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How will we handle the New Oil?

> **We have to master it in the 2020s**

Data is the new oil. But unlike the old oil, which has a storing and distributing process that is decades old, we are still grappling with how to handle the New Oil. This becomes more so since everything is getting rapidly digitized, a process that has only been speeded up thanks to Covid. Once IoT (Internet of Things) devices start multiplying, will we be able to handle the explosion? We still have a lot of unstructured and unread data.Can we bring it all into the grid quickly? Can we keep optimizing analytic tools using tools like Artificial Intelligence?

Storing of data and backing it up requires a huge amount of data centers as the cloud continues to expand. Data migration is another issue and smaller players struggle with that. There's data sovereignty wherein the data has to obey the laws of the land. Every country has different sets of rules even though we are trying to get them standardized. The location of data is important.Every government would rather keep the data in their own countries. Geography matters!

There's data security. It is quite sensitive.Who can view your data? Data has to be kept securely. Bad actors shouldn't steal it. Cybersecurity is getting more relevant by the day. Then there's data privacy. Everyone wants to keep their data private.But is that possible? Don't tech giants already have access to your data? Can they share it with their partners? Can they share it with the government?

How much data from citizens can a government ask for and when they store it, is it as secure as those kept by the best players in the industry? Surveillance and contact tracing both have led to a whole new world of data issues. What about data ethics? Are we able to keep a hold on that?

There's the path that data takes. Today we have a network of data centres all over the world, an expanding mobile workforce and a rising Work From Home culture. We all have multiple devices and multiple WiFi connections at home. The global Internet data network is getting denser and heavier with data each passing day. We are finally heading towards a paperless office, a pipe dream in the 1980s. You can do everything online from booking, to purchasing to verification to government jobs. Your mobile is now your wallet and I-card. That simply means more online data.

Data was already there, but only now is it getting rapidly digitized and increasing exponentially. Call it Gigantic Data rather than Big Data. Success in the 2020s will depend on our mastery over every challenge that this the New Oil throws at us.

Sunil Rajguru

INDIA EYEING EV30@30 TAG- BUT THERE'S MANY A SLIP

With increased policy and financial supports for the EV manufacturers and buyers, India certainly has sped up the efforts for mass adoption of EVs. But more than anything, it needs to bridge the gap between Intent and Execution first

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Over the past decade, India took baby steps towards embracing Electric Vehicles (EV) mainstream but to little effect. Although being considered as an emerging market for EVs, the adoption of EVs is still very low in India for significantly higher upfront costs than internal combustion engine (ICE) vehicles, coupled with the lack of Charging Infrastructure and subsequent Range Anxiety, and Reliability issues.

As per the Society of Manufacturers of Electric Vehicles (SMEV) reports, only 1.56 lakh EVs were sold in India in FY2020 as against 1.3 lakh units in the previous fiscal- which is a nominal fraction of the total vehicle sales in India every year.

However, considering the alarming level of air

Break-up of EVs vs. ICEV sales in India (FY2020)
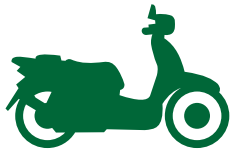
1,52,000 Units

1,74,10,000 Units

3,400 Units

27,73,571 Units

600 Units

40,257 Units

pollution especially due to the carbon emission in the transportation sector, India has certainly sped up the efforts in this regard of late by increased policy and financial supports, as well as by ramping up infrastructure to incentivize automakers and buyers further.

Government Pushing transition to Electric Mobility

Government's push for EVs has always played a key role in facilitating EV adoption in India. For the faster transition to electric mobility, the government laid down the principles and strategies under the National Electric Mobility Mission Plan 2020 (NEMMP 2020) in 2013 and launched the FAME scheme (Faster Adoption and Manufacturing of Hybrid & Electric Vehicles in India) in 2015.

India has also set an ambitious target of achieving 30% new EV sales by 2030 by pledging to the global Clean Energy Ministerial (CEM) EV initiative and participating in its EV 30@30 campaign.

The central government has also asked the states to frame their EV policy and provide additional fiscal and non-fiscal incentives to manufacturers and buyers. According to reports, at least 10 states and union territories have published draft EV policies or notified final policies detailing fiscal, non-fiscal and

other incentives.

Last year, the government announced a financial outlay of Rs 10,000cr for three years till 2022 under FAME II scheme. Out of the total sanctioned amount of Rs 8,596cr for incentives, Rs 1,000cr has been earmarked for setting up charging stations for EVs in India. The government will offer incentives for electric buses, three-wheelers and four-wheelers to be used for commercial purposes and will cover two-wheelers. Besides, FAME II will offer incentives to manufacturers focused on developing EVs and its components and for localizations also.

Besides four-wheelers, the government has also decided to focus on two-wheelers, and three-wheelers as well, where sales are generally much higher. To ensure a rapid transition to electric mobility, Niti Aayog, last year has proposed to have only electric three-wheelers operating in the country by 2023, and only electric two-wheelers by 2025.

OEMs focus on improving Battery and Range

EVs, now, are at a tipping point globally as automakers and OEMs have been putting their skin in the game too with an aggressive launch pipeline. Strong policy and innovation tailwinds, along with continuous improvement in EV and battery technology, as well as in the range and performance of EVs are helping OEMs scale up and launch more affordable and superior products. As per industry estimates, there are nearly 150 new launches lined up from large global OEMs over the next three years – twice as many as the previous five years.

New product launches, even in the affordable category have now a minimum range of 250Km and respectable top speeds – pegging them well in terms of performance compared to ICE. By 2030, Battery

EVs are assumed to reach an average driving range of 350-400 km corresponding to battery sizes of 70-80 kWh, projected IEA reports.

Also, the Lithium-ion battery costs have decreased by more than 85% since 2010- which is helping to transform the economics of EVs to a great deal. OEMs have predominantly preferred to rely on the battery suppliers, but now are working towards making their own batteries and/or procure cells locally.

GM this year revealed details of its new Ultium Batteries based on a proprietary low cobalt chemistry for the lithium-ion cells that helps reduce the cost and improve the performance of the battery.

At Tesla's Battery Day event, Elon Musk disclosed the company's plans to reduce the battery designing and manufacturing cost of its battery. The new tabless battery cells, and changing the materials inside the cell should allow Tesla to halve the price per kWh and help it build a $25,000 electric car, said Musk. Tesla also plans to build a new cathode plant to reduce supply chain costs and simplify cathode production.

Accelerated rollouts of Charging Infra

Creating a robust EV charging infrastructure is one of the key prerequisites for faster adoption of EVs in any country, but lack of charging-infrastructure investment (public or private) continues to remain one of the persistent challenges for EV adoptions in India making the users exasperate further with range anxieties.

Also, different charging techniques and infrastructure requirements for different vehicle segments e.g. 2Ws, 3Ws, 4Ws and passenger cars just add further to the problem. Hence, the government and automakers are forced to explore multiple charging options such as conventional charging stations having both slow and fast chargers, home charging points, and battery swapping stations, etc.

Home charging points will continue to dominate in the electric 2W and 3W segments, however charging stations with fast chargers would be required to drive the adoption of passenger cars in India.

"The government is already supporting charging infrastructure under FAME II. Additionally, government intervention would be required to establish partnerships between state-run agencies, PSUs, private organizations, and aggregators to set up robust charging infrastructure across the country. More importantly, similar to developed countries, the Indian government should continue providing incentives and subsidies to charging infrastructure providers until the critical mass is attained," suggested Seshasayee Tatineni, Senior Research Analyst, Mobility Practice, Frost & Sullivan.

Launching its EV policy, Delhi government said it will work on the accelerated rollout of charging infrastructure collaboratively with private partners. The government plans to set up public charging and battery swapping stations at prominent locations in the city. In addition to slow and fast public charging stations, setting up charging facilities in restricted public spaces such as malls, office complexes, group housing societies, hotels, education institutions, hospitals etc. has also been identified as a priority.

West Bengal Housing Infrastructure Development Corporation (WBHIDCO), meanwhile, has also taken significant strides towards fulfilling its electric mobility target by setting up a network of fast-charging stations in New Town, Kolkata in partnerships with Energy Efficiency Services Limited (EESL), Lithium Urban Technologies and Fourth Energy Partner. Lithium's charging station is being considered as the largest EV charging facility where

25 EVs can park side-by-side for charging.

"The New Town Kolkata Development Authority (NKDA) has also revised its rules and made it mandatory to set aside EV charging space in the parking lot of commercial or big residential plots. Generally, one parking space for every 150 sq. m of total floor area is mandatory, wherever a property is developed or redeveloped, as per current regulations. Now we have also made it mandatory to earmark 2% of the car parking subject to the minimum of one for setting up EV charging," said NKDA and WBHIDCO chairman, Debashis Sen.

The new guidelines by the Ministry of Housing and Urban Affairs (MoHUA) have also mandated residential and commercial complexes to allot 20% of their parking space for EV charging facilities.

"Currently, we are moving forward with a viable approach by entering cities and developing their charging infrastructure. We install fast-charging stations across all of our dealerships and even provide roadside charging to ensure a seamless public charging experience for our customers," said Rajeev Chaba, President & MD, MG Motor India.

"From experience in markets where EV adoption has been higher, the charging of EV happens at home almost 85% of the time. If we look at the Indian market then this percentage will turn out to be even higher. However, the charging capacity installation comes with its share of challenges and hence, we feel that customers need help in this area. MG conducts free-of-cost EV charger installations at the homes of all of its customers," added he.

Addressing Ownership Cost concerns

India has always been a price-sensitive market. Hence, the higher upfront cost of EV ownership than fossil-fuel vehicles continues to be the biggest barrier to mass adoption of EVs.

Policy Incentives: EVs have always been more expensive than their ICE counterparts, mainly due to the higher cost of the battery. The Ministry of Road Transport's recent announcement allowing EVs to be sold and registered without the battery will certainly reduce the upfront cost by 30%-40% and encourage new business models such as battery swapping, which prove to be cost-effective for customers. While this policy may be well received by electric 2W and 3W manufacturers and customers, it is highly unlikely to work for passenger cars in India, doubted Tatineni of Frost & Sullivan.

"More than the incentives or lack of charging infrastructure, it is the lack of affordable yet reliable

EV Tidbits

★ China has over 52.5% of the global EV market share in 2019 with 1,195,606 units, followed by Europe (591,303 units) and the United States (320,062 units) with 26.0% and 14% shares respectively.

★ Nine of the top ten markets for EV penetration rate were European. Norway continued to lead the market in terms of penetration rate at 60%.

★ Battery EVs (BEV) dominated the market with a strong 74% share (1,687,598 units) and plug-in hybrid EVs (PHEV) accounted for the remaining 26% (586,183 units).

★ Automakers launched 143 new EV models in 2019- 105 BEVs and 38 PHEVs.

★ Penetration of EVs (BEVs and PHEVs) has been higher in the premium PV market, compared to the mass market. EV penetration to reach nearly a third of all premium vehicles sold globally by 2024-25.

★ Tesla was the market leader in 2019 with over 367,000 units sales followed by BYD and RNM at 228,204 and 201,509 units respectively. Tesla Model 3 became the highest selling EV globally with sales of 300,092 units.

★ SAIC, GM, and BMW had the highest EV penetration rate in the passenger car segment in 2019 at 12.8%, 12.1% and 7% respectively.

★ 3D printing is helping to speed up design and development for EVs.

★ Japan, South Korea, Malaysia, Australia, and India are the emerging EV markets in APAC. Of these, Japan, South Korea, and India offer the most attractive incentives on the purchase of EVs and the development of associated charging infrastructure.

Data Source: Frost & Sullivan, Mckinsey, IHS

EVs in the Indian market that is affecting the sale of EVs in the country. The government to focus more on motivating traditional vehicle manufacturers to launch electric products by incentivizing and supporting them in component localization and not just providing incentives to the customer. We have to realize that electric 2Ws and 3Ws have grown in the last 2-3 years without the support of government regulations or incentives," he suggested further.

Sohinder Gill, CEO, Hero Electric Vehicles also agreed and believed that providing incentives and tax benefits for manufacturers and OEMs willing to increase localization levels on their products will not only generate more jobs, increase revenue, reduce reliance on imports but also massively drive down costs of EVs which then will naturally appeal more to buyers.

Priority Lending: Easy financing of EVs can prove to be extensively helpful for facilitating mass-adoption of EVs, according to Gill. "Financing of EVs is low and public sector banks can be told to undertake priority lending especially for the lower-income group customers. Most pertinent, however, from a mass-adoption point of view, would be to allow FAME II (Faster Adoption and Manufacturing of Hybrid and EV) funds for the low-speed category vehicles as well," suggested he.

Retrofitting: EV Retrofits can also help in lowering the barriers to EV adoption, said Deepak MV, CEO & Co-founder of the EV startup, ETrio. ETrio has recently launched the country's first retrofitted electric light commercial vehicle (eLCV). "Retrofitting provides dual benefits by decarbonizing the environment on the one hand and decongesting roads on the other. Our scientific retrofitment process makes diesel guzzling LCV into a green productive vehicle. For example, retrofitment can give Tata Ace 5+ years of life extension. Plus ETrio's eLCV pricing can even compete with a

diesel counterpart on the Total Cost of ownership and by saving almost 60% of the operational expenses, it can help in reviving the driver owner's earnings also."

TCO Benefits: EVs have a strong advantage as far as operating economics are considered. Further, the increase in operating costs over the life of the vehicle is significantly higher for ICE vehicles over EV. If you calculate the true cost of EVs, it will be far lesser than other ICE vehicles. The total cost of ownership(TCO) is quite comparable in the four-wheeler segment even at the current prices. An analysis done by ETrio shows the cost benefits of EVs clearly by comparing the operating costs of EVs as against Diesel vehicles. EV adoption in company operations can dramatically reduce running costs of fleets as well, it makes business sense as well considering the rising fuel prices, and the new affordable EV models coming into the market. Companies adopting EVs can also benefit from reduced emissions.

"Adoption of battery swapping and battery rentals as a business model will significantly reduce the total cost of ownership (TCO) for cars and will enable early adoption of EVs. As it is still early days for EVs in India, traditional ICE vehicles seem more cost-effective. However, with increasing production, reduction in battery costs and improvements in charging and related technologies, it is expected

Operating economics of EVs vs. Diesel vehicles

	Fuel	Maintenance	Total
EV cost (per km)	Rs 1.20	Rs 0.50	Rs 1.70
Diesel Vehicles cost (per km)	Rs 4.20	Rs 0.90	Rs 5.10
Cost Savings in EV (per km)	Rs 3.00	Rs 0.40	Rs 3.40
Monthly Cost Savings (for 100 km per day)	Rs 12,000	Rs 1,200	Rs 13,200
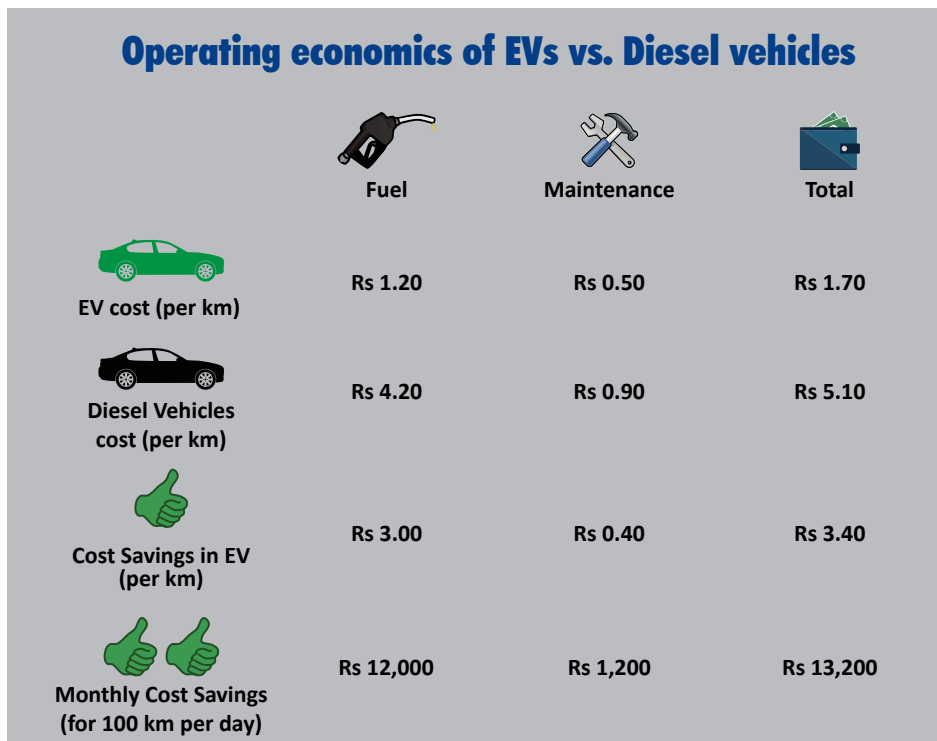
Data Source: ETrio

that the price of EVs will come down drastically in the coming years," said Pawan Bhageria, President- Tata Motors SBU, Tata Technologies. However, critical components of EVs such as the battery, motors, controllers are being imported from China, low availability of battery charging infrastructure and primitive charging business model and range concerns continue to be challenges- which must be addressed for easier and faster adoption of EV in the country, added he.

Emerging areas with strong adoption potential

The World Business Council for Sustainable Development (WBCSD) in its report identified three most scalable use cases for business and fleet EV adoption in India: employee transport, platform-based ride-hailing and last-mile urban freight and deliveries.

The Indian logistics stands at USD 160 billion with road transportation contributing to a lion's share of 65% could be a potential area for EV adoption. The announced EV adoption targets by major e-commerce and logistics incumbents make intra-city logistics especially in the e-commerce logistics space as well a potential area of EV adoption

"As per a study, the majority of online users abandon purchase on account of the shipping cost being too high. This has forced all the e-commerce players to reduce operating costs. Further, the last mile or intra-city logistics also contribute to almost 50% of e-commerce logistics cost and the optimization of the same is the focus of the industry," explains ETrio's Deepak.

The decarbonizing mandates by the governments have prompted many urban mobility players to extend their EV fleet. Besides EV-only ride-hailing platforms such as BluSmart and Smart-E, EVs have also been adopted or are being evaluated by established ride-hailing companies such as Ola, Uber, Meru, Bounce, Rapido, Yulu, etc. among others.

EV-based deliveries are also gaining traction. For instance, EV100 member IKEA aims to run 60% of its home delivery fleet on electric within 3 years of operation and Swiggy has piloted the use of EVs in 10 cities in India.

Besides identifying such innovative use cases for EVs and incentivizing EV productions and adoptions, India also needs to take a more pragmatic approach towards its electric mobility mission also by increasing awareness on alarming carbon emission from vehicles and the benefits of switching to clean mobility for a sustainable future.

EV/Alternate Fuel targets by e-Commerce and logistics majors

amazon
Aims to include 10,000 EVs in its delivery fleet by 2025 in India

Flipkart / Myntra
Aims to replace 40% of its delivery fleet with EVs by 2020

FedEx Express
Targets 30% more fuel efficiency for its global fleet by 2020

ups
Hopes to have 25% of its fleet running on alternate fuels

GATI
Sets up a subsidiary 'Avaan Shakti' to build a 100% EV fleet

TOWARDS SUSTAINABLE AND AFFORDABLE TRANSPORT

The future is electric, but evolution is a must. Electric Vehicles (EVs) still have some way to go before they touch the right price point and range to start replacing the fossil fuel ecosystem. The motor. The inverter. The converter. The battery. A look at the tech behind this new revolution

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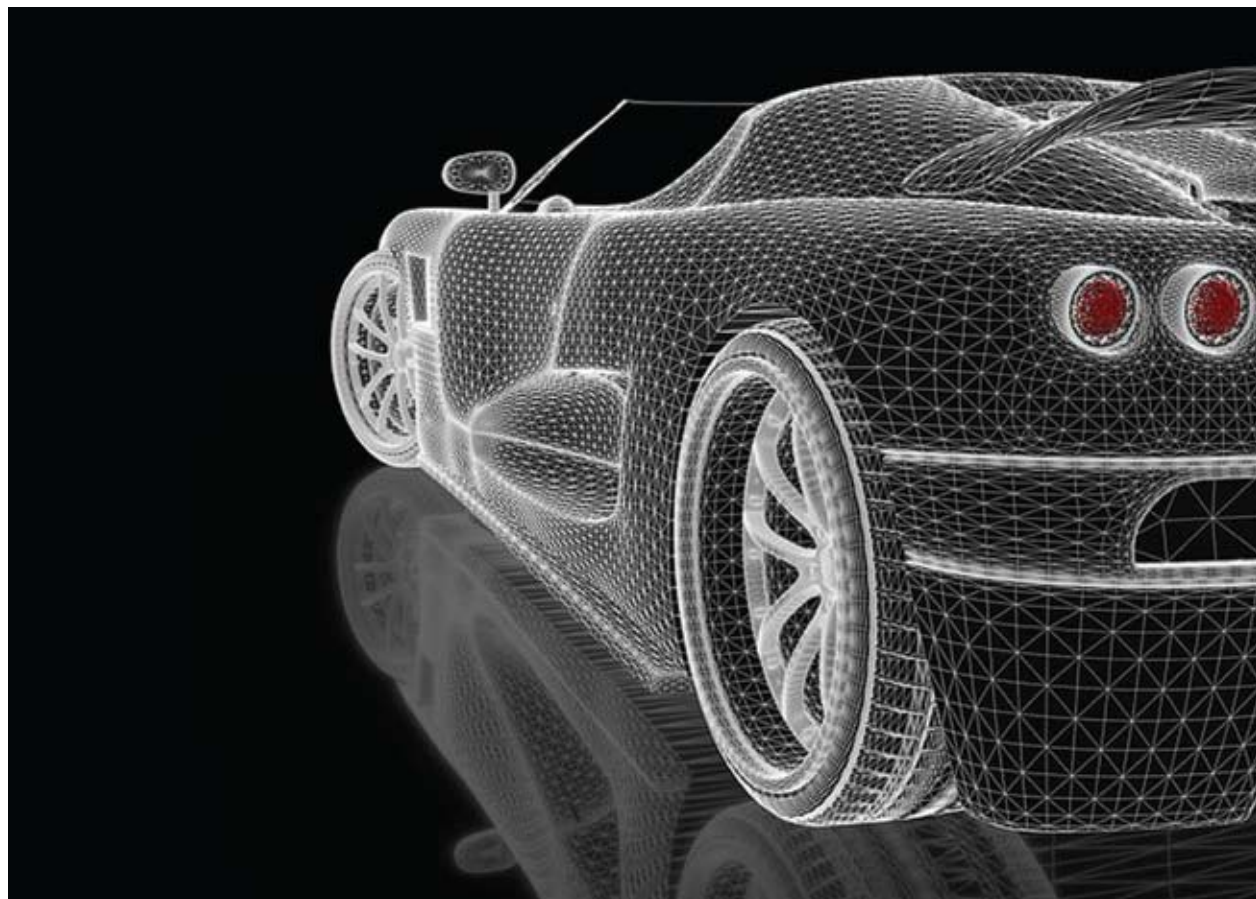
The automobile industry has evolved in the past several years with the push to manufacture low-emission vehicles. With the transport sector accounting for around 24% of CO2 emissions globally, car manufacturers are rising to the challenge, setting ambitious targets for carbon emissions reductions. The most vital evolution is Electric vehicles (EVs). EV manufacturing is gaining momentum across the globe and India is one of the prominent markets.

Manufacturers have already begun manufacturing EVs. Global sales of EVs exceeded 2 million in 2018,

Figure 1: EV market growth forecast

million cars per year

(Source: https://about.bnef.com/electric-vehicle-outlook/#toc-download)
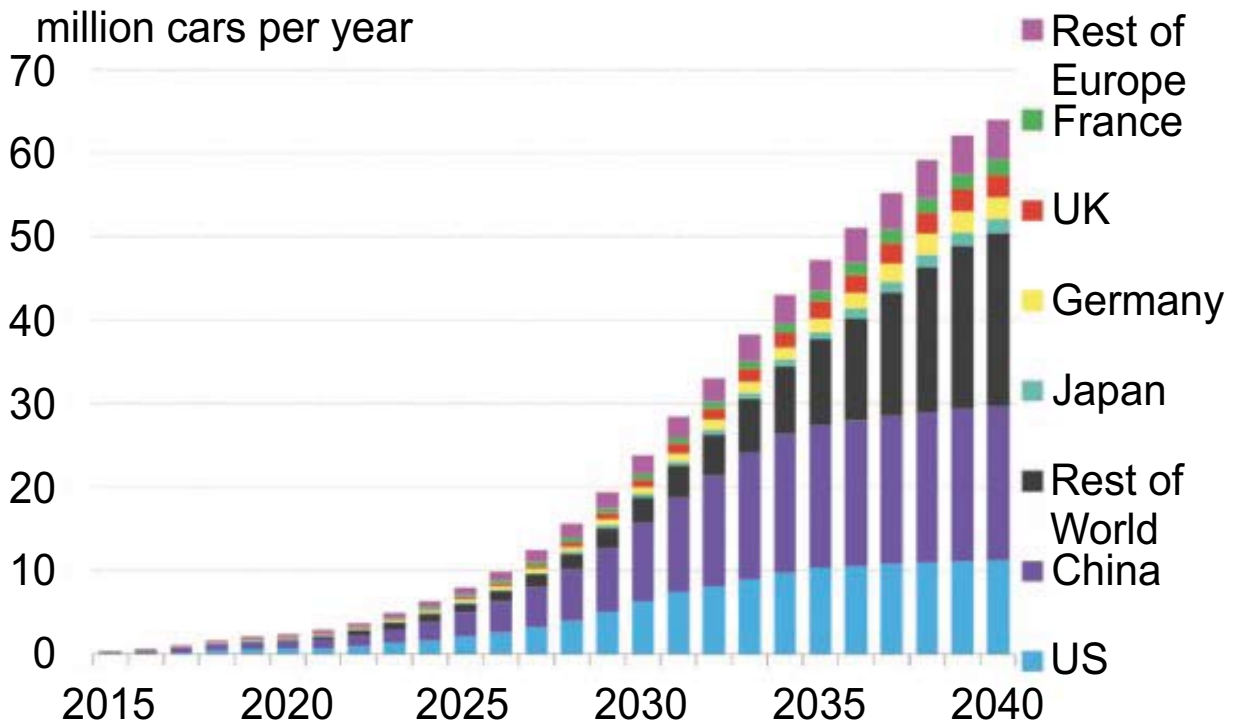
up from just a few thousand in 2010 and industry analysts forecast an acceleration of this growth, with EVs expected to account for 57% of all passenger vehicle sales by 2040 at which time 30% of the global passenger vehicle fleet will be EVs.

The serious business

In the face of ever-tighter global emissions regulations, car manufacturers are making transformational changes to their operations and many have made aggressive commitments to reduce carbon emissions by increasing their ranges of EVs.

Tesla is the current market leader with the Chinese automaker, BYD, close behind and many other manufacturers gearing up to launch products in this increasingly competitive market. The Indian market is a bit different.Giants like Tata Motors and Mahindra & Mahindra tried to tap on the EV market in India. However, brands like Hyundai and MG also trying to make their space in the segment.

The Volkswagen Group plans to increase global production levels and product options of its EVs, aiming to launch 70 full-electric models over the next 10 years, with expected sales of 22 million vehicles. In doing so the group plans to reduce 2030 emission

levels from its vehicles by 40% when compared to 2015 levels. VW Group CEO, Herbert Diess has been quoted as committing the car manufacturer to become fully carbon-neutral across all its operations by 2050.

"There have been various breakthroughs in the last 12 months around lithium-ion batteries. With newer chemistries guaranteeing longer cycle life and higher kilometre warranties to a better understanding of the importance of heat dissipation and thermal stability at higher discharge rates which would lead to higher standards of safety & reliability.

As more vendors and research labs begin to focus on the development of a sustainable EV ecosystem, new technologies would be developed and commercialized which would increase efficiency and lower down costs to make EVs mainstream."

—Gurfaraaz Singh, Head of Innovation & Design, Inverted

The challenges

Electric cars won't be successful, unless they improve battery range and reduce price: Bill Gates

In February this year, Microsoft founder Bill Gates had a conversation with popular tech YouTuber Marques Brownlee AKA MKBHD. They discussed making the world a better place and if EVs could lead to sustainable transport with its price point.

Gates responded that even though a premium exists today, over the next decade this premium would come down to zero — even with a slightly less range than we want from electric cars. He expressed his hope for the passenger cars to do better in comparison to all other sectors.

He also mentioned: "I just got a Porsche Taycan, which is an electric car – and I have to say, I mean, it's a premium price car, but it's very, very cool. That's my first electric car, and I'm enjoying it a lot."

Not everyone can purchase Porsche Taycan, and that's why Bill said to increase the range and reduce the price, which is currently the biggest challenge for the EV manufacturer.

The Technology

The tech evolution can help, there are effectively two types of EVs: All-

electric vehicles (AEVs) and plug-in hybrid electric vehicles (PHEVs). AEVs can be further classified as battery electric vehicles (BEVs) or fuel cell electric vehicles (FCEVs), both of which must be charged from the electrical grid and are also usually capable of generating electricity through regenerative braking. Figures 2 and 3 show simplified block diagrams for a BEV and a PHEV.

A BEV is propelled entirely by electric motors powered by on-board batteries, does not use an internal combustion engine hence does not rely on fossil fuel. During braking, the electric motor can function as a generator, recharging the battery by converting the vehicle kinetic energy into electric energy.

In a PHEV, the internal combustion engine remains the main energy source, with the battery and electric motor used to improve overall efficiency; the PHEV is propelled by the electric motor when the ICE is less efficient and otherwise runs on the ICE. Again, during braking, the electric motor works as a generator, recharging the battery. Since they rely less heavily on the electric motor, PHEVs can use smaller battery packs than BEVs.

In both the BEV and PHEV, a large battery provides current to high voltage components within the system, which supply the electric power train of the

BEV Block diagram

(Source: https://toshiba.semicon-storage.com/ap-en/application/automotive/ecology/hev-ev.html)

vehicle. The Inverter and the DC-DC Converter are key high-voltage sub-components within both types of vehicle; the inverter converts the DC current from the battery to the three-phase ac current required by the electric motor. The DC-DC Converter converts the high voltage generated by the vehicle motor, (during braking, for example), to the typical battery voltage, usually either 12V or 20V.

The inverter, the DC-DC Converter, and the battery system are all key parts of the EV drivetrain, each presenting unique design challenges and requiring specific testing approaches during manufacture.

The Motor

What can help to get more power and better mile per charge – one is motor and then battery. More powerful more with consume more battery and go for less miles. But with tech revolution, now more powerful engines are efficient enough to take you miles in one charge.

There are two types of motors – DC and AC, as the name suggest these motors differ according to their power type (AC or DC)

Different Types of Motors

All the electric vehicles are using BLDC Motors, as they do not use brushes. It uses the permanent magnet that rotates; rotation is achieved by changing the direction of the magnetic fields generated by the surrounding stationary coils. To control the rotation, you adjust the magnitude and direction of the current into these coils.

PHEV Block diagram

: Applications using semiconductor components

: PHEV-specific components

(Source: https://toshiba.semicon-storage.com/ap-en/application/automotive/ecology/hev-ev.html)

DC Motors	Brushed DC Motor
	Brushless DC Motor (BLDC)
	Stepper (STP)

AC Motors	Induction Motor (IM)
	Synchronous Motor (PM)
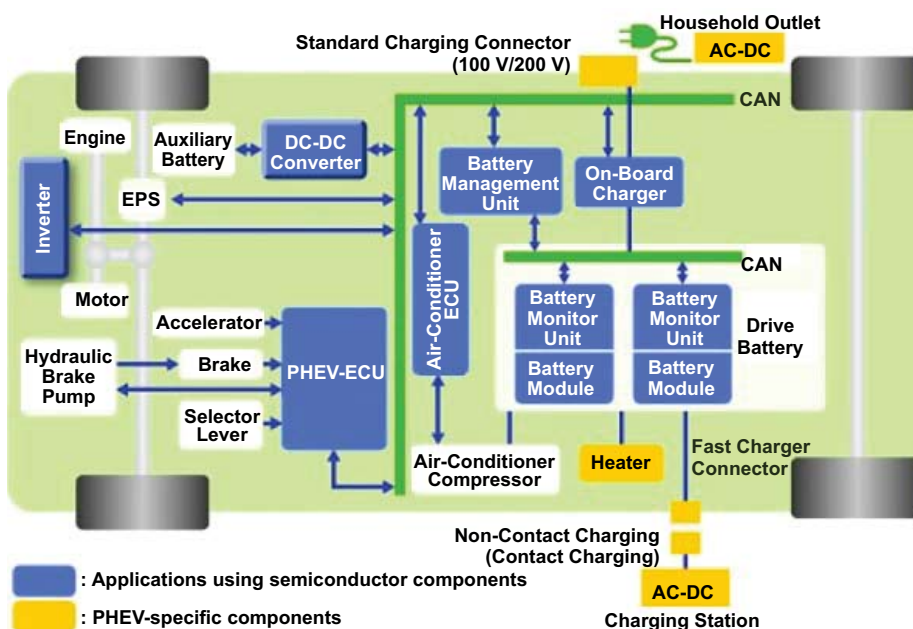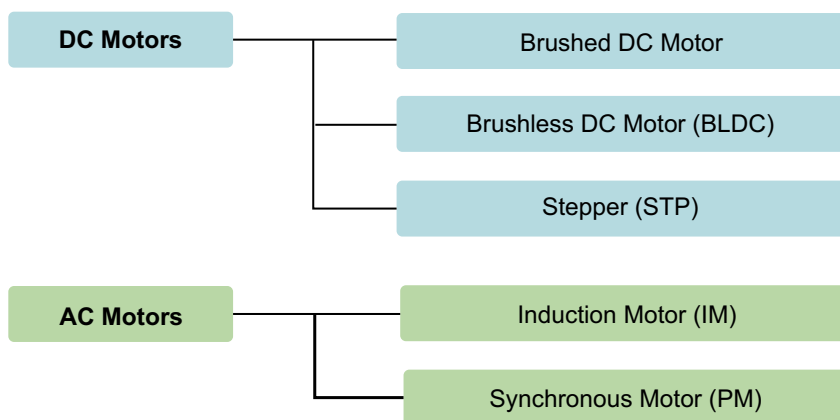
amounts of high voltage currents in a high-temperature, hostile environment. Traditionally the domain of Insulated Gate Bipolar Transistor devices, (IGBT), new Wide Bandgap, (WGB), Silicon Carbide, (SiC), and Gallium Nitride, (GaN) based technologies are increasingly being adopted by manufacturers seeking improvements in power and efficiency levels.

Transistors based on these technologies offer several advantages, including high temperature and high voltage operation and improved efficiency. At the same time, however, they bring new challenges to the designer in ensuring stable and safe designs. With the very fast switching speeds of GaN power transistors, great care must be taken to avoid the high levels of EMI emissions or transistor breakage that can be caused by parasitic inductance.

While well-designed circuits and board layouts can address these issues, iterative design cycles can be time-consuming and expensive. Leading-edge power circuit simulator software are now available that offer valuable performance verification during the design phase, greatly speeding time to market.

A BLDC Motor.

3 Key Advantages of BLDC Motors

Efficiency - These motors can control continuously at maximum rotational force (torque). This is why even small BLDC motors can deliver considerable power.

Controllability – Using feedback mechanisms, you can control these motors easily to delivery precisely the desired torque and rotation speed. Which result to reduces energy consumption and heat generation and lengthens the battery life.

Durable and silent – As it doesn't have brushes, it doesn't produce spark where contact is made, as a result no noise and better durability.

The Inverter

The power transistors used within an inverter must seamlessly convert, switch and regulate large

Figure 3: A BLDC Motor

The DC-DC Converter

DC-DC Converters also bring design challenges; traditional solutions, based on silicon devices required expensive water-cooling systems. The new WBG devices can reduce the need, and hence the cost, for water cooling but introduce potential safety issues as they enable multiple converter applications to be integrated into a single module, raising the operating voltages above the 60V safety limit. Testing of converters can, therefore, be a hazardous process and suitable test equipment, conforming to the recommendations of standards such as NFPA 79, must be used to protect designers, technicians, and operators.

Today, innovative systems for this purpose are being developed, which are equipped with safety features designed to protect both the people doing the testing and the equipment under test. These systems have been designed with regenerative capabilities, which transfer the energy used during testing back to the grid, thereby enabling savings from energy consumption and cooling costs.
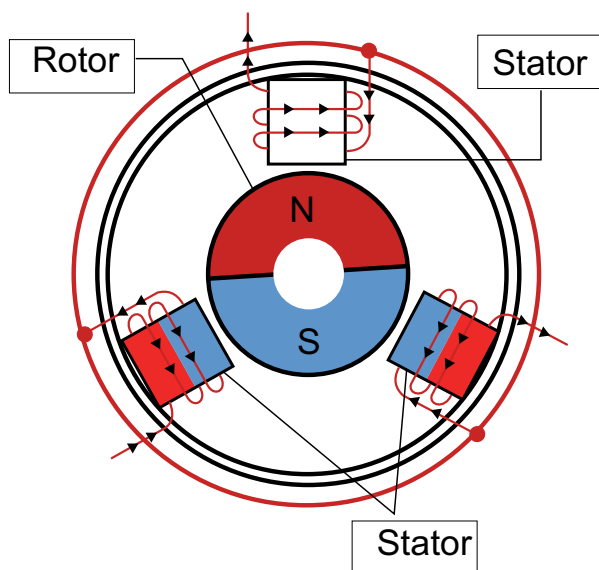
The Battery

The battery is the third of the key onboard components, its characteristics determining how far the EV can travel between charges. EV battery technology has evolved rapidly over the years, with current, averagely priced models enabling a car to travel for over 100 miles. The 2018 Nissan Leaf, for example, has a 40-kWh battery pack, with 192 Lithium-Ion cells, giving it a range of 151 miles. At the high end of the market, the battery in the Tesla Model S has 7,104 Li-Ion cells, enabling it to travel 315 miles between charges. The market for EV batteries is buoyant and analysts forecast continued high growth as manufacturers look to develop faster-charging batteries which enable more miles per charge.

For battery manufacturers, effective testing of each individual cell is key to the overall performance of the battery pack. A phenomenon known as cell self-discharge can decrease the shelf life of the battery and reduce its initial charge level. Traditional testing techniques involved monitoring a cell's open-circuit voltage over a period of many weeks which is not ideal, given the increasing need to get to market quickly.

Equipment providers are nowadays able to address this problem, by developing self-discharge measuring solutions that reduce test time from weeks to hours, enabling manufacturers to significantly reduce test cycle time and hence speed up time-to-market.

The Roadside Ecosystem

Outside of the car itself, charging stations are a vital enabler of the growth in the market for EVs and understanding charging patterns and behaviours of drivers is key to the ability of power companies to plan for peak loading on the grid.

Public charging infrastructure becomes essential once EVs become mainstream or are adopted as the primary means for commercial transport. The first phase of early adopters only requires public charging infrastructure as a confidence-building measure, as these EVs users would use the vehicles to travel from home to office and back—both of which places can be easily equipped with regular AC chargers.

In the second phase when EVs become vehicles being used not just for city commute but for long distance/outstation travel is when countryside charging infrastructure becomes critical.

As a country we are still in phase 1 of the adoption of EVs and the same way that the government has built public charging infrastructure in Tier-1 cities,

"With the market for EV cars set for significant growth, a broad and diverse ecosystem, encompassing on-board and roadside technologies is expanding. As the demand for newer, more powerful and more efficient electric drivetrains continues, further innovations in power devices, cells and batteries will emerge. This wide range of devices and applications will need a correspondingly wide range of powerful test solutions to verify designs and ensure compliance with relevant standards."

—Fred Weiller, Senior Director of Solutions Marketing, Keysight Technologies

it would be able to build this infrastructure in the countryside. With the infrastructure for petrol pumps being State-owned—mandating that each pump be equipped with a fast charger is only limited by government intent & policy making, rather than being a decision based on economic viability to be made by private players—which is far more challenging.

Is swappable battery a good solution?

The experiment with swappable batteries is an idea which definitely deserves a fair runway. However, there are operational challenges which would need to be solved for, from shared responsibility to interoperability and standardization of battery connectors and communication protocols.

On paper, the idea definitely holds merit in reducing the upfront cost of ownership of an EV and reducing the time to charge, but the successful implementation in a shared ecosystem will have foreseeable challenges.

Battery standardization is the only way to make swapping successful. Currently there is no standard design or specification for any EV battery.

Conclusion

The opportunity lies in the shift being driven by the largest automobile manufacturers and government policies globally to phase out ICE vehicles and incentives the adoption of Electric Vehicles - which would have an automatic effect on the entire ecosystem which would promote innovation & development of new technologies around EVs.

Infrastructure & costing key concerns for consumers

The CMR-PCQ "Usage and Attitude of Electric Vehicle (EV) technology" study looked into what the Indian consumer expects when it comes to EVs, batteries & infrastructure. Presenting 8 key findings of the study conducted by CyberMedia Research

More than 3 in every 5 people prefer battery electric car engine.

Low emission and low operating cost are seen as benefits for consumers.

Big infrastructure biggest concern amongst the consumer. Others are cumbersome charging and high maintenance cost.

Compares to a similar vehicle with a traditional internal combustion engine, more than 3 in every 10 consumers are willing to pay Rs 3-5 lakh more for electric vehicle engine.

1 in every 3 consumers expect minimum 320 km driving range for all-battery-powered vehicle.

3 in every 10 consumers expect to charge for 1 hour to less than 4 hour in all-battery-powered electric vehicle.

More than 2 in every 5 consumers expect Government to build the basic infrastructure like charging stations and others, along with electric utilities and existing fuel companies.

Half of the consumers trust Government the most to manage the data being generated and shared by connected vehicles.

"INCENTIVES FOR LOCALIZATION & EASY FINANCING WILL DRIVE EV ADOPTION"

Sohinder Gill, CEO, Hero Electric Vehicles tells PCQuest what kind of government impetus, policy intervention, innovation, and localization are needed to foster the manufacturing and adoption of EVs in India

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As a leading player in the E2W space, what kind of opportunities and roadblocks do you see for the EV uptake in India? Do you have any suggestion, which could make the adoption better?

Given the plans of the government for a majority of mobility to be electric mobility in the country by 2030, both the public and the private sector need to come together to make a robust infrastructure so that we can see substantial adoption of EVs in the country.

However, there are certain areas where we need swift and major improvements. Two of them are the properly executed charging infrastructure, and rebates for Indian manufacturers matching the localization levels. While a lot has been initiated and actioned in this regard by the government via FAME II and the recently announced Delhi's EV policy there is a caveat which leaves the low-speed segment from availing such benefits. Since they are the drivers of the whole EV segment and make up more than 90% of the total sales, such benefits will help foster our electrification of mobility goals further.

Another heartening thing is that ever since the lockdowns, the awareness level in the people with respect to clean and emission-free mobility has certainly increased a lot. We have seen a growing interest among customers who are very interested in understanding the benefits, ease, and convenience of electric vehicles since then, and I feel that is a big boost of morale for the entire EV industry. I am certain this trend will continue even after the lockdown and we are expecting a great run towards the late 2020 and early 2021 and on an upward trajectory from

SOHINDER GILL, CEO, Hero Electric Vehicles

there on as social distancing will continue to be a priority.

Cost remains the biggest barrier to EV adoption, what kind of policy intervention, govt. incentives, and innovation are needed to overcome this issue?

There is a different set of requirements for each segment type. We need to look at specific problems and then look for the solutions to those problems. Considering the pressure on government funds due to COVID-19, it may be prudent to go for indirect policy measures such as mandating businesses like e-commerce, couriers, etc. to switch to electric in a phased manner. The government is strongly committed to reviving the economy and bringing back the growth rates to where we were.

Financing of EVs is low and public sector banks can be told to undertake priority lending especially for the lower-income group customers. Most pertinent, however, from a mass-adoption point of view, would be to allow FAME II (Faster Adoption and Manufacturing of Hybrid and EV) funds for the low-speed category vehicles as well.

We can look for incentives and tax benefits for manufacturers and OEMs who are willing to increase localization levels on their products. This step will not only generate more jobs, increase revenue, reduce reliance on imports but also massively drive down costs of EVs which then will naturally appeal more to buyers.

Additionally, the government could include EVs as a part of the Swachh Bharat campaign to create awareness on the benefits of this category towards the environment. Relay messages on radio, banners, and other platforms to spread the word of switching to electric for a better India and a better planet altogether.

What kind of innovation are you trying to do in the EV battery space (improving range, reducing form factor and costs, etc.), especially keeping India's power situation and the lack of charging infra in mind?

Range anxiety is troublesome and setting up guidelines and defined policies in place can help foster the adoption of EVs in India. At Hero Electric we have taken care of these issues. Our entire range comes with high quality Li-Ion portable batteries that can be charged via a 3-pin domestic socket. This eliminates the need to depend purely on a charging station and most importantly, you can charge the battery anywhere, anytime. This has proven to be a

> **Providing incentives and tax benefits for manufacturers and OEMs who are willing to increase localization levels on their products will not only reduce reliance on imports but also massively drive down costs of EVs**

great feature for all our customers and helps us not to depend on external resources/support. Also, in the time of social distancing this is a really safe option as customers don't have to make any visits to the petrol pumps, exchange money, credit card thereby preventing them from any possible exposure to the virus.

Also, after the central govt's recent announcement regarding the sales of EV's without batteries, we acted swiftly and partnered with EV Motors for batteries powered by IoT. This will not only help reduce the upfront cost of the EVs and put them at par with ICE counterparts, but will enable customers to track the performance, charge, life, of their batteries allowing them to be more aware and connected with their scooters. These batteries can also be charged by a 3-pin domestic socket.

Creating a robust EV Charging infra is one of the prerequisites for EV adoption. Could you suggest a holistic solution to the problem?

Delhi Govt's recent policy is certainly a step in the right direction and should be emulated by other states and even at the centre as well. The one-of-a-kind scrapping policy is certainly ambitious and will push more customers to look at EVs seriously. Having said that Delhi's policy also overlooks low-speed electric two-wheelers (E2W) and the policymakers should relook at it.

Apart from this a standardization in battery shape, size and power should be mandated to allow the battery swapping to really take-off and there is equal opportunity for buyers irrespective of the brand.

Rebates in the form of no taxation on Indian assembled batteries, components, charging stations, and incentives for 'Made in India' products will definitely boost the adoption especially when we are at a stage where we need to make a stronger case for EVs so that people move on from buying EVs to choosing and loving EVs. The need to bridge the gap between ICE and EVs has not been greater. We must make the most of it.

"INDIA IS CERTAINLY BETTER POSITIONED TO EMBRACE EVS"

Rajeev Chaba, President & MD, MG Motor India tells PCQuest why EV adoption is crucial for India vis-a-vis ICE vehicles and what kind of innovation, incentivization and infrastructural support are needed for the shift

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RAJEEV CHABA, President & MD, MG Motor India

What kind of opportunity and roadblocks do you see for the EV uptake in India vis-a-vis ICE vehicles? Do you have any suggestions on what could make the EV adoption better?

I can easily see more opportunities than roadblocks. To begin with, India is a net importer of crude oil. Its crude imports totaled $112 billion in FY2019, which is more than the GDPs of several economies including Ecuador, Sri Lanka, Myanmar, and Bahrain. Now, this is a recurring spend that only increases with the adoption of ICE vehicles. This is where the biggest opportunity for EV is. EV adoption can save our nation its valuable foreign reserves. At the same time, India aims to build its renewable energy capacity to 175GW by 2022 and take it further to 450GW by 2030. EVs are best positioned in this landscape.

People also have to realize that EV technologies have enhanced over the past couple of years. They no longer have the lags in pickups as there used to be earlier. For instance, MG ZS EV delivers a better power to an end-user even if you compare it with any high-end ICE-driven SUV. The vehicle zooms from 0 to 60 mph in around 8.5 seconds.

The only roadblock that I see is that of infrastructure. A superior adoption will require a robust EV charging infrastructure throughout the nation. The entire value chain, including the government and the industry stakeholders are taking positive steps in this direction. It will bring about a positive change and catalyze EV adoption.

Cost remains the biggest barrier to EV adoption, what kind of policy intervention, govt. incentives, and innovation are needed to overcome this issue?

The central and state governments are taking conducive steps in this regard at present. FAME II has led to an adoption of more than 27,000 EVs including 5,595 electric buses. It has further approved more than 2,600 EV charging stations across 24 states, out of which, more than 1,600 stations will be fast-charging stations. Simultaneously, state governments – including Delhi and Telangana alongside others – are also taking positive policy measures with

subsidies, road tax exemptions, and so forth. If you calculate the true cost of EVs, it will be far lesser than other ICE vehicles. Total cost of ownership or TCO is quite comparable in the four-wheeler segment even at the current prices.

We believe that all governments are firmly aligned with 'Clean India, Green India' vision and taking the right steps. India's EV journey can be taken a notch above if more innovations are promoted in the EV space together with infrastructural development and incentivization.

The technologies in the EV battery market have undergone significant changes in recent years, yet innovation is needed to increase the efficiency and decrease the charging time. What new tech development and innovation we are likely to see in the coming years at both ends – electric engine and battery?

There are two aspects that need to be looked into. One is the price of lithium-ion batteries and the second is the continuous innovation that is taking place in the EV battery space. The focus is to improve the range that an EV can travel in a single charge and reduce the charging time. If we look at the price of lithium-ion batteries, it has come down drastically over the last 5 to 10 years and is expected to come down even further over the next 5 to 10 years. It is widely believed that the price will be around $100 level in the next 3 to 4 years. This is when we will see mass adoption of EVs from consumers since at this price there will be parity at TCO level between an ICE vehicle and an equivalent EV. Similarly, the range is also improving and now topping 500 kms in one charge for some top-end vehicles. Both of these developments are a result of the continuous innovation and development that is happening in the field of EV batteries.

If we look at trends in new types of EV batteries then a lot of interesting developments are taking place. For instance, research is being conducted in the field of Solid-State Batteries. In solid-state batteries, the liquid/Gel Polymer Electrolyte (GPE) is replaced by a solid electrolyte which takes less space and is a fast conductor of ions, thereby making solid-state batteries lighter, smaller, safer, and more powerful. The technology is not yet ready for large-scale commercial production. One of the key problems with this technology is the formation of metal deposits when lithium anodes are used, often causing such deposits to penetrate the electrolytes.

Then there is progress in the space of Li-Metal

In markets with higher EV adoption, almost 85% charging of EV happens at home. But, the charging capacity installation comes with its share of challenges and hence, customers need help in this area

batteries. Lithium-metal batteries use lithium anodes rather than graphite as in the case of Li-ion batteries. Lithium is much lighter than graphite and has twice the energy density vis-a-vis Li-ion batteries. However, the main issue with the Li-Metal battery is its low life cycle. Li-Metal batteries are most likely to get commercialized along with the development of solid-state batteries, as they are difficult to design using a liquid electrolyte due to the high reactivity of Lithium in an aqueous medium. Then there is work happening in the space of Supercapacitors, Li-Sulphur batteries, and so forth. These will be some of the prime developments taking place in the near future.

Charging infra is another roadblock for EV adoption- what is the biggest roadblock according to you?

The charging infrastructure is one of the major roadblocks in the pan-India EV adoption. Currently, we are moving forward with a viable approach by entering cities and developing their charging infrastructure. We install fast-charging stations across all of our dealerships and even provide roadside charging to ensure a seamless public charging experience for our customers.

As far as EV charging is concerned, from experience in markets where EV adoption has been higher, the charging of EV happens at home almost 85% of the time. If we look at the Indian market then this percentage will turn out to be even higher. Therefore, in order to assist our customers, we have focused on debottlenecking the process of providing home charging facilities seamlessly. Our effort is to make the EV ownership experience as hassle-free as possible. The charging capacity installation comes with its share of challenges and hence, we feel that customers need help in this area. MG conducts free-of-cost EV charger installations at the homes of all of its customers.

Given the ongoing initiatives led by the governments and industry stakeholders, we believe that the scenario is going to change considerably in the future.

E-COMMERCE & INTRA-CITY LOGISTICS HAVE STRONG POTENTIAL FOR EV ADOPTION

Deepak MV, CEO & Co-founder of EV startup ETrio tells PCQuest what makes EVs a better choice for the E-Commerce and intra-city logistics and how retrofitted electric light commercial vehicles (eLCV) can speed up the EV adoption in these sectors

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What makes e-commerce and logistics a potential area for EV adoption in India? What are the factors that could accelerate the adoption further?

Commercial Vehicle sales have grown 20% and 17% in FY 18 and FY 19 respectively to reach 1 million mark. The small commercial vehicles (SCV) segment (vehicles under 1 Tonne) stand at 235,024 (287180 including LCV Dost) with more than 15% share of the overall commercial vehicles category. The SCV industry finds its primary application in the intra-city logistics space and has been growing at an incremental rate of 10%, 17% and 35% respectively in the last three years.

The Indian logistics stands at USD 160 billion with road transportation contributing to a lion's share of 65%- is also another potential area for EV adoption. The logistics value chain comprises transportation, warehousing and administration.

Some of the major factors which will accelerate the EV adoption in intra-city logistics especially in the e-commerce logistics space are:

Decarbonizing Mandate: Most governments have set deadlines for complete transformation of mobility to zero-emission. In addition to this, major e-commerce and incumbent logistics players have unilaterally set targets for transformation of their commercial vehicle fleet to electric as shown below:

Ease of Charging Infrastructure: A key component in enabling electrification of intra-city logistics is the ease of charging infrastructure. The e-commerce logistics space can adopt this if they are

DEEPAK MV, CEO & Co-founder, ETrio

provided with charging facilities at hubs, overnight slow charging options, and government subsidies for enabling EV charging infrastructure. Adoption of renewable energy will also help in driving the electricity costs down.

Route predictability and limited range: The routes for each of the delivery vehicles are well mapped and the average run of a vehicle on a single shift is in the range of 50-60 km a day.

Operating Cost Optimization: As per a study,

the majority of online users abandon purchase on account of the shipping cost being too high. This has forced all the e-commerce players to reduce the operating costs as well as contain excessive fluctuations over certain term periods. Further, the last mile or intra-city logistics also contribute to almost 50% of e-commerce logistics cost and the optimization of the same is the focus of industry. EVs have a strong advantage as far as operating economics are considered. Further, the increase in operating costs over the life of the vehicle is significantly higher for ICE over EV.

What are some of the challenges to the faster commercial EV adoption in India and how are you trying to address those issues?

The biggest bottleneck inhibiting the industry at large from launching EVs is the significantly higher upfront cost of EVs. Other challenges include Range Anxiety, Reliability, and Charging Infrastructure.

While all the above factors facilitate rapid EV adoption, the SCV segment hasn't seen any EV being introduced by either the large OEMs or smaller organized players except e-Supro launched by Mahindra & Mahindra in 2018. However, the model was discontinued due to poor market response and product issues.

We at ETrio, took these challenges and turned them into our strength by providing Connected Mobility solutions; a highly feasible Total Cost of Operations; Finance, Insurance, RSA, AMC and other Value-Added Services.

A holistic system must work towards overcoming all the challenges of the EV ecosystem. This is driven through various initiatives at ETrio such as driver training, connected IoT for remote monitoring and predictive maintenance, ease of home socket charging, 24X7 service and most importantly a robust vehicle.

Cost remains the biggest barrier to EV adoption, what kind of policy intervention, govt. incentives, and innovation are needed to overcome this issue?

The significantly higher upfront costs of EVs are overwhelming the operating cost advantage of EVs and stretching the breakeven period beyond the earning potential and patience of the Indian customer. We feel that homogenization of state EV policies is needed to avoid confusion and to help OEM maintain single standard pricing and processes. Also, Technological and Monetary Support to MSMEs for Rapid Indigenization of Supply Chain, Re-Inclusion

> **The last mile or intra-city logistics contribute to almost 50% of e-commerce logistics cost and the optimization of the same is the focus of industry. EVs have a strong advantage as far as operating economics are considered**

of Direct subsidy for retrofitment, Policy on the life of vehicle allowing longer life for EVs and extension of life post retrofitment will also help drive faster adoption of EVs in the country.

What kind of innovation are you trying to do in the EV battery space (improving range, reducing form factor and costs, etc.), especially keeping India's power situation and the lack of charging infra in mind?

Range extension on a battery is more of an indication of the vehicle efficiency and that has been the primary focus of ETrio since its inception. We work on reducing powertrain losses. It's like making the engine more efficient, so that fuel consumption (battery in this case) is less. Certain quick bits like cutting off power supply during idling, optimizing drive cycles, etc. have been done to extract more range from the same battery size. Furthermore, a robust assembly design coupled with smart BMS optimizes losses inside the battery pack itself.

You recently launched the country's first retrofitted electric light commercial vehicle (eLCV). Do EV Retrofits help in lowering the barriers to EV adoption?

Retrofitting provides dual benefits by decarbonizing the environment on the one hand and decongesting roads on the other. Our scientific retrofitment process makes diesel guzzling LCV into a green productive vehicle. For example, retrofitment can give Tata Ace a 5+ years of life extension.

ETrio's eLCV pricing can even compete with a diesel counterpart on the Total Cost of ownership and by saving almost 60% of the operational expenses, it can help in reviving the driver owner's earnings also.

We feel, with a potential to transform and electrify intra-city logistics with a production capacity of 5000 vehicles annually, our initiative will not only help reshape the e-commerce logistics space but also have a deeper impact on the EV ecosystem.

EV PRESENTS A SIGNIFICANT OPPORTUNITY FOR ENGINEERING & IT SERVICES COS

Pawan Bhageria, President- Tata Motors SBU, Tata Technologies tells PCQuest how Engineering and Technology service providers can play a crucial role in India's EV story

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As a tech solution provider to the automakers and OEMs, what kind of opportunity and roadblocks do you see for the EV uptake vis-a-vis ICE vehicles in India?

The EV industry in India is still at a nascent stage, but has potential to emerge as the preferred option for multinational automotive players. The Indian Government has laid out ambitious plans and supporting policy frameworks, regulations, incentives for this segment.

EVs present a significant opportunity for Engineering and IT services providers also.

Technology service providers like Tata Technologies and others can play a significant role in lightweight body design, battery packaging, battery management systems, design of motors and other critical components. They can also play a big role in enabling efficient manufacturing facilities adopting smart manufacturing technologies like IoT, AI/ML, and advanced communication technologies.

However, critical components of EVs such as the battery, motors, controllers are being imported from China, low availability of battery charging infrastructure and primitive charging business model and range concerns continue to be challenges- which must be addressed for easier and faster adoption of EV in the country.

Cost remains a biggest barrier to EV adoption, what kind of policy intervention, govt. incentives, and innovation is needed to overcome this issue?

Yes, there has to be a concerted push from regulatory authorities towards greener cars. Policy intervention has to come on three broad fronts:

Financial – covering areas such as streamlining of GST, Import duty, subsidies, electricity rates, toll rates and EV financing among others;

Regulatory – covering areas such as common technical standards, charging infrastructure, land use, battery recycling and other areas; and

Adoption in public transport – the government can procure an EV fleet for government offices and lead from the front.

Thankfully, the Indian government is taking steps in the right direction to streamline its EV policy such as proposals to bring EV financing under priority lending, increase FAME II subsidy and extend the timeline by one year, etc. The National Electric Mobility Mission Plan 2020 and India's participation in the global EV30@30 campaign are also a right move towards achieving the target.

Adoption of battery swapping and battery rentals as a business model will significantly reduce the total cost of ownership (TCO) for cars and will enable early adoption of EVs. As it is still early days for EVs in India, traditional ICE vehicles seem more cost-effective. However, with increasing production, reduction in

Adoption of battery swapping and battery rentals as a business model will significantly reduce the TCO and make adoption of EVs easy

PAWAN BHAGERIA, President- Tata Motors SBU, Tata Technologies

battery costs and improvements in charging and related technologies, it is expected that the price of EVs will come down drastically in the coming years. Broad educational initiatives are also needed to help buyers understand the TCO over the EV life cycle compared to traditional diesel and petrol vehicles.

As Tata Technologies is already working with automakers and OEMs on various EV projects, could you tell us about some of the technology innovations that you have done for the EVs so far?

Tata Technologies has been at the forefront of EV engineering by helping automakers from India and across the globe design lightweight 5-star NCAP bodies, battery packaging, battery management systems, and other critical components for EV. We are increasingly investing in Embedded and software capabilities as companies ramp up investments in electric and connected cars. The electric powertrain is an identified focus area and you will hear more interesting innovations around this area from us in the coming days. Tata Technologies is also focused on modularization as an approach for efficient mass production of EVs.

SMART CITIES, SMART MOBILITY: A NECESSARY EVOLUTION

India is on the path of developing smart mobility solutions that are affordable and secure to drive acceptance and engagement from Indian citizens

Sachin Khosla

The Global Smart City Performance Index by the England-based market research company Juniper Research evaluates the top 20 smart cities on four yardsticks- mobility, health, productivity, and safety. Since 2017 when the index was formulated, Singapore has pipped other global cities to claim the top spot. Mobility forms a central tenet in Singapore's roadmap to a holistic transformation. To realise this goal, Vehicle to Everything (V2X) is one of the ambitious projects that Singapore has in the pipeline. The project aims to develop a system that connects all elements of the city's mobility network. It will create an extensive and updated picture of the roads, promoting safety and reducing congestions.

Smart mobility is the key to realising the dream of a truly futuristic city and one that we must focus on. While there is no dearth of investment in developing transportation infrastructure, there is a need to focus on more unconventional approaches that go beyond just interlinking roads or introducing high-speed vehicles.

Traffic congestion, inadequate parking spaces, lack of last mile connectivity, poor safety conditions and unsatisfactory public transport systems are some of the challenges faced by Indian cities. As per one report, India loses $21.3 billion annually to traffic and poor road conditions. Furthermore, there is a steady rise in air pollution. Smart transportation can tackle these pain points by offering integrated solutions where conventional mechanisms prove inadequate.

What is smart mobility?

Smart mobility is the blend of different modes of transportation and infrastructure to make travel faster, cleaner and more efficient. It can also lead to the usage of other modes of transportation, reducing the dependence on petrol/diesel powered vehicles. To achieve efficiency and uniform connectivity, smart mobility makes use of new technologies such as Internet of Things (IoT), predictive analytics and machine learning (ML) to integrate all modes of transportation.

The introduction of electric trains in the early 20th century was a paradigm shift in the world of transportation. So is smart mobility now. The number of persons killed in road crashes in India in 2018 was registered at 1.51 lakh

fatalities. The need for smart mobility is evident in this extremely high rate of traffic accidents. What can smart mobility do to address this? As part of the larger ecosystem of smart mobility, autonomous vehicles can calculate the best possible action to take by going through information in the central database about similar such scenarios experienced by other vehicles.

Why is smart mobility vital for smart cities?

Cities accommodate about 31% of India's population. The Smart Cities Mission launched by the government in 2015 aims to drive economic development and improve quality of life by harnessing technology for smarter outcomes. The realisation of this dream is incomplete without smart mobility. Rather than building more roads to reduce congestion, it is vital for city administration to integrate automation and smart connectivity in the existing infrastructure to address the problems.

Smart mobility is a part of urban planning and requires the intervention of authorities. Some examples of smart transportation policies include congestion pricing, demand-based parking fees, low-emission zones and toll lanes. Policies on these issues include employing real-time data for better analysis of outcomes.

How in India faring?

At the 2018 Global Mobility Summit 'MOVE', PM Modi outlined his vision of future mobility in India with the 7Cs: common, connected, convenient, congestion-free, charged, clean, and cutting-edge. India is on the path of developing more solutions that are affordable and secure to drive acceptance and engagement from Indian citizens.

Public-Private Partnership is being viewed as a major source of innovation mobility solutions. Consider Pune. Selected as India's first lighthouse city by an urban mobility lab, eight solution providers such as Ashok Leyland, Lithium Urban Technologies, Ola Cabs and other private players will work with the Pune Municipal Corporation (PMC) to address six opportunity areas in Pune's mobility system.

Private sector companies are coming to the fore to encourage the use of gasoline-free vehicles. The Indian Oil Corporation recently launched a battery swapping facility for electric vehicles (EVs) at one of its petrol pumps in the city of Chandigarh. The pilot project will eventually be scaled up in other cities.

Integrated ticketing system is another area where city authorities are focusing on. Mumbai's single ticketing system for payments with a smart card is one such example. Commuters can book tickets to travel on the suburban railway network, the Brihanmumbai Electric Supply and Transport bus services, the monorail and the metro with a single card.

SACHIN KHOSLA, CEO, DigiMantra Labs

Challenges ahead

Digital solutions will be instrumental in augmenting smart mobility in India. But this requires development of other areas, especially network infrastructure. With a need for a complete overhaul, political intervention is the need of the hour to build tomorrow's digitally-connected transport future. A report by the Tower and Infrastructure Providers Association states that India has close to 400,000 telecom towers which is expected to increase at a CAGR of 3% in the next three to five years. We can have more initiatives being taken up in this regard.

While a lot of Public-Private Partnerships are paving the way for comprehensive solutions to smart transportation, it needs to be given a fresh impetus. Added to this is the insufficient funding. The contributions of both the central government and the state government needs to be increased for the better deployment of projects under Smart Cities Mission.

The success of smart cities also lies with the citizens, and it is important to help citizens to develop this perspective. For instance, making public transportation affordable and uniform to reduce congestion and traffic is the government's responsibility but using public transport instead of private vehicles is one choice that the citizens have to make on their own.

Smart mobility includes the use of various new technologies to transform how we travel. But to a large extent, it focuses on the reorganisation of the existing modes of transportation. Bicycles, cars and trains are not new, but these can be optimised and be made more efficient with technological solutions. It will lead to a better quality of life and not just reduce the time spent by commuters on the road. It will also lead to a sustainable transport system that can dramatically reduce emission levels and free our cities from toxic smoke.

The author is CEO, DigiMantra Labs

HYBRID CLOUD AND SECURITY: DON'T HELP THE HEIST-GANG

Hackers are smarter, discovering new zero-day vulnerabilities and developing sophisticated ways of attacking cloud applications—leaving your production environment vulnerable to attacks

Pratima H

On the face of it they all look miles apart. The Great Pearl Heist of 1913 or the Big England Railway Heist 1963 or The Stop-Watch's Gang's airport master-stroke of stealing gold bars. But if we look closely, there is a pattern to the legerdemain.And it's more than the chutzpah and elegance of doing it all in plain sight or daylight. They all happened while something was in transit.

The problem is not that minds like Max Mayer are not clever or cautious enough. The British jeweler was almost Holmesian-level-brilliant when he thought that envelopes of post-office mail would be the safest means to transport precious pearls. But how can you account for what happens when the thing is 'somewhere in between'? Mayer could not have anticipated the split-second timing and craftsmanship that was about to come from Grizzard-lytricks. The envelopes reached their destination. All still well-sealed on the surface. But no pearls. Only a French newspaper and exactly 11 sugar cubes.

RICHARD BECKETT, Public Cloud senior product marketing manager, Sophos

It is, evidently, easier to slip something away when it is moving – as the world's most classic heists have shown again and again. More so because there is uncertainty and confusion on who is responsible, about where exactly the pearl or gold is and when to believe and when not to believe a tampered railway track.

And that's eerily close to how a hybrid cloud environment sounds.

Whether it is some mix of private cloud, public cloud, and on-premises infrastructure or a new case of workload orchestration and migration from one environment to another, enterprises have to be vigilant about the attackers patiently, and stealthily, waiting out there.

Consider this. As many as 49 per cent were seen with at least one publicly accessible, unpatched web server, while 44 per cent had internet-facing workloads containing secrets and credentials (including clear-text passwords, APIs (Application Programming Interfaces) and hashed passwords that could facilitate lateral access across a cloud environment) in an analysis of 2 million scans of 300,000 public cloud assets running on Amazon Web Services (AWS) Microsoft Azure and Google Cloud Platform (GCP).

The report from Orca Security also reveals that – once past the internet-facing workload and with keys-in-hand, cybercriminals traverse less secure internal machines in search of crown jewel data. And

'The benefits of moving to the cloud are well-documented, relating to both increased organisational agility and lower costs associated with reduced capital and operating expenses. The challenge now is how to meet the agility needs of the business, while protecting applications and data deployed in the cloud without adding complexity or cost.'

RIYAZ TAMBE, Director - Sales Engineering, India & SAARC, Palo Alto Networks

most enterprises were seen with these neglected, internet-facing workloads that stayed unpatched for more than 180 days.

In the IBM data Breach report 2020 as well, we can see thatpassword reuse, not patching, and improperly configured cloud infrastructure came up as major cost exacerbators in a breach. Stolen or compromised credentials and cloud misconfigurations topped as common causes of a malicious breach – making up to nearly 40 per cent of malicious incidents. Also worrisome is the part where attackers used cloud misconfigurations to breach networks nearly 20 per cent of the time. This led to a jump in breach costs by more than half a million dollars to $4.41 million on average. No wonder it shaped into the third most expensive initial infection vector examined in the report.

These numbers just reflect what the industry has witnessed in several attacks and breaches already.

Yes, attackers are going after the low hanging fruit. "You won't have to look far to find stories of Amazon S3-related data breaches caused by misconfiguration, where S3 security settings were

set to 'Public'. AWS has even released an update to help customers from running afoul of this, one of the biggest causes of cloud data breaches. And shared storage breaches are by no means limited to Amazon customers." Richard Beckett, Public Cloud senior product marketing manager, Sophosleaves no warts hidden as he paints the real grim picture of the current cloud landscape.

"Attackers are moving to more sophisticated attacks. Living off the land, attackers are known to automate searches to exploit vulnerabilities in virtual machines, and using this entry method, exploit cloud provider metadata services on the machine to access temporary IAM (Identity and Access Management) credentials to footprint the customer environment. From there, they've looked for the IAM permission template for a particular role, applied it and switched to said role, giving them access to central storage, amongst other things in the environment, and finally proceeded to exfiltrate data." He adds.

Isn't that exactly how a conjurer and a laser-artist would plan and execute a big heist? It may look difficult for the common eye but it is so easy to pull off when one has patience and an ear for loose-ends.

Let us look at Cloud security a little more viscerally here and examine the vulnerability of some specific stripes of clouds – hybrid and public clouds.

If you don't know you are the guard, you are in a soup

It is easy for attackers to exploit confusion. We have heard about how the Pearl-heist mastermind Joseph Grizzard allowed police to search his home for stolen diamonds when he was hosting a dinner party. And where were those diamonds all the time- at the bottom of his bowl of Pea soup!

Stones or Diamonds – that's the question that haunts enterprises as well. If only the security teams were as clever and clear enough about which bowl to hide the gems in. The fuzzy nature of security-responsibility in a hybrid cloud set-up does not help much here.

Let us first talk about the public cloud, where it is a strong matter of shared responsibility and where playing hot potato won't help much. Rohan Vaidya Director of Sales – India, CyberArk explains, the first question is one of responsibility, and it is one that organisations often overlook. "Cloud vendors are committed to the security of the cloud infrastructure, including the compute, storage and networking resources, as well as the physical infrastructure. However, the application owner is responsible for

MARK HINKLE, CEO, Triggermesh

protecting the applications, data, OS and other enterprise infrastructure, as well as other assets running in the cloud. Application owners can't afford to forget that the security of these elements in the cloud is in their hands."

Riyaz Tambe, Director - Sales Engineering, India & SAARC, Palo Alto Networks echoes that thought. "Organisations need to recognise that cloud security is a shared responsibility."

That does not mean that public clouds are skewed towards security loop-holes – at least, not when compared to hybrid clouds. The idea that public clouds are less secure than hybrid or private clouds is false, Sophos pipes in here with another peek into reality. "The issue is in a lack of understanding around what the customer is responsible for in terms of security. Cloud providers operate a shared security model, and this means the customer is responsible for securing anything they run, or store in the cloud." Alas, that's not how it is –almost half of Sophos survey's respondents didn't fully understand their responsibilities for securing cloud environments.

Mark Hinkle, CEO, Triggermesh reasons that public clouds are actually more secure for small businesses because AWS, Google, etc are serving so many customers and are forced to be secured for compliance reasons. "Your files are actually safer in the cloud than in your own data center, both from a physical security standpoint and an access standpoint. In terms of Hybrid cloud, the biggest security issue remains the network security/access and the authentication and authorization needed, without dedicated network links you can potentially send your company's traffic over the public network."

Any infrastructure with an attack surface is

vulnerable and the real issue is the same one that you face in the private data center, he points out. "Human error. Improperly configured infrastructure, exposed credentials (either due to carelessness or phishing scams)."

Tambe captures the drift and talks about how cloud-native companies have an advantage because they have developed nothing on premise and cloud security is embedded as part of their architecture. "Therefore, they are always ahead. But most organisations have a hybrid model; you have something available on premise and a lot of workload on the cloud. The question is, how do we secure data regardless of where data can be addressed and be motioned? We believe that organisations need a prevention-focused security architecture for cloud deployments that stops threats across all potential attack vectors."

Vaidya does not mince any words when he hints that enterprises will have to chin up and face the imperative without any illusions or assumptions. "It's up to the organisation to close many of the gaps, whether the use case is public or hybrid cloud. Ex: Ensuring the right users. The same is true for hybrid cloud environments – except that those same security measures that keep the cloud safe need to work for

1. Almost 24% were observed to have at least one cloud account that doesn't use multi-factor authentication for the super admin user. About 19 per cent had cloud assets that are accessible via non-corporate credentials: (The Orca Security 2020 State of Public Cloud Security Report)

2. 140 million was the average total cost of data, 5,522 was the cost per lost or stolen record and 53% of data breaches were caused by malicious attacks. Also, the average time to identify a data breach increased from 221 to 230 days(IBM data Breach report 2020)

3. 37% Indian IT managers are concerned about managing multiple public cloud providers at the same time and 34% are concerned about identifying sudden increases in cloud spending (a sign of crypto-jacking). About 32% of Indian organisations hold themselves responsible for maintaining the security of their organisation's public cloud environments but 55% organisations see it as a joint responsibility between them and their cloud services providers/partners. (Sophos Global Survey on Public Cloud Security)

MURTAZA BHATIA, National Manager – Vertical Solutions, NTT Ltd. (India) Networks

both and on-premises environments without slowing anyone down."

Mail or Museum? So is a Hybrid Cloud an easier heist-target than a Public Cloud? Shrikant Navelkar, Director - Oracle Relationships, at Clover Infotech contends that a Hybrid Cloud environment isn't more vulnerable compared to other Infrastructure as a service (IaaS), provided the integration between multiple environments are tight and the data moving amongst these environments are encrypted. "Similarly, a Public Cloud is not fragile in terms of security, as they sign stringent Service Level Agreements (SLAs) with customers. As per these SLAs, they need to maintain highest level of security and ensure constant monitoring of customer data."

Murtaza Bhatia, National Manager – Vertical Solutions, NTT Ltd. (India) argues in the same vein. "The security challenges across various models such as private, hybrid or public remain same. The fundamental issue, however, is about theonus of data security when it moves to cloud. The ownership remains with the client and does not shift to cloud providers or the system integrator. The challenge also lies in maintaining the same levels of security, controls and visibility in the hybrid or private cloud, as we do for services and data hosted on-premise."

90 Seconds or Run

What actually powers the clockwork-precision of the stopwatch breed of hackers? At the cost of digressing, let us first remind ourselves about those three Italian men who hid themselves in a supply closet at The Louvre, Paris – Yeah, the Mona Lisa heist.

Or about the thief who disguised himself as the very maker of the protective glass frame of a painting. Or about the well-timed tampering of the line-side signals that minds like Bruce Reynolds planned for a railway heist.

Translated into a hybrid cloud scenario, these tracks and closets are nothing but the chinks that stay in the development and management armour of a cloud. This is where it is crucial to understand the aspects of custom code, replicated data and visibility tools.

Custom code narrows down the chances to get a traditional malicious attack in a spread, whereas replicated data allows one to rebuild systems when data loss happens because of the attack, as Kumara Raghavan, Director, SDI, HPC & AI, Lenovo Data Center Group, APAC concurs.

At the same time, data consistency is one of the key challenges associated with replicated data. Cost of Ingres and Egress for high-res workloads has to be factored, remarks Narendra Bhandari, Senior Vice President at Persistent Systems.

Experts galvanise well on some common and key cautions areas here:

- Custom-built applications migrated to the Cloud can turn into a security gap, thanks to the multiple sources of source-code development inside an enterprise
- The apt version of the code should be moved to the Cloud "as is" and safely parked there
- Conduct hardening and vulnerability assessments before switching to the Cloud
- Use DevOps smartly. Security teams mustenable developers to secure their automated process with tools
- For infrastructure as code, security tools should act as a gatekeeper in the development pipeline to ensure insecure configuration, or templates containing embedded secrets and keys, never get to a test or live production environment
- Make extra efforts on security if the vendor does not support the custom codes as a standard practice
- Proper usage of visibility tools helps the highest level of security

Trip The Alarms - Yourself

When some art-lovers stole Gauguin, Picasso, Van Gogh – from Whitworth Art Gallery, Manchester – the paintings were discovered in a public bathroom near

KUMARA RAGHAVAN, Director, SDI, HPC & AI, Lenovo Data Center Group, APAC

to the museum, with a strange note. 'The intention was never to steal but to highlight the woeful security.'

May be the best defence stance for cloud security is to think a step ahead and very objectively – with no ego and no blinkers.

This is what enterprises should be doing, as suggested by industry practitioners and experts:

1. Think like an attacker.GuardIP and PII and do not make it easy for attackers to find them through privileges
2. Question over-reliance on manual models, specially as workloads in cloud environments get spun up and down at very high rates and can have a lifespan of months, days, hours, or even minutes
3. Reflect seriously on decentralised security policy management and multiple cloud technologies from a security perspective
4. Apply redaction and encryption to prevent the data leak or breach during migration
5. Exercise control on rights management, API keys, digitally signed requests for the management consoles and APIs that power the on-demand self-service aspects of cloud computing

There you go!

Think about what's moving right now in your enterprise. Movement is the very power that Cloud promises. Do not let it be its weak point. The next season of Money Heist should better be saved for a comfortable couch on a weekend. Not for your office.

QUICK AND DIRTY MEANS WEAK AND SLOPPY

Are the leaps that you are taking to put a cloud on the ramp turning out to be just the loose ends that hackers need?
Rohan Vaidya, Regional Director of Sales – India, CyberArk tells us why velocity of deployment, ownership of responsibility, and idle resources are some easily-overlooked, but very critical factors,to be careful about –if an enterprise wants to make a cloud environment solid, secure and sturdy

Pratima H

What new gaps have surfaced when we think of cloud security right now?

The first question is one of responsibility, and it is one organisations often get overlook. Security in public clouds is a shared responsibility between the public cloud vendor and the organisation. Cloud vendors are committed to the security of the cloud infrastructure, including the compute, storage and networking resources, as well as the physical infrastructure. However, the application owner is responsible for protecting the applications, data, OS and other enterprise infrastructure, as well as other

assets running in the cloud.Application owners can't afford to forget that the security of these elements in the cloud is in their hands.

Are hybrid cloud more vulnerable? Or are public clouds more fragile here?

It is up to the organization to close many of the gaps, whether the use case is public or hybrid cloud. Organizations should start by ensuring that the right users – and only the right users – can access only the applications, the cloud infrastructures, the cloud platforms necessary for their role and only when they need them. The same is true for hybrid cloud environments – except that those same security measures that keep the cloud safe need to work for both and on-premises environments without slowing anyone down.

Is there any strong role that custom code, replicated data and visibility tools can play here – in spoiling or strengthening security in a hybrid cloud set-up?

In the emerging technology space, there are unknown vulnerabilities which the hacker community is constantly exploiting. Most of the technology vendors have a fair share of effort and investment to mitigate these vulnerabilities by a common practice of either with version-upgrades or rolling out patches. In a customised environment it takes additional efforts to maintain custom codes, implement security guidelines or perform security drills to ensure a strong security posture. In many use cases the technology vendor does not support the custom codes a standard practice. The users are left to their own prerogatives to ensure the security of their applications or infrastructure

Are enterprises strong and aware enough to take care of idle resources and costs in hybrid cloud environments? Any security implications here?

Organisations clearly understand the need for strong cybersecurity and are quickly realizing the benefits of Security-as-a-Service. But, as companies migrate to the cloud, the attack surface also expands. This has led to a surge in cyberattacks and many companies are struggling to prioritise projects and tools that can best protect their people and business.

Sometimes, the best way to make those decisions is to think like a cyber attacker. Consider: If you were an external attacker or malicious insider looking to steal sensitive data, launch ransomware or use your infrastructure for illicit cryptomining, what would you do first?

ROHAN VAIDYA, Regional Director of Sales – India, CyberArk

If you're like most cyber criminals out there, you'd go straight for the privileged accounts, credentials and secrets which would quickly allow you to gain access to an organisation's most valuable and sensitive information like intellectual property and PII (Personally Identifiable Information). And it's pretty easy for attackers to find them, since privileges exist everywhere.

How much damage can be inflicted by poor integration and weak deployment velocity of cloud investments - for developers and security teams? Is this high for hybrid clouds?

Quick and dirty is well versed term when it comes to IT professionals who want to get things done to support the business demands. The business team is constantly under pressure to catchup with either customer demands, or adapting to the external environment or changing competition landscape. Their time-to-market in the modern times has a high dependency on the technology teams which support their business applications. It's a tough situation to always balance the velocity of deployment and security guidelines. General perception of non-critical applications or infrastructure may not need as much attention to security guidelines. A modern hacker has been exploiting these vulnerabilities. Emerging technologies give ample of these opportunities for the hacker to exploit effortlessly.

LOCATION INTELLIGENCE HELP BUSINESSES THRIVE AMID COVID-19

Location data, analytics, and resulting insights turn out to be a potential game changer during COVID-19 crisis, by making businesses 'Think Global, Act Local' and localize their offerings

Nikhil Kumar

For decades, globalization seemed a primary business advantage with the ability to link businesses and exchange best working practices. The arrival of the pandemic halted trade, upended industries, and the way businesses are conducted. In the pre-pandemic days, consumers increasingly purchased goods online, without worrying about when and how it would be delivered. With global supply chains disrupted, transportation ceased and the demand-supply chasm widened. Consumers struggled to stock the essential purchases. Paradoxically, regional businesses with their homegrown supply chains and local customer outreach adopted a swift and localized response in the style of: 'think global, act local.' The regional nature of the pandemic meant that these businesses could service the universal customer needs, in a very specific geographical and spatial context. That's true now and will be so even more, in the coming future!

'Think global, act local', simply means adapting business models to suit individual localized audiences, by finding the right mix of global and local in all operations. A company can be global, but it must also be locally relevant to each individual market it serves. Moreover, it needs data, analytics and technology that not only addresses immediate business challenges around workforce protection, stabilize supply chain, reassure customers of timely service but also provide long-term strategic value. These are essential actions, but they can underwhelm

without sufficient geographic awareness. And this is where location intelligence can help companies integrate spatial insights of their entire business value chain into systems of automation and engagement, thus driving market differentiation and operational profits.

According to a Markets & Markets report, the global Location Analytics Market size is expected to grow from USD 10.6 billion in 2019 to USD 22.8 billion by 2024. Let us then look at a few sectors, where location intelligence, analytics and resulting insights can drive significant transformation in the aftermath of COVID-19:

Transport and logistics

Given the regional nature of COVID 19, with some areas affected more than the others, we saw the conventional delivery network come to a standstill. Brands relying on unlimited delivery models, were hit due to a driver shortage and skyrocketing delivery

prices, resulting in unhappy customers. For these organizations, looking to rebuild their business models and compete better in the on-demand economy, geospatial technologies, and cloud -based apps and maps embedded with voice controls can enable optimal distribution routing. An apt example of how location data can be a potential game changer is that of a retail floral business in the US, GotFlowers. Using cloud-based routing algorithms based on real- time traffic, predictive traffic and incident information, the floral retailer, now communicates directly with its customers and partners to automate, calculate, and optimize delivery.

Supply chains

The pandemic has forced people to change many of their traditional behaviors. However, they are most likely to return, along with some new habits, such as visiting grocery stores closer to home, ordering online and contactless restaurant delivery. Companies can leverage location data to monitor these new customer behaviors, localize production, inform their supply chain strategies to offer hyperlocal offerings across retail, food, and service industries. A remarkable example of the potential that geoenrichment tools can offer, can be seen in the rising popularity for UK's mega grocer Sainsbury's virtual queuing system, where customers can join a line-up from places like their car, parking lot or nearby outdoor location via an associated smartphone app. This allows the firm to maintain public health and safety protocols.

Fleet management

The fleet management industry has seen disruptions in supply chains and shutdowns, despite there being a need for emergency deliveries. At other places, drivers and riders have been rendered unemployed. Some food retailers and cab sharing companies have taken up a large portion of these deliveries, forcing a pivot to a diversified business model. Location-based technologies, such as advanced sensor technologies offer compelling promise for the industry, making it possible to track fleets of trucks, trailers, and goods on trailers. Insights into the location of fleets and market demand can enable fleet managers to streamline goods delivery, predict weather and road conditions, ensure driver safety and efficient fleet management.

Public Sector, public health, and smart cities

COVID-19 has put a spotlight on the need

NIKHIL KUMAR, Country Head, India, HERE Technologies

for precise data, smarter governance, and public distribution systems. With so much uncertainty looming around, the governments and public sector entities can leverage geographic information systems to tailor messaging around sanitization, public safety, and emergency response services. Additionally, the GIS-embedded mobile apps and big data dashboards can help governments in decentralization of departments, waste management or deploying accurate police and medical personnel to the ones in need, thus driving real-time collaboration and engagement between policy makers and citizens.

In a nutshell, in a post-pandemic era, the success of any business will eventually be determined by its adaptability in three ways: companies that use globality of the market, fall back on a strong regional network and adapt to local conditions on-the-go. This, in turn, will only force businesses to reassess the pace of digital transformation of their operations. With emerging technologies such as IoT, artificial intelligence, blockchain drive industry 4.0, only the companies that integrate these technologies with spatial intelligence will thrive in and survive another pandemic.

The mantra really is to think globally, network regionally and act locally!

The author is Country Head-India, HERE Technologies

RAPIDLY EVOLVING TECH COUNTERING SUPPLY CHAIN DISRUPTIONS

Through the Covid crisis, companies are defining and focusing on their core competencies, driving deeper customer relationships, developing new business models, adapting their supply chains, says Rahul Baheti, Chief Operating Officer, SAP Indian Subcontinent

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How has ERP managed to ensure business continuity planning in the time of the Covid-19 crisis/lockdown?

As the world navigates through the ongoing Covid-19 crisis, it is essential for organizations to adopt quality solutions as part of their business continuity strategies. Companies are being predictive and proactive in their decision-making to stay relevant and build enterprise resilience. To survive, companies are defining and focusing on their core competencies, driving deeper customer relationships, developing new business models, adapting their supply chains, streamlining their operations, and managing their finances. Those that have an intelligent Enterprise Resource Planning (ERP) as their backbone to support their business functions will be able to do this quickly and will emerge stronger. To help businesses, SAP is offering numerous tools, reports, and services through our SAP S/4HANA Movement program, enabling our customers to map their way to an intelligent ERP foundation at their pace and convenience. We are working together with our customers recognizing those needs and meet them with SAP S/4HANA, our Intelligent ERP by providing real-time insights, real-time planning, forecasting, and simulation, as well as embedded analytics at each step, ensuring business continuity.

What about the supply chain? How can the supply chain—local, national & global—be maintained during such crises? What about the role of AI and blockchain in the same?

Supply chain being the lifeline of humanity, it is critical to maintain for businesses to maintain operations especially during these times. Enterprises have been taking considerable precautions while interacting with various stakeholders to maintain business continuity at a local, national and global level. SAP has a responsibility to help maintain reliable and transparent supply chains to ensure critical supplies reach the people and places where they are needed. That is why SAP has opened access to SAP Ariba Discovery – so any buyer can post immediate sourcing needs and any of the four million suppliers on Ariba Network can respond with their

ability to deliver the goods and services required with no fees through the end of this year. With digitisation and automation at its best, SAP is helping build a resilient network for its customers all over the globe. The use of intelligent technologies such as Machine Learning, Artificial Intelligence (AI), Robotic Process Automation (RPA) and blockchain is rapidly evolving, allowing organizations to run supply chains smoothly.

Will the cloud now play a greater role in businesses and what about threats, both security and otherwise?

Cloud technologies are placed at the centre of events, and their usage in companies of all industries are growing as we speak. Large enterprises as well all small and medium businesses are taking the cloud route in this current pandemic as it provides more agility and security.SAP and its partners are offering industry cloud solutions that extend the end-to-end processes of SAP's intelligent suite to help drive customer's core business in their industries. SAP's industry cloud strategy will deliver innovative, vertical solutions enabling rapid development, deployment and integration.Customers can also enhance and extend the business capabilities while maintaining process integrity and compliance thus enabling them to respond to changing business requirements while minimizing integration and support costs.

When it comes to ERP, what does the New Normal look like? What further changes can we expect in the 2020s? What role will Big Data and IoT play?

SAP is committed to helping businesses persevere tremendous disruption today and strengthen their digital foundation to tackle the next normal that lies ahead. SAP has enabled a series of innovation to S/4HANA to make it easier for businesses to add AI and robotics to improve business results, automate business processes and make accurate predictions for better decisions. Companies can now reimagine their global businesses and utilize AI to gather more insights and stay relevant in these times.Companies are now leveraging technologies such as the Internet of Things (IoT), Big Data, AI, Blockchain, and augmented or Virtual Reality – in order to automate manual activities, mitigate potential risks early on, and stay two steps ahead in this New Normal.

What further changes can we expect as WFH is drastically scaled up, remote working is the key and also an increasing mobile workforce?

At SAP, we remain focused on supporting our customers, employees and communities during

RAHUL BAHETI, Chief Operating Officer, SAP Indian Subcontinent

the COVID-19 pandemic.SAP already had a strong infrastructure to enable remote work, we were able to quickly adopt a virtual sales and remote implementation strategy to enable our employees to work productively from home. Majority of our employees have been working from home, but we continue to operate efficiently due to various skill building & development sessions and workshops being conducted, helping our employees to stay productive and ahead of the curve. We have also opened up access to technologies that can help employees, companies, communities, and governments continue to move forward. We managed to ensure seamless functioning through our preparedness and are seeing employees being productive while they work from the comforts of their homes while taking care of their families. We are also helping other organizations to understand their employee's requirements and how they can help their employees feel supported and productive.

This temporary working condition that we are living in is now turning into a long-term change, with many companies planning to move majority of their on-site workforce to a remote working position permanently post this pandemic. However, to make this a reality, businesses will need to consider the challenges and take action in overcoming them to ensure employees are not overworked and can continue functioning safely and productively.

MOBILE APP'S UX PLAYS AN IMPORTANT ROLE IN ITS SUCCESS OR FAILURE

Right from efficient onboarding and ease of use to security and trustworthiness, there are many things than an app creator should think of while developing an app, especially in an age of increasing personalization

Ashish Mittal

The evolution of the market from offline to online started two decades ago. Starting from the basic HTML websites to the present day's incredibly responsive and swift websites to the apps we use in our everyday life the key factor which shaped this incredible revolution is "Customer Experience and their ease of access". From food ordering right from your bedroom to learning a new skill; all had the same specific base.

The same idea is harnessed to make apps more likeable. From an app perspective, The term "user experience" was coined by Don Norman, the first to describe the importance of user-centred design: the concept that design decisions should be based solely on the needs and wants of users.

Below are the main key points which an app creator should have in mind while developing an app…

A perfectly Functional app: Application makers don't generally concentrate enough of their endeavours on consummating the usefulness of an application for their users and lamentably end up with a broken app. A report from Localytics uncovers that 21 per cent of versatile users forsake an application after one use if the application doesn't convey the experience they anticipate.

Every feature of the app, in one way or another, should help the user to achieve the goal for which he/she, in the first place installed it.Prioritizing during the product roadmap phase of development will enable users to complete tasks more easily.

Efficient Onboarding: The goal of onboarding is to show the value of your app to the user, by demonstrating how they can achieve what they want, quickly and efficiently. On the off chance that the client is experiencing difficulty in the initial screens, they'll probably drop off decisively. Conveying a phenomenal onboarding experience is the establishment for drawing in and holding clients.

There are numerous systems you can coordinate to amplify the portable UX during the onboarding stage to urge users to return consistently, for example, an instructional exercise to show the users how the application functions.There are many strategies you can integrate to maximize the mobile UX during the onboarding phase to encourage users to come back time after time, such as a tutorial to show the user how the app works.

This is progressive onboarding, ideally used if your app has a complex workflow or hidden functionalities that the user may not be aware of right away. Extraordinary client onboarding brings down relinquishment rates as well as help support long haul achievements measurements like client maintenance and client lifetime esteem.

Another consideration to keep in mind is to reduce the number of steps needed for account creation/signup, and include multiple registration options (i.e. sign in with Facebook or Google).

Convenience: Convenience incorporates the layout of data, plan, content, and different components that empower users to achieve their objectives inside the application. Help users by instructing them which symbols can be chosen, tapped, or swiped. Ensure that you stay predictable with motions all through the application to advance convenience.

Reduce Search Effort: Help your users find what they need rapidly to fulfil their requirements. There are various inquiry techniques you can incorporate into your application, for example, standardized identification filtering and watchword search. Giving users an inquiry alternative and channels to control them directly to what exactly they're searching for and will altogether expand change rates. The motivation behind this strategy is to assist users with finding precisely what they're searching for so the inquiry mix mustn't channel down to zero outcomes.

Limit User Input: This is the information users are needed to enter, for example, their Visa and charging data, during enlistment or checkout for instance. User info required should be negligible on cell phones as users may get disappointed with the little screen size. To stay away from the high drop off rates, try to restrict the number of fields and just incorporate essential data. Smooth out this cycle by coordinating autocomplete, spell-check, and forecast text help.

Assure Security and Trustworthiness: Various clients will download an application just to be overwhelmed with a not inconsequential rundown of consents holding back to be recognized before they can use the application. Authorizations incorporating/requesting Mastercard data while there isn't any direct or immediate requirement for it as it makes the user suspicious or worse, can make him uninstall the app.

Ensure you give straightforward authorization arrangements and permit your users to control how their data is shared inside a portable application. By obviously delineating your business strategies and practices, your users will have a sense of safety tolerating authorizations. Incorporate direct connect to your security guidelines page, especially for a retail application. Strengthen trust by showing confided in identifications of security, particularly when users are confiding in your image with their own and monetary data.

Integrate Gesturization: Gesturization includes the activities users make while collaborating with your application, for example, squeezing, swiping, and looking over. Knowing how your user's act is vital for gestures, to comprehend what activities they're comfortable with. Thus, users will feel more comfortable with your application, making the onboarding cycle a lot simpler.

Offer Assistance: Offer your user quick help inside the application by offering distinctive help alternatives. Users will regularly look for help in the toolbar or tab bar of an application. Offer various ways for users to get upheld, including self-serve FAQs and live help through click-to-call fastens, or live visits.

Personalize the UX: Personalization gives a more exceptional and pertinent experience to the user. At whatever point conceivable, customize the UX by utilizing user information to show important substance and material in the application. For instance, provide users with explicit retailer bargains dependent on their area. The more adjusted the experience is with a user's needs and inclinations, the almost certain they are to keep on utilizing the application.

Making it a stride further, remembering the user's name for the screen and in informing is a simple and successful approach to customize. Make certain to just show hyper-important substance to every individual user for the best outcomes. Pushing popups and irrelevant content will probably disturb the user.

Kill The (Error) Messenger: Error messages are fatal to an incredible user experience structure. In addition to the fact that it is horrendous for the user, however, it typically intensifies the mix-up by prompting inadequately structured popup messages. Rather than just indicating a terrible, superfluous blunder error message to the user, execute another approach that offers elective alternatives to the user to address the issue.

A typical fix is a spotless and clear connection back to the beginning stage before the issue happened, or another screen that offers an alternative way to finish their task.

Conclusion: A developer should understand and follow the above tips to make a difference in the user experience of the app. Whether it is Android app development or iPhone app development the developer needs to give extra attention to this aspect.

The author is Founder Director, Yugasa Software Labs Pvt Ltd.

STITCHING RPA & AI TOGETHER FOR INTELLIGENT AUTOMATION

The scope of automation can be increased exponentially by bringing RPA and AI together

Manish Bharti
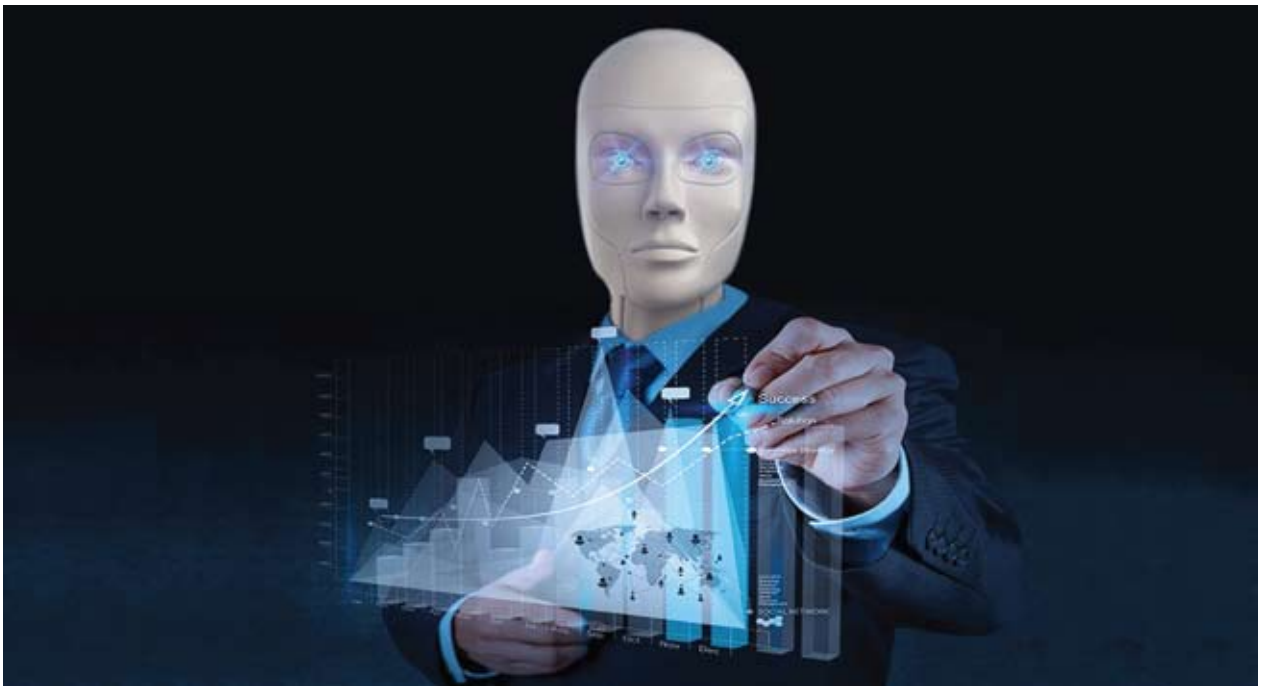
Half a year and no cure later, we are still progressing through the global pandemic that has managed to disrupt the entire world order. COVID-19 has left economies in shambles as they struggle to identify business contingency plans (BCP). Many of them are finding that technology has been able to help maintain business workflows while reducing man-hours for employees during this crisis.

Many companies across sectors are just starting on their journey towards digital transformation and 2020 may just be the push we need. In fact, NASSCOM reports that $191 billion was spent by Indian IT companies on digital capabilities and the revenue for the new digital areas – AI, ML, sensors, robotics – amounted to $50 billion from the total. This shows that there is an urgent need being created to overcome the challenges we are currently facing such as reduced manpower, increased workloads, and disrupted workflows.

Automation is being seen as a torchbearer in helping businesses transition to the 'new normal'

as we inculcate the norm of social distancing. Transcending industries, automation has been able to decrease precious time from being spent on repetitive processes.

RPA and AI

Companies often struggle to implement the primary technologies for innovation - automation, AI, and machine learning (ML) - into their workflows. To streamline these processes, RPA can be brought into the mix. This can be used to extract data manually from multiple sources and compile them into reports that can save hours of employee time and provide accurate results

Manual processes, especially those that are recorded on paper are often slow to process and hard to automate. Collecting unstructured data and running analytical models is not enough, it needs to be structured to be actionable and automated. While the future looks promising for automation, there have been reports on the benefits of bringing together RPA and AI. However, until recently, there has not been a single integrated platform to synchronise RPA workflows with AI models and provide a seamless experience.

AI and RPA can be combined with other technologies such as document understanding and Optical Character Recognition (OCR) to create workflows that can organize, interpret and validate documents, allowing employees to take timely action in high-stakes professions while saving on costs. Across the board, AI and automation are being used to work on tasks like email classification, inventory management, and loan approval. AI and RPA together can deploy, consume, manage, and improve machine learning models of bots. This means that they can help bots recognise images on a screen, extract critical information from invoices and updating data, use natural language from voice and text inputs to solve customer service requisitions.

By combining these technologies, organisations will be able to see benefits such as higher RoI, faster and more efficient automated output through increased accuracy and decreased usage of manhours, and an overall happier and productive workforce. A report by Zinnov predicts that Hyper-Intelligent Automation spends will grow by ~8x to $340 million by 2024.

A single platform

A platform that can combine these technologies will allow for smarter, faster, and more efficient

MANISH BHARTI, President, UiPath, India and South Asia

bots that can identify and automate more practices that are manual and repetitive. While RPA alone is capable of many advantages such as the ability to interact with various applications with data from any digital medium, leading to ease of scalability, it cannot seamlessly process unstructured data or make complex decisions. On the other hand, AI can receive inputs and make decisions based on predictions, without regular human validation.

By bringing RPA and AI together, data scientists, RPA developers, and business users can work together and benefit through efficient RPA workflows. Bots can be made smarter to process exceptions and automate more cognitive processes, while data scientists can easily deploy, manage, and improve their machine learning models and invest more time on use cases and business problems rather than DevOps and engineering. Manual processes such as invoicing, order processing, data scraping, HR onboarding, and email segregation can be automated. All these benefits ultimately lead to happier business users.

The scope of automation opportunities increases exponentially by adding AI to the RPA workflow. RPA will be the arms and legs to the automation's AI brains. With manned or attended bots, a virtuous cycle of AI assisting robots is created and this will make them smarter. Humans and AI will work together to learn and improve over time, creating a hybrid workforce.

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AI MODELS COOKING MOLECULES– NOT RACHEL'S ENGLISH TRIFLE

As labs, vaccine researchers and pharma players work tirelessly to find answers to fight the Covid-19 crisis; IBM brings out more AI hands to join the deck

Pratima H

The clock is ticking. The wisps of fumes are wafting up. The pots and pans are sweating. But in this Master-Chef level of pressure-cooking, no perspiration beads leave a human forehead. Reason? It's a robot breaking down and recreating a recipe in this lab!

The idea of synthesizing and re-synthesizing molecules with the help of Artificial Intelligence (AI) is too great an idea to wrap one's head around in the first effort. After all, it is easy to mix the recipe pages of a traditional layered dessert with that of a shepherd's pie (as poor Rachel did in that famous Friends episode when she mistakenly whipped up ground beef or lamb, peas, onions, and custard together).

But IBM wants to change that 'accidental glue on recipe books' problem for chemistry kitchens now. A group of scientists at IBM Research Europe are using AI, cloud technology and robotics to attain that goal. Some three years back this team began to develop Machine Learning (ML) models to predict chemical reactions. They came up with RXN for Chemistry–a neural ML translation method to predict the most likely outcome of a chemical reaction using neural machine translation architectures. As claimed by the team's description of the solution, it translates the language of chemistry converting reactants and reagents to products, using the SMILE representation to describe chemical entities.

One might, rightfully, raise some concerns that make this concept hard to believe–like degree of accuracy and speed, lack of bias and transparency–but what if they get confronted and addressed strongly with a live-lab example!

Something that IBM RoboRXN exhibited today at a global live-demo meeting. Experts like Dr. Teodoro Laino, Dr. Alain Vaucher and Dr. Matteo Manica from IBM showed how the model actually works in a real-life array of test tubes and chemical paraphernalia. They showed how RoboRXN uses

machine learning algorithm for designing (AI) and executing (automation) the production of molecules in a laboratory remotely accessible (Cloud) with as little human intervention as possible.

As Dr. Vaucher explained with an apple-pie analogy, making a molecule is a multi-step process where the specific set of ingredients, and the actual string of steps to be followed, matter a lot. "Ingredients can be hard to guess. There can be multiple possibilities and ways of connecting them for a given molecule. You cannot always look up the recipe in a database because the chemical space is huge and number of molecules too large. Therefore, this AI model has been designed to determine the ingredients. It can do retro-synthesis analysis and determine the synthesis actions. The model can work on questions like–what ingredients do I need for this molecules? Just like an apple-pie recipe needs pie-crust and sliced apples, a certain molecule would need certain ingredients–to be mixed in a certain order."

He and the team also spelt out the elegance that

the model aims at when it comes to translation. "It gives a text-based representation and sentence of atoms in chemical language. The humans can read the translation in a comprehensible way while the AI can understand its chemical alphabets too."

Once the model knows the ingredients, it can outline instructions for mixing, stirring, concentrating etc. and you moveahead with the recipe. It can convert reaction steps to a set of structured actions. So if one has a compound to synthesize, these AI models can be used to find ingredients and then pursue the synthesis steps to execute in a lab.The team gave a peek into the entire RXN framework approach, where they have opted for a purely data-driven scheme. "This means that once the Machine Learning algorithm acquires enough examples, it will be able to figure out on its own which words to pay attention to in order to extract the right production steps. The major advantage of such a data-driven approach is that it relies on data only. To improve it, one simply needs more examples."

The team also explained the contrast with other approaches, stressing how thisDeep Learning model converts experimental procedures as a whole into a structured, automation-friendly format, instead of scanning texts in search of relevant pieces of information.

Explaining the architecture anatomy of this model, the team talked about the challenges that were anticipated well in time. Like infrastructure, ability to show answers in a human-readable format, ability to cater to different locations and components and mapping it all to a hardware in an uncomplicated way.

This is where use of the IBM Cloud as infrastructure component takes care of scalability, high availability of services and fast deployment cycles, Dr. Manica told. "The hardware translator takes care of other issues. All components are hardware-agnostic and scalable from a single lab to a factory scale.The solution is a good mix of infrastructure, automation, AI and Robotics with solid integration architecture."Notably in 2019, IBM has started to collaborate with a group of synthetic organic chemists at the University of Pisa, Italy to integrate a retro-synthetic architecture into the RXN tool.

Attention has also been paid to data curation issues with good degree of quality and automation for cleaning of data sets. The team explained how the model takes care of noisy data, forgetting and learning aspects.

Answering a question on the relevance of the 'Black Box' problem of AI in this scenario, Dr. Laino and Vaucher said, "Yes, it is a valid concern. It is an ongoing effort across the industry and being dealt by worldwide Machine-Learning communities. A few model architectures have been published to understand the model's predecessor areas. The special architecture we have, allows us to better visualize the model and understand why a certain procedure was picked. That said, it is a continuous and rigorous effort to design models that help humans to better understand the 'why' parts."

Addressing other media queries around accuracy, bias, proximity to chemist's intuition, and IP concerns, the team outlined how the quality of predictions ultimately depends on the data that the model is trained on.With benchmark accuracy levels of over 90 per cent, the effort is towards selecting the right prediction based on criteria like cost-effectiveness or confidence. "The model can create multiple predictions at the same time for molecular retro-synthesis. Our model's focus in entirely on the quality of data, unlike the approaches that may be used by other models. Data security and privacy assurance are embedded and assured here so we have no access to what the user is doing." Added Dr. Vaucher.

Incidentally, the current walls that many global vaccine efforts are facing include challenges like the long cycles of development and manufacture, rate of vaccine obsolescence in light of the virus's fast evolution and other lab-level challenges . Use of synthetic biology, nano-molecules with self-assembly properties and antigens, Lego-work on proteins, gene-blueprint-based vaccines with DNA-RNA Molecule information, m RNA vaccines etc. are heralded as ways to decompose these dead-ends with radical approaches to molecular innovation.

It is not hard to imagine,then, the strength of the support that the pharma fraternity and molecular innovation space can get from such advancements. IBM seems to be working on a Covid Treatment area in a study in the US related to the inhibitor for the spiking protein of the virus. Results can come soon and many other labs and white-coats around the world can use AI to accelerate vaccine and other answers in a better way. Provided—AI can bring the speed it promises without any errors or prejudices or side-effects.

Rachel might have botched up a dessert and got away with it but a lot hinges on following the right recipe and using the correct set of ingredients when it comes to molecule-recipes today. If you are a robot, you cannot always count on a Ramsay or a Monica to watch over your shoulders. You should not.

Not when the Covid clock is getting louder every second.

RESPONSIBLE GAMING: PLAYING FAIR IN THE TIMES OF COVID

Gamers tend to go overboard with the time they spend on their favourite game, and it's time that gaming platforms start inculcating Responsible Gaming habits among the players, allowing them to self-regulate by setting their own limits

Navkiran Singh

In the midst of the global pandemic surrounding us right now, the world finds itself in a unique predicament. With social distancing in effect, an exponential increase in screen time, and the new normal still being shaped every day, we're all connected yet more isolated than we have been in a long, long time. A sense of collective and personal responsibility looms large and is more important than ever before.

We should also not forget that this is also a time for corporations to feel a greater responsibility towards their employees as well as their customers, and do everything possible to foster an ecosystem that helps safeguard the interests of the individual while promoting the forward movement of society as a whole.

Any company that conducts business with these goals in mind will make sure that Corporate Social

Responsibility projects are just one aspect of a bigger goal. In today's times, working from home presents challenges to both the company and the employees, and every day there needs to be work done to make the process more comfortable for everyone involved. Until the organisation has a sense of community, nobody else will.

The biggest stakeholders, however, continue to be the customers. And for the Real Money Gaming (RMG) industry, its customers are the players who wish to play their favourite skill-games from the comfort of their home, making their time indoors a little more fun. As a poker player myself, I have been tuned in to the needs and wants of India's booming poker community right from the get-go. The need has always been to create a wholesome experience for our users, and much like managing a sports team, there have to attempt to ensure that players have a good time both on and off the playing ground, which for poker are the digital felt.

An excess of anything is bad, and while gamers are notorious for going overboard with the time they spend on their favourite games (games like PUBG had to start incorporating six-hour limits after which they would disconnect you automatically!) poker gets a particularly bad rep. RMG companies need to be mindful of creating a safe and positive gaming environment for users.

RMG platforms need to ensure that the data analytics and player service teams work in sync to identify negative playing behaviour (such as playing for long hours) and telephonically reach out to anyone with troublesome patterns to encourage better playing etiquette. Any further reckless behaviour can even result in a ban on the profile, and since each user profile undergoes a KYC process, the player can not create a new profile on the platform altogether.

Now with a global shift towards more responsibility on part of the operators, the functions we used to execute manually have come under the purview of Responsible Gaming. India's gaming culture boom has not been just monetary. It has been accompanied with more visibility on the amount of time spent playing, the play-life balance and mental health aspects of gaming as well, which aligns perfectly with the needs of the Real Money Gaming industry.

RMG platforms need to offer Responsible Gaming tools to the players, allowing them to self-regulate by setting their own limits in terms of how much they can deposit in a day, week or month as well as

NAVKIRAN SINGH, Founder & CEO, Baazi Games

the amount of money they can spend on cash tables. Another core feature of Responsible Gaming is self-exclusion, which lets players take a break from poker for a period of time they decide. Once confirmed, they are logged out of the app and cannot log back in until the stipulated period is over.

In eight months, almost 2,500 users have utilised Responsible Gaming tools to self-regulate, making the game more fun for themselves and enriching the quality of their lives. The self-exclusion numbers are most impressive: ~4,00,000 hours of poker breaks have been taken in total, equivalent to about forty-years off the felts!

At first glance, it may seem counterintuitive and against the interest of any company to celebrate the monetary loss incurred by restricting 45 years of a player at the felts. But the industry can only be as successful as its companies, and a company can only be as successful as its customers. Thus, building platforms that value players and promote their well-being is of prime importance and gaming responsibly is as important for operators as it is for players.

The fact that there has been a 25% increase in the usage of Responsible Gaming tools since the lockdown came into effect only proves further that players are aware of this too. The Real Money Gaming industry is growing every day. Operators continue to grow in acceptance and popularity. Let's take a stand and make sure it grows in the right direction while we're at it.

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IIOT TRANSFORMING INDIAN MANUFACTURING SECTOR

IIoT(Industrial Internet of Things) or Industry 4.0 is changing the landscape of the manufacturing industry in India. While technologies such as robotics, AI, ML, cloud computing and big data analytics exist in the manufacturing sector, their integration with one another will transform the way we do business, says Rajeev Sharma, Chief Strategy Officer, Mitsubishi Electric India Pvt. Ltd.

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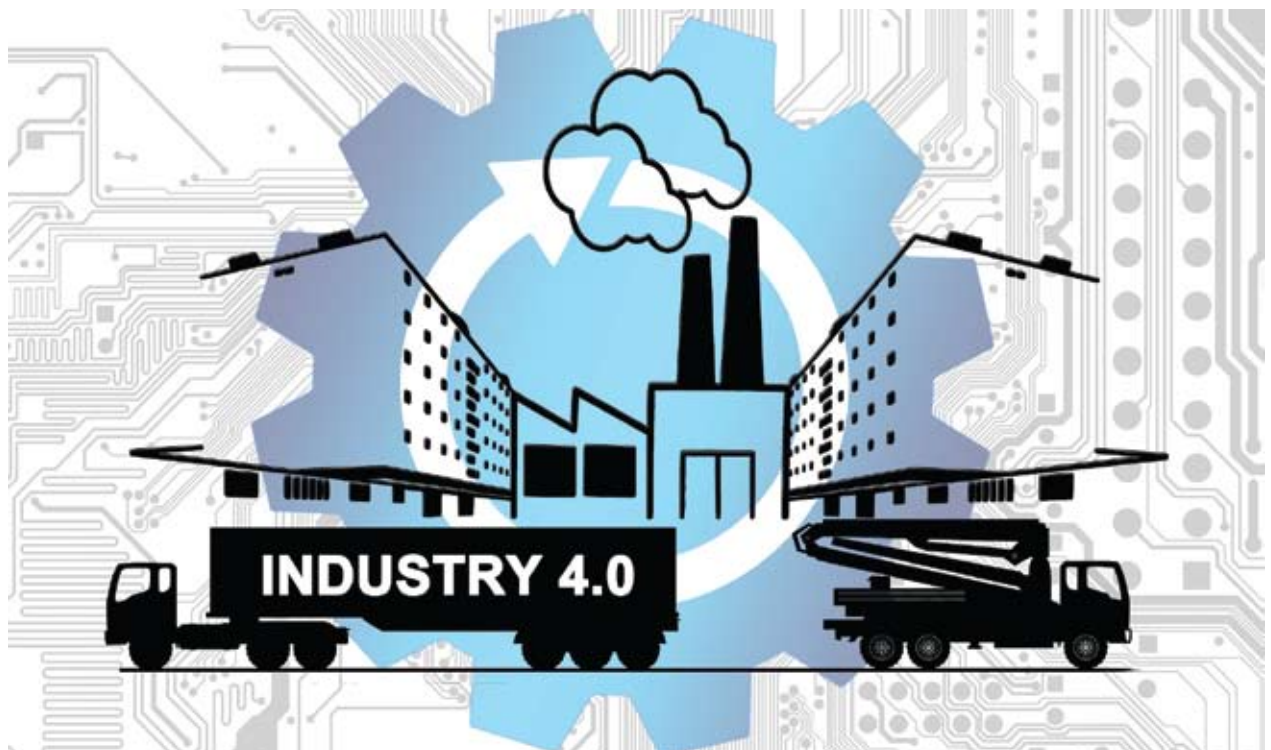
How has the Covid crisis affected the Indian semiconductor industry? What will the New Normal look like in the 2020s?

COVID-19 has significantly altered the fundamentals of the sector, including customer behaviour, business revenues, and numerous aspects of corporate operations. Mitsubishi Electric is channelizing and strategizing the business development activities to fit in the new normal and targeting it in three phases i.e. immediate, mid-term and long-term phases in India. In immediate business opportunities, we will continue to focus on traction, utility solar, solar power, and consumer durables. For the mid-term phase, we are channelizing our best efforts in getting the design for emerging segments of EV Charger, EV Traction and Medical.For the long term, along with the growth of the above-mentioned segment, we are looking forward to contributing in High Voltage Direct Current (HVDC) and Space for High Frequency (HF) & Optical Devices (OPTO). On the Product side, our regular checks

and development will be on Dual-in-line packaged intelligent power module (DIPIPM), Industrial Insulated Gate Bipolar Transistor (IGBT), and most importantly, X Series High Voltage- Industrial Insulated Gate Bipolar Transistor (HVIGBT) for various Applications. In parallel to existing Silicon (Si) power devices, we have also started offering new, improved performance Silicon Carbide (SiC) Power devices to customers.

How is SPECS helping? What more needs to be done to have Make in India a success in this field and for India to dominate globally?

Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS) introduced in April 2020, is aimed to offer monetary stimulus of 25% of capital expenditure for the manufacturing of goods that form the supply chain of electronic goods. This is a welcome step from the government and will help in strengthening the Make in India initiative.

The question of whether India can build and sustain its semiconductor fabrication facility will probably take some time due to current conditions.The level of investment and the infrastructure required. However, there may be progress toward a viable homegrown development, if the planners focus on older process technologies rather than manufacturing at the bleeding edge. Also, a very significant focus from government directly on initiatives like Make in India, invest in India, and Design in India is giving a major push to the various companies.

What about the rise of factory automation systems and their role in Industry 4.0?

IIoT or Industry 4.0 is changing the landscape of the manufacturing industry in India. While technologies such asrobotics, AI, ML, cloud computing and big data analytics existin the manufacturing sector, their integration with one anotherwill transform the way we do business. In India, IIoT is still in theearly stages, but it is already transforming the manufacturingsector in terms of responsiveness to customer needs, bettertransparency, agility, and cost savings.

At Mitsubishi Electric, we call it e-F@ctory--a smart manufacturing solution that utilizes cutting-edge Factory Automation products based on its high-speed networking technologies like CC-Link IE and CC-Link IE TSN to visualize information and coordinate with high-level Manufacturing Execution Systems (MES), to improve productivity, while reducing Total Cost of Ownership (TCO). It enables rapid Digital Transformation of the manufacturing industryby integration of IT & FA/OT systems. For this, all our FA

RAJEEV SHARMA, Chief Strategy Officer, Mitsubishi Electric India Ltd.

Products like PLCs, HMIs, Inverters, AC Servo Systems, NC Controllers, IndustrialRobots, IPCs and Low Voltage Switchgear are equipped with advanced technologies for communication. e-F@ctory offers greater visibility of the production processes. Factory Automation is becoming more and more digital with the advent of smart manufacturing and the fact that India is a preferred manufacturing hub, it becomes imperative to increase competitiveness and build an efficient value chain.

You have launched a series of collaborative robots in India. What will be their role in the New Normal where no touch technologies will rule?

We recently launched the MELFA ASSISTA series of collaborative robots in India intending to bring efficiency and increasing production with optimal financial and physical input. It will also be helpful for the industrial units to meet the world's new requirements. MELFA ASSISTA Collaborative Robot can support the industry with easy programming, fast set-up, flexible automation in comparison with industrial robots and ensure collaborative efforts with human interaction, while all the while maintaining high standards of safety.

The work in the new normal will be done cohesively between humans and robots, as human intervention is required to monitor the work done by robots and achieve increased efficiency.

What about your R&D ecosystem in India? Is India finally ready to become a big IT power in the R&D space?

Mitsubishi Electric India has one R&D centre at Pune in India which develops Factory Automation products for India. Wehave developed a range of Factory Automation products like Graphic Operation Controllers (GOCs), Energy Metres, Modular I/O in India.The R&D Centre constantly works on developing Factory Automation products and solutions for thecost-effective and need-basedspecification of the factory automation market. These products are cost-effective and high on reliability other than our "Made in Japan" product range.

R&D is a very capital-intensive activity and needs time. The challenge with India in the past was that companies did not have the luxury of capital or time to support R&D because of which we have been followers in most fields, not innovators.However, in the new IT age, things are gradually changing, and Indian companies are playing a bigrole here. There are a lot of new research and development activities happening across sectors and we will reap benefits in the longerrun. I am sure India will evolve as a challenger in the R&D space in the near future.

Will the role of Artificial Intelligence increase in all of the above. How have you implemented AI solutions so far?

Mitsubishi Electric has been a company where Innovation is a part of our core strategy. Our efforts are always ongoing. We're proud to be ranked No.2 globally and No.1 among Japanese firms for international patent applications filed in 2019 by the World Intellectual Property Organization (WIPO).

Artificial Intelligence has gained a lot of significance and many of our R&Dactivities are dedicated to Artificial Intelligence, mentioned below are some of the key technologies using AI that I would want to Highlight:

A) Mitsubishi Electric has developed ClariSense integrated Internet of Things (IoT) technology, which will be used for accelerated development of IoT systems construction within the company and its group companies. ClariSense, which synthesizes Mitsubishi Electric's Maisart®* artificial intelligence (AI) technology, security technologies and other strengths as a general electrical equipment manufacturer, is a unified design guideline and solution library in the form of IoT system that can be centrally maintained and expanded.

B) Mitsubishi Electric has recently developed a cooperative AI technology that can enhance work collaboration between humans and machines.

The system uses "inverse reinforcement learning", or IRL, to learn and imitate the actions of skilled workers. IRL, one of the key features of Mitsubishi Electric's "Maisart AI" technology, which enables machines to imitate human-like actions based on relatively small amounts of data.Eventually, the technology is expected to be used in autonomous driving vehicles and other applications.

C) Mitsubishi Electric has also developed what it believes to be the world's first technology capable of highly natural and intuitive interaction with humans based on a scene-aware capability to translate multimodal sensing information into natural language by using Mitsubishi Electric's proprietary Maisart compact AI technology. Scene-Aware Interaction technology is expected to have wide applicability, including human-machine interfaces for in-vehicle infotainment, interaction with robots in building and factory automation systems, systems that monitor the health and well-being of people, surveillance systems that interpret complex scenes for humans and encourage social distancing, support for touchless operation of equipment in public areas, and much more.

D) Mitsubishi Electric has also developed the world's first diagnostic technology based on the company's proprietary Maisart AI technology that uses machine learning to analyze sensor data and then generates a model of a production machine's transition between various operational states, thereby enabling the technology to detect machine abnormalities rapidly and accurately for improved productivity in factories and plants.

E) We have also developed the aeration control technology to reduce the electric power consumption for supplying air (aeration) to biological reactors which is essential for biological wastewater treatment. By leveraging the company's Maisart AI technologies, the system accurately predicts the quality (ammonia concentration) of the water flowing into the reactor over in few hours.

Going forward, Mitsubishi Electric will continue to develop its new cooperative AI for eventual application in commercial facilities.The envisioned benefits include improved operational efficiency, enabling workers to maintain social distancing and allowing machines and humans to operate alongside each other safely in settings such as factory production lines and logistics warehouses as well as in applications for autonomous-driving vehicles.

BIG TECH & BIG DATA

Does Silicon Valley have too much power? Are they monopolies? Do we need a Keep in India data campaign? Can the US and Chinese governments sort out their data differences? How can governments handle the tonnes of data that all their citizens are putting up on Social Media? What about the issue of data ethics?

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All these issues have come to a head in 2020. First up, the biggest story is that India has banned dozens of Chinese apps and the world has not only taken note; but followed suit. It's not just about a global rivalry or the skirmishes at the border. If Chinese apps are storing data in Chinese servers and the government there has access, then it serves as a major security breach. In fact for the Indian soldiers at the border, the ban list was expanded to even include American apps. This is also one of the reasons that Huawei came under the scanner: National security.

Data localization is a big issue. Ideally we should have enough data centres across the country, both private and government, and data that relates to the citizens of India should never leave its shores. We need strong legislation on those grounds.However our utter dependence on US and Chinese apps has to do with the fact that Indian apps have not at all been successful. Look at all the popular means of communication. Facebook. Instagram. WhatsApp. TikTok. LinkedIn. Twitter. Zoom… you won't find a single name in the global list. Till Indian IT makes the pivot from services to apps, such issues will persist. India also set up a committee last year to look into sharing non-personal data

In the US, President Donald Trump has taken on TikTok head on.The Chinese company will now have to sell off its US operations if it has to survive there. Trump had taken on Huawei and has come out with a Clean Network Policy: Clean Carrier, Clean Store, Clean Apps, Clean Cloud & Clean Cable. Silicon Valley doesn't have just Trump to worry about. The US Congress has also taken on Big Tech. Amazon's Jeff Bezos, Facebook's Mark Zuckerberg, Apple's Tim Cook and Google's Sundar Pichai all had to testify in the anti-trust case. What do we call it? Data monopoly? He who controls the data controls the world and now governments of the world are waking up to that fact. Continuing with the US, more than half of the State Attorney Generals there are looking into anti-trust violations by Big Tech. Data woes continue as a data transfer arrangement between the US and EU set in 2016 has faced recent legal troubles.

Zuckerberg has been summoned by the Parliaments of both UK and Canada. He didn't go to testify. The Canadian government has summoned him with a subpoena and he could be technically arrested if he sets foot in Canada and doesn't testify. Such a thing won't happen, but these collisions show that governments are finally waking up to the power of big social media.

China is a unique case where the Internet there is dominated by Chinese companies and the likes of Google Search and Facebook don't have a role. All their data pipes are virtually closed to the world. Russia wants to separate its Internet from the global Internet. Is this the way forward where countries will maintain their own data silos?

Maybe the maximum action has happened in the European Union. They came out with the General Data Protection Regulation which set the pace for most of the world. They are planning a comprehensive ePrivacy Regulation (ePR). The EU had begun a competition investigation against Google way back in 2010. While the EU have levied massive fines against Big Tech companies, the latter seem to have generally gotten their way in the way they do business.

Recently the EU has tried to change rules to make data unlocking much easier for them, but that's easier said than done. They are coming out with a Data Act in 2021 that should increase the sharing of data between governments and businesses. It is also bringing in things such as data generated from IoTs (Internet of Things) in industries (key for 4.0). Today we have more IoTs than people and the absolute upper limit for IoTs by 2030 is 500 billion. One can't even comprehend the amount of data that will be coming out.

Things are getting more and more complicated and it's not just about the volume of data. There is so much data that humans cannot handle it. Algorithms will sift through the data ocean. When Artificial Intelligence takes over (along with Machine Learning and Deep Learning) for management of data, who will be held responsible if something goes wrong?

The 2020s will see a lot of data questions asked and maybe not all of them will be answered.

> **The Personal Data Protection Bill was presented in Parliament in 2019. It calls for the setting up of the Data Protection Authority of India and protect the privacy of the citizens of India and create a framework to do so**

DID YOU KNOW SILICON VALLEY VIRTUALLY OWNS US MAINSTREAM MEDIA?

Today social media is probably the most important factor when it comes to moulding public opinion. Till the 2000s the mainstream media ruled the narrative but in the 2010s it totally took over. Earlier heads of states would look at the papers every morning and prime time TV at night to gauge where they stood. Now they probably look at Twitter trends

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Facebook surpassed 2 billion users while Instagram and WhatsApp crossed 1 billion and were being chased by something like TikTok. Mainstream media simply can't compete.

While social media, of course, is owned by Silicon Valley giants, did you know that they virtually own the mainstream media too? First up is the most obvious one. The richest man in the world Jeff Bezos (not Amazon) bought the *Washington Post* for a cool $250 million way back in 2013. Not to be outdone, Salesforce founder Marc Benioff and wife Lynne bought *Time* magazine for $190 million.

The *Atlantic* monthly is owned by the Emerson Collective, founded by Laurene Powell Jobs. If you haven't guessed already, then Laurene is the widow of billionaire icon Steve Jobs. The MS in MSNBC stands for Microsoft, which invested $221 million but later slowly pulled out of the venture. *Slate* magazine was also once under Microsoft. Both Jobs and Gates had a mainstream media link.

Huffington Post was acquired by AOL in 2011 for $315 million. AOL itself was acquired by Verizon Communications for $4.4 billion. Time Warner was a mainstream media giant and had hundreds of entities (magazines, TV channels etc) including CNN, HBO, Warner Brothers, *Time* magazine etc. The whopping $165 billion merger of AOL and Time Warner fell through at the beginning of the millennium. If not IT then at least ICT. AT&T has taken over Time Warner.

Talking of ICT, Mexican telecom billionaire Carlos Slim is now the single largest shareholder of the *New York Times*. Coming back to HuffPo, it was founded by a conservative turned liberal (Ariana Huffington) and another conservative (Andrew Breitbart). The other two founders Jonah Peretti and Kenneth Lerer founded Buzzfeed, thanks to, no surprises here, the likes of Softbank and VC firms. Another giant, USA Today, was taken over by Gannett, which is partially owned by Softbank. *Vox* has also received a lot of VC funding. *Vox* owns New York magazine.

Ownership is one thing, but donations flow in from Silicon Valley billionaires regularly. Like recently former Google CEO Eric Schmidt gave $4.7 million to NPR, which is a national syndicator to more than 1000 public radio stations all over America. There are many such instances. You also cannot really take on a Silicon Valley mogul which the then popular Gawker learned the hard way and it went down under after its confrontation with Peter Thiel, co-founder of PayPal and current board member of Facebook. The only person who has managed to retain some control is Rupert Murdoch with Fox News and The *Wall Street Journal*. But you hardly hear much of him nowadays.

Which is more powerful? Social media or mainstream media? To Silicon Valley, it doesn't matter—they virtually own them both!

Ruling the advertising pie too

Last year Google announced that it had made a whopping $4.7 billion the previous year through digital advertising just via its tie-ups with just the US news industry! What must be the figure for all social media for all countries? Social media is eating a huge chunk of the mainstream media advertising piebut taking away their readership as most people get their news via WhatsApp and their Twitter feeds. Now anyone can become an online writer, photographer, videographer and make his or her content go viral.

DESPERATE NEED TO BOOST OUR BANDWIDTH

As it is there was a demand for higher and higher bandwidth in the past, but the post-Covid world will see us wanting the same at stratospheric levels, what with a rising WFH culture, a burgeoning mobile work force and the need for online collaboration reaching unprecedented levels

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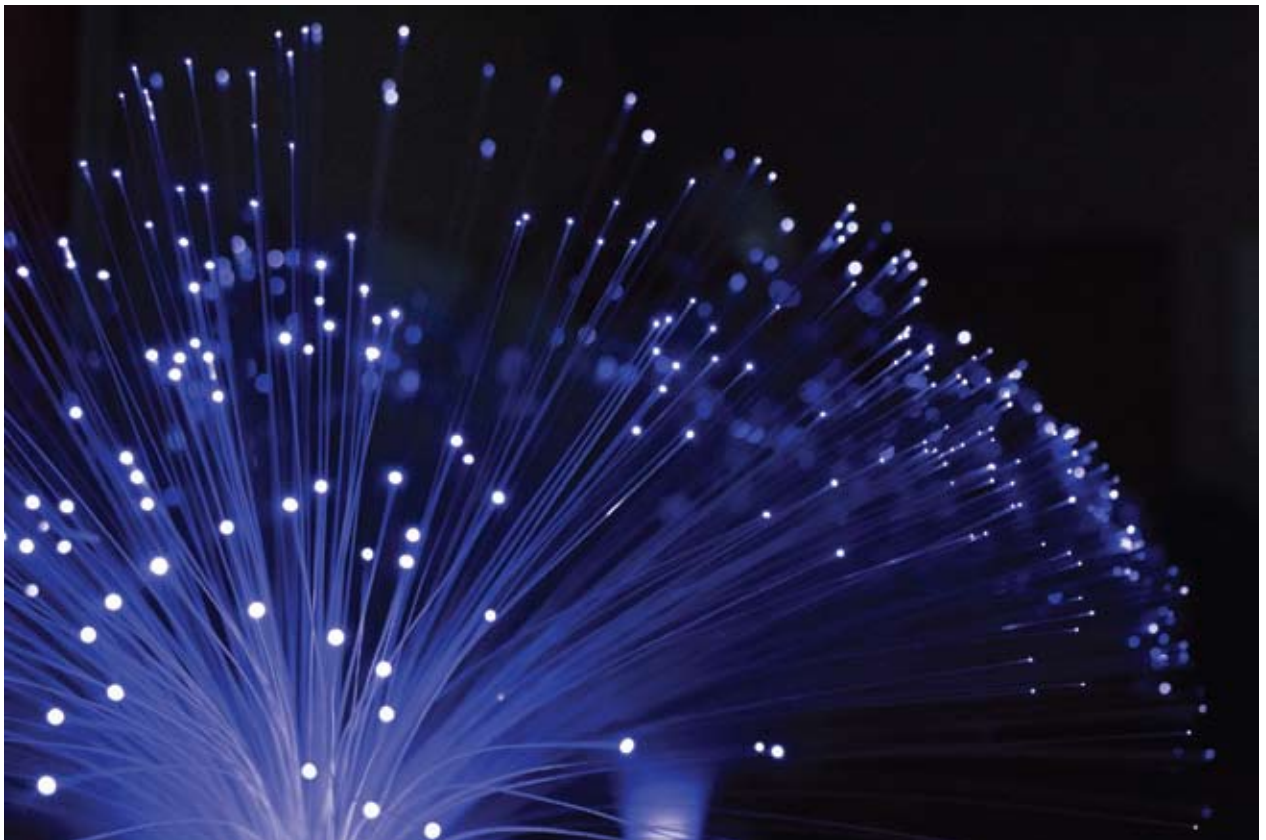
At the turn of the century the then NASSCOM President, late Dewang Mehta, grandly declared that India needed *Roti, Kapda, Makaan, Bijli aur Bandwidth*. (Food, clothing, shelter, electricity and bandwidth). While at that time it seemed a bit unusual, it now seems prophetic. India removed record people out of poverty in the 2010s. That was set back by the Covid pandemic-lockdown-recession, but hopefully we will bounce back in 2021. We are on course for 100% electrification by 2022. Thanks to the concept of mobile broadband, it is now actually possible to

aspire that each Indian citizen has high bandwidth levels.But for that a lot still has to be done at the infrastructure level.

Enough! Let's just get in 5G… now! When 4G was coming they promised us 100Mbps though that did not practically happen in most places. That way 5G promises us an upper theoretical limit of 10Gbps. Even if we get a fraction of that, then it would be a great leap forward. 5G has been lagging so much and delayed so much that it has almost become a joke. But maybe now the time has finally come. First Mukesh Ambani announced in the Reliance Annual General Body Meeting that they can implement 5G within a year of getting the contract. Even if they first start in city centres, or they divide the country into zones and give it to all the players, it might be enough. 5G is very capital intensive, requiring smaller and a greater number of towers. Difficult in a recession; could be handy and give a lot of jobs and contracts in a post-recession building up phase. The government should just announce the auction this year and let the 5G world roll out in the 2020s.

More fibre in the diet: This year we finally have a 2300km underwater optical fibre cable connecting Chennai with the Andaman & Nicobar Islands. What took it so long?Why can't we lay optical fibre to all the remote regions of India? Come to think of it, some populated areas still don't have fibre. That way we at least have the Bharat Broadband Network launched in 2012. It aimed to give 100 Mbps to all 250,000 gram panchayats (625,000 villages). They were planning to complete that by 2022 also the year when India was supposed to be fully electrified. If that happens then India would go truly digital, but the Covid crisis has set that back by a bit. In the dotcom boom of the late 1990s, companies laid far more Internet cable than was needed. It seemed a waste when the bust happened, but that is exactly what powered the next boom. India needs to be fully cable-ized.Complete digitization will automatically follow.

What about satellite Internet? Once satellite phones were popular, but what about satellite Internet? SpaceX's Starlink project plans tens of thousands of satellites in Low Earth Orbit to provide Internet services. Similar projects have been considered by Amazon (Project Kuiper), Samsung and Telesat. OneWeb and Airtel have announced a tie-up for the same. There are many more such innovations which people have thought of like Wi-Fi towers for rural areas and even blimps. Some talk of drones for temporary Internet service.

Either way the post-Covid 2020s are going to see an appetite for broadband that will keep increasing and we need a buffet of solutions to deal with that. Fast!

There are many reasons for this. If bandwidth issues are not sorted out then a lot of work operations will start choking. A look at some of the spikes…
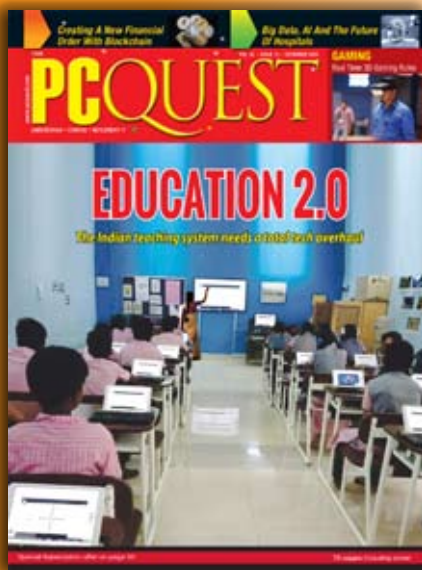
1. **Collaboration:** The world is Zooming ahead with collaboration tools and even if we return back to normalcy, video calls will continue due to cost factors and convenience. In fact if 3D collaboration becomes popular, bandwidth will become even more of an issue.
2. **OTT:** Netflix. Amazon Prime. Hotstar Disney+. A host of Hindi and regional language players. Like cable channels we have multiple OTT channels and millions of new accounts have been added during lockdown which will continue being consumers even afterward.
3. **Work For Home:** Let's face it, many jobs have already been permanently WFHed. Also these jobs will slowly shift to Tier II/III towns and there will be great requirements for bandwidth there too.
4. **Mobile workforce:** This crossed the one billion mark some time back and we are accelerating toward 2 billion. The smartphone has become a powerful computer and requires as much bandwidth.
5. **Online education:** While online schools may not catch on (except in remote areas) online colleges which get government accreditation and may end up being far affordable than expensive offline ones.
6. **Mobile apps and e-commerce:** This combo has become a superhit and both are proliferating at record levels. The data is always on to order, monitoring is always on, GPS is always on. Data has to be a continuous large pipe.
7. **Cloud:** With more and more stuff moving to the cloud, there will be more need the keep accessing that data from multiple locations. Cloud means movement of data is much higher than usual.
8. **Connected cars and drones:** With no touch technology and social distancing this will also take off. Right now legislation, not technology, is keeping them back. Driverless cars will also make their debut.

There are also many other emerging technologies like VR/AR which could be implemented in a much larger way requiring even more bandwidth.

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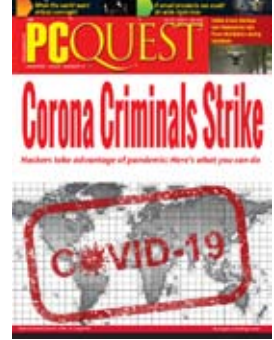
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8 REASONS WHY ONLINE EDUCATION WILL RULE

The Covid pandemic-crisis-lockdown-recession probably presents the greatest technological shift and lifestyle change since World War 2. At the beginning of this crisis, many people thought that things would return to normal, but that may not happen. It's why we have coined the term "New Normal"

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Changes taking place in the education sector may well become permanent for a variety of factors. But look at why online education is on the ascendant.

1. Costs

In the US, the student debt is more than $1.5 trillion. The education system was creaking even before Covid. Now it will be even more difficult for colleges to recover costs and students to repay thanks to a recession which may last a few years. It is a fact that higher education is getting more and more expensive for even middle-class students all over the world. The only thing that is stopping online colleges from taking off is government accreditation. Once that happens, nothing can stop online universities from expanding in a big way.

2. Quality

During Covid, everyone has been pushed into the swimming pool and is being forced to learn to swim. Bandwidths are being upgraded, collaboration tools are being refined to include special features for education. Teachers and students are being forced to learn these new skills. The world will learn from its mistakes and best practices will come up by 2021 which will be adopted by educational institutions all over the world.

3. Quantity

Did you know that one teacher can simultaneously conduct classes for thousands of students? As far as the student is concerned, he has a direct connect with the teacher who can have the same virtual presence for every virtual student. The teacher can know how many are active on screen. They can keep asking multiple choice questions to every student and will immediately know who all are not participating. Facial Recognition can be applied to see if the teacher is teaching well and if every one of the many students online are paying attention or whether something wrong with them.

4. Data Analytics

Educational institutes create a huge amount of data. Now all this data can be digitized, collated and analyzed in a manner that cannot be done offline. Artificial Intelligence-Machine Learning-Deep Learning techniques can take it to the next level. Teaching can be streamlined and optimized. Even checking of papers can be slightly automated. Once you are used to the online world, Robotic Process Automation (RPA)

> "The biggest industry of the future, the one with the most dollar amount, will be online education. Colleges will eventually have to disappear because they don't really make sense for the price."
>
> **—Scott Adams, political commentator, tech evangelist and creator of the popular cartoon strip Dilbert**

can be used to streamline administrative processes.

5. Virtual Reality

VR is very handy when it comes to education and training purposes. But you can't put the cart before the horse.We had to wait for online education itself to reach a critical point which may now be happening. VR can help students to take virtual tours of any place on Earth or universe or even inside the human body. They canvisit the best museums and conduct scientific simulations. Many educators were thinking of having VR headsets in classrooms, but now they can be used at home too.

6. It's Eco-friendly

Students can save a lot of time by not commuting. For some it may be convenient but for others it may not be. There is also the environmental factor by bringing down commute and saving on carbon emissions. The dream of a paperless office has been around for decades. With online education and the cloud available for storage of huge swathes of data with backup, that dream can finally come true.

7. Remote Education

India is a far-flung country with many remote areas—villages, mountainous terrain, there are those who are cut off for many months or maybe even throughout the year. With virtual education everyone gets a chance to participate no matter where they are. One expects that every university in the long run will offer online classes along with their offline ones. Offline classrooms also could also go live.

8. Home Education

This is also one option preferred by many parents, but they do not go ahead because their options are currently limited.Yesterday home schooling consisted of only tuitions and studying at home. With online education going big, the option of home schooling will also open up to whichever parents are keen on it.

WE ARE ENTERING AN ERA OF RAPID DIGITIZATION

Lendingkart's Chief Analytics Officer Abhishek Singh talked about how the mobile has become a game changer from a lending perspective and all the changes taking place during the Covid era

PCQ Bureau

We are entering an era of rapid digitization #Lendingkart

0:31 / 23:01

Abhishek Singh said, "100% digitization will still take some time, but it's become very rapid digitization. People have had to change their business models overnight and that's starting to shape up most of the digital integration that is happening."

Check out the complete interview at: https://www.youtube.com/watch?v=sBbjsnhPeJY&t

"New Normal is hybrid of physical & virtual"
Sudhir Syal, CEO Middle East & Lead – Global Touring, BookMyShow talked about how they have

New Normal is hybrid of physical & virtual: BookMyShow's Syal

0:59 / 13:43

got into live entertainment and the New Normal in the era of Covid.

Said Syal, "Pre-Covid our raison d'être was to bring entertainment into people's lives out of home. Now it has changed to bringing entertainment into people's homes. We have done this via launching a livestreaming product where entertainers are performing live. The New Normal, I see it as one where there's a hybrid existence of both physical and virtual. There are also newer technologies like Augmented Reality and Virtual Reality and we are evaluating these."

Catch the complete interview here:https://www.youtube.com/watch?v=4m6TL-Qc1wM&t

Cloud, data and opting for a "go local" setup

Amrish Kumar Jain, Chief Information Officer, Tally Solutions, discusses Digital Transformation, disruptors like GST and the changing cloud and data paradigms in the Covid Era.

Jain talked about the importance of going in for a local kind of setup because of the new compliance laws coming into the picture where each and every country is trying to push the data to its local data centres. He also discussed disruptors like GST and Covid, and stressed the importance of having an equipped IT team to take on these kinds of disruptions with a forward looking approach.

Catch the complete interview here: https://www.youtube.com/watch?v=aPpPt3s3jD0&t

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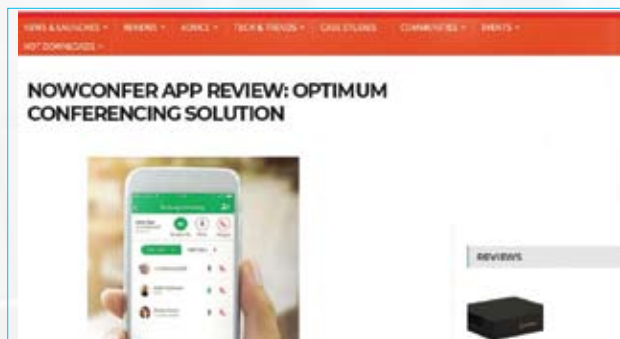
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WEARABLE

RIVERSONG WAVE S FITNESS BAND REVIEW

— Ashok Pandey
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You are fit and healthy, you can fight against most of the viruses. And to be fit and fine you need to do some exercise and other physical activities. But if you want to track your fitness or calorie you burned, then you need a fitness band. Riversong, a subsidiary of the leading mobile phone developer- IMG Technology Group, has added a new product to their fitness family, Wave S, a fitness band, the successor to Wave.

Design and Feature

The new Wave S comes with a 0.96" TFT colour screen and 2.5D tempered glass. The band monitors changes in the heart rate of the users on a real-time basis, allowing them to track and adjust the intensity of the activity.

It also notifies the users about incoming calls, messages, emails, etc., keeping them up-to-date and always connected. Wave S comes with the heart rate monitoring feature along with blood pressure and blood oxygen monitoring helping to keep track of the routine for a healthier lifestyle. It also has a unique feature called Multisports mode where Wave S track the data according to the specific exercise one is doing.

The fitness band Wave S also boasts IP67 water resistance.

When you get the band, there is no charging port and cable you would get with it. The Riversong Wave S has in-built charging which makes it convenient to charge as no extra accessories are required, you can directly insert this into any power bank or charger.

Performance

The Riversong Wave S smart band can be paired with iOS and Android via an app called RS Wave S. You can easily configure the watch using the app. You can wear the smart band 24×7, its water-resistance so no worry about a water spill.

The Wave S keeps track of your daily activities and exercise levels. Once connected to the phone, it also shows you important notifications such as calls and messages.

Using the Wave S for more than two weeks, we didn't find any visible performance lag while exploring the device or using its functions. However, sometimes we missed gesture controls. It tracks all the daily activities accurately and keeps you updated on how much you have to do more. Additionally, it can act like music play and camera shutter controller, meaning you can manage your music

Price: ₹2,299

SCORE

Overall: **9/10**

PRICE: **8**/10
PERFORMANCE: **9**/10
FEATURES: **9**/10

KEY SPECS: Supports both Android and iOS devices, 0.96-inch screen, 90 mAh battery, IP67

PROS: Great battery life, water-resistant, accurate monitoring

CONS: No Touch screen

and click selfies suing the band.

Wave S battery can last for more than 7 days with moderate usage. We used it with all the features enabled and connected with smartphone 24 hours. Still, in one charge, it was able to last for 5 days, which is great.

Bottomline: Riversong Wave S Fitness Band has all the features which you can expect from a fitness band. It captures your daily activities and notifies you with calls and SMSs etc. With great 5 days of battery life, its one of the perfect fitness bands.

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POWER BANK

VINGAJOY FUELBAR POWER BANK REVIEW

— Ashok Pandey
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Day-by-day our mobiles are being packed with a giant battery that can easily last for more than a day. Still, if you are travelling you need a power backup to keep your device up and running. VingaJoy FuelBar VB – SX3 power bank is one of the compact solutions for you.

Design and features

The made in India power bank has a lightweight and compact body which makes it easy to carry. The Non-Metallic Frame body material offers a firm grip to hold the power bank. It comes with an LED Digital Battery Indicator, which lets you know the charging level and functionality of the power bank.

VingaJoy FuelBar Power Bank has dual input charging ports (TypeC/V8) and output charging port with 2.0A. This power bank is offering 6 months product warranty. The 10,000 mAh battery has 500 life cycles. It comes with a carry bag inside the box to carry the massive power bank easily.

The VingaJoy FuelBar weighs 249 grams and works well with all kinds of smartphones, tablets, and headphones. It also features overcharging protection, meaning your device is completely safe against overcharging and overheating.

The power bank comes with features like over power protection, short circuit protection, and reverse current protection, means complete peace of mind.

Performance

The VingaJoy FuelBar power bank has a powerful polymer battery capacity of 10,000mAh. It takes more than 6 hours 26 minutes to be fully charged. The fully charged device can charge two devices simultaneously.

During our test, we were able to charge 2 devices, Samsung Galaxy M30 (5000 mAh), and Vivo X50 (4200 mAh). We used both USB ports simultaneously to charge Samsung and Vivo devices. Both devices were around 15 per cent of battery left and then the FuelBar charged it to 100 per cent. The power bank offers more than 90 per cent conversion rate.

Price: ₹2,499

Overall: **8/10**

SCORE

PRICE: **6**/10
PERFORMANCE: **9**/10
FEATURES: **9**/10

KEY SPECS: 10000 mAh power; Compatible for all kinds of mobile Phones/Mp4/Game; Built-in LED indicator; Supports over-charged, over-discharged; Over-voltage, over-current and Short Circuit Protection

PROS: Compact design, solid build, multiple protection features

CONS: Expensive compare to the competition

Bottomline: The VingaJoy FuelBar power bank is compact and has massive battery capacity, which is common with most of the power banks out there. But, features like overcharging protection, over power protection, short circuit protection, and reverse current protection, makes it a better choice over others, though, you need to pay a premium price as well.

SMARTPHONES

Samsung Galaxy Ecosystem

Galaxy Note20 and Galaxy Note20 Ultra

The Galaxy Note20 series comes in two versions: Galaxy Note20 Ultra and Galaxy Note20, both are built for efficiency.

Now, on the Galaxy Note20 series, new S Pen and Samsung Notes features provide an even more powerful experience and extend to Galaxy Tab S7 and Tab S7+ for flexibility and convenience. Plus, a deeper relationship with Samsung's long-standing partner, Microsoft, makes the Galaxy Note20 series and your Windows PC seamlessly work together.

An Advanced S Pen: The enhanced S Pen offers the ultimate writing experience so you can capture your ideas whenever inspiration strikes. It has more lifelike precision that gives you more accuracy and responsiveness.

Samsung Notes App: Samsung Notes app features auto-save and syncing capabilities, so lost work becomes a thing of the past and you can pick up right where you left off as you move from device to device. Samsung Notes easily straightens your messy handwriting into legible penmanship.

Work Smarter Across Devices: Microsoft's Your Phone app with Link to Windows integration now enables you to easily access your mobile apps directly from your Windows 10 PC without disrupting your flow.

Power to Play: Samsung is also bringing its Microsoft partnership to the entertainment side of the Galaxy Note20 series, taking mobile play to the next level. Fully immerse yourself in the most powerful mobile gaming experience Samsung has ever engineered into a smartphone, so you can game like a pro from your couch, backyard, or wherever the day may take you.

Xbox games on the Galaxy Note20 series: Play over 100 Xbox games on your phone or tablet, directly from the cloud (beta) with Xbox Game Pass Ultimate, including hits like Minecraft Dungeons and Gears 55. The Galaxy Note20 series gaming experience is further up-leveled with its AI game booster and Bluetooth audio response optimization, and 240Hz touch latency on the Galaxy Note20 Ultra.

Cinematic-Style Filmmaking: With 21:9 aspect ratio and 24fps recording, the Galaxy Note20 series' 8K camera now gives you access to ultra-high resolution and a professional quality video experience. Paired with Galaxy Buds Live, for example, you can record crystal-clear audio while minimizing noise in the background6.

Advanced Samsung DeX: For the first time with Samsung DeX7, wirelessly connect the Galaxy Note20 series to a Smart TV when you need a bigger screen. Manage two screens simultaneously so you can text with your friends on the Galaxy Note20 series while watching a video in a Smart TV.

The Galaxy Note20 series is built with the fastest processor of all Galaxy devices. Galaxy Note20 Ultra offers a vivid and bright Dynamic AMOLED 2X display and 120Hz refresh rate.

Galaxy Tab S7 and S7+

Galaxy Tab S7 and S7+ are two versatile tablets that combine the power of a PC, the flexibility of a tablet, and the connectivity of a smartphone. Building on Samsung's legacy of Galaxy 5G leadership, Galaxy Tab S7 and S7+ will be unlocking seamless videoconferencing, fast downloads, and virtually lag-free streaming.

Experience PC-level productivity on Galaxy Tab S7 and S7+ thanks to a powerful processor, an improved keyboard experience (keyboard sold separately as Book Cover Keyboard), and an improved S Pen with similar capabilities as the Galaxy Note20 series—all empowering you to get more done in less time.

Galaxy Watch3

The next-generation companion is for managing your routines, smashing your fitness goals, and taking ownership over your health. Built with premium materials and a slimmed-down version of the popular rotating bezel, Galaxy Watch3 features the craftsmanship of a luxury timepiece, while still being comfortable enough to wear all day and all night.

With the Blood oxygen feature, you can measure and track oxygen saturation over time, for fitness and wellness purposes. The new Samsung Health Monitor app on Galaxy Watch3 offers cuff-less blood pressure and electrocardiogram measurements, available in markets where these features have been authorized.

Galaxy Buds Live

Galaxy Buds Live with a truly iconic design and comfortable fit– they're like nothing you've seen or worn before. Combining AKG's sound expertise with a bigger, 12mm speaker compared to Galaxy Buds+, along with a bass duct, audio sounds deep and rich so you can enjoy music the way the artist intended.

Galaxy Buds Live come with three microphones and Voice Pickup Unit so you can feel like you're in the same room as your loved ones, even when you're apart. These earbuds feature Active Noise Cancellation for open type bringing the best of both: live and spacious sound quality, with the ability for you to tune in (or out) of the world around you. Get lost in an audiobook without missing the train conductor's announcement.

Galaxy Z Fold2

Samsung unveils the Galaxy Z Fold2 with meaningful innovations that offer users enhanced refinements and unique foldable user experiences. Whether folded or unfolded, you can enjoy a luxury mobile experience with Galaxy Z Fold2's premium design.

The Galaxy Z Fold2 comes packed with two edge-to-edge, nearly bezel-less Infinity-O Displays. The Cover Screen is 6.2-inches and the massive Main Screen is 7.6-inches23, making them both larger than the Galaxy Fold.

Redmi 9: The budget smartphone

Redmi 9 features the Aura Iconic Design and sports a 16.5cm (6.35) IPS HD+ display with a 20:9 aspect ratio for an immersive viewing experience. The display comes with TÜV Rheinland Low Blue Light certification.

The rear of Redmi 9 sports a textured design that prevents fingerprints so that the device can retain its pristine look at all times. The device features a fingerprint sensor on the rear and AI face unlock to ensure secure access to your smartphone. Redmi 9 also supports dual 4G standby SIM cards with a dedicated microSD card slot and comes with a 3.5mm headphone jack.

Redmi 9 sports an AI dual camera, a 13MP main camera and a 2MP depth sensor coupled with an LED flash. The AI selfie camera is powered by a 5MP sensor.

Redmi comes with 4GB RAM and 64GB of storage with a dedicated microSD card slot for expansion up to 512GB. Redmi 9 is also available in a 4GB RAM and 128GB storage variant.

Redmi 9 sports a MediaTek Helio G35which is clocked up to 2.3GHz, paired with a 5000mAh battery and it runs on MIUI 12 based on Android 10 out of the box.

Redmi 9 will be available in three color variants: Carbon Black, Sporty Orange, Sky Blue. The retail price is INR 8999 for the 4GB+64GB variant and INR 9999 for the 4GB+128GB variant.

OPPO A53 with 90Hz Punch Hole Display, 18W fast charger

OPPO A53 is OPPO's first smartphone with 90Hz refresh rate and 120Hz Touch Sampling rate in the pocket friendly segment that comes paired with a 6.5-inch Punch Hole -Display, a 5000mAh battery and 18W Fast Charging.

The device will be available in 6GB+128GB and 4GB+64GB variants at a price of INR 12,990 and INR 15,490 respectively. Crafted to offer an experience at par with flagship smartphones, the device will be available starting 25Th August 2020. OPPO A53 is the sleekest phone in the market with a 5000mAh battery and the brand's first smartphone with 90Hz refresh rate under the 15k price segment.

Crafted with a 3D-curved Iridescent Wave Design, OPPO A53 comes packed with a 16MP AI front camera and a 13 MP AI triple camera set up on the rear side to capture clear details with a professional bokeh effect.

A53 comes packed with Qualcomm's Snapdragon octa-core 460 processor, also sports 6GB+128GB and 4GB+64GB variants which can be expanded to 256GB through a 3-Card Slot that offers flexibility to store heavy data on the smartphone.

The 4GB+64GB variant will be available for ₹ 12,990 whereas the 6GB+128GB variant will be available for 15,490 in three color options - Electric Black, Fairy White, and Fancy Blue

moto g⁹: The next generation of its largest franchise (g series)

Motorola moto g9 has the latest Qualcomm Snapdragon 662 processor, a triple camera system - which includes a 48MP main sensor with class leading f/1.7 aperture and two days of power with a massive 5000mAh battery plus 20W TurboPowercharging .

Thanks to the 48 MP triple camera system on moto g9 you can easily capture amazing pictures in any light or setting with the main camera, depth sensor and Macro Vision camera. A massive 5000mAh battery gives you over two days of power on a single charge, making it possible to stream music for 83 hours, stream videos for 16 hours, or browse your favorite websites for 13 hours. And when you do need a quick energy boost, a 20W TurboPower charger gives you hours of power in just minutes of charging.

The 6.5" Max Vision HD+ display gives you maximum viewing thanks to a 20:9 aspect ratio. With a bigger screen to body proportion, nothing gets in the way of your favorite entertainment.

moto g9 has 64 GB of built-in storage, so you have room to download more photos, songs, movies, and games. You can even add up to 512 GB more using the microSD card slot.

There are no clunky software skins, no duplicate apps - just near-stock Android 10 that we know consumers love.

The moto g9 is available at INR 11,499.

HOT LAUNCHES ≫

LAPTOPS

Lenovo Legion 7i

Boasting of breathtaking visuals in a sleek body, the Legion 7i is built for consumers appreciating high performance and premium style in gaming laptops.

The thin and light laptop with 19.9mm thickness and weighing 2.2kgs, the Lenovo Legion 7i comes with colour-accurate IPS display, with full HD (1920 x 1080) resolution combined with NVIDIA G-Sync technology with 144Hz refresh rates.

The Legion 7i TrueStrike keyboard is inspired by Lenovo's heritage in innovative keyboard technologies, and it is built to withstand heavy long-term use. The laptop houses an intelligent cooling system called the ColdFront 2.0, which is an improved synergy of hardware and software.

Lenovo Legion 7i offers up to 8 hours of battery life with 80WHr battery and it also integrates smarter power features such as Hybrid Mode under the Lenovo Vantage Control, to prolong battery life.

The laptop promises excellent speed with up to 10th Gen Intel Core i9 H-Series mobile processor, and up to NVIDIA GeForce RTX 2080 SUPER GPU with Max Q graphics.

Lenovo Legion 5Pi and Legion 5i

Legion 5Pi comes packed with high-caliber features ideal for eSports enthusiasts and streamers, while Legion 5i is a mainstream gaming laptop that doesn't skimp on the premium options. Both Legion 5Pi and 5i retain most of the features and smart attributes of the flagship Legion 7i.

Both the devices are powered by the latest 10th Gen Intel Core i7-10750H processor. The Legion 5Pi has the eye-catching "Y"-illuminated Legion logo on the top cover, with slim mylar bezels, up to 144Hz refresh rates, 100% sRGB display, a TrueStrike keyboard with four-zone RGB customization, ColdFront 2.0 with dual fans and quad ventilation and supports up to NVIDIA's latest RTX 2060 GDDR6 for superior graphics. The Legion 5i comes with an iridescent Legion logo that adds to the minimalistic style quotient, IPS 1080p display with 120Hz refresh rate, the TrueStrike keyboard, and ColdFront 2.0 thermal solutions and supports up to NVIDIA GTX 1650ti GDDR6 graphics.

Legion 7i, Legion 5Pi and Legion 5i are available in Slate Grey, Iron Grey and Phantom black color variants respectively. Legion 7i pricing starts at INR 1,99,990; Legion 5Pi starts at INR 1,34,990, and Legion 5i starts at INR 79,990.

Lenovo Yoga Slim

Lenovo Yoga Slim 7i is powered by the latest 10th Gen intel Core processor is designed for the modern worker.

Powered by a high-capacity 4 cell 60 watt-per-hour battery with Rapid Charge Pro, this laptop includes Lenovo Q-Control Intelligent Cooling feature which uses artificial intelligence to optimise battery life by an average of up to 20% (based on Intel verification testing).

Yoga Slim 7i allows users to smartly manage their day with voice assistants (Alexa and Cortana), and allows facial recognition with Windows Hello. Taking privacy and security to the next level, the laptop is equipped with AI-powered attention sensing software - Glance by Mirametrix which includes features such as Smart Display for securing on-screen confidential content.

The Yoga Slim 7i offers full HD IPS display, integrated with Dolby Vision and Lenovo Super Resolution. It is also equipped with Intel Iris Plus graphics, and upto NVIDIA GeForce MX350 2GB GDDR5 graphics for additional graphics acceleration for AAA games.

Yoga Slim 7i comes in Slate Grey color and is going to be available at the starting price of INR 79,990.

PRINTERS

Epson EcoTank Printers

Epson EcoTank printers, L14150, L15150 and L15160, are offering low TCO (Total Cost of Ownership) and a high page yield of up to 7,500 pages in black and 6,000 pages in colour (CMY) to reduce the inconvenience of frequent refills.

The new printers are powered by Epson's proprietary PrecisionCore technology, which helps deliver faster prints and they use Epson's Heat Free Technology to consume less power, thereby reducing power bills and helping to conserve the environment.

The printers also come equipped with a host of connectivity options - Wi-Fi, USB and Ethernet – for seamless printing.

The Epson L15150 and L15160 are A3 size Multi-Function Colour printers (MFP) with pigment based inks (CMYK) for water & smudge resistant prints and enhanced durability.

On the other hand, the Epson L14150 is an A4+ Multi-Function Colour printer (MFP), designed for on-demand A3+ printing and up to legal size scanning and copying. Equipped with pigment based black Ink and dye based colour (CMY) inks, this printer is targeted at small office/home offices (SOHO), small and medium business (SMB).

The L14150, L15150 and L15160 printers are available at the price of Rs. 44,999 Rs. 86,999 and Rs. 96,499 respectively.

Fujifilm Instax SHARE SP3 Printer

Fujifilm's first square format smartphone printer, the instax SHARE SP3 is the successor to the SP-2.This prints in a 2.4:2.4 aspect ratio which is a square format and has gained popularity thanks to photo hosting and sharing service platform 'Instagram'.

There is a dedicated SP-3 app that comes with new features to make every step easier and more fun, from selecting the photo to the final printing process. Users can print up to 9 photos on one sheet using the Collage Template, a feature enabled by the square format of the SP-3, or use My Template to add text to printed photos. My Template comes with templates in 11 designs.

The Instax SHARE app can access your social media accounts such as Instagram and Facebook and print photos directly from the accounts. The app is also compatible with Dropbox, Google Photos and more.

The all new instax printer will now be available all over India in retail outlets and ecommerce platforms with best buy price INR Rs.12,999/-

SMARTWATCHES

Garmin Instinct series smartwatch

Garmin Instinct-Tactical Editionis loaded with advanced features to make outdoor activities more informative and data-rich.

Built for the true outdoor enthusiast, the Tactical edition supports users with premium features like Jumpmaster, Dual Position Format, Night Vision, and Stealth Mode along with other preloaded tactical activities.

Users can enjoy a peace of mind in the outdoors as the battery life of Instinct Tactical lasts 14 days in smartwatch mode, up to 16 hours in GPS mode, up to 40 hours in UltraTrac battery saver mode, so all activities will be recorded on the device.

Available in 4 exciting color options, the Instinct Tactical Edition is priced at Rs. 31,990

HOT LAUNCHES »

AUDIO

LG XBOOM party speakers

LG Electronics (LG) XBOOM speakers are known for their unique Karaoke feature. This time the ON2D model bring some more diversified features that include 2 mic ports, 9 Echo effects, Vocal Sound Control making the karaoke feature more powerful for realistic vocal sound and even enables you to do duets with two ports.

With input options like DVD/ CD, USB, Bluetooth, FM, XBOOM ON2D provides a variety of modes for playback. These are not just restricted to Mobile phones for connectivity, but one can also enjoy the other options as well

The new XBOOM ON2D speaker has a phone cradle option making it a convenient place to keep your mobile phone safe. It can also be connected to a TV via Bluetooth, Aux In and HDMI Out. The speaker has a Powerful Sound Output with its 16.5 cm Woofer Size. This refers to how much continuous power the speaker can handle

LG XBOOM speakers is available in key markets at the price of INR 18990.

ZOOOK Show Stopper Party Speaker & Studio Solo soundbar

ZOOOK's Show Stopper Party Speaker is equipped with circular LED lights, which change colours and patterns with responsive sound, Studio Solo has a slim LED light bar underining the speaker.

Show Stopper Party Speaker

This speaker comes with two 6.5-inch full-range Woofers and two 2-inch Tweeters. This speaker supports multiple connectivity, with Bluetooth, on-board USB reader, TF card slot and Aux to play MP3 or other music files.

The speaker has a comprehensive control panel on the top to manually adjust echo, bass, volume, treble etc. It further comes with a wireless mic for karaoke performances and remote control. The speaker also has two inputs to attach wired mics and one input to attach guitar.

With its integrated rechargeable 4000 mAh battery, users can enjoy music for longer hours and party until you want.

MRP: Rs 14,999

ZOOOK Show Stopper Party Speaker & Studio Solo soundbar

The soundbar comes with built-in subwoofers that create a magical soundscape when put to use. The device is 60 CM long and super sleek. It gives a 50W output and supports USB, Aux Optical cable as well as Bluetooth. It can be used with TV as a soundbar or can be used as a normal Bluetooth speaker. HIFI sound with DSP and 3D surround effect. There are two speaker drivers, a subwoofer and dual channels.

Studio Solo uses Bluetooth version 5.0 to connect instantly and deliver more stability. Additionally, when connected with the user's smartphone, it allows lower power consumption. Its high capacity rechargeable 1800 mAh lithium battery lets you enjoy music for up to 3 hours. Also, you can manage your calls when connected with a smartphone.

MRP: Rs 5,999

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