bringing optimism and this time, we are here to give our readers various articles from the various fields of Engineering, a path-breaking Interview from our alumnus, and a cameo from the medical domain.

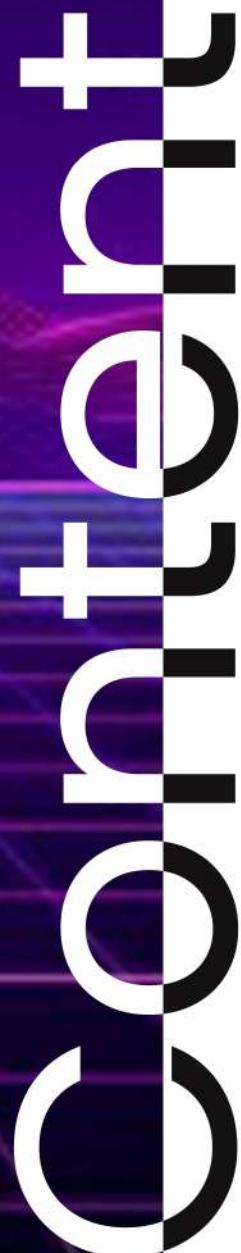
We are here with you at all times be it in good or bad. It gives us great pleasure to see that our friends are having a good time reading our magazine.

We would like to hear from you guys. Please mail us your queries and feedback from our webpage.

Keep Reading!! Keep Learning!!

**- Hemant Karanjkar
Editor**





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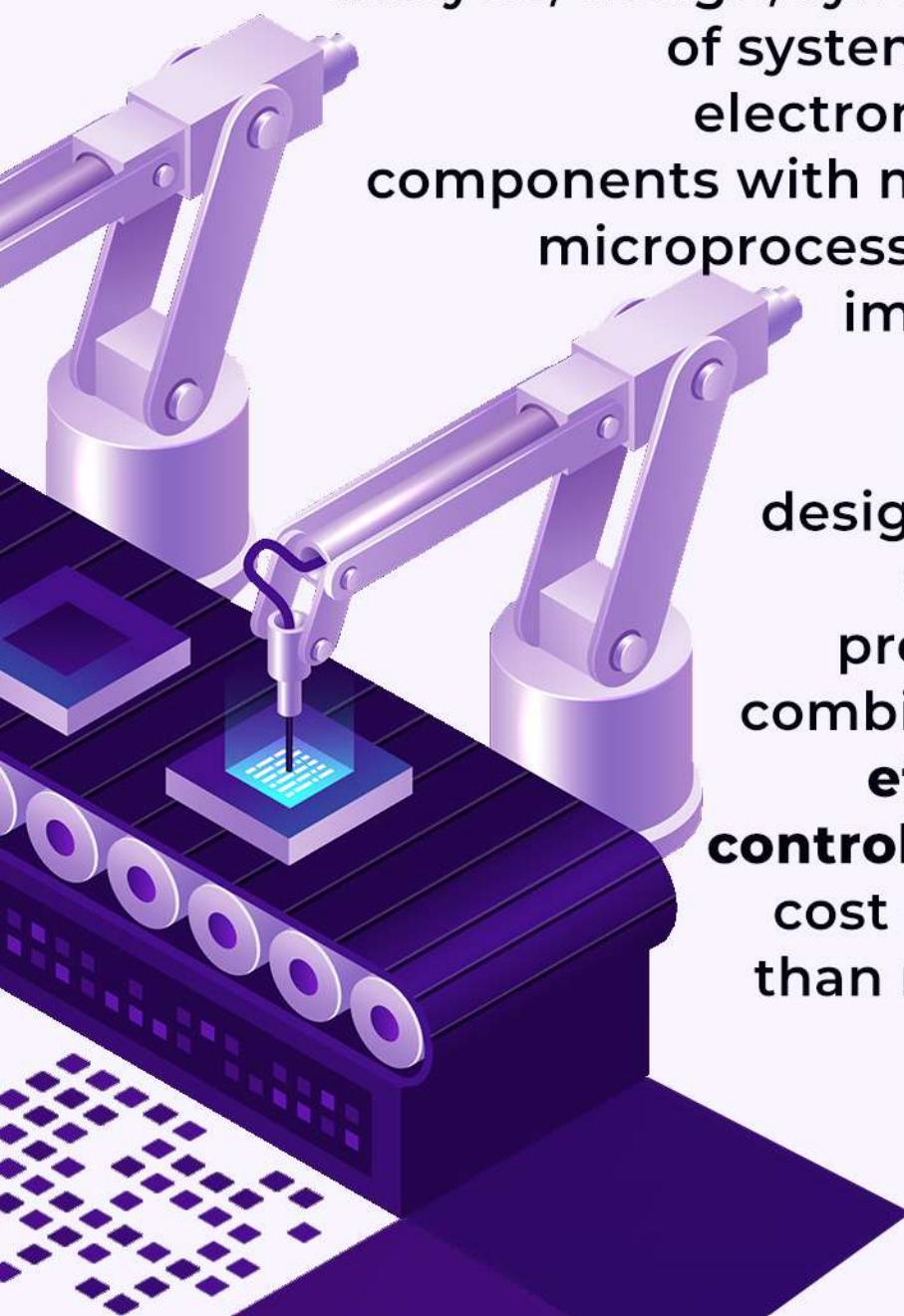
Mechatronics

The Art of creating **Simpler**
and **Smart** Systems



01

Mechatronics is an interdisciplinary field that is a fusion of Mechanical and Electrical Engineering with Computer Science. It also includes the control engineering, the systems engineering, and the telecommunications engineering. The term "Mechatronics" was coined by a Japanese engineer in 1969, representing 'mecha' from mechanisms and 'tronics' from electronics. It now has a broader meaning and is a field of study involving the analysis, design, synthesis, and selection of systems that incorporates electronics and mechanical components with modern controls and microprocessors. It is crucial as it improves the system's functionality and features and aids to design by making it more simple and smart. It provides a demanding combination of **increased efficiency, precision, control, reliability**, and the cost generally being less than mechanical systems.



Applications

- # **Day to day lives :** Cameras, Washing Machines, Digitally Controlled Combustion Engines, Toaster, Dish-washer, automatic air conditioning systems, automated door systems, security systems, and many more.
- # **Medicinal Use :** The remote and miniaturized mechatronic systems for medical science helps in better examination and monitoring of patients. They lay the foundation for creating tools for endoscopic surgeries, implanted devices, robotic surgical devices, and much more. Some examples are cardiac pacemakers, ultrasonic probes, prosthetic limbs that execute movements through muscle contractions, and defibrillators.
- # **Aeronautics and Defense :** Unmanned Aerial Vehicles, automatics pilots, automatically guide vehicles, mine detection robots, and various weapons.
- # **Use in Manufacturing :** Automation of industrial processes and various machines. Automotive: Antilock brake, active suspension, cruise control, airbags, etc.

Contribution of DARPA through Competitions

Defense Advanced Research Projects Agency (DARPA) provides challenges to the entire engineering community to do something incredibly difficult. It provides cash prizes to the individual or team, providing the best solution. They keep the prize money if the task does not complete.

For the past 15 years, DARPA decided to take the Challenge route and offering cash prizes to the winners of their contests because:

- # DARPA establishes an ambitious goal and opens the door for novel approaches through prize competitions.
- # Cash Prizes attract many potential solvers ranging from Fortune companies to high school students, and a wider variety of people get working on the challenge.
- # They pay Prizes only if a team succeeds, and DARPA gets some new out of the box approaches that might lead to the same problems.

SENSING

Captures spherical images and comes with an optional PTZ camera with 30x optical zoom for detailed inspections.



MANUFACTURING

Enables fast prototyping for tight timelines indoors and around objects.

COMPUTING

Allows for faster prototype development via an onboard processing unit.

POWER

Provides longer run times and an easier power source for easy integration.

Boston Dynamic's Spot is a four-legged robot that climbs stairs and navigates challenging terrain with ease. Designed and built to be rugged, it has IP54 rain, dust protection and works in an environment with a temperature range of -20 degrees Celsius to 45 degrees Celsius. It has a programmable API. Equipped with 360 degree vision and obstacle avoidance, the robot can be driven remotely and programmed for autonomous missions. It can carry weight up to 14kg and react dynamically according to the environment resulting in crash protection. It balances itself after falls.

IPULATION
mobile manipula-
asks like opening
d grasping

ER
regulated pow-
n ethernet port
payload
on.

MIT's Mini Cheetah is a four-legged robot weighing 20 pounds with a range of motion that rivals a champion gymnast and can move on an uneven terrain about twice as fast average person's walking speed. It can also walk either right side up or upside down. The most impressive ability of this robot is to perform a 360 degrees backflip from a standing position. It is very robust and easy to operate and not very expensive to fix. If it experiences an unexpected force, it automatically shuts down, and after receiving a signal to restart, it rights itself on all fours.



CIVIL
))

Opera Singers and the Structures

02



Have you ever happened to see an Opera Singer passionately sing and break the wine glass in the air? Let's admit, we always wanted to do something like this and make the crowd go wow. What if I reveal the secret behind this magic of theirs? So, let me teach you how.

The Secret Formula lies in the sound waves. As a science student, we already know that Frequency and amplitude are the basic properties of these sound waves, which makes one sound wave different from another.



Opera Singers and the Structures

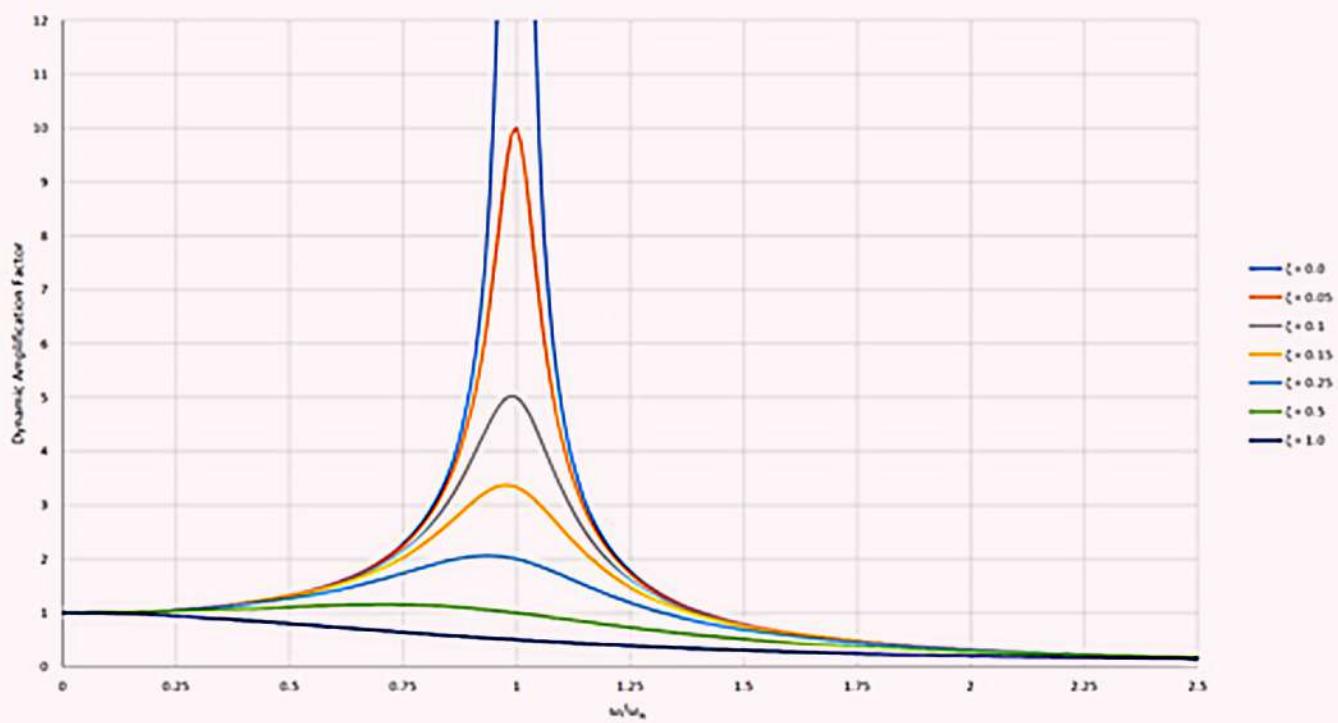
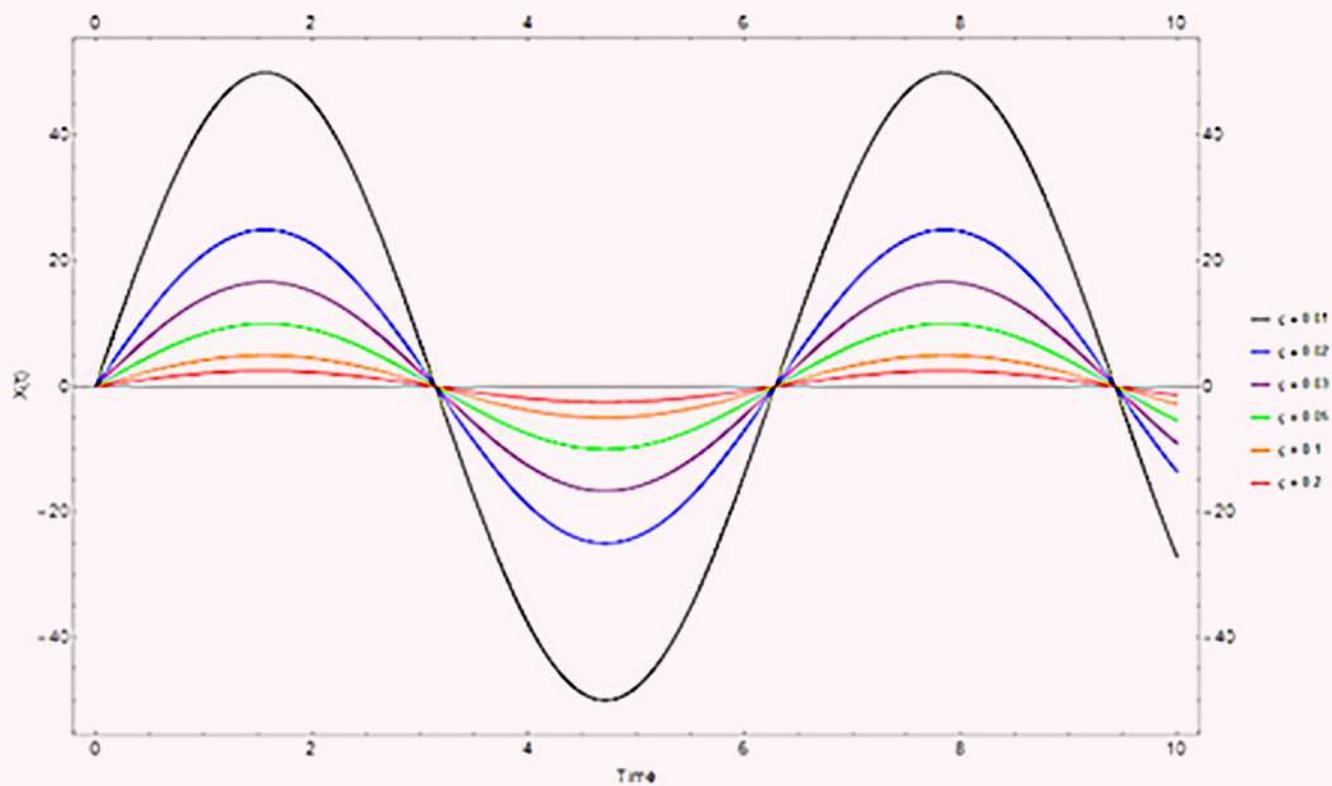
Every material in the nature, including the wine glass has a specific resonant frequency (the natural frequency at which the particles of the object vibrate). For a wave to cause vibrations, its frequency should fall in the range of the resonant frequency of the object.

Performers use this property and resonate the frequency and amplitude of their singing to match with that of glass. Moreover, glass has a very low damping coefficient. As a result, with time glass resonates with that of the sound and the particles displace from their mean position which results in the breaking of the glass.

This also can be explained with concept of stress and strain. Strain is proportional to stress. As the strain increases with time, stress in the glass increases and ultimately it breaks.

You might be wondering, what about the buildings and structures around us? Yes, even they are a victim of this phenomena. But fortunately, buildings have an inherent form of energy dissipation called damping. Which means, the building dissipate energy either through heat or cracking (acting as heat dissipating sources), which prevents the structure to oscillate more violently.

To understand the effect of damping on amplitude of vibration more, we can refer the following graphs :



Opera Singers and the Structures

When damping coefficient is zero, displacement is infinite. But this displacement isn't instantaneous.

In context to Buildings, Wind generates vibration in the structures. Due to which displacement of structure increases at a particular rate. At one point, the structure finally breaks as it doesn't have capacity to handle more displacement. And once the structure breaks, we can say that the displacement of the structure has reached infinity.

Such significant energy dissipation is quite common in concrete structures than steel structures because of their low ductility. Moreover, Concrete structures also face fewer issues with wind oscillations because they are heavy and have more damping while steel structures are light with very little damping.

Tune mass dampers are employed in many high-rise buildings to reduce the energy losses due to Damping caused by the wind. In case of seismic movement, viscous dampers as braces are provided to reduce seismic demands on buildings.

Now, you might wonder what Tuned Mass Damper (TMD) are and why is it called so? As said before, they are used to reduce energy losses in the buildings due to Damping. Since, the mass and natural frequency of damper is tuned to the natural frequency of the building. So, dampers actually oppose the motion of the building and moves out of phase with the motion of building and reduces displacement demands on the structure.

These kinds of dampers are generally locked in a seismic event because the displacement demands in seismic action are very high and dampers are not designed to accommodate the high displacement demands.

In case of seismic activity, damper consists of a piston head that moves inside a cylinder filled with silicone oil. When an earthquake strikes, the horizontal motion of the building causes the piston in each damper to push against the oil, transforming the quake's mechanical energy into heat.

So, I hope you learnt the trick and the science involved in it.

Insomnia and Sleep Disorders

SLEEP

03



Common Sleep Disorders

If you are experiencing difficulty in sleeping, you're not alone. Many uncommon and rare sleep disorders affect millions worldwide, and many remain a mystery to the medical community. For this reason, if you have a sleep disorder or suspect you have one, it's best to consult a sleep specialist or doctor before taking any sleep medications or supplements.

The 7 most common sleep disorders include :

- 
- 
1. Insomnia
 2. Somnolence
 3. Restless leg syndrome
 4. Sleep Apnea
 5. Sleepwalking
 6. Sleep Eating
 7. Night Terrors

Insomnia

Insomnia is a sleep disorder in which one cannot fall asleep or stay asleep through the night. It is a desynchronization of your circadian rhythm, and it can become a severe issue.

Insomnia is the most common sleep disorder in America, with about 1 in 3 adults affected and 1 in 10 suffering from severe and chronic insomnia. Common causes include stress, anxiety, drug and alcohol use, diabetes. It's more likely that if you are older, you may suffer from this disorder.

Somnolence

Somnolence is the scientific term for excessive sleepiness or drowsiness. Similar to hypersomnia, those who suffer from somnolence experience moderate to severe daytime sleepiness.

This condition's causes are wide-ranging and include stress, jet lag, work-related sleep problems, insomnia, and anxiety. Several medical conditions and medications can also cause it.

Restless Leg Syndrome

Restless leg syndrome (RLS) causes an uncontrollable urge to move your legs. This movement disorder occurs while you're awake, making it difficult for the sufferer and their partner to relax and fall asleep.

Restless leg syndrome is more common in women (especially pregnant women). This movement behavior disorder is usually caused by a lack of mobility or sitting still for an extended period. It might be especially severe after a long movie, flight, or lecture.

Sleep Apnea/Snoring

Sleep apnea is a condition caused when your throat gets blocked partially or entirely during sleep. There are many types, including central sleep apnea (CSA) and obstructive sleep apnea (OSA).

In this disorder, one experiences loud snoring or wheezing during sleep. This is not only a severe condition that blocks your airway and reduces sleep quality, but it can also be very straining on relationships. People with sleep apnea may suffer from insomnia and somnolence as well. Causes include drug and alcohol use, smoking, and being overweight.

Sleepwalking

It is also known as somnambulism. It is a condition whose causes include stress, sleep schedule changes, illness, or sleep deprivation.

Unfortunately, there is no cure for sleepwalking; you can try decreasing stress and getting plenty of fulfilling sleep. A lack of sleep often correlates to increased anxiety.

Sleep Eating

Like sleepwalking, people suffering from Sleep-related eating disorder (SRED) eat and even prepare meals while asleep.

This disorder's causes are believed to be stress, anxiety, eating disorders, or withdrawal from alcohol or nicotine. It is more common in adults, and those who are already experiencing other sleep disorders like sleep walking have greater chances to experience sleep eating.

Night Terrors

This disorder is also called sleep terror disorder. A person suffering from these experiences extreme fear and distress while sleeping. This is different from nightmares because, in the nightmare, a person gets anxiety when he wakes up, and in-sleep terror occurs when you are asleep.

This sleep disorder causes a lack of sleep, stress, illness, or changes in your sleep environment. This disorder is more common in children than in adults.



INSOMNIA

Insomnia is a type of sleep disorder. Individuals with insomnia find it difficult to fall asleep, stay asleep, or both. People with insomnia often don't feel refreshed when they wake up from sleeping.

Insomnia is a sleep disorder that affects as many as 35% of adults. It can have severe effects like excessive day time sleepiness., higher risk of auto accidents. In fact, insomnia is one of the first symptoms of depression.

CAUSES FOR INSOMNIA

In order to properly treat your insomnia, you need to become a sleep detective.

- # Emotional issues such as stress, anxiety, and depression cause half of all insomnia cases.
- # Medical problems or illness also contribute to insomnia. Ex- Asthma, Allergies, etc.
- # Your day time habits; sleep routine also plays a significant role.

MAJOR SYMPTOMS

People who experience insomnia usually report these symptoms: lack of concentration or slowness in activity, sleeping difficulty, depression, headache, irritation, anger, etc.

Complications of insomnia

- # Problems affecting the brain, including neurodegenerative and neurodevelopmental disorders, are associated with insomnia.
- # Insomnia can lead to other sleep disorders such as sleep apnea etc.
- # It can lead to many medical conditions such as heart strokes, obesity.
- # People suffering from insomnia lack work performance, loss of memory, finally leading to mental disorder.

TREATMENT

Severe Insomnia cases are treated by the pharmaceutical method. The American College of Physicians (ACP) recommends cognitive behavioral therapy (CBT) as a first-line treatment for chronic insomnia in adults.

Along with medication, changing the lifestyle will also decrease insomnia. Before sleeping, taking warm milk, avoiding alcohol, choosing a pleasant sleep environment, and changing sleep routine are generally suggested by physicians.

Meditation is a natural, comfortable, drug-free method for treating insomnia. It reduces stress, anxiety, depression, digestive problems, pain.

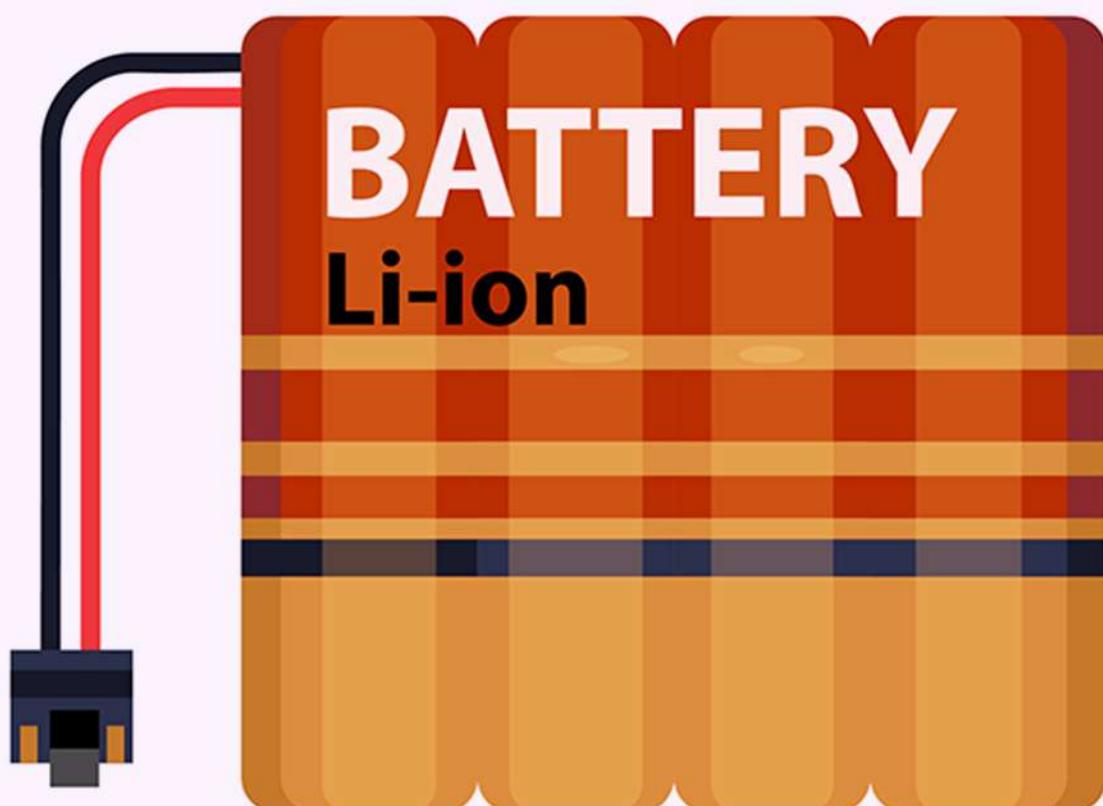
Nanomaterials in Lithium-ion Battery

04



Nanomaterials are materials whose single unit is sized between 1 to 100 nm. In recent times, with advancements in nanotechnology and microfabrication research, they have received a wide-spread application in life sciences, IT sector, manufacturing processes and have now dived deep in the modern-day engineering. Nanostructured materials have grabbed attention lately for their application in energy storage devices, majorly those with high charge or discharge current rate such as li-ion batteries. Nanotechnology has shown its potential to deliver the next-generation batteries, with reinforced performance, much better durability and safety at a feasible cost and lithium-ion batteries (LIB) are the key players in this game.

A typical LIB consists of an anode, cathode and electrolyte through which lithium ions keep on moving between cathode and anode during charging and discharging cycles. The electrodes of LIB, both anode and cathode, are made of materials having the capability of getting easily inserted with the lithium ions. Nanosized materials are used for electrodes that facilitate large surface areas and short diffusion paths. The faster the insertion of lithium ions, faster is the storage and delivery of energy, i.e., they're directly proportional. 1D vanadium oxide materials, LiCoO₂ nanofibers, nanostructure spinel (LiMn₂O₄), phosphor-olivine (LiFePO₄), are among the many alternatives explored as cathode material for the next generation of LIBs.



Similarly, nanosizing the anode materials can result in the anode having short mass and charge pathways resulting in a higher reverse capacity and faster rate delivery. Nanostructured materials like silicon nanowires, silicon thin films, carbon nanotubes, graphene, tin-filled carbon nanotubes, tin, germanium, are currently being explored as anode materials for the next generation LIBs. Talking about the electrolytes, which help the lithium ions to move, solid electrolytes can be used for better safety, efficiency and performance as compared to liquid electrolytes. Nanostructured solid electrolytes have also been proven to improve lithium-ion conductivity. For illustration, when the conventional bulk lithium thiophosphate electrolyte was made nanoporous it conducted lithium ions 1000X faster.

LIB technologies have led to large scale improvements in the transportation and electronics industry in terms of effectiveness. It has replaced the old heavy batteries on a promising scale. Also, various research projects have put the cherry on this cake and led to the production and use of high-performance machinery (e.g. Toshiba, A123 Systems, etc). More advancements concerning its properties are likely to be achieved in the future cause there's always something we can improve on.



LIMITLESS

**"The Sky is not the Limit.
Your mind is."**

He believes in hard work and perseverance and is an inspiration for the youth aspiring to make a rewarding career in data science.

He has been kind enough to take time from his busy schedule to talk about his triumphant career journey. CEV presents an interview with the World's first 4x Kaggle Grandmaster, a YouTube sensation, and an SVNIT Surat alumnus!

ABHISHEK THAKUR,
Chief Data Scientist,
boost.ai

INTERVIEW



1. So, firstly, how's Covid-19 treating you, and how has it influenced your life?

For people like me who sit in front of a laptop all the time and have no social life, not much has changed. On a serious note, covid-19 has influenced my life quite a lot. Since March, 2020, I am home and trying to avoid going out and meeting people as much as possible. I live in Norway and the government acted quite swiftly in the very beginning. This saved a lot of people from getting covid-19 here. But since my family members live in India, it is quite stressful to hear the news of a growing number of cases each and everyday. Apart from that, being home and working from home is something I like and it has also given me a new perspective on many different things.

2. How does an electronics engineer from NIT, Surat land up a job-to-kill-for in Norway?

In 2007, when there was AIEEE, I managed to get a good rank and that gave me an opportunity to study electronics engineering from SVNIT, Surat. However, I was always interested in studying computer science but for my state (there was a state quota at that time) there was only 1 seat of computer science in SVNIT. Thus, I couldn't do my bachelor's in computer science.





I always took elective subjects in computer science though. This passion of studying computer science brought me to Germany in 2011 (right after my bachelor's degree finished). I studied computer science from University of Bonn and it was during this time when I developed an interest in machine learning. My first job was a data scientist role in Berlin in a small start-up company. After spending over 6 years in Germany, this interest in machine learning, deep learning and data science is what brought me to work in Norway.

3. Were you encouraged by your family to take up whichever field you chose or were they inclined to Science from the get-go? How important do you think is it to provide this choice to the kids?

Mostly, Indian parents are more inclined towards science. You either become a doctor or an engineer. However, that is not entirely true. Otherwise, you wouldn't see any other profession in India. There are many people in top management of different companies who do not have a science background. My family always supported me with whatever I wanted to study. It is indeed very important to provide this choice but more than that, proper guidance of the choice is more important in my opinion. At the end of the day, it is the kids who have to work and not the family members. I think that one should always work and study something they are interested in otherwise, it just feels like we are doing it for the sake of it.

4. What according to you are the relevant skills required in an ideal Data Science Portfolio?

Data science, machine learning, deep learning, AI have become buzz words every company is using these days. Due to this, there is a very high interest about these topics among students. These days everyone wants to be a data scientist. The problem is most of the people do not want to study in the right way or they rush. The skills required are definitely not more than some

basic mathematics, statistics and programming. If someone has to start with data science, they should start from the basics and take it slow and easy instead of rushing. Good things take time and it is wise to spend some time making the foundation strong. Theory as well as applications are equally important in building a data science portfolio.

5. Online certifications. With context to the present scenario, do you think there's an ever-growing possibility that they would undermine the conventional education system?

Conventional education system is something I like more than online certifications. Getting the certificates online is easy. One doesn't have to work hard for them. People should really go for knowledge rather than certifications.

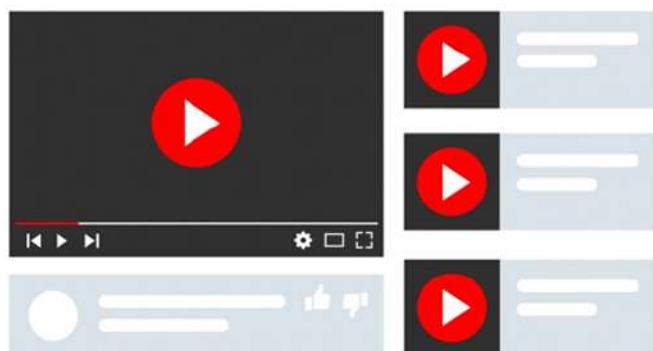




I have seen many people with over 50 certifications who are not able to build simple models in machine learning when it comes to applications. I would rather have no online certification but a really good portfolio of projects and a good knowledge about those projects. Another drawback of the online certifications is lack of interaction. You are not able to interact with other students or instructors as much. Some MOOCs are really good. For example, I have always loved the courses by Andrew Ng. One should remember that online certifications are a way of paying back to the instructors. If you think you have learned a lot from a certain instructor in one way or the other, go for the certification. They are not very useful when it comes to the real world. Knowledge is all that matters.

6. With over 30k subscribers and counting, what motivated you initially to open your own YouTube Channel?

My initial idea of starting the YouTube channel was simple. I saw that most channels or courses focus on theory and none of them focus on applications. So, I made a channel that purely focuses on the application of machine learning / deep learning and also on other aspects like writing good, production ready code, deployment, etc. These things are not taught in the online courses or class-room programmes. Making tutorials for my youtube channel also lets me revise the concepts which is quite useful for me.



7. Would you suggest everyone to read as much as they could in an organized fashion or figure out their own way of learning and discovering new ideas in a more personalized way?

Everyone is different when it comes to learning new things. I would suggest making a plan of your own. Read some theory and apply it.

8. So, we at CEV connect our young minds with a world of possibilities. How important do you think it is to receive and provide the right kind of guidance to nurture and ignite impressionable, young minds?

8. So, we at CEV connect our young minds with a world of possibilities. How important do you think it is to receive and provide the right kind of guidance to nurture and ignite impressionable, young minds?



The right guidance is quite important. If we limit our discussion to machine learning and data science, you will see that its not difficult for people to learn the theory around different concepts. But when it comes to applications, many fail. This can only be improved by proper guidance. Choose a mentor and follow them. One more thing to remember is that any mentor can guide you only upto a certain extent. You have to do most of the work.

9. How important is it to network? Are you able to find time from your busy schedule to keep in touch with your friends from college?

When I was in Berlin, I became part of the Berlin Machine Learning Community. Going to meetups every month, listening to talks and networking with people helped me quite a lot. Networking with the right people is the key. If there are meetups or events around machine learning where you live, attend them. You will always get to learn something new and meet some interesting people. You might even find your next employer at one of these events. As far as my friends from college are concerned, I am still in touch with a few and talk to them quite often. Just like I found time for this interview, I do always find time for my friends.



10. What is your opinion with regard to strengths and weaknesses? Should we work on our weaknesses or just play to our strengths?

Choose a track and become a master in it. A lot of time people ask me which library to choose. Well, there is no right answer. One must be a master of something and have knowledge about the others. Once you feel like you are strong enough with what you have learnt, you can invest time to strengthen your weaknesses.



11. Do you admire any famous personality? What is it about them that you look up to?

There are many. Sundar Pichai, Elon Musk, Andrew Ng are a few names I admire the most. Well, there is something common in them. All of them are hard-working and there is always a lot to learn from them.

12. In the end, any advice to our readers out there from our college or beyond who want to pursue a career in data science?

Beginners have one problem. They give up too fast. If you want to start with data science, start with the basics. Do the courses from Andrew Ng and then apply what you have learned to real world problems. Take part in Kaggle competitions. Learn from the winners of the competitions. Write a blog post about your approach. Learn from the open source codebases available on Github. Whatever you use, feel free to use them as long as you know how everything works under the hood. In the end, it's all about perseverance. Don't try to be a jack of all trades. Rather, be a master of one.





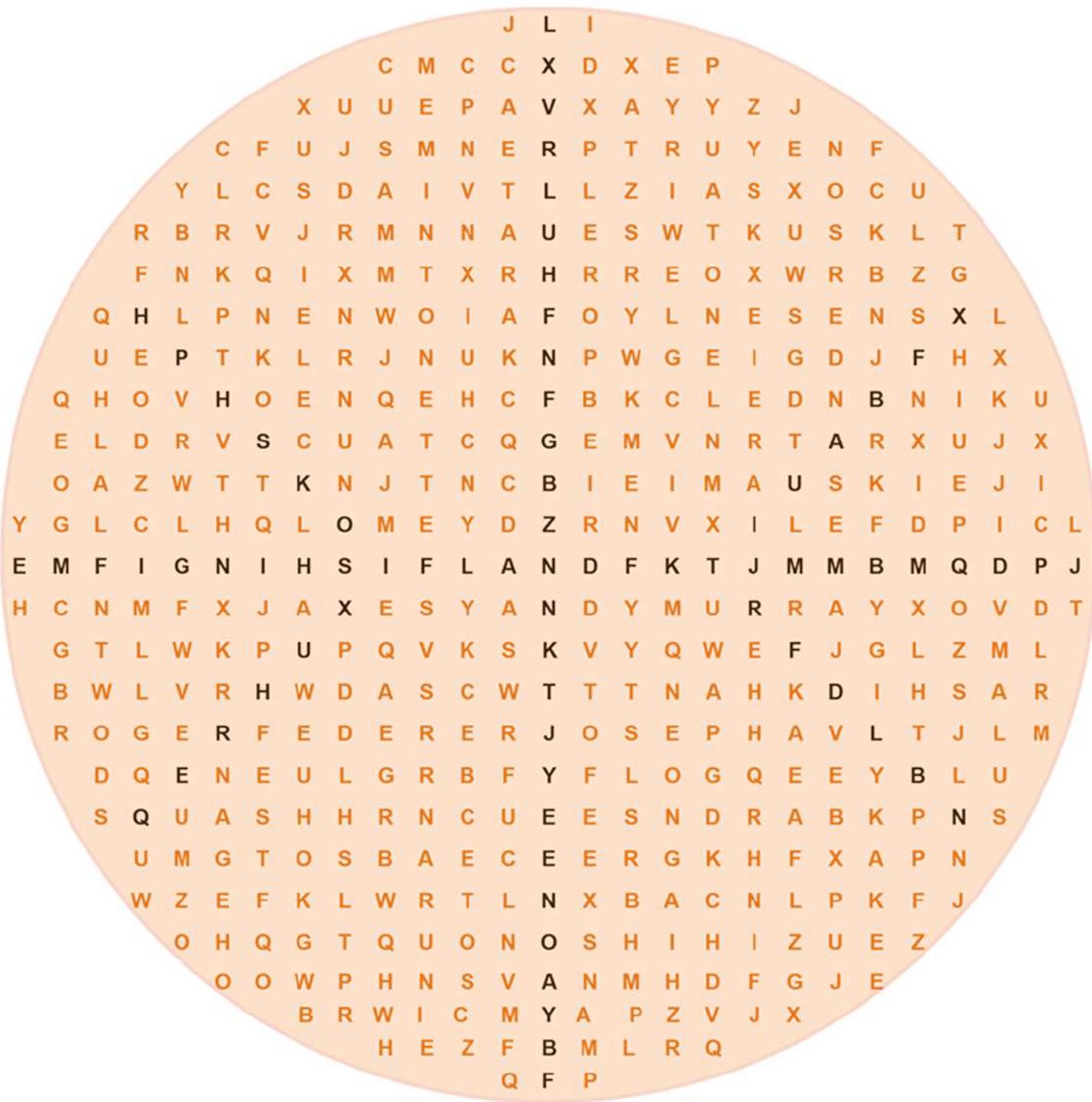
SPORTS MANIA



QUESTIONS

1. The only sport to be played on the moon?
2. The only country to have participated in every Olympics under its own flag?
3. The biggest participant sport in the world?
4. Olympic Gold Medals are Predominantly Made of ?
5. He is gold medalist in the 100m butterfly at the 2016 Olympics, winning Singapore's first-ever Olympic medal in swimming beating michael phelps.(only name, not surname)
6. He won men's singles 2012 and 2016 Olympic gold, making him the only tennis player, male or female, to have won two Olympic singles titles.
7. In 2002 World Cup, who became the first and only goalkeeper to win the Golden Ball?
8. Who recently Became First Fast Bowler To Take 600 Test Wickets?
9. Who holds the record for the most Grand Prix victories? (only name, not surname)
10. He is the world's highest paid athlete in 2020 in forbes.
11. Floyd mayweather vs. Manny Pacquiao in a fight dubbed as the "Fight of the" on May 2, 2015 which generated 4.6 million ppv buys and a revenue of over \$400 million.(fill in the blank)
12. How many Total number of players on each team are there on field in baseball game.(write number in words)

SPORTS MANIA



13. She is the longest reigning wwe women's champion.(Also knowned as the man)
14. Volleyball was Originally known as ?
15. USA Olympic sprinter who broke Bolt's record. She now holds the record for the most gold medals at the track and field World Championships.(only surname)
16. Which game in the Summer Olympics will make its debut at the 2020 Games in Tokyo Japan?(could not due to covid)
17. Which sports has been called "the sport of kings"?
18. Who beat India's PV Sindhu in three sets to become the first non-Asian woman to win an Olympic Games 2016 gold?(only surname)
19. Which country is the most successful nation of all time at the Winter Olympic Games?
20. He is now widely regarded as the best chess player of all time. (only surname)
21. Manika Batra became 1st Indian woman to bag a commonwealth table tennis individual gold medal in CWG 2018. She recently won which prestigious award?
22. He is youngest footballer in fifa world cup to score a goal.(not original name, his popularly known name)
23. Dipika Pallikal Karthik is an Indian professional player and first Indian to break into the top 10 in the PSA Women's rankings. Name the sport she plays.(sport also name of a fruit)
24. It is considered as the oldest sport in the world.
25. The Youngest and fastest to complete 300 T20 wickets.



Artificial Intelligence in Cyber Security

05

»

While Artificial Intelligence is being leveraged in different areas such as healthcare, finance, and transportation, cybersecurity is one that has received special attention because of the rate at which threats are evolving and the volume of attacks.

Nowadays, due to a vast collection and connection of data, security is always a concern for a safe and efficient ecosystem over the Internet. An AI-assisted cybersecurity model is therefore looked upon for handling various challenging issues such as **privacy protection**, **proactive defense**, **behavior detection**, **intrusion detection**, etc. Various inter-connected features between AI and cybersecurity can be a reason that can lay the foundation of a secure internet of the future.



How Does AI Improve Cyber Security?

- # AI can keep up with exponentially increasing demand for cyber security teams and efforts by assisting human system managers, and taking care of simpler threats and attacks, which make up a large chunk of today's cyber security issues. This helps address the issue of under-staffed cyber security workforces while freeing up time for the existing workforce to focus on complex threats that cannot be resolved by the AI technologies.
- # New AI algorithms use Deep Learning principles to adapt and improve accuracy over time, and based on prior cyber-attacks, detect and eliminate more advanced threats.
- # AI systems handle threats according to a standardized procedure and hence do not make the mistakes that come with variability and eventual inaccuracy of a human touch.

The benefits are just a fraction of the potential of AI in helping cybersecurity, as it isn't a silver bullet, and could also be exploited by malicious hackers.

Limitations of AI-based Cyber Security

- # Cybercriminals use AI in their malware for automated tasks to execute cyber-attacks such as Deep fakes, which involves using AI to replicate and manipulate a person's voice and image.
- # They even look for ways to evade detection by studying how the underlying models work and try to confuse the models working on AI. Developing a malware that was able to manipulate medical scans and produce fake cancer images, resulting in erroneous diagnoses, have also been done, which only shows us the extent to which this technology can be misused.
- # Additionally, in order to build, train and maintain an AI system, companies require huge amounts of resources including memory, data and computing power, which is not affordable to all.

While the use of AI in Cyber Security creates new frontiers for research of security, specifically the widely used AI tools like big data, game theory, and reinforcement learning, which makes learning increasingly crucial for real-time analysis, and decision making for fast reactions to security-based attacks, it can also make it easier for cybercriminals to penetrate systems with no human intervention.

Knowing these limitations and drawbacks, it's clear that AI is a long way from becoming the only cybersecurity solution. As AI becomes even more robust, it will become ever more effective, leading to it becoming one of the most effective prevention methods of cyber-attacks.



CEV's HORIZON



Venture Capital

06



Venture capital is a form of private equity and a type of financing that investors provide to start-up companies and small businesses that are believed to have high profits further. Venture capital generally comes from well-off investors, investment banks, and any other financial institutions. However, it can take a monetary form as well as technical or managerial expertise. Venture capital is typically allocated to small companies with **exceptional growth potential** or to companies that have overgrown and appear poised to continue to expand.



In a venture capital deal, large ownership chunks of a company are created and sold to a few investors through independent limited partnerships that are established by venture capital firms. Sometimes these partnerships consist of a pool of several similar enterprises. One crucial difference between venture capital and other private equity deals, however, is that venture capital tends to focus on emerging companies seeking substantial funds for the first time. In contrast, private equity tends to fund more massive, more established companies that are seeking an equity infusion or a chance for company founders to transfer some of their ownership stakes.

Features of Venture Capital investments

- # High Risk
- # Lack of Liquidity
- # Long term horizon
- # Equity participation and capital gains
- # Venture capital investments are made in innovative projects
- # Suppliers of venture capital participate in the management of the company.

Methods of Venture capital financing

- # Equity
- # Participating debentures
- # Conditional loan

Conditional Value at Risk and Investment Profiles

Conditional Value at Risk (CVaR), also known as the expected shortfall, measures the amount of tail risk of an investment portfolio. It is obtained by taking the weighted average of the 'tail' losses in the distribution of possible returns beyond the VaR cut-off point.

For stable investments, the Var may be sufficient for risk management in the portfolio containing the investment. However, for less stable investments, the Var may not present a clear picture of the averted risks.

Tax Benefits from funding VCs

In India, venture capital funds that are registered with regulator SEBI are eligible for a pass-through tax status. This exemption is given under section 10 (23FB) of the Income Tax Act, 1961, to avoid double taxation. The investor needs to pay for the taxes on the income earned through venture capital investments. The SEBI (Alternative Investment Funds) Regulations, 2012 (AIF Regulations) have replaced the SEBI (Venture Capital Fund) Regulations, 1996 (VCF regulations) from 21st May 2012. This amendment took effect from 1st April 2013.

Investments in VCs indirectly add to the taxpayers' base. India is gearing up its security laws and is aiming at providing investors with a more secure and regulated environment.

Types of Venture Capital Funding

Many types of venture capital are classified as per their applications at various stages of a business. The three principal types of venture capital are early-stage financing, expansion financing, and acquisition/buyout financing.

The venture capital funding procedure gets complete in six stages of financing corresponding to the periods of a company's development.

- # **Seed money:** Base financing for proving and fructifying a new idea
- # **Start-up:** New firms needing funds for expenses related to marketing and product development
- # **First-Round:** Manufacturing and early sales funding
- # **Second-Round:** Operational capital has given for early-stage companies that are selling products marginally.
- # **Third-Round:** Also known as Mezzanine financing, this is the money for expanding a newly profitable company.
- # **Fourth-Round:** Also called bridge financing, 4th round is proposed for financing the "going public" process.

A) Early Stage Financing:

- # Seed financing is defined as a small amount that an entrepreneur receives to be eligible for a start-up loan.
- # Start-up financing is given to companies to finish the development of products and services.
- # First Stage financing: Companies that have spent all their starting capital and need finance for beginning business activities at the full-scale are the primary beneficiaries of the First Stage Financing.



B) Expansion Financing:

Expansion financing may be categorized into second-stage financing, bridge financing, and third stage financing or mezzanine financing. Second-stage financing is provided to companies to begin their expansion. It is also known as mezzanine financing. It is provided to assist a particular company is expanding in a significant way. Bridge financing may be provided as a short-term interest-only finance option as well as a form of monetary assistance to companies that Go Public initially.

C) Acquisition or Buyout Financing:

Acquisition financing assists a company in acquiring certain parts or an entire company. Management or leveraged buyout financing helps a particular management group to obtain a specific product of another company.



Prominent Venture Capital Firms in India

Accel Partners

It has Funded major start-ups like Flipkart, BabyOye, Book My Show, Zansaar, Freshdesk, Probe, Myntra, CommonFloor, etc.

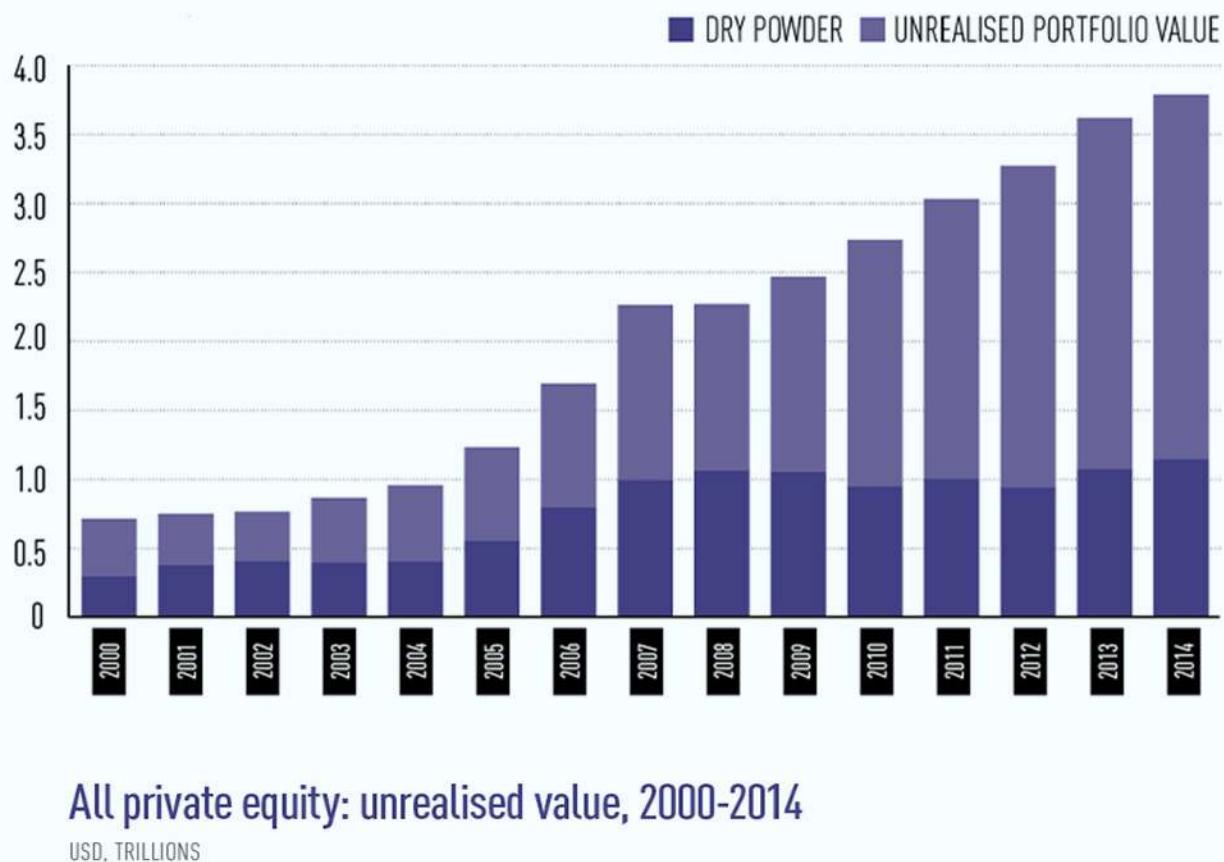
Founded in 1983, Accel Partners has a global presence in Palo Alto, London, New York, China, and India. Accel partners make typical multi-stage investments in internet technology, Mobile and software industries, Cloud-Enabled services.

Helion Venture Partners

Major start-ups funded include MakeMyTrip, Yepme, NetAmbit, Komli, TAXI for Sure, and PubMatic.

Investing in technology-powered and consumer service businesses including Mobile Services, Retail, Healthcare, and outsourcing industries, Helion Ventures Partners is a \$605 Mn Indian-focused, an early to mid-stage venture fund participating in future rounds of financing in syndication with other venture partners.

Venture Capital



All private equity: unrealised value, 2000-2014

USD, TRILLIONS

Advantages of Venture Capital

- # They bring wealth and expertise to the company
- # A large sum of equity finance can be provided
- # The business does not stand the obligation to repay the money
- # In addition to capital, it provides valuable information, resources, technical assistance to make a business successful
- # It acts as the survival tool for emerging start-ups



Disadvantages of Venture Capital

- # As the investors become part-owners, the autonomy and control of the founder is lost
- # It is a lengthy and complicated process
- # It is an uncertain form of financing
- # Benefit from such financing can be realized in the long run only
- # Risk assessments cannot be averted
- # Pseudo capitalism cannot be ignored.

Power Sector Automation

Today and Tomorrow

07



The power sector is **one of India's most crucial sectors**, without which the imagination of modern India is impossible. Electricity has become an integral part of our life, so has become Automation. Digitalization is increasing across the world, and devices are becoming increasingly intelligent. The future is digitalization. India is leapfrogging dynamically by driving essential electrification while installing the latest technology for power quality and smart grids and simultaneously coping with large-scale renewable energy integration. The large distances and grid complexity are increasingly making automation and digitalization down to the distribution grids attractive levers for the operators. Every electrical equipment will be digitally connected in the coming years, allowing a switch from failure-based maintenance to reliability-centred asset management through condition monitoring and analytics.

Types of Automation

There are two power automation options, i.e., Hard Automation and Soft Automation. Let's discuss both of them.

Hard Automation:

Energy operators already rely heavily on Automation. They use machines and computers to deliver fuel to the right place and keep it burning, respond to shifts in wind speed or cloud cover, keep generators and turbines running, and transfer electricity they produce to transmission and distribution systems. Thus, it is a positive development, making power generation and delivery faster, safer, and cheaper. But Automation also creates vulnerabilities of a shutdown of networks. But what if power station operators could avoid these shutdowns?

With the help of new technologies, this is no longer a question. Plant owners now have access to new types of Automation that can help keep existing equipment in service, even in the event of unexpected changes. They can opt for more hard Automation – that is, unmanned mobile units such as robots and drones that operate mechanically and report results digitally.

They can use this type of equipment to check working conditions and monitor performance at the sites that humans cannot or should not access. For example, GE reported in January 2017 that its 648-MW photovoltaic plant in the Indian state of Tamil Nadu had raised its efficiency levels by using a robotic system to wipe its solar panels clean from dust and other substances every night.

Soft Automation:

Both drones and robots excel at the task of collecting data that show exactly how well a power station is operating – and how likely it is to encounter trouble shortly. They complement soft automation options such as smart devices and monitors, Artificial Intelligence (AI) solutions, and analytics.

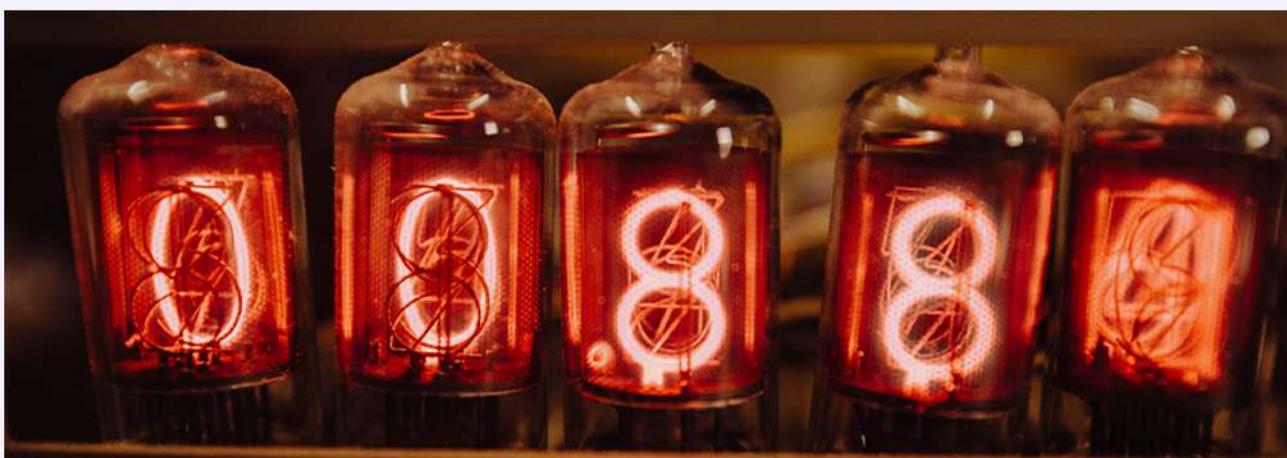
Like robots and drones, the Internet of Things (IoT) devices are capable of gathering massive amounts of data on the performance of individual components of electricity production and delivery systems. They can perform this task and respond to problems automatically. They use their wireless connections to the internet to make operational information available to any utility employee who needs it – and in real-time, too.

Smart devices can also supply information to AI applications, such as the one India's Nabha Power Ltd used to develop a predictive and preventive maintenance schedule for a 1,400-MW coal-fired station in the state of Punjab. With this system in place, the plant, which is the biggest supplier of power in the region, was able to stop its critical condensate cooling-water pumps from breaking down. As a result, it succeeded in increasing uptime, reducing financial losses, and ensuring steady electricity supplies to customers.

Growing Digitalization and Automation

To increase operational efficiency and ensure effective network planning, distribution companies are also undertaking many digitization and grid modernization initiatives. The DISCOMS (Distribution Companies) are also focusing on enhancing its consumer service experience by implementing information technology solutions. Digitization and modernization have become the buzzwords for grid up-grading the advanced information technology solutions with business operations and planning.

In the Transmission segment, there has been a continuous advancement of equipment pieces for transmission, with the application of digitalization and Automation and making it suitable for smart grid operation, which is more compact, reliable, environment-friendly, and requires the minimum time for installation and commissioning. Moreover, as the pace of renewable energy integration increases, and there is widespread adoption of smart grid technologies. As a result, we need more utilities to increase the deployment of intelligent types of equipment and facility or for undertaking modifications to transform the existing modules into smart kits as the availability of real-time data is critical in both developments. Going ahead, equipment manufacturers need to undertake innovations and move towards smaller but smarter equipment. As a result, there is a need for more sophisticated operation and control to keep pace with the increase in supervisory and operational management in power generation, transmission, and distribution.



Review's Review

Confusing, Right?

08



Hola binge-watchers!!!!

Hope you are completing all the movies and series that you were planning to watch later when the college was open. Anyway, you must all be familiar with various popular movie critic sites like IMDb. Many of you might also have a habit of checking them before watching a movie or for the recommendations.

But I'm sure that most of you must have wondered at some point in time how these sites judge movies/series and on what basis these sites give them a rating.

So, I will be discussing some of the most famous critic sites (**Metacritic**, **Rotten Tomatoes**, and **IMDb**) and how they rate movies...



IMDb

It is, without any doubt, the most trusted and popular critic site. Whenever we search for any movie on Google, the IMDb rating always appears below the poster of the film. Also known as the **Internet Movie Database**, it's owned by Amazon. The rating system entirely depends on the users of this website. Anybody and everybody can create an account on this website and start rating movies. But IMDb does not use arithmetic mean (i.e., the sum of all votes divided by the number of votes) or median votes to get the final rating.

The rating given by this site is the weighted average rating. The IMDb weighted average rating does not change upon receipt of each new vote; instead is updated numerous times per day.

Even though some people claim that they know how the weighted average of IMDb works, they have never revealed the method that they use due to the fear of it getting manipulated. But they use the same way of rating for all movies/series without any bias to make it fair for all.

IMDb registered users can cast a vote (from 1 to 10) on every "released title" in the database. Individual votes are then aggregated and then summarized as a single IMDb rating, visible on the title's main page. By "released title" I mean that the movie and series must have been shown publicly at least once (including festival screening). If you want to see the complete breakdown (age-wise rating or how many users rated how much) of the detailed votes, click on the number of votes located directly below the IMDb user rating. And most importantly, a TV series rating is not the weighted average of the ratings of individual episodes. Instead, customers vote separately for the rating of the series as a whole via each title's series page. But you can see ratings of each episode individually.

IMDb is useful to explore and gather information about films, TV shows, documentaries, cast, and crew members.



Spider-Man: Into the Spider-Verse (2018)

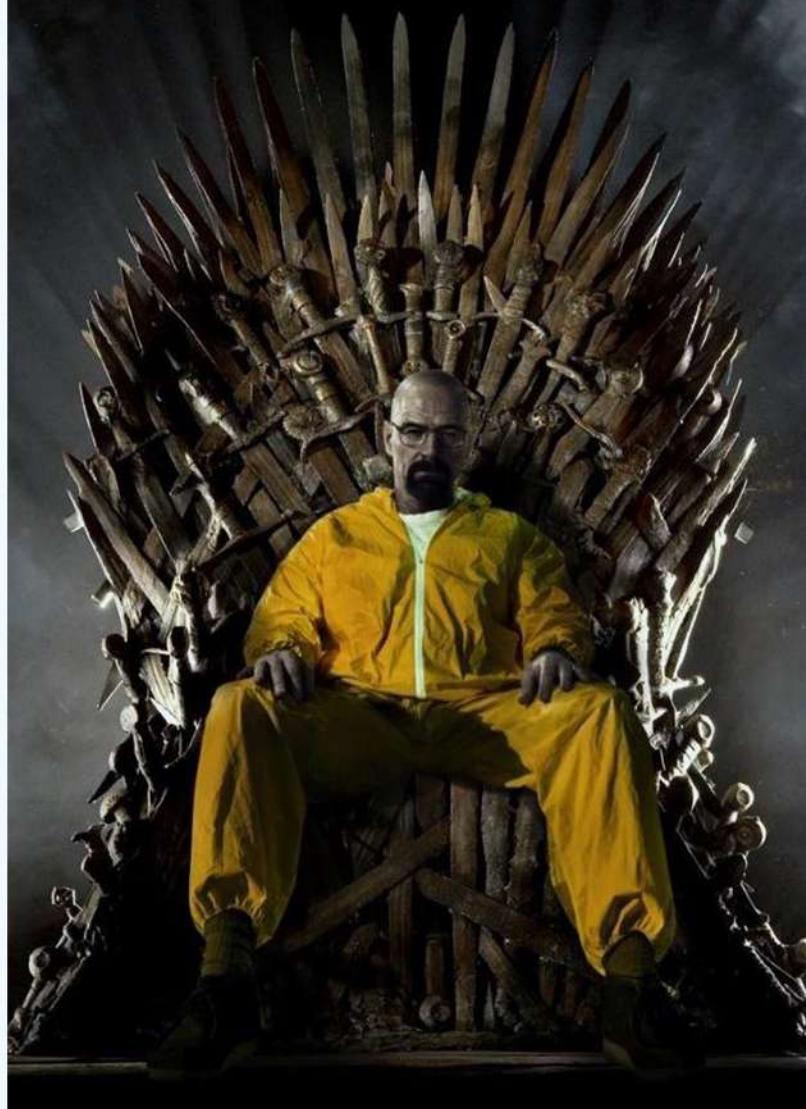
PG | 1h 57min | Animation, Action, Adventure | 12 December 2018 (UK)

★ 8.4 /10
338,215

Rate This

However, in some instances, the ratings get biased. For, e.g.

1. Alia and Karan Johar's **Sadak 2** bear the brunt of public backlash, as they thought them to be connected to the SSR suicide case, in the form of it getting rated **1.0**
2. In some cases, a movie with a fewer number of reviews gets the same rating as the movie with a greater number of reviews.



3.

Quite often, fans of a particular star or series overrate the movies and vice-versa (like **Game of Thrones** fans and **Breaking Bad** fans started downrating **Breaking bad** and **Game of Thrones** respectively, so that they could prove that their choice is better).

4. Films are getting rated even before release (like "**the current war**").

5. Historical Movies like **Padmavat** also get less rating as the sentiments of people related to that particular community gets hurt by the facts presented in the film resulting in disputes.

So, in short, IMDB ratings are given by fellow movie and TV watchers... So, if you put any credit into other people's tastes, then go ahead.



Rotten Tomatoes

It is an American review-aggregation (system that collects reviews for product and services) website for film and television.

Although the name "Rotten Tomatoes" connects to the practice of audiences throwing rotten tomatoes when disapproving of a low stage performance, the original inspiration comes from a scene featuring tomatoes in the Canadian film Léolo (1992). Owned by Fandango, an American ticketing company that sells movie tickets via their website, they give scores via Tomatometer.

The Tomatometer score is based on the opinions of hundreds of film and television critics. The Tomatometer score represents the percentage of professional critic reviews that are positive for a given film or television show.

A Tomatometer score is calculated for a movie or TV show after it receives at least five reviews.

When at least 60% of reviews for a movie or TV show are positive, a **red tomato** is displayed to indicate its Fresh status. When less than 60% of reviews for a movie or TV show are positive, a **green splat** is displayed to indicate its Rotten status.

To earn the coveted "**designated fresh**" seal, a film needs at least 40 reviews, 75 percent of which are fresh, and five from "top" critics.

The Audience can also score, and a popcorn bucket denotes this score. When at least 60% of users give a movie or TV show a star rating of 3.5 or higher, a **full popcorn bucket** is displayed to indicate its Fresh status and when less than 60% of users give a movie or TV show a star rating of 3.5 or higher, a **tipped over popcorn bucket** is displayed to indicate its Rotten status.

But with Rotten Tomatoes' audience score, the situation is different. Anyone on the internet can contribute — not just those who saw the film. As a result, a film's Rotten Tomatoes score can be gamed by internet trolls seeking to sink it simply because they find its concept offensive, as was the case with the all-female reboot of **Ghostbusters**.



It's also easy to see why anyone might assume that Rotten Tomatoes scores became more tightly linked to ticket sales with potential audiences more likely to buy tickets for a movie with a higher score, and by extension, giving critics more power over the purchase of a ticket. The opinions of about 3,000 critics — a.k.a. the "**Approved Tomatometer Critics**" who have met a series of criteria set by Rotten Tomatoes — are included in the site's scores. Though not every critic reviews every film, so any given score is more typically derived from a few hundred critics, or even less. The scores don't include just anyone who calls themselves a critic or has a movie blog. Rotten Tomatoes only aggregates critics who have been regularly publishing movie reviews with a reasonably widely read outlet for at least two years. Those critics must be "active," meaning they've posted at least one review during the last year. The site also deems a subset of critics to be "top critics" and calculates a separate score that only includes them. There's a straightforward reason the two rarely match, though: **The critical score is more controlled and organized.**

Why? Most professional critics have to see and review many films, whether they're inclined to like the movie or not. (Also, most critics don't pay to see films because studios hold special early screenings for them ahead of the release date, which removes the decision of whether they're interested enough in a movie to spend their hard-earned money on seeing it.)

But does that make Rotten Tomato more reliable? NO. Because not everyone has the same opinion about everything as all critics don't rate movies unanimously. Most critics love arguing about movies with each other because they often find that disagreeing with their colleagues is what makes their job fun. It's fair to disagree with others about a movie, which doesn't mean that they are "wrong."

Also, critics aren't weather forecasters or pundits, and they're not particularly interested in predicting how audiences will respond to a movie. Critics show up where they're told to show up and watch a film, then go home and evaluate it to the best of their abilities.

And most importantly, they turn every rating into a 100(>60 reviews) or 0(<60 reviews) score, which is their biggest con.



metacritic

Metacritic

It is a website that aggregates reviews of films, TV shows, music albums, video games, and books. For each product, the scores from each review are averaged (a weighted average).

Metacritic's scoring converts each review into a percentage, either mathematically or what the site decides subjectively from a qualitative review. Before being averaged, the scores are weighted according to the critic's fame, stature, and volume of reviews. Each movie, game, television show, and the album featured on Metacritic gets a Metascore only after at least four critics review it.

Metascore is a weighted average, in that they assign more importance, or weight, to some critics and publications than others, based on their quality and overall stature. For music and movies, they also normalize the resulting scores (similar to "grading on a curve" in college), which prevents scores from clumping together.

Metascores range from 0-100, with higher scores indicating better overall reviews. A result is a single number that captures the essence of critical opinion in one Metascore.

They highlight Metascores in three colors so that users can instantly compare: **green scores** for favorable reviews, **yellow scores** for mixed reviews, and **red scores** for unfavorable reviews. Metacritic designates a movie as "Must-See" when it achieves a Metascore 81 or higher and has been reviewed by a minimum of 15 publications. "**Must-See**" movies are reviewed by a broad cross-section of the best critics. In total, approximately 5% of films in Metacritic's database achieve this elite status. Like movies, Metacritic designates a game as "Must-Play" when it achieves a Metascore 90 or higher and has been reviewed by a minimum of 15 publications.

But they have faced criticism on their assessment system, alleged third-party attempts to influence the scores, and the lack of staff oversight of user reviews. They also have been criticized for converting all scoring systems into a single quantitative percentage-based scale. For example, an "A" score equates to a value of 100, an "F" to the value of zero, and a "B" the value of 67. Further criticism was directed to the website's refusal to publicize how it aggregates scores.

So to summarize,

IMDb is excellent for getting to know what general audiences think of a movie. If you don't care what the critics say and want to see what people like yourself thought of a film, you should use IMDb.

Rotten Tomatoes offers the best overall picture of whether a movie is worth seeing at a glance. If you only trust the opinions of top critics and only want to know if a film is at least decent, you should use Rotten Tomatoes.

Metacritic offers the aggregate score which is the most balanced. If you don't mind which critics' opinions go into the final score and prefer seeing a general average, you should use Metacritic. They also make it easy to compare professional, and user reviews side-by-side.

And know that it's okay to form your own opinions, too. After all, in the broader sense, everyone's a critic.

Also, I want to answer a familiar doubt which most of you might have thought of even though it isn't related to our main topic.

D A R K

Why are TV series generally rated higher as compared to movies?

TV series are VERY LONG while movies are, if we compare them, VERY SHORT.

If you watch a Good series for a long time, you will grow a bond. Also, waiting for an episode to air acts as a catalyst to that feeling. That can't happen with a movie which is around 2 hours usually.

Also, TV shows have cumulative ratings based on many different episodes: some good and some bad. The good episodes tend to outweigh the bad episodes, mainly if the show goes on for several years. TV shows don't get to stay on the air if they don't attract viewers, and for that, you need good episodes consistently. That's why it can have a "better" rating.



Wonder. Think. Create!

 cevnitsurat

 cevsvnit

 cevsvnit

 cutting edge visionories

Designed By
Deepanshu & Nandhini

