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# PCQUEST

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- Apeejay School International (IB), Panchsheel Park, New Delhi
- Apeejay School, Saket, New Delhi
- Apeejay School, Pitampura, Delhi
- Apeejay School, Noida, U.P., Near Delhi
- Apeejay International School, Greater Noida, U.P.
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COVERY STORY

## AI: Driving the future of software development

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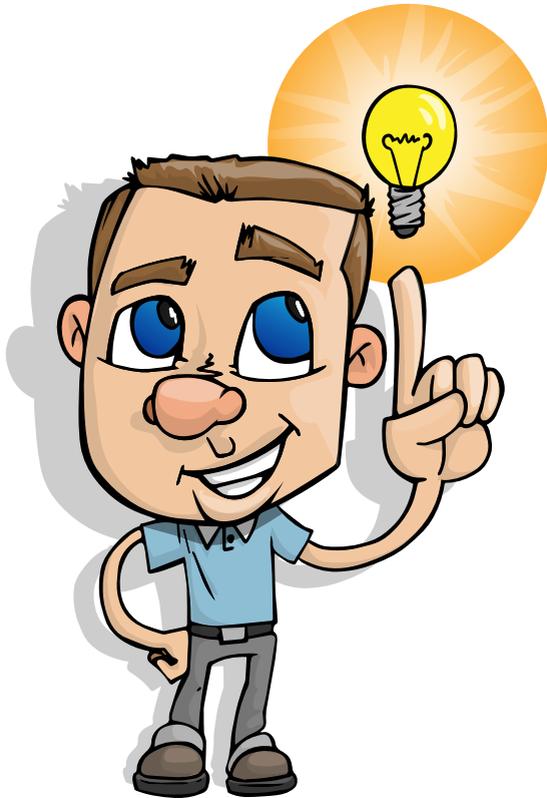
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## #PCQuestTroubleShoot

✉ ashokpa@cybermedia.co.in

**I am a civil engineering student, what would be the best laptop configuration that can handle civil engineering software?**

■ *Ashan Atesh*



Civil engineers use different software applications that require good processing power. Your priority should be on choosing a laptop with a dedicated GPU. As a Civil Engg student, you might also have to use software such as AutoCAD that requires graphics rendering. So, the dedicated graphics in the notebook will accelerate the overall performance.

As you're going to become a civil engineer, then keep your future requirements in mind as well. You should go for a Core i5 or i7 CPU coupled with min 8 GB RAM and a discrete 4 GB NVIDIA Quadro GPU.

■ *Ashok Pandey, CyberMedia Labs*

**What is the best laptop configuration for programming in C, Java, Python, and some major programming like cyber security and app development?**

■ *Anit Chakraborty*



A programmer can work on any laptop with a decent hardware configuration as it doesn't require any graphic rendering or huge processing power. However, that depends on the application which he is using and other factors, for example, developers

host the application locally on their laptop, and then they test its functionality. Also, developers use emulators that enables one computer system to behave like another computer system and some work with large data sets or modelling. In this case, the laptop requires competent processing capacity.

I recommend to choose a laptop powered by an Intel Core i7 processor with Intel UHD Graphics, and 8 GB RAM. It can easily handle most applications that developers use. Another important factor to consider is the version of Windows. I recommend going for Windows Professional instead of Home edition because it supports most programming languages.

■ *Ashok Pandey, CyberMedia Labs*

**I am using Android studio and want to purchase a new laptop, is a 14-inch laptop good for Android Studio?**

■ *Prem Singh*



Yes. A 14-inch laptop is good enough for running Android Studio because ultimately, you'll be designing mobile apps that will run on Android devices, which are likely to have even smaller screens. So developing them on a 14-inch screen is more than enough, and the device also becomes lighter.

Moreover, screen size doesn't really matter here, as long as the display is crisp and ensures that all coding text is clearly readable. So, more than screen size, you should focus on the screen quality and machine configuration for running Android Studio.

You'll even find full-HD (FHD) screens even in 14-inch laptops. On the specs front, Google recommends having at least 8 GB RAM for running Android Studio, no matter what the OS. Plus, going with an SSD is recommended as it will give you the performance you need while testing the apps you develop.

■ *Ashok Pandey, CyberMedia Labs*



# New World Order Time for Tech to Shine

Friday, 23 July 2021 | 9:30 - 5:30 PM

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**Sunil Rajguru**

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## We have entered our 35th Year

**W**hile the pilot of PC World India came in January, the first official edition was launched in July 1987. We subsequently became PCQuest and this July we have officially entered our 35th Year. In 1987 India was still a few years away from Liberalization. There was no World Wide Web. Floppy disks and Intel 386es ruled. (The 586 was the now distant Pentium) Computers were hallowed and kept in closed AC dust free environments. You had to remove your shoes to enter the “Computer Room”.

In the last few decades, PCQ was always there as a pioneering figure informing our readers and guiding the industry. We were the first to champion bulletin boards, the precursor to chat rooms. The first to give a CD and subsequently DVD with any magazine. The first with a Linux initiative for India. The first with the concept of PCQuest Labs, which became CyberMedia Labs. And so on and so forth.

It's been a great era for Indian technology. The Personal Computer transformed the country in the 1980s while desktop publishing led to tremendous benefits across all industries. The Internet came in the mid-1990s even though the ecommerce blast would come much later. It was also the time of the telecom revolution.

On the eve of 2000, the Y2K crisis led to a good number of doomsday scenarios for the world but it ended up making India an IT services superpower. While desktops and laptops gave villages a miss, not so the smartphone which dominated every aspect of India's geographies and social classes and could be called a true rural revolution.

Finally we had the Covid Era which was a time of technological acceleration or techceleration. No touch technologies. A supersized WFH culture with true collaboration. Smart healthcare. Ecommerce domination. It all happened. And much more. The 2020s will truly be the Decade of Technology because it has pervaded every industry and vertical, big or small, and every human being flung across all the far corners of the globe. We will come out of the Covid Crisis with technology.

So we will use the next year to look at both the magazine themes of the yesteryears along with India's tech journey. We will ask industry experts to share their journeys. We will walk down memory lane and look at the key events of the 1980s and 1990s, along with all the progress made in the new millennium. We will also take a look at the road ahead.

But most importantly we want to interact with our most valuable assets: Our readers down the ages. So please do Tweet us your memories at our handle @pcquest with the hashtag #PCQ35Years

*It all began  
in 1987*

*Sunil Rajguru*

# RANKING OF TOP 100 ENGINEERING COLLEGES EMPLOYABILITY INDEX

AUGUST 2021

HOW EMPLOYABLE ARE STUDENTS  
OF INDIA'S TOP T-SCHOOLS:  
A RANKING OF WHERE THE  
ENGINEERING COLLEGES STAND.



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# A glimpse of 35 Years of PCQ

The metamorphosis of India's first Technology Magazine



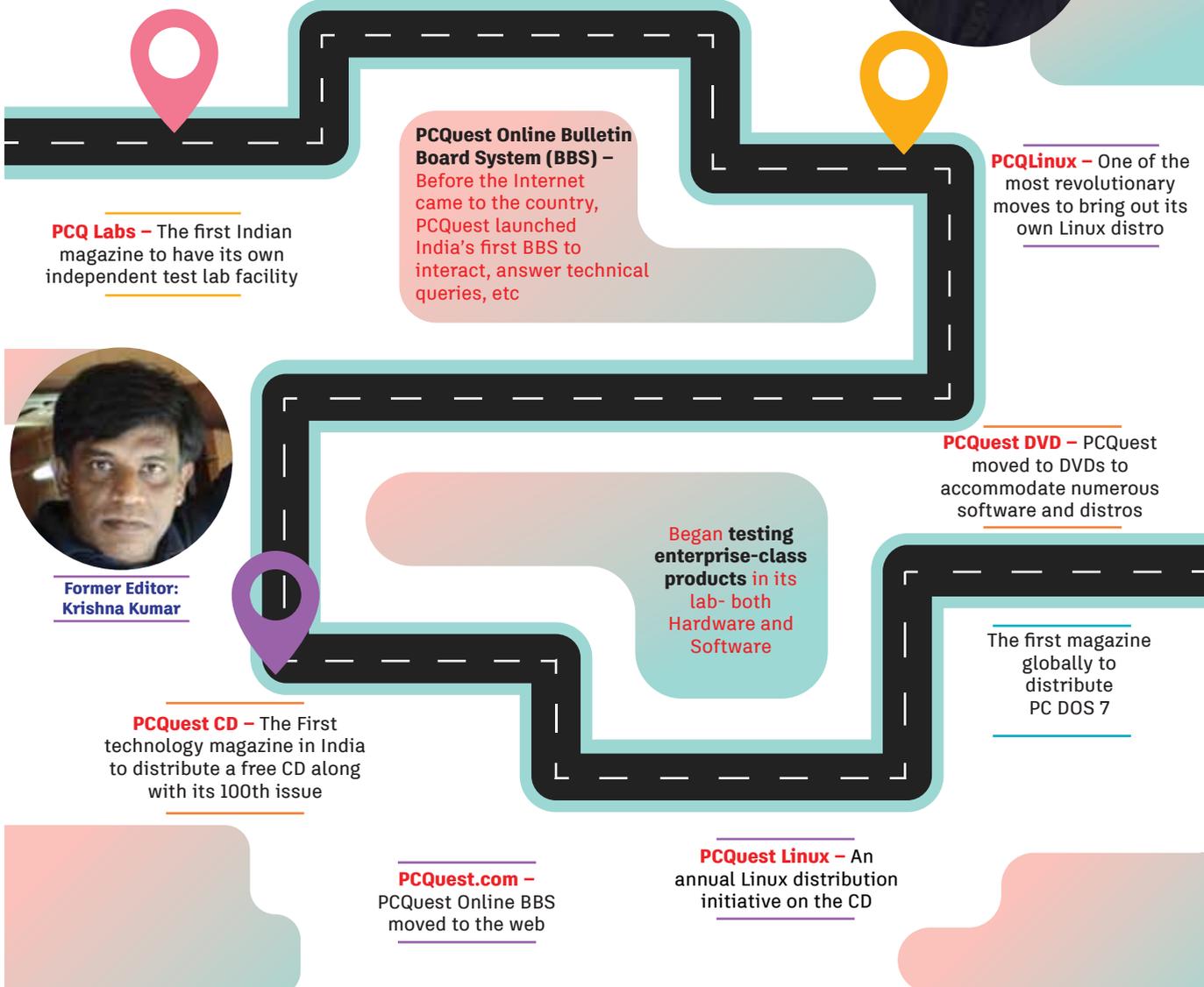
**Founder Editor:**  
Shyam Malhotra

Launched **PC World** in India, the name being licensed from the international PCWorld magazine

**PC Quest** – PC World become PC Quest



**Former Editor:**  
Prasanto Kumar Roy



Started recognizing India's Top **Tech-led Startups** and engaged them through a unique 360-degree Startup program

**Business Now Express** – A unique outreach program for Indian SMEs

**PCQuest SMB Forum** – A series of roadshows that continued for 5 years, covering over 32 cities

**Best IT Implementation Awards** to recognize and honour all the good IT projects in the country

**TechLive (Initially called QTy)** – PCQuest started its own videos for distribution along with with the DVDs

Started a separate magazine, **SMB Handbook** and sent it out to the SMBs quarterly free of cost and took it online in a later phase

The first IT magazine to introduce **QR codes** in India



**Editor: Sunil Rajguru**

**PCQ video interviews** – When the pandemic hit PCQuest conducted a wide variety of video interviews with tech leaders across industries

**EV tech Maturity** – For the first time, PCQuest covered electric vehicle technology and innovation

**PCQ User's Choice Awards** – Users' Choice and Most Wanted IT Brands relaunched with the new identity

**PCQuest Gaming** – PCQuest came up with the Gaming India special

**Enterprise Solutions Showcase** – The first event ever in India to showcase IT solutions in action to the CIO community

Set up its own **High Performance Cluster**. PCQuest was the first magazine to do it out of 20 P4 based machines connected over a Gigabit Ethernet network

**Spark IT** – A mega developer conference series with CIOl that helped developers and project managers stay ahead of the curve

**Readers' Query Service and PIMS** – Another first in India, to allow readers to ask for more information about any product

**Users' Choice and Most Wanted IT Brands** – The only survey in the country that captured the brand preferences of key IT decision-makers

**Former Editor: Anil Chopra**

First to setup **PCQ online forum**, and gained 3L+ users



# AI: Driving the future of Software development

**Ashok Pandey**

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With increasing digital transformation, the need for custom software is also increasing. AI in software development is impacting each phase of the software lifecycle, enhancing, and automating the traditional processes, and improving productivity through speed, quality and cost

**T**he Artificial Intelligence (AI) revolution is silently brewing in the way we think about and write software. Popularly, the next wave of AI-driven software development is known as Software 2.0. You often find statements like, “AI is eating software.” We’re not sure about that, but one thing is true: AI is changing the way software is written.

Imagine the traditional flow of software development. A programmer identifies the key idea (algorithm/approach) to solve a problem and, subsequently, writes appropriate code. In this workflow, all the hard work of coming up with the approach to the problem rests firmly on the programmer’s shoulders. (Good for everyone, except the poor, put-upon programmer).

But imagine a slightly different scenario. An AI algorithm is provided with examples of expected inputs and outputs. Using this information, AI determines the correct algorithm/approach that would result in different inputs being transformed into appropriate outputs. (And our programmer becomes a little less put-upon in the process. Win-win.)

Programmers painstakingly and carefully design software systems, “instruction by instruction,” in a process that can be slow, tedious, and error-prone. But, with new developments in AI, that is all changing. Instead of programming “instruction by instruction,” the industry is moving to a paradigm of programming “example by example.” Many examples of what we want the program to do can be collected (or not do) and labelled using a simple scheme. These examples are then fed to a machine learning algorithm that trains our algorithm. At the end of this process, a “trained model” appears that can be used as a program.

The software industry, on some level, has started to accept this idea. It is no longer a question of whether AI will change the way we write software. It is just a question of when.

One of the important ideas facilitating this new way of programming is neural networks. Multiple layers of neural networks are used by deep learning to extract and transform data. Each neural network layer takes its input from the previous layers and progressively refines



**ANURAG SAHAY**  
Head of AI practice,  
Nagarro



“Right now, the software industry is only at the start of the AI transformation. Currently, there are a lot of simple deep learning tools widely available. And the field for deep learning engineers is growing to match. AWS Sagemaker or Google AutoML are well-known examples of tools to help build AI programs. TensorFlow, Pytorch, and many other libraries and tools are beginning to create the ecosystem of deep learning technology. These are exciting times. We expect more and more tools to become available and further spur the AI automation revolution.”

them. The layers are trained by algorithms that minimize errors and improve accuracy. In this way, the network learns to perform a specified task, but it can be designed to perform any task if one has examples. This technique allows us to devise very complex instructions with the help of examples. This is something that even a very smart programmer would struggle to do.

Using deep learning, we can automatically create programs. But these programs look very different from the traditional programs we are used to seeing in C, Java, or Python. These deep learning programs are simply a collection of numbers. Lots of them. (Seriously. Whatever you are imagining isn’t enough. We are talking millions, if not billions, of numbers.) These numbers make up important parameters of the neural network. Using these numbers, we can reconstruct a neural network to complete any task.

AI programs are design specifications of neural networks. And whoever has this collection of numbers can build a neural network that can solve the specific problem it was trained to do. It is a lot to think about, but we need to get used to the idea. It is strange to think of programs that look like a collection of numbers. But that is the future of AI-driven

software creation.

Software 2.0 is a paradigm shift. The idea is new, the tools are different, and the people trained on these tools are different alt. So, naturally, the process of developing software in this mode is also very different from traditional software development.

Iterations guide our process, and, in many ways, the process is designed around them. We discover business requirements in these iterations. We collect better data in these iterations. We design better neural network models in these iterations. It is an exciting time as the software industry works to formalize and simplify this process.

▼ Artificial Intelligence to make software development easier

The ‘Ninety-Ninety’ rule of software development by Tom Cargill from Bell Labs states that “The first 90 percent of the code accounts for the first 10 percent of the development time. The remaining 10 percent of the code accounts for the other 90 percent of the development time.”

This implies that developers initially address low/medium complexity features & this builds all major features of the software. However, the remaining 10% are highly complex features and hence require the most



**RADHAKRISHNAN RAJAGOPALAN,**  
Global Head,  
Customer Success,  
Data and Intelligence,  
Mindtree



“Companies and coders are increasingly using Artificial Intelligence (AI) to aid software development in everything from writing and reviewing code, detecting bugs, and testing software, to even optimizing development projects. AI has a huge impact on software development and is poised to enhance software and application development.”



**PANKAJ SACHDEVA**  
VP Innovation &  
India Site Leader,  
Pitney Bowes



“Developers are using AI during Planning and Design, Development, Testing, Deployment and Maintenance. Some phases such as Testing have more mature AI than others, but there is a noticeable AI footprint in each phase. There are growing use cases for Security and TechOps too.”

effort & time. AI intervention at both ends of this spectrum helps make the complete software development lifecycle much easier. It learns from data & the more we use it, the smarter it becomes.

▼ AI is impacting the SDLC in diverse ways. Here are some of them.

**Requirements Engineering and Management:** Requirements management is the process of eliciting requirements while verifying and tracking what end-users expect of the software application. This is one of the major causes of delays, cost overruns and failed projects if done poorly. AI assistants can detect incomplete requirements and quantification, thereby speeding up the review process.

**User Experience Design:** Quick prototyping is an area where AI-based tools can be used effectively. Hand-drawn wireframes can be quickly converted into clickable prototypes. Many open and commercial tools are available in this space. Microsoft’s Sketch2Code is an example of using a computer vision approach to identify controls and layout from hand-drawn images and generate HTML5 code.

**Architecture and Design:** This is exclusively done by humans, as complexities in mapping a business domain and design trade-offs pose many challenges to AI. Yet, AI assistants can aid reviews for best practices.

**Software Development:** The application of AI in coding and unit testing is an area where interesting AI tools are emerging. These include coding assistants, automated unit

tests, semantic search engines and natural language-based code generation tools, to name a few.

**Testing:** Testing tools have the widest adoption of AI. One example of the application of AI in testing can be seen in visual testing tools that can detect UI changes and automatically adjust test cases, minimizing build breaks. Another application is in generating automated test cases from manual test cases and test plans. A complementary area is test data generation that can be accomplished using generative adversarial networks (GANs). Opensource components, such as TGAN or CTGAN, can generate fully synthetic data from real data.

**Project Management:** This has been a manual activity with lots of mapping dependencies and managers struggling to arrive at the big picture. Start-ups such as Forecast are changing this through an AI-driven platform to integrate data from different enterprise applications, automate project management tasks, and bring in predictability across the project lifecycle.

#### ▼ Impact of Artificial Intelligence (AI)

The fact that AI has revolutionized businesses across the world is a no-brainer. For every business, particularly tech-driven ones such as Superpro, software security is a crucial aspect that cannot be overlooked. The system gathers data using the sensors and software installed on the customers' end. AI enables us to study the data using Machine Learning (ML) to distinguish any irregularities or threats. By integrating with AI tools, development becomes faster. Software developers adopting AI can also avoid false notifications and alerts and receive authentic early warnings.



**DR. RANDY ALLEN**  
VP, Machine Learning  
Software, SiMa.ai



“While techniques similar to AI have been employed in software development for a long time, AI proper has not yet impacted software development. “Similar” techniques have included dump analyzers that examine the core dumps resulting from an aborted execution of a software product for common causes and enhanced Lint-like analyzers that flag questionable, but technically correct, constructs such as “while(i = x)” and “a[i++] = i;”. Inferring common potential mistakes like these will be a ripe area for AI.”

The opportunities for automating software development using AI is massive. According to Gartner research, by 2022, it is expected that at least 40% of new application development projects will use AI virtual developers on the team.

Over 70% of work that is done manually by software engineers could be automated with development automation tools that are based on AI when combined with existing development technologies. GPT-3, the largest ML model released in June 2020 presents a significant opportunity for automating development and is already seeing adoption. While it is relatively early stages, enterprises and the development community is assessing both the efficacy in their environment as well as the impact on their business.

### Here's what our industry experts has to say about the Future Impact of AI



◀ **VARUN GOSWAMI**, Global Head - New Products COE, Newgen Software

“With the enhanced use of AI in software development, software developers can leverage no-code or low code frameworks to rapidly create complex applications. AI can help in making the coding process easier and accelerating development lifecycles. Furthermore, AI can analyze the usage trend and effectively predict the changes required in an application, thereby reducing any future downtime.”

Here's what our industry experts has to say about the Future Impact of AI

**BALAKRISHNA D R (BALI)**, Senior VP, Service Offering Head - ECS (Energy, Communications & Services), AI & Automation, Infosys

“While existing AI accelerators have shown promise in auto-generating / auto-completing code or documentation, the limitation of AI systems has been with respect to understanding the surrounding context. Present AI systems can comprehend a statement or function, but they cannot decipher a larger function, class, file, or project. Researchers are making efforts to understand larger surrounding contexts to predict (generate) more relevant code. This will enable humans to co-develop software with AI accelerators in pair programming mode. The AI accelerator can auto-complete statements/blocks of code that are written by humans. It can also auto-generate code from the description, which then will be manually corrected.”



**PADMASHREE SHAGRITHAYA**, VP, Head - AI & Analytics, India I&D, Capgemini

“Artificial Intelligence will enable developers to build better & smarter software, that are responsive in real-time to end-users and incorporates self-supervised learnings to reduce data dependency and enhance performance. Further, Explainable AI will form an integral component of AI-based software development as it will ensure that the results of the solution can be deciphered by humans - facilitating transparent “AI Glass Box” models - where humans have the control of determining when AI results can be trusted.”

**GAURAV TRIPATHI**, Founder & CEO, Superpro.ai

“AI allows software developers to build better software using technologies such as ML, Deep Learning, Data Analytics, and Natural Language Processing. AI will continue to significantly impact software development both in terms of design and creation.

AI's infinite potential is yet to be fully discovered by mankind. We have just scratched the surface and the impact it has created has already been a game-changer.”



**SHIVANAND PAWAR**, Product Manager - for Mosaic AI platform, LTI

“In the long term, we expect AI tools to evolve to write code for us, going beyond the current “no-code/low-code” tools we see in various specific domains. For example, Microsoft and Cambridge University have already developed an experimental tool to do this called DeepCoder.”

**PIYUSH JHA**, Senior VP – Engineering, GlobalLogic

“In the coming future, the next shifts are going to be more dramatic and drastic. As AI engines start becoming smarter, they will start to write complex pieces of code with the added bonus of being flawless and efficient. We are already witnessing low code, no code and citizen developer framework starting to become mainstream. It is no longer a leap of faith to see AI engines write entire applications themselves.”



**RAJEEV TIWARI**, Co-Founder, STEMROBO Technologies

“The Software Development of the future will be more complex requiring multiple variances, parameters, situations, behaviour analysis and multiple parameters. All this will lead to a much complex software development with advanced algos and deep learning techniques. At the same time, the Software Testing, Bug Fixing and Software Development Process will become complex and will require a great of parallel processing and data-intensive inferential decision making. All this is impossible to achieve without having AI being used to leverage Software Development.”

**SUMAN REDDY**, Managing Director & Country head, Pegasystems India

“By adopting AI in software development, traditional software development isn't going away, but it's getting a modern makeover. Software development tools with AI enhancements are an excellent example of how AI can empower rather than replace workers. Technology leaders are on a mission to help their companies build the future, and using AI to improve software development practices can help them achieve that goal.”



**RADHAKRISHNAN RAJAGOPALAN**, Global Head - Customer Success, Data & Intelligence, Mindtree

“With increasing digital transformation, the need for custom software is also increasing. Like DevOps and Agile methodologies, AI in software development will have a significant impact on productivity improvements. It will become commonplace over the next few years to have AI assistants embedded in every aspect of the SDLC lifecycle.”



**POOJA SINHA JUNEJA**, Software Development Manager, Clearwater Analytics, India

“In the future, AI will touch upon and revolutionize many other aspects of the Software Development Life Cycle where human intervention is still a must. The future of DevOps will be AI-driven through Swifter failure forecasting, faster RCAs, anomaly detection, analyzing past performances to name a few. AI automatically fixing bugs and just not being limited to detecting them. AI will almost certainly be used to detect gaps in existing technology and notify companies when new software is necessary.”



◀ **NIKHIL MISHRA**, Innovations Lead & Solutions Expert, ZingHR

“The future is already here. IMHO the very basics of tech outlay will be the first things that AI is changing. E.g., to build a product specially a SaaS one you might have to write 1000 lines of code, now all you have to do is just choose the skin of the product and get your data sets in and you have your ready app or product. In the same way, the world of software and hardware intelligence will evolve to integrate and bring both machine learning and deep learning to an autonomous AI mode to self-create, self-judge and perhaps self-decision. In all the above AI will be the key source.”

**DR. RANDY ALLEN**, VP - Machine Learning Software, SiMa.ai

“The main impact will be in the areas of debugging and supporting software – the “backend” of development – rather than in the direct development of software proper. Some programmers excel at both writing debuggable code and debugging running code. Inferring and deploying the commonalities among these programmers is a task ideally suited to AI. This will be an incredibly valuable area for AI given that the most expensive part of software development is debugging and support.”

**SRIVIDYA KANNAN**, Founder, Director, Avaali Solutions ▶

“AI could be used across the development lifecycle from needs understanding to designing and deploying including training to some extent. However, it can show maximum impact during the coding and unit testing phase to bring down the cycle time. While tasks such as test execution have already been automated using various scripted automation tools, what is being explored is to further automate using ML to create and manage tests. ML models are also being used to complete partially written codes and further training the models using the developers’ own code to auto complete codes. Also, scenario-driven API testing, test data generation and test insights and test self-healing could be good use cases. Some have gone to even look at auto ML to automate building ML models.”



Artificial intelligence (AI) is important in the design, development, and testing of software. It could help with software design, software testing, GUI testing, strategic decision-making, and automated code development, among other things. AI-powered software can enable efficiency for developers. It can halve the number of keystrokes that developers need to type, catch bugs and vulnerabilities before the code is reviewed or tested. It can also automatically generate some of the tests required for quality assurance and help predict deployment failures before hand.

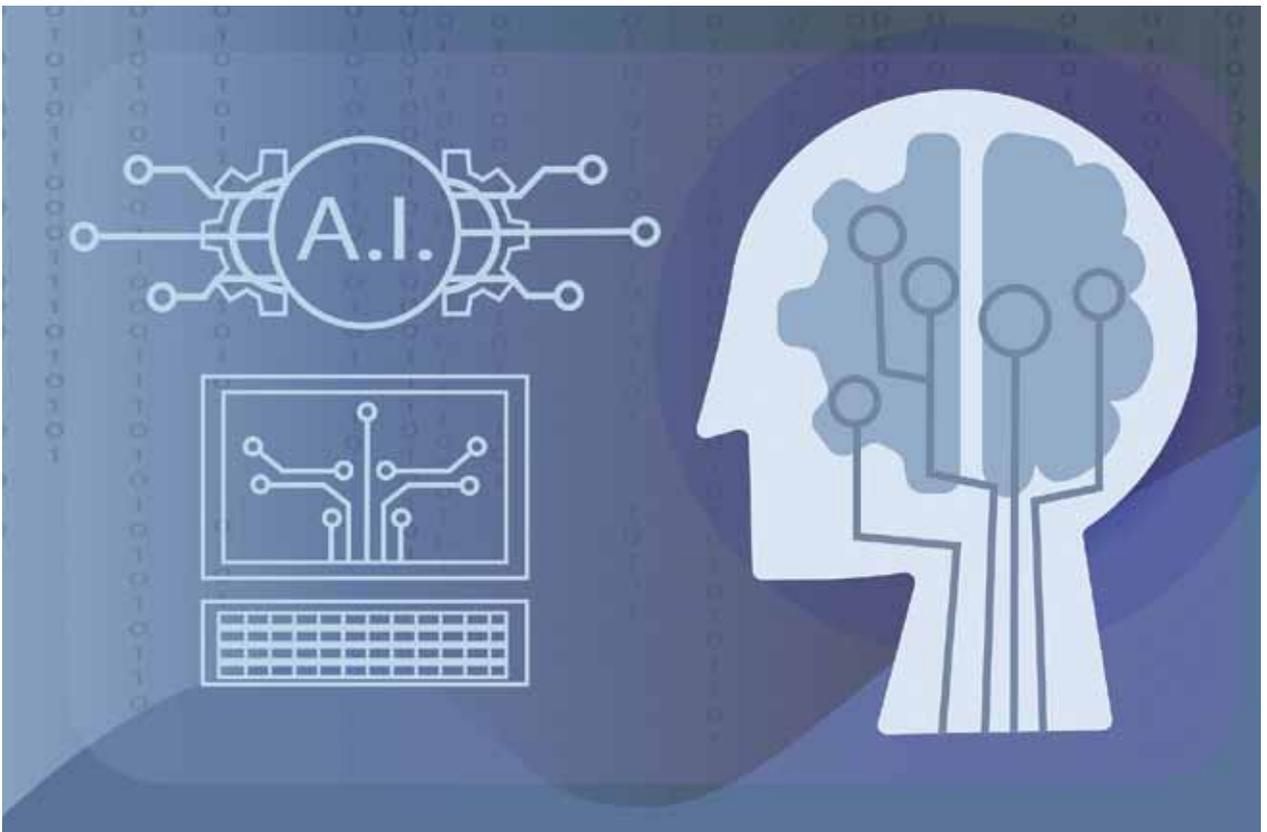
But in addition to AI as a tool to support

software development as we know it today, for certain use cases, AI provides a more fundamental shift in software development. Traditionally, if there is a problem to be solved we provide a program that describes a very explicit sequence of steps to be followed, and that results into a solution that drives certain performance KPIs. Modern-day AI machine learning and real-time decisioning systems operate differently. You only provide the problem and a way to evaluate the performance of a candidate solution, but the system will learn from feedback to generate the solution itself. ■

# AI's coming of age: Embedded AI is here!

**Krishnan Shrinivasan**

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With AI capabilities now being embedded at the device level, specific tasks can be performed on-device without the need to send data back to the cloud to run an AI model. AI models are run at the device level, on the data captured by the devices

Once science fiction in Hollywood films, artificial intelligence (AI) has become a technology that we have brought into our homes and workplaces to better our day-to-day lives. The groundwork is being laid for a more AI-enabled future – one where creativity is enhanced, productivity is increased, and businesses, beyond fast-food chains, are always in operation. Let's take a look at AI.

### What is AI?

AI is a term applied to computers, robots, or machines that exhibit aspects of human intelligence and reasoning, such as visual perception, speech recognition, and decision-making. To achieve these capabilities, AI works by processing data to identify patterns, make predictions, and recommend actions on any given task.

AI is commonly broken into two categories – weak AI and strong AI.

**Weak AI:** It is limited to performing a specific function. This form of AI is anything but 'weak' - it's highly intelligent at carrying out a task in its narrow scope. Some examples of weak AI include Apple's Siri, Amazon's Alexa, or Google Assistant. These programs understand certain keywords and produce responses to commands but can't quite discern the meaning of what was said.

**Strong AI:** Unlike weak AI which is limited in scope, strong AI is general in its function. It can perform a variety of activities. It can process, learn, and complete tasks entirely autonomously. Currently, there are no practical examples of strong AI available for public use, but plenty of applications are in development. One area that strong AI will



**KRISHNAN SHRINIVASAN**, VP & MD, Lam Research India

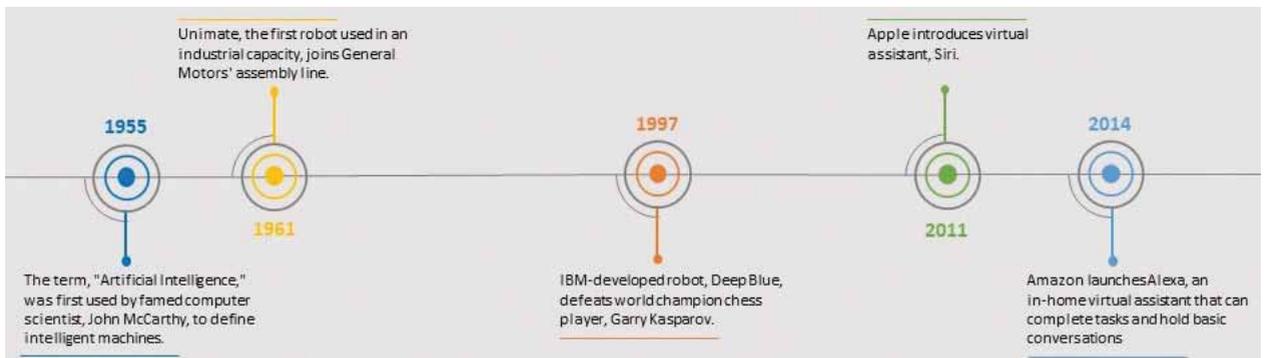
likely be deployed in is cybersecurity, whereby applications can learn from previous phishing activity and make security predictions from current trends.

### The subset of AI

Machine learning and deep learning fall under the umbrella of AI. While AI is a term to describe machines that can perform tasks, machine learning goes a step further – asserting that machines can also learn and adapt without being explicitly programmed. A subtype of machine learning, deep learning, uses an artificial neural network that acts similar to the human brain, to analyze data and learn.

A key differentiator between deep learning and machine learning is in how the systems learn and are trained. For example, if you were to sort your photos on your phone, you

### Major milestones in AI development



would need to present the machine learning algorithm with structured data, data that is sorted with identifiers like dogs, landscapes, and family. Once fed through the system, the machine learning algorithm will sort based on what it learned from your tagged photos. Deep learning on the other hand doesn't require structured data to categorize your images. Instead, it processes the image through neural networks that classify specific features. In other words, if a photo contains a mountain or a body of water, the algorithm will classify it as a landscape and if the photo has furs and whiskers the system would identify it like a dog.

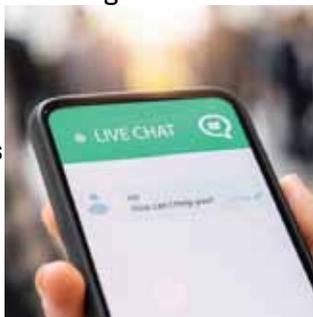
### Applications of AI

AI is all around us, with 77% of people using at least one AI-powered service.

Applications like Google Voice can be used to transcribe spoken words into written text with its automatic speech recognition. The application is also able to understand and translate spoken words across twelve different languages.



Natural language processing machines have reshaped workplace capabilities. With applications like chatbots and voice assistants, businesses are able to interact with customers in real-time no matter the time of day. Additionally, auto-correct and email filters help employees send more polished, mistake-free responses to customers and clients.



In the construction industry, real-time recognitions have revolutionized space, making construction sites safer and more secure. The AI software processes video feeds to extract real-time data while monitoring systems leverage machine learning to uncover actionable insights to

predict accidents and unsafe conditions.

In-home safety has also been drastically improved with the introduction of AI. Monitoring systems and home security cameras have significantly reduced the number of thefts and break-ins with IP network cameras and door cameras that each incorporate AI-powered facial recognition capabilities.



### Specialized chips for AI

At the core of AI, are chips that support the cognitive functions of AI-enabled applications. These applications are compute- and memory-intensive and the continued evolution of semiconductors has brought AI into our everyday devices.

The industry is shifting to new strategies in DRAM, such as stacking chips vertically using through-silicon via (TSV) technology, bringing high speed, high capacity, and low power to high-performance computing and AI.

With recent advancements in specialized chips, systems are being developed with embedded AI. Instead of AI computation and processing occurring in the cloud, AI functions are being performed at the device level.

The effects of AI can be seen all around us. Its development over the past 70 years cannot be overstated, as the once nascent technology now resides within most of our pockets. AI continues to improve the functionality and efficiency of everyday life, from auto-correct to the security of a construction site. In fact, the AI industry is anticipated to grow to a \$126 billion dollar industry over the next four years, due to its impact across sectors. ■

The author is VP & MD, Lam Research India

# AI in Classical Dance: No Goosebumps, Yet

Pratima H

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If AI can play Chess, if AI can do a surgery, if AI can write a song - what stops it from waltzing into hard-core artistic fields like Classical Dancing? The 'Dance' Part or the 'Classical' Part?

**A**nyone who has been mesmerized by a Kathak dancer's endless and effortless spins; anyone who has tried to learn the intricate gestures of Bharatnatyam; anyone who has broken ankles learning the impossibly-meticulous pirouette of Ballet – knows this for sure. It is a far-fetched idea to think that a robot can do it better and faster. How can it, when humans are still scratching the tip of the big iceberg of art and music? At least for now, and maybe thankfully, some stuff is still beyond the reach of Artificial Intelligence (AI).

Or is it?

### ▼ Dance Like AI is Watching

Experiments and endeavours are on full tilt – all across the world – to discover how, if at all, AI can make its way into the beautifully-complex galaxy of Dance. There is Louise Crnkovic-Friis who is exploring various forms of this intelligence. She has executed

a collaboration with a multimodal AI doing generative choreography, writing and semantic style transfer – contrasting and integrating it through the lens of neurodiversity.

Then there is NVIDIA whose researchers have worked in collaboration with University of California, Merced and developed a deep learning-based model that can automatically compose new dance moves that are diverse, style-consistent, and match the beat. It is a generative task with the potential to assist and expand content creations in arts and sports, such as a theatrical performance, rhythmic gymnastics, and figure skating – as Nvidia stated in a paper on this subject.

There is also Wayne McGregor who has been experimenting with AI for choreography with Google Arts & Culture Lan.

A lot of the stage has been covered and is being touched with AI – When it comes to the sometimes silly, sometimes cathartic, human muscle called – Dance.



But **Anuradha Nag, Artistic Director, Taringini School of Kathak Dance, San Jose** and a senior disciple of Kathak legend Pt. Birju Maharaj feels AI is still many years away.

### ▼ You Can Rotate, But Can You Twirl?

Nag, who has been learning and practicing this art since childhood, is not a sceptic. She was, herself, trying to know more about AI and is planning to do an interesting research on the subject. She has been hearing exciting stories about AI's foray into Art, specially from her niece who is a cognitive science student and a student who works at Nvidia. But she opines that while genres like Ballet are more about fluidity, something as intricate and as footwork-intense as an Indian Classical Dance would be tough to crack for any AI - for now. "I know that work is underway in areas like Yoga - for skeletal accuracy, *Mudras (Asamyukt)* in Bharatnatyam and gestures in Kathakali; but Kathak is a different genre altogether. It is not so much about Mudras in the technical sense. We also have gestures in *Abhinaya* and *Gat* parts of Kathak. Companies like Nvidia have tried the spins part too. But Kathak is a lot about *Jatis* in the 16-beat cycle. We can definitely feed in the data and get many combinations out of AI. However, it is hard to surpass a human mind here. AI needs data and

a human mind is creatively prolific and beautifully-unpredictable. Today itself I created a new Toda in *Jhaptaal* during a live class. It was spontaneous. But also not really. It emerges that way due to all the 40 years I have spent in this art. That's still a difference between a human and a machine."

Nag nails the difficulty on the aspect of *Riyaas*. "Our dance is a lot about constant and deep practice. I am fascinated by how AI was able to



recreate a performance in Japan. That can work well for heavier, and broader, movements. In Kathak, there is an unwavering emphasis on simultaneous movements of eyes, hands and feet. It's very intricate and very deep. That explains why a student bears so much resemblance to the Guru one follows. Maharaj-ji has redefined Kathak on many levels – in the way wrists, elbows, eye-angles and geometry work. That's complex and hard for AI – at least, for now. Maybe we can do something on the rhythmic part or collaborative part with AI, but I think there is a long way to go.”

Crnkovic-Friss, incidentally, has stated in her paper that recent advances in deep learning have enabled the extraction of high-level features from raw sensor data which has opened up new possibilities in many different fields, including computer generated choreography. “The Lulu Art Group has in collaboration with Peltarion developed a system, chor-rnn, for generating novel choreographic material in the nuanced choreographic language and style of an individual choreographer. It also shows promising results in producing a higher level compositional cohesion, rather than just generating sequences of movement. At the core of chor-rnn is a deep recurrent neural network trained on raw motion capture data that can generate new dance sequences for a solo dancer. Chor-rnn can be used for collaborative human-machine choreography or as a creative catalyst, serving as inspiration for a choreographer.” In fact, after six hours of training,

the RNN knew how the joints are related and it made its first, careful and somewhat wobbly attempts at dancing.

McGregor's tool uses a camera that watches dancers move in space. It suggests something from the archive– but can also offer ideas that are totally original. This is with the idea of reflecting a particular dancer's style, or combining the styles of two different dancers to come up with a hybrid.

Nvidia's paper explained that it is a decomposition-to-compositions framework which first learns how to move, and then how to compose. The team made this work by collecting dance videos of three representative dance categories including Ballet, Zumba and Hip-Hop. – which means over 361,000 clips or approximately 71 hours of dancing footage. The researchers exuded confidence adding that extensive qualitative and quantitative evaluations demonstrate that the synthesized dances by the proposed method are not only realistic and diverse but also style-consistent and beat-matching.

And why not! Data - that's good enough for any AI. Feed it good data and it will spit out something that's expected out of it – or who knows, something new. So AI can emulate dance but is it emulating or mimicking? And does the difference really matter? And can it really follow unique dance/dancer styles?

Also, what if AI is not about elbowing out (pun intended) humans but helping them as a collaborator or as a repository of data? Can AI be a good choreographer, at least?

### ▼ Choreographer-By The Side?

Yes and No. **Dr Ananda Shankar Jayant** reasons that all this takes a lot of intuitive knowledge. "And human intellect, per se, is always evolving." Dr. Jayant, who has been conferred the Padma Shri in 2007 and the Sangeet Natak Akademi Puraskar for Bharatanatyam in 2009 contends that it is never just about movement. "It's so much more than that. Plus, it's subjective and hinges a lot on unpredictable improvisation."



In a remarkably-objective way, **Dr. Saroj Sharma, Director, Kala Ashram College of Performing Arts** opines that AI can definitely be explored as one more creative avenue. "Technology has surprised us with so many possibilities and at so many levels that by now its prowess is hard to refute. It would be interesting to watch what an AI model comes up with when we feed all *todas* and beat-variations of a *Taal* into it." However, she maintains that humans would and should always see AI in a supporting role and not as a protagonist. "Human creativity would supersede technology at so many angles. We should use AI as an augmentation force and not the other way round."



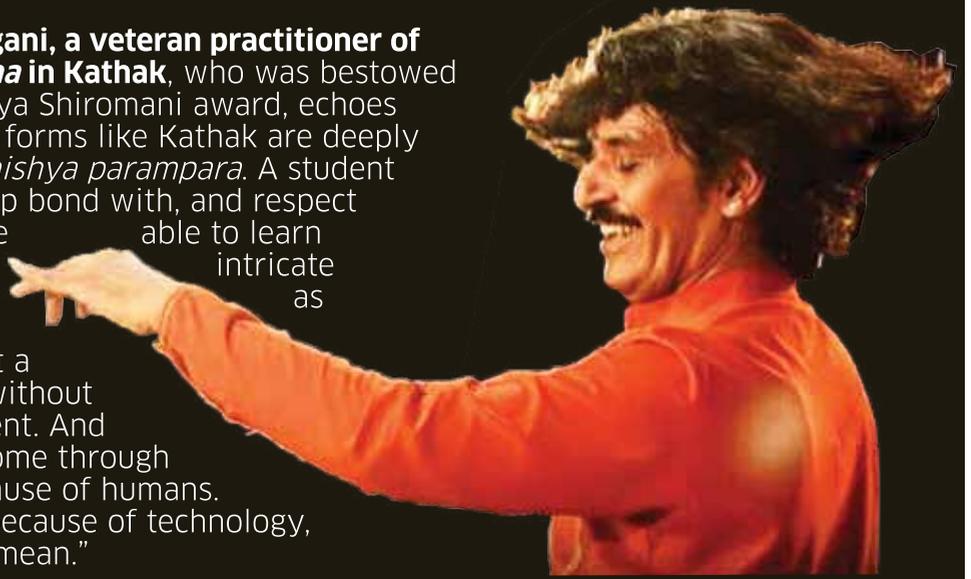
emulate what happens in the mind and soul of a dancer."

Plus, there is the abstraction aspect. Dr. Jayant reminds us that classical dances are very abstract in their essence – there are so many emotional layers and the whole performance is so experiential that it is hard to imagine a robot on stage. "It is a spiritual moment at times. There are so many variables on stage – during a live performance – the artist, the energy, the time, the day, the audience – everything plays together to create a great performance. It can be put in a box."

Nag – who has been bestowed with the Sringarmani award and has been working with legendary gurus and choreographers such as Pt. Birju Maharaj, Smt. Kumudini Lakhia, Smt. Kalanidhi Narayanan and Prof. Deitmar Seyffert of Germany - has a hands-on perspective on the aspect of human augmentation. She avers that a lot of research on that front is happening at many Tech giants already but the human factor stays indispensable. "Collaboration is a good possibility but even there, it should be done under human guidance. In my lifetime, I do not think AI will be able to dance as we artists do. It can be tried for dances where structural angles are stressed upon like Odissi or

Dr. Sharma, who has been awarded the 'Nitya Sadhna' recognition, iterates that argument in another form. "Kathak is about the symphony of mind, body and soul. A robot can simulate the body part but it is hard to

**Pt. Rajendra Gangani, a veteran practitioner of the Jaipur *gharana* in Kathak**, who was bestowed the Shastriya Natya Shiromani award, echoes that thought. “Art forms like Kathak are deeply rooted in *Guru-Shishya parampara*. A student has to have a deep bond with, and respect for, the Guru to be able to learn something as intricate and soulful as Kathak. It cannot be done at a superficial level without human involvement. And technology has come through humans. It is because of humans. Humans are not because of technology, if you get what I mean.”



Bharatnatyam. Speaking of Kathak, only some *Todas* in *Vilambit laya* may be tried for training AI. But the real Kathak, specially the one with Maharaj Ji’s style – that’s not possible. There are so many *sams*, body angles, so much beauty and human depth – that an AI would not be able to get close at all.”

### ▼ **The Jugal-Bandi Will Take Time**

That said, virtuosos like Dr. Sharma and Nag are not dismissive but open to AI – and would love to explore more. “I would be curious to know what can AI reproduce and whether it can create something new in compositions for artists like me. I am intrigued about what some researchers have done with *Ragas* and *Raginis* in Indian Classical Music.” Nag adds that she is not totally against the intersection of technology. “Our creativity doesn’t diminish because we have to feed in the system with many examples for it to recognize and then be able to bring out that we perhaps missed out on.”

Dr. Jayant is also grateful in the sense that technology has evolved in so many ways like projection mapping, lighting production etc.. Artists are thankful for all that they can do with technology. “But technology is an adjunct to Art. It cannot lead Art. It can only mimic or synthesize some parts – and repeat. Even if I imagine a futuristic VR performance with holographic wonders, the audience would still know that it is not a real human artist

there. Nothing can replace a live, and sublime, performance. If it can, that day has still not arrived.” Incidentally, she has conceptualized and created *Natyarambha*, a first-of-its-kind digital arts initiative – as she describes it- a Bharatanatyam practice app that intersects at the crossroads of tradition and technology, and enables a traditional art form ride the technology wave

All in all – something as abstract and as intricate as an Indian Classical Dance form would be quite a challenge for the next frontier of AI. In Classical Dance, there is ‘*Nritt*’ and then there is ‘*Nritya*’. The former is about structure and body movements. But the latter is where the catch for AI lies- because it is all about emotions and an individual’s signature on the dance. That unique stamp cannot be modeled into an algorithm.

Of course, AI’s role in adding to the creativity of artists and composers would be quite a milestone to watch for. But would it be able to mesmerize and travel to the depths that a true human artist does – well, that’s a day that will take a long-long time to come – as per all the experts of the Dance we spoke to. The unspoken ‘Wow’ between a Guru and a student; The gooseflesh one gets when watching a great performer whirl in the air – that’s not some data that we can feed and let AI chew upon.

AI may have a big brain but it would still have - two left feet. ■

# AI is a game changer for Video Analytics

**Rajesh Dangi**

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With the ability to efficiently assess voluminous data produced by videos, Machine Learning and Deep Learning algorithms have significantly spiked up the adoption of video analytics across industries

**T**he internet has an ocean of images and videos that exude diverse meaning or context to its creator. It can become a relevant source of information should there be a way this data can be read, analysed to arrive at coherent information, and applied to derive meaningful applications, beneficial to a larger audience.

Video surveillance is a common technology owned by public and private entities alike to monitor their surveillance requirements. Video Analytics on the other hand is an advanced emerging technology that gathers, processes and analyses the visual content from the CCTV/IP cameras, making the data an asset that can be put to meaningful use to empower businesses.

#### ▼ Evolution of Video Analytics

Nazi-occupied Germany was one of the first countries to possess video surveillance to observe the launch of long-range guided ballistic missiles. Later, the first video surveillance system was installed in 1942 for observing the launch of V-2 rockets ( long range ballistic missiles) but later on, evolved into other industrial use cases. Cut to the 1970s, the evolution of video analytics began with VCR technology making it easier for companies to record video camera feeds. However, this offering only facilitated the storage of data without the ability to read or derive any useful information from it.

The technology witnessed massive advancements from the 90s, when video surveillance was adopted by retail stores, service centers, warehouses, etc. ensuring safety and security, gathering information to boost sales, track inventory, and improve service. Today, video analytics has grown by leaps and bounds to imbibe the latest advancements such as Artificial Intelligence (AI) and Machine Learning (ML). The technology has further boosted Video Analytics by offering a powerful and scalable method for extracting detailed and relevant information from these virtual vision systems.

#### ▼ How AI powers Video Analytics

Video Analytics also known as Computer Vision majorly follows pattern recognition,



**RAJESH DANGI**, Chief Digital Officer, NxtGen Infinite Datacenter

a technique by way of training a computer model to read/understand visual data by feeding the image dataset and then subject the dataset to various AI/ML techniques, or algorithms. This process enables the system to derive intended patterns related to predefined labels establishing a context from the new images it 'sees' from the real-time inputs from camera feeds or media files. Video Analytics when applied to these captured media feeds enable the users to slice the feed into frames as images, identify and recognize objects inside those images such as animals, objects, colours, and even the texts embedded inside the image which helps establish a logical connection/context to the content.

Video Analytics when coupled with more evolved ML technologies offers a plethora of criteria that can be applied to the media feeds/images. Deep learning has been a game-changer in the approach to Video Analytics. Deep learning aids problem solving

by being able to extract common patterns and transform them into a mathematical equation and thereby helping in classifying future pieces of information. Deep learning is a rich methodology, encompassing neural networks, hierarchical probabilistic models, and diverse unsupervised and supervised feature learning algorithms. The recent surge of interest in deep learning methods is testimony to the fact that they outperform all previous state-of-the-art techniques as well as the abundance of complex data from different sources e.g., visual, audio, medical, social, and sensor. With such remarkable progress, this technology has found its place across verticals and applications.

### ▼ Applications of Video Analytics across industries

In the current situation, the potential of video analytics can be well utilised by industries such as Healthcare, Education, Manufacturing, Banking, Civic Services, Hospitality among many others. For instance, in healthcare, video analytics can be efficiently utilised to monitor the movement and access of bonafide healthcare professionals. Similarly, in the manufacturing sector, it can be used to manage workers' movement in an area while addressing the COVID safety and hygiene protocols. The list of Video analytics applications and use cases is endless as the adoption continues and foreays in solving complex and impactful problems across multiple domains ranging from safety, security to workforce productivity

Furthermore, public safety is a non-negotiable agenda for any government, enterprises, and service providers managing large crowded public places. Surveillance refers to the processes of focusing systematic and routine attention on certain human behaviours for influencing, managing, protecting, or directing purposes. Video Analytics systems for public surveillance

have developed significantly in terms of object detection, tracking, classification, behaviour analysis and optical character recognition for ANPR (Automated Number Plate Recognition). Facial recognition algorithms can detect, recognize a particular person, vehicle thus improving accuracy and reliability to monitor real-time situations, facilitating greater mobility management, and even gathering evidence for law enforcement.

### ▼ Video Analytics-as-a-Service

Thus, in a nutshell, the inclusion of video analytics has created endless possibilities

and avenues for diverse audiences by creating a significant value proposition. The technology which was accessible to CAPEX-heavy public bodies and enterprises is now at offer as a service with minimal infrastructure modifications. Today the service is also available as an end-to-end offering, with hardware, software, and services bundled together as a single subscription, thus significantly reducing

the burden of multi-vendor, multi-technology management and cost-effectively delivering desired results as guaranteed outcomes. With the ever-dynamic nature of technologies and its resulting upgrades, there is an immense potential of Video Analytics-as-a-Service that will chalk inroads into many unchartered territories, assisting professionals to make informed decisions faster while providing enriched and powerful consumer experiences in the future. So, are we there yet? Yes, but partially. The technology has evolved by leaps and bounds, though its adoption needs to be welcomed at scale and that, in turn, will enable the entire ecosystem to achieve the full potential of Video Analytics-as-a-Service. ■

The author is Chief Digital Officer, NxtGen Infinite Datacenter

▼ AI/ML in video analytics enables the system to derive intended patterns related to predefined labels and establish a context to the new images it sees from the real-time inputs from camera feeds or media files

[https:// AI](https://AI)

# Addicted to memes? AI can help you create one!

Soma Tah

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**A**s social media and social messaging apps such as WhatsApp, Facebook, Twitter, Instagram, etc. continue to become all-pervasive, netizens have found a new way to communicate is through memes. Popularity of memes often surpasses the emojis and GIFs even, purely because of its fun way to transform any conversation with timely, and relatable content. Brands are also riding the meme wave to connect with the users.

Making memes, however, is not an easy task. Memers often rely on a patchwork of unreliable photo-editing tools which generally do a shoddy edit job. The popular meme-creating platforms take the pain away. The popular Indian meme-making app, MemeChat, for example, has integrated an AI Meme Generator (AMY) keyboard in its app which makes creation of memes a matter of a few minutes. It supports all the messaging applications.

## ▼ Is it easy to make personalized memes?

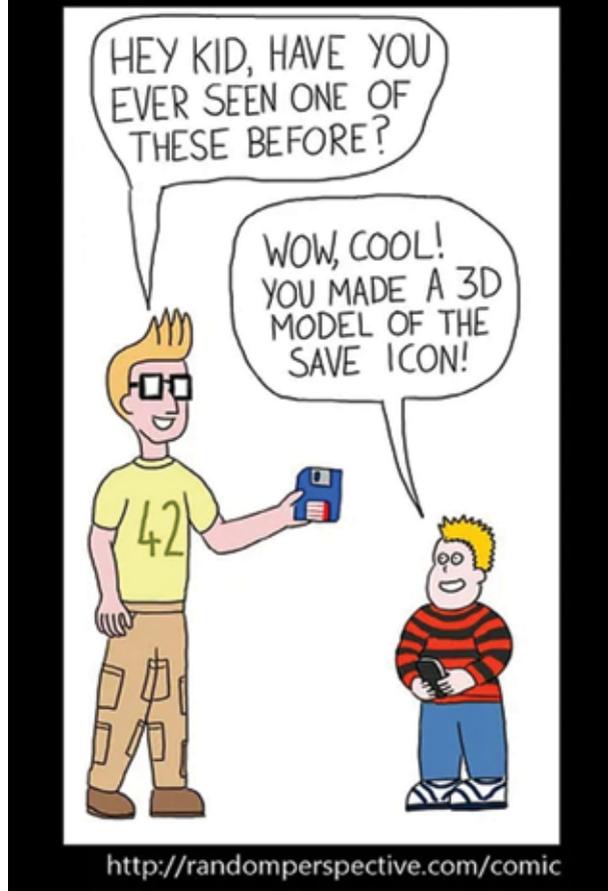
Explaining the challenges MemeChat CEO & Co-Founder, Kyle Fernandes said, "It was



**KYLE FERNANDES**  
CEO & Co-Founder,  
MemeChat

definitely difficult to actually even consider the fact that the complexities of humor could be modeled by AI, or with fundamental mathematics approximation theory. Also there were problems such as selecting the best image and the best caption for creating memes, approximating the sense of humor of the memer, etc. So, we started taking the users preferences and customization into account. There is a set of parameters that we have modeled are mostly the kind of content the user would like to see, or the kind of memes he/she likes to interact with, what kind of features he/she is using, etc. We are using this data and learning to help memers come up with a lot funnier memes quickly."

The ability of AI to learn and evolve continuously is very crucial here. As the meme creators create new memes, the AI-based meme generator starts tracking all the information such as the kind of templates or the captions he/she is using and learning these data to understand the changing state of humor on our platform, and in the country as well. ■



Creator: Ben Dickson

<http://randomperspective.com/comic>

# Tackling the academic Contract Cheating menace with AI

Soma Tah

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**O**ne academic misconduct that has become a serious issue in the academic arena nowadays is Contract Cheating or Ghost Writing that involves students seeking help from an external party- who writes in exchange for money, or friends, family and relatives to complete their assignments or assessments.

Turnitin, the academic integrity and originality checking solutions provider, during a survey found that about 66 percent of instructors surveyed have admitted that they would not act on potential cases of contract cheating due to insufficient evidence.

Not many institutions have duplication detection tools and processes in place to deal with contract cheating issues and ensure academic integrity. A research paper reveals that Georgia Tech University in the US, for example, has built an AI agent, Jack Watson, that poses as a contractor, monitors auction sites, and helps to identify students attempting to purchase assignments. The AI agent, however, is a work in progress still and the researchers are automating the monitoring and identification of contract cheating further.

## ▼ Can AI effectively curb this problem?

Now one issue in dealing with plagiarism or contract cheating is that it is very difficult to tackle without an intelligent or AI-based tool that continuously learns and adapts itself. While the use of AI to address contract cheating in academic institutions is still in its early days, this technology certainly opens



**CHAITALI MOITRA**, Regional Director- South Asia, Turnitin India

the door to new possibilities for the academic institutions not only to uphold academic honesty, but upholding the value of a degree also.

Chaitali Moitra, Regional Director- South Asia, Turnitin India said, "AI tools can be a great enabler for educators, but there are some limitations of the technology as well. For example, when it comes to essays or creative writing, teachers need to spend more time on the assessments part. But the biggest challenge with embracing AI tools in upholding academic integrity is that educators often fail to use these tools effectively for the lack of understanding of how these tools work."

Turnitin, for example, is harnessing the power of AI in their solutions such as Originality, iThenticate, and Similarity to identify the instances of contract cheating, and detect patterns and help the institutions tackle this menace effectively. ■

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# Gig-Economy continues to thrive with smart cross-border payments

**Soma Tah**

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Cross-border payment platforms play a crucial role in enabling this freelancing ecosystem, helping businesses and professionals to pay and get paid globally, as easily as they do locally

**T**he future of work has been changing rapidly with the entrance of millennials and Gen Z into the workforce and manifesting in their increasing tendency to treat jobs more like gigs and not some career destinations. Various study reports suggest that a growing majority (as many as 64 percent) of millennial full-time workers do side hustles. Gen Xers and Baby Boomers are also catching up fast with this trend. Working as independent professionals or freelancing has become an increasingly popular career choice for many of them as they can work on their own terms.

Digital technologies have made Remote Work accessible and accepted by an increasing number of organizations who have started embracing the growing reality of generational shift into the modern workforce. Thanks to the proliferation of freelancing marketplaces such as Upwork, Toptal, Fiverr, etc. and the availability of efficient collaboration tools, and hassle-free payment solutions companies can find remote workers and skilled talents worldwide and connect with them.

The ongoing pandemic crisis has also changed the future of work forever by making remote and on-demand workforce the new norm, and opened new doors for many skilled workers. While many found their world upended with mass layoffs, furloughs, and pay cuts some of them just took a lap of faith



**ROHIT KULKARNI**  
VP & Regional  
Manager- South Asia  
& MENA, Payoneer



“Third-party API integration with useful tools such as Envoice, TopTracker, Time Doctor and other business platforms makes it easier for freelancers to transact on our platform”

and started as independent professionals or freelancers.

### ▼ The Gig is up despite pandemic

“Although people had to reset, they found businesses who wanted to outsource to the freelancers in India. Cost arbitrage plays a crucial role here. If you hire a freelancer in the US, you have to pay almost \$40-45 an hour, or sometimes even upwards of \$50 an hour. In India it is mostly at \$15-30 an hour depending on what kind of work you’re getting done

## Top 10 Fastest Growing Freelancing Countries

(Based on YoY revenue growth)

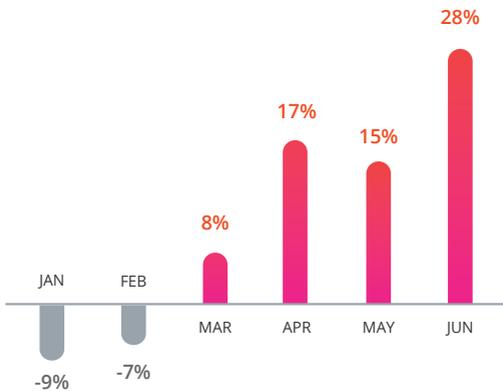


Data & Image Source: Payoneer

for cost arbitrage,” said Rohit Kulkarni, Vice President & Regional Manager– South Asia and MENA Region at the cross-border payment platform, Payoneer.

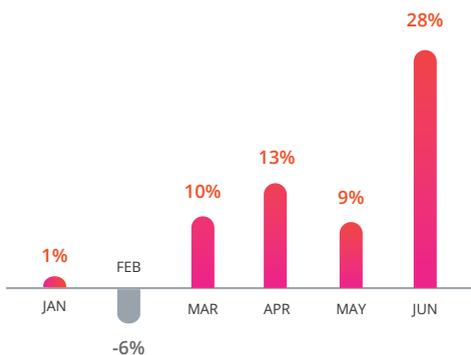
Payoneer’s data indicate that the pandemic could not dampen the thriving freelance economy. In most markets, the freelance economy is still going strong and continues to show strong signs for even stronger growth. India saw a massive 46 percent increase in new freelancers from Q1 to Q2 2020 to emerge as the second fastest growing freelance market in the world.

### Monthly Growth in Global Freelance Revenue



The data above represents the month-on-month growth in global freelance revenue since January for the first half of 2020.

### Monthly Growth in Indian Freelance Revenue



The data above represents the month-on-month growth in Indian freelance revenue since January for the first half of 2020.

Data & Image Source: Payoneer

India’s freelance economy currently consists of an estimated 15 million freelancers. After

comparing 2020’s winter holiday season to 2019’s, Payoneer data reveals that global freelancers actually enjoyed a 54 percent year-over-year increase in revenue.

### ▼ Simplifying the global freelancer payments is a must

Although many freelancers work for clients based all over the world in this increasingly borderless world, making payments to international freelancers can be a costly and cumbersome process. The space is often fraught with challenges such as high markups on currency exchange, lack of transparency on fee structure, and complex documentation processes, etc.

Getting payment from clients in USD, GBP, or EUR can be an extremely cumbersome process to manage, confirmed Swati Agarwal, an independent professional who is running her own company now. She started her career as a computer engineer in Tata Consultancy Service, but chose to move to her hometown, Siliguri- a small town in West Bengal to start as an independent professional.

After getting good response from the clients abroad, she founded a company called ‘Appycodes’ and is managing a team of 18-20 people now. Recounting some of the hassles related to cross-border payments she faced during the process, she said, “We faced a lot of issues after the introduction of GST in India as services exporters are required to furnish a Foreign Inward Remittance Certificate (FIRC) to get GST benefits. But obtaining FIRC used to be a very tiring and costly process, as we needed to provide paper applications to banks for every transaction, while banks used to charge significant document fees to process FIRC requests.”

However, things are not the same anymore, thanks to the continuous innovations taking place in the Payment Service Providers (PSP) space.

Pymnts in one of its ‘Gig Economy Tracker’ in 2020 observed that gig workers/freelancers, especially those who are on the younger side are not ready to accept traditional excuses like international payments take more time or that currency conversions are costly and difficult.

### ▼ Choosing the right cross-border payment solution

It is very important to choose the right PSP who not only helps the users to do cross-border transactions as quickly and cost-efficiently as possible, but also does it in a seamless manner.

Partnering with third-party providers equipped to handle cross-border payments such as PayPal, TransferWise, Payoneer, etc. can iron out a lot of freelancing payment issues. “Third parties can mitigate potential payment process hiccups, including foreign exchange concerns and payment speeds. They are also better able to educate businesses and gig workers about the costs involved in sending payments via wire transfers, physical checks or other methods because many utilize automated software that tracks shifting foreign exchange rates and other facets that impact currency exchanges,” suggested the Pymnts report on Gig Economy.

There are PSP platforms which allow freelancers to get paid from freelancing marketplaces and private clients directly to one single account. These platforms also make the transaction experience seamless for the users on the platform by allowing users to send invoices, generate payment requests, track them, send reminders, etc.

Reaching new markets also becomes easier if the platform facilitates a wide range of payment and settlement currencies. As setting up multiple bank accounts in the countries that they are looking to accept payments in can be costly, selecting PSPs who allow use of local currencies for transactions is a good option. This can help keep the pricing transparent. Checking the transaction costs and the forex rates they offer is also important. Low forex rates raise the costs of currency conversion, for example, if you convert USD to INR, the deductions will be pretty high.

It is wise to select a PSP that offers a secure, global payment gateway enabling funds to be securely transferred between the professionals, businesses, and the issuing and acquiring banks. It validates the payment and encrypts the sensitive financial data that is being transferred between the relevant parties.



**SWATI AGARWAL**  
Founder,  
Appycodes



“Getting payment from clients in USD, GBP, or EUR earlier used to be an extremely cumbersome process to manage and so was obtaining FIRC, when GST came into play”

### ▼ The key lies in localization and co-creation

Unfortunately, no company has been able to crack cross-border payments issues fully yet. But keeping the compelling prospects of cross-border payments in the gig and freelancing economy in mind, it has become extremely crucial for the PSPs to listen to these users carefully, understand their challenges to innovate further.

Some of the features and services that Payoneer provides today on its platform are the result of active listening, said Kulkarni. Payoneer, for example, supports third-party API integration with useful tools such as Invoice, TopTracker, Time Doctor and other business platforms- which makes it easier for freelancers to transact on its platform. Platforms like PayPal and Payoneer also offer automated digital FIRC to ease the GST-related woes of the freelancers.

“We are using our expertise to do many such localizations and create a conducive environment for the independent professionals/freelancers to grow globally. Helping users like Swati to get paid in a seamless manner, faster and at a low cost is going to help us transform some of these individuals/ freelancers to grow into small and medium businesses and hopefully to become much larger organizations at some point of time, driving a lot of transformation for India globally,” added Kulkarni. ■

# The 'not so fine' print behind the collaboration solutions pricing

**Pankaj Gupta**

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When it comes to the pricing of enterprise communication or collaboration solutions, almost every platform can offer a similar, competitive rate card on the surface, but bill a considerably different cost for similar solutions

**B**usinesses these days are increasingly looking for enterprise communications solutions to ensure business continuity, create distinct consumer experiences, and enable multilateral collaborations. As most mid and large-size companies look at implementing communications platforms according to their specific needs, often budget becomes the deciding factor between the plethora of options available today. However, the pricing of most CPaaS or Communications APIs service providers is not as simple, transparent, and comparable as it is for, say, choosing among the top 3-4 telecom service providers based on their tariff plans. Thus, CTOs and IT heads need to scratch beneath the surface to compare the pricing of shortlisted service providers to avoid any shockers at the time of billing.

Here are some filters that they can use:

#### ▼ Room Size for Video Calls

The first and foremost consideration is the room size for any video call. While some platforms charge based on the number of participants and the number of minutes that they are part of the call, i.e., for a 2 min video call among 3 participants, the calculation will be  $3(\text{participants}) \times 2(\text{minutes}) \times \text{tariff}$ ; others charge based on other parameters like “per subscribed minutes”. Using “subscribed minutes” as a metric makes the billing more complicated as “subscribed minutes” are calculated as  $N(\text{participants}) \times (N-1) \times \text{Duration}$ , where N is the number of participants and Duration is the total duration of the video call. Using the same example of 3 participants over a 2-minute video call, the resulting charges would be  $3(\text{participants}) \times (3-1) \times 2(\text{minutes}) \times \text{tariff}$ . So, even if both platforms offer the same tariff, the former is half the total cost of the latter, who are using “subscribed minutes” as their pricing metric. And this example is only based on a 3-party call. Imagine if it is a larger group call, the cost will be exponentially higher!

#### ▼ Screen Sharing

Be it online team meetings, a video conference, or a client presentation, we cannot imagine a collaborative digital world



**PANKAJ GUPTA, CEO & Founder, EnableX.io**

without screen sharing. Often, to make the pricing competitive, platforms talk about key metrics such as the number of participants, call minutes and recording minutes only. However, the fine print is that many of them count every screen share as one additional (up and down) stream of communication, which is treated as an additional participant. This increases the net cost of every session significantly. Thus, it is important to consider using a platform that does not charge clients for screen sharing to make video calls more productive at an optimal cost.

#### ▼ Cumulative Resolution

As businesses look to create ‘life-like’ digital experiences, high-definition multilateral video calls are not a luxury but a need of the hour. While some platforms explicitly state the price for HD and HD+ calls, they attach a unique meaning to these labels. For instance, even if all the participants on a call are using standard definition (SD), as long as the participant’s cumulative video resolution remains more than 921,600 pixels, it is automatically considered an HD+ call. In another case, even if there are merely two people on the call, but one of them is sharing



his/her screen (screen sharing mandatorily needs HD+), the entire call will be charged as HD+. This is a big and deliberate gap in their marketing communication to convince the CTOs to subscribe to a seemingly low-cost plan, which may eventually charge HD+ price while offering an SD experience. It is advisable to choose a provider that does not charge anything extra for HD+ experience. This allows clients to easily offer an HD+ experience to their stakeholders without having to bother about the nitty-gritty of individual and cumulative resolutions.

The key takeaway from the above is that when it comes to pricing an audio or video call between two individuals, almost every platform can offer a similar, competitive rate card on the surface, but bill a radically different cost for the same call. The game starts changing when businesses scale up

and need technology to support deeper, more efficient, and seamless collaboration.

▼ When it comes to pricing an audio or video call between two individuals, almost every platform can offer a similar, competitive rate card on the surface, but bill a radically different cost for the same call

The complex tariff formulae carved out of microscopic terms and conditions could lead to billing disasters for businesses. The thumb rule here is to opt for a platform that is upfront about the fine prints and uses a simple billing formula based on the tariff and number of users. There should not be any additional or hidden charges for screen sharing, added resolution, etc. since these are bread and

butter for everyone who works in an online environment and cannot be charged as a luxury. The formula also helps businesses project their IT expenses and streamline their budgets with higher certainty and without undue surprises. ■

The author is Founder & CEO, EnableX.io

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# Automation can take the pain out of cloud migration

**Brad Rosairo**

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With automation, much of the manual custom scripting and spreadsheet maintenance is no longer necessary, and by eliminating that, you'll significantly reduce the likelihood of errors occurring during the migration process

**A**s we look to the future, it's safe to say that the impact of the global pandemic will influence business for years to come. Some industries are just now beginning to recover, and as part of this process, leaders are looking for new technology solutions to help them operate more effectively and efficiently.

Cloud software has been and will continue to be instrumental to workers' collaboration and teamwork. Consider that earlier this year, Microsoft Corporate Vice President Jeff Teper tweeted that Teams has 145 million daily active users. That was up from 115 million users in October 2020. And Microsoft is not alone. During the past 18 months, other businesses worldwide have seen skyrocketing adoption rates for collaboration tools, including Google Workspace, Panopto, Slack, WebEx and Zoom.

Now, increasingly, businesses are looking to the cloud for other solutions to streamline operations, realize productivity gains and save money. Many experts believe businesses of all sizes will continue to invest in cloud-based solutions for infrastructure management, assessment and reporting, cost analysis, and an array of other functions.

### ▼ Why the Cloud?

Compared with on-premise solutions, solutions that reside in the cloud are often easier to deploy, cheaper to operate and offer superior security and scalability. In addition, businesses adopting solutions from multiple cloud vendors have many more choices available.

John Abel, Technical Director, office of the CTO, Google Cloud, told ZDNet in 2020, "Businesses taking a multi cloud approach can cherry-pick the solutions that best meet their business needs as soon as they become available, rather than having to wait for one vendor to catch up. Avoiding vendor lock-in, increased agility, more efficient costs and the promise of each provider's best solutions are all too great to ignore."

But to leverage the cloud, it's important to carefully manage the migration of data, whether it's moving from on-premises, from one public cloud provider to another, or from a hybrid-cloud environment, in which the



**BRAD ROSAIRO**, Director, Business Development-APAC, BitTitan

organization maintains a combination of public and private cloud resources.

### ▼ Potential Migration Pitfalls

In its META CIO Survey 2020, IDC found that 30% of respondents with medium-to-large organizations highlighted migrations as a key challenge. In addition, nearly 40% of respondents cited a lack of skills as the obstacle hindering their rollout of migrations. Given this, it's essential to be aware of the potential challenges and have a game plan for addressing them. Here are a few things to consider:

**Resource availability.** Migrations are often high stakes and complex because data is such a valuable asset to organizations. It's important to recognize this and hire experienced IT consultants or make sure your internal team has the appropriate skills to execute it.

**The risk of manual processes.** Migrations are complex endeavors, particularly at scale. Relying on first-party tools, spreadsheets and scripts to manage projects takes up additional resources and time while introducing the risk of data loss or downtime. In addition, with manual migrations there is no way to co-manage projects or easily give others visibility into the process. Troubleshooting migration errors can be difficult and time consuming,



and manual migrations often require different tools and processes for each workload within the migration project.

**The nuances of your environment.** Make sure you've assessed all your IT infrastructure and that external consultants and internal IT staff truly understand it. If you're moving to a hybrid environment, it can be inherently more complex so this analysis is even more important. Finally, once the migration project is complete, you may want to centralize management of the new infrastructure for continued success.

### ▼ Automating Migrations

IT professionals can address these issues by automating the migration process with cloud-based migration tools. With automation, much of the manual custom scripting and spreadsheet maintenance is no longer necessary, and by eliminating this work, you'll significantly reduce the likelihood of errors occurring during the migration process.

From importing users to finalizing

individual batches, all management of migration projects can be automated and streamlined. The result is a straightforward, seamless migration that enables less experienced IT staff to manage and execute these projects.

Finally, it's important to know where your data resides when it is in transit. Data sovereignty laws govern the storage of data even when it is in transit. Make sure your IT partners understand the rules and that the migration software they select will enable them to maintain compliance.

The cloud can be a tremendous resource for businesses of all sizes. From improved performance and scalability to cost savings and multiple security options, the cloud offers companies in all industries a broad range of advantages, but for success, businesses must have a well thought-out plan, the right staff and world-class tools. ■

The author is Director, Business Development-APAC, BitTitan

# What leads to the failure of DevOps: Key steps to reduce the risk

**Anupam Kulkarni**

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DevOps doesn't fail in an organisation, organisations fail in DevOps. Before an organization opts for DevOps, it is crucial to understand the challenges and effective ways to address them

**D**evOps across industries comes from the need to get better-delivered product and break down silos for efficient collaboration across teams. Technically speaking, it entails two major components from a business perspective, i.e. Developments and Operations. However, in simple terms, it is all about creating the right culture in an organization. It is when people in an organisation come together to solve the problems in a streamlined workflow, develop business value and new processes. However, people often fixate on the tools, trying to implement the best layout and create a toolchain. While tools are imperative to operate and deliver the best product, they need not be the key obstacle, but lack of an exponential culture can be.

As per the report by Markets and Markets, the DevOps market size is expected to grow from USD 2.90 Billion in 2017 to USD 10.31 Billion by 2023, at a Compound Annual Growth Rate (CAGR) of 24.7% during the forecast period 2018–2023.

### ▼ Role of DevOps in an Organization

DevOps doesn't fail in an organisation, organisations fail in DevOps. To understand this statement, we have to see DevOps transformation as much more than a mere technical transformation. It involves changes across various layers – from organisational structures to ways of working to altering the DNA of Dev and Support Staff. In the digital-first world, moving on from traditional legacy processes to operating with agility and speedy delivery is a must to institute DevOps. DevOps ensures high scalability in more ways than one. Effective communication, one of the key features of DevOps is reflected through team scalability. In addition to the decreased cost in software development, DevOps ensures faster software release, a reduction in software development failure and a faster recovery time. It thus fosters a performance orientation instead of power-play between teams, ensuring software can be scaled effectively.

Understand the challenges and effective ways to address them.

### • Development and Operations Department:

The common mistake organisations make



**ANUPAM KULKARNI**, Co-Founder & CEO,  
iauru Systems

while introducing a new process is to start directly with the new idea while introducing a new process. Adding a new department without removing the older process only adds more process and red tape rather than helping to improve the structure. It needs leadership but not in traditional or department based management. To truly break this barrier, business leaders need to ensure that they share responsibility, are transparent with each other and feedback comes in at each stage of the delivery cycle. The strategy is to implement a framework that allows both groups to interoperate efficiently. Most developers continue to work in silos even after DevOps principles are in place, making the transformation difficult to achieve.

### • Set Realistic Goals:

For organisations that are accustomed to working in a siloed structure in the development process, it might get tricky as it infuses cultural shifts with the operations and developments team. DevOps might come as a culture shock, especially for large organisations as they have well-established processes and rapid transformation is difficult at the information, people and process level.

The larger the organization, the longer this transformation might take.

While implementing the DevOps strategy initially, keep the process slow to avoid inertia and so that the staff can learn, adapt, and train. Establish the initial level with setting and tracking multiple metrics to adopt, then pursue the goal iteratively.

#### • **Lack of coordination:**

Having a DevOps led pipeline does not just focus on accelerating delivery. Building on innovations, analysing customer requirements and creating software that matches these needs is not just the responsibility of the development team. It's a collaborative effort of various teams coming together and working in sync. The various teams that we need to consider are UI/UX designers, product managers, architects, operations director, release managers, QA staff, business analysts and more. The true goal of DevOps is to offer shared business value to all stakeholders while upholding customer interests. DevOps will succeed when there is coordination and transparency between teams. It's much more than just a software delivery model.

#### • **Lack of clear visibility:**

Before moving towards making pre-existing processes faster, better and more cost-efficient through DevOps and automation ask yourself if you have clear visibility on what's going on across the whole development delivery chain. Unless leaders know where the bottleneck lies, which releases are at risk and why, even several tools will not be able to ensure agility. When everything in the delivery chain is connected you can analyse the effectiveness of the pipeline and see whether

it's yielding business value.

#### ▼ **Making culture the focal point of DevOps**

For successful implementation of DevOps in an organization, culture plays a crucial role, backed by collaborative team efforts, shared goals and shared business value. DevOps is a successful outcome of a healthy culture and healthy thinking in an organisation. When organizations lay a strong emphasis on their culture, DevOps happens naturally. With this, it becomes imperative for organizations to address their cultural gaps in order to build a continuous evolving business and hence a growth mindset. Moreover, leaders need to play a larger role and focus on measures to be taken for incentivizing the organisation for positive outcome and changes to be made to drive the organisation for achieving its goal. The organisation should encourage independent decision-making by employees and sharing information openly and broadly. The culture in an organisation needs to focus on freedom & responsibility while emphasizing on context over control.

▼ DevOps might come as a culture shock, especially for large organisations as they have well-established processes and rapid transformation is difficult at the information, people and process level. The larger the organization, the longer this transformation might take

#### ▼ **Key take-aways for Leaders:**

- Observe the before-DevOps situation, tools, and behaviour of the software development team
- Identify 'What They Do' and 'What Should They Do and Why'
- Train them not only with the tools, but make them understand DevOps As a Philosophy
- Make this transformation easier by establishing habits from top management ■

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# The Need for Speed and Agility in the New Normal

**Subrato Bandhu**

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This new normal, digital-first and cloud-first transformation has become even more urgent. While COVID-19 has caused many disruptions, it also presents opportunities for digital innovation and differentiation initiatives

**T**he pandemic-imposed imperatives have changed the business ecosystem and challenged corporate strategies, workflows, technology, and employees. It has forced businesses to compress the value of years of digital transformation to just months. To maintain corporate stability, a 'new normal' is upon us and companies are rapidly adapting to keep pace with these changes. As market demand changes, so must the technologies that are involved. Secure and easily deployable technology allows companies to fast-track their development while staying agile. The pandemic has drawn IT limitations as organisations seek to set up the infrastructure needed to minimise losses to their operations and are constantly searching for ways to tackle complex situations in minimum time.

A research report on "The Speed of Change: How Fast Are You?" highlights the importance of ingenuity and adaptability in the current dynamic environment. Yet, data reveals that the bulk of survey respondents indicated that their average application delivery time is about 3 - 6 months, which is considered an eternity given the unpredictability of the current situation. Organisations must act much faster than this.

### ▼ Speed of Responding to Constant Changes

As per the OutSystems study, the pandemic has categorized organizations in two ways – those that are responding quickly to change and others that are struggling. In the new age of digital urgency, businesses that are responding quickly are galloping ahead in the race to survive and succeed.

The investment in techniques and technologies for improved delivery speed is another remarkable difference. Leaders spend substantially more on techniques that focus on getting closer to consumers and experience. They spend 37% on the implementation of design thinking and design sprints and 26% on the mapping of consumer journeys. Leaders are also likely to invest twice as much in containers, microservices, low-code, and new languages or frameworks for programming.

Another study by Infosys shows that collaborators in digitally mature companies



**SUBRATO BANDHU**, Regional VP India, OutSystems

have their eyes on revenue generation, not more tactically on technology metrics. They leverage the digital ecosystem to empower employees, bring personalized customer digital experience, and drive revenue. Over three-fourths of the respondents (76%) indicated that digital initiative goals and corporate strategy are aligned (56% somewhat and 20% fully). However, for the respondents who identified as fully aligned, IT was represented over marketing by a nearly two-to-one margin.

When it comes to pace and cadence for application development, leaders concentrate more on new technologies and methodologies to maximise speed. This emphasis allows them to become more competent in their investment in agility and strive for quality improvement, which in turn allows them to grow even faster and add value. Compared to a year ago, these factors today enable leaders to experience faster application delivery for their organisations.

### ▼ Catch Up with Leaders: How to Win in the Race for Speed

It is clear that in this new normal, digital-first and cloud-first transformation has

become even more urgent. While COVID-19 has caused many disruptions, it also presents opportunities for digital innovation and differentiation initiatives. Consequently, demand for application development is increasing to address the constant change in planning and adopting digital innovation as it is the first step to cope up with the pandemic. It is clearly stated in an IDC research that in the next 3-5 years, every enterprise is going to have a digital innovation factory just to have an edge over the competition.

The disruptions in customer preferences, supply chains and offline buying channels have made adaptability and agility crucial not just for survival but to access opportunities quickly. Today, 28% of enterprise leaders in India list faster integration of customer feedback to speed software releases as the main business goal, as stated by IDC.

Now more than ever before, adaptability and agility will require new partnerships, collaborations and strategic mergers and acquisitions. The imperative for the competition is not just to collaborate and compete with each other for survival, but also to access opportunities quickly.

Businesses must learn agility from leaders by focusing on consumer and user experiences and changing their priorities to deliver value to consumers to keep up with the demand. Here are a few ways to achieve the same:

**Start with UX** - Use customer journey mapping and design sprints to put the user at the center of the development process.

**Build for Change** - Adopt iterative, agile development practices to accommodate uncertainty, unclear direction or change requests.

**Add New Skills** - Look for whatever skills

the team needs next - web, mobile back-end, and modern stack.

**Focus on Continuous Delivery** - Add technology to help teams achieve continuous delivery without assembling an array of DevOps tools and skills.

**Reach Legacy** - Find tools with built-in and DIY connectors for easy integration with any enterprise system, database, or web service.

For understanding we can take Edelweiss, a leading financial company, as an example, which moved to a low code development platform to adapt to the changing market needs and business requirements. Initially, the company was operating on its legacy Loan Origination System (LOS) that lacked agility, requiring heavy management for daily business operations. The benefits could then be reaped by the business teams who are processing all kinds of loans, managing analytics scorecards, rolling out features etc. now in weeks rather than months, without being

heavily dependent on the IT team.

In today's time, it is evident that speed is the key to success in any business across the world. Organizations that are focused on consumer demands and provide entrepreneurs a simple and quick route to innovation can deal with the market dynamics, improve flexibility and resilience to face tech disruptions. Business leaders must enhance their organization's speed and agility to mitigate the major challenges they face and to drive technological transformations into creating new opportunities and value. Whether companies are executing their goals or just getting started, they always have potential not just to get into the game, but to win it. ■

The author is Regional VP India, OutSystems

▼ Now more than ever before, adaptability and agility will require new partnerships, collaborations and strategic mergers and acquisitions. The imperative for the competition is not just to collaborate and compete with each other for survival, but also to access opportunities quickly

# A Good workman keeps polishing the tool-box

Pratima H

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Aspects like up-skilling, re-skilling and continuous learning have been redefined in a strong way in the pandemic-dotted months. Have they helped the IT industry to deliver productivity and relevance while also confronting heterogeneity and the gap on soft skills?

**Supriya Menon, Director- Education, VMware India** puts the spotlight on the many shadows that accompany the new paradigm of learning – specially in an IT context

## What is the biggest challenge about learning today? Has the pandemic phase helped to solve it or add to it?

Protocols adopted in the new normal have inspired companies to reimagine how employees can learn and develop skills. Learning and development (L&D) professionals are relooking at learning programs as a response to the pandemic. In a post-pandemic era, IT professionals can access a myriad of advanced learning programs. While there is an increase in the adoption of technology in general, people are still trying to cope with the changes in their personal, professional, and social lives.

Factors such as identifying key learning areas to advance one's career, dedicating time to attend virtual training to building new skills; indulging in digital skills are some steps professionals can take. However, the pandemic has ushered in a new era of learning programs such as online subscriptions, virtual instructor-led training, and digital learning courses. This will help in improving employee learning experience with a little nudge from the employers, who want to upskill their employees for the future of work.

## ▼ Did you witness any jump in learning during the lockdown months? If yes, where and how will it affect the future talent roadmap?

Initially when the lockdown was first announced, there was a slowdown in the number of enquiries and requests from potential and existing customers. This could be due to the preference of in-person instructor lead class that the customers were used to as well as the impact of the shift to the new normal, where some of the people were still getting used to the remote working model for the first time. However, towards the end of the year we saw an increase in training, with reskilling and upskilling becoming more critical within highly digitalized environments. There was an increase in attendance of virtual classes, online training and subscription of different learning platforms. Today, we see a definite shift in training with a goal to attain competency in many roles and people are consciously gravitating towards building up skills to be future-ready.

## ▼ What spurred the idea behind the concept of VMware Learning? How is this



“We need to ensure employees are mindful of unconscious biases, especially to build meaningful workplace relationships”



**SUPRIYA MENON**  
Director- Education,  
VMware India

## different from what has been practised so far and in talent development initiatives at various IT companies?

VMware Learning programs provide training and certifications designed to help enterprises and IT professionals leverage the opportunities provided by VMware solutions. Through Learning, VMware offers to help enterprises target their training initiatives and get more value from their VMware investments. The pandemic has accelerated digital transformation and has set in motion a structural shift that will change the way the IT workforce will approach job roles and responsibilities. As businesses adopt advanced technology, the industry needs to acquire the right skill sets to stay relevant. VMware Learning provides certifications that give enterprises the confidence that their technology professionals completely understand and are comfortable with all the benefits that come from VMware Products and solutions. VMware's certification comes with credentials such as the best teachers, course material that is exclusively built based on our products and solutions and years of experience.

## ▼ What skills or capabilities are your focus areas now- especially with the advent of automated coding tools, AI's dominance, low-code platforms and fast-growing tech obsolescence?

Advanced learning programs can open the door to a plethora of opportunities that go beyond just enhancing one's technical skills. With a more remarkable ability to perform at

elevated proficiency levels, IT professionals also gain a competitive edge that enables them to pursue greater roles and take on more challenging and rewarding opportunities. Before pursuing a new learning path, it is important to identify one's career goals. Having an idea of what the end goal looks like will make it easier to identify the right learning path and take that first step towards elevating one's career in a field as dynamic as IT.

At VMware, we approach learning through formal and informal training. Formal training provides a structured path and is delivered through a carefully-curated curriculum depending on the desired focus areas, through expert-led training, software credential programs, web-based on-demand sessions. Informal training or self-directed training fosters a continuous learning culture and is meant to sustain steady career growth through individual learning and collaborative learning tools that are driven by discussions, mentoring, engagements helping people pursue new learning opportunities.

### ▼ Can learning interventions help with tech-heterogeneity in enterprises?

Learning will help in diversifying solutions to the customers based on the customer needs. In the past, we have noticed that one of the main reasons for the lack and lag of adoption of technology is due to the unavailability of right skill sets.

### ▼ How important are soft skills in the entire learning landscape?

There is a growing emphasis on impactful and professional communication skills, especially in the backdrop of remote working. Senior leaders, employees, and businessmen today are working more collaboratively than ever before. For businesses to foster a culture of learning, growth, and development, it is equally important that employers encourage soft skills to ensure effective interpersonal communication, job performance, customer service, with a focus on inclusion to ensure employees are mindful of unconscious biases, especially to build meaningful workplace relationships. Leaders, too, can use their soft skills to communicate effectively with their employees in a changing environment with their ability to inspire confidence and storytelling to their teams and customers.

### ▼ How do you ensure addressing the needs of diversity, futureproofing of skills and life-long learning in this effort?

Given our experience of working from home over the last year, it is evident that the possibilities in the IT industry are limitless, with industry advantage through remote hiring irrespective of where employees are based. As we move into a hybrid model of working, progressive organizations will be more inclined towards hiring the right talent for the job based on their merit, regardless of their gender, ethnicity, or place of origin. That can further help in employing a diverse pool of talent that brings in fresh perspective and cultural awareness, contributing to innovation.

Similarly, organizations must invest in learning and skilling existing employees to retain talent and future-proof their careers. The technology industry is fast-paced, and IT professionals need to refurbish their skills often to stay on track. For instance, training team members in areas of application modernization and Kubernetes will enable the employees to be more resourceful, leading to being a valuable asset to the organization in the long run. Pursuing greater roles and taking on more challenging and rewarding opportunities, learning programs can go beyond technical training as they use relevant tools, whether self-paced, virtual, on-demand or virtual labs.

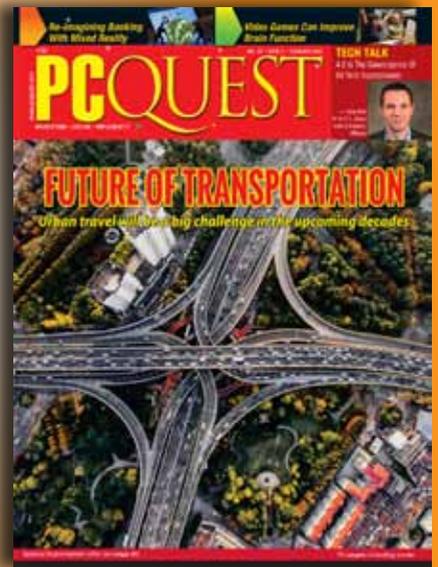
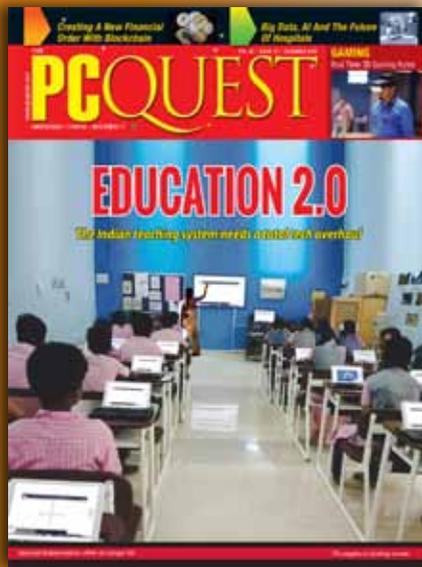
### ▼ What are the problem areas and trends to watch out for - when we look at the immediate future of IT learning?

The future of learning is quite promising, especially as we increasingly find ourselves using digital mediums to learn and communicate in most aspects of our lives. Going forward, I see more industries embracing the change in the medium of instruction along with developing courses that will not only utilize but also encourage the use of digital tools, new-age ways to connect, develop, present, and learn. With virtual learning taking the lead, learning can be done universally, facilitating new learning experiences, sharing best use cases, building a bigger network, all perhaps limited only by our imagination. This is also a great opportunity for cross-culture innovation, forgoing traditional concepts of learning and adapting to new forms of effective communication amongst both mentors and learners. ■

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# Crowdtesting has become an essential part of the software QA process

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A fast and reliable software testing is the need of the hour. The industry is transforming software/app testing by combining codeless test automation with crowdtesting

**T**he software industry is witnessing numerous developments, from manual coding to codeless software and application development. Most software testing tools are developed with a programming mindset, and the problem is most of the testers are not programmers. Codeless test automation can solve the challenges and can enhance the overall testing process.

We spoke to **Mark Granot, VP and GM, Applause Israel** to understand the codeless test automation benefits, crowdtesting solutions and impact of COVID-19 on the industry.

### ▼ Why should one consider codeless test automation?

With the technological landscape changing faster than ever, the quality of digital experiences and the speed at which they can be delivered has become paramount. Brands must get exceptional digital assets into the hands of their end-users, quicker than competitors or they risk losing market share. This requirement for quality at the speed of development has led test automation to take on greater importance across all industries. However, building and maintaining a complete automation framework takes time, and hiring SDETs – who are in high demand and low supply – can be cost prohibitive. That is where codeless test automation comes in. It enables anyone to create test automation effectively, thus saving cost, time and resources.

### ▼ How are crowdtesting solutions lowering entry barriers and increasing testing velocity?

Applause Codeless Automation (ACA) lowers the barrier to entry to automation by providing a SaaS product that makes it easy to create test automation scripts. Anyone can do it, regardless of programming expertise or automation experience. That's because codeless test automation enables anyone to create test automation without writing a single line of code. A user simply clicks through the pathways of an app within the product, which captures the steps and creates a test script. From there, users can



**MARK GRANOT, VP & GM, Applause Israel**

run the tests on real devices and execute tests within the codeless test automation product.

ACA is the only codeless automation offering that is truly enterprise-grade. It also offers support for mobile (iOS and Android) applications, which is unique in the codeless test automation market. With Applause Codeless Automation, users can execute test automation on real devices, export to their bug tracking systems and maintain compliance with both Appium and Selenium. By enabling any employee at an organization to create test automation, lowers the barrier to entry to automation and helps businesses mature their entire test automation strategy at a much faster pace.

### ▼ How crowdtesting is suitable for industry giants as well as SMEs and startups?

Today, the quality of digital experiences can help win or lose customers. And with the costs of switching practically, non-existent and end-users won't hesitate to move to a competitor if a digital experience does not meet their expectations. This is true across all industries – from healthcare to financial services to media and entertainment – and for companies

of all sizes.

This need to deliver exceptional digital experiences to end-users is why crowdtesting has become an essential part of the software quality process for brands across the globe. Crowdtesting leverages customized testing teams sourced from a globally dispersed community of digital experts, who are highly vetted and ready to stand up testing at a moment's notice, in any language, on any device and operating system.

These testers serve as proxies for an organization's customers – delivering detailed and authentic real-world feedback on the quality, user experience and functionality of their digital assets.

The distributed, remote and on-demand nature of crowdtesting gives brands unparalleled scalability and time-to-results when compared to traditional testing methods. It also delivers unmatched and nearly limitless coverage across testing scenarios. Since testers are available on-demand and around the globe, testing can be scaled up or down to meet the needs of both internal teams and end-users.

### ▼ How are you ensuring quality while crowdsourcing the testers?

At Applause, we take the professionalism of our uTest Community very seriously. Testers build skills through our Academy Program, which features increasingly demanding coursework, as well as through Centers of Excellence that provide rigorous training in highly specialized areas such as accessibility, automation and payments testing.

We also use AI/ML capabilities within our community selection process to ensure that our customers are always matched with the right testers. Our AI/ML capabilities curate the best testing team for the project based on

client requirements – i.e., location, language, device/OS, etc. – and our testers' profiles.

### ▼ What are some of the disadvantages; can you highlight some of the improvements which you are looking for?

When it comes to codeless test automation, it is really meant for less complex test scenarios. This is true for all existing codeless test automation products. For those less complex scenarios – think smoke testing and

portions of a regression testing suite – codeless test automation is a great fit. And, because it is a great fit for these types of testing, teams can focus on the more complex scenarios with traditional automation, which is better suited for more expertise in automation and programming.

### ▼ How codeless test automation works and its architecture or process?

With Applause Codeless Automation, users simply click through the pathways of the app

within the platform to follow pre-defined test steps. ACA records the steps and creates a test script. Users can go back to add logic via assertions that confirm the application functions as intended. From there, ACA merges the test steps and assertions into a test script, which users can execute on real devices within the platform. ACA users can run tests on real browsers and mobile devices, not emulators, to get a true picture of how the app will function in the real world – no device lab required. ACA reflects Applause's commitment to openness, with test scripts compliant with Appium or Selenium and test results exportable to Jira. Finally, ACA fits into customers' existing QA frameworks to help reduce bottlenecks and expand test coverage quickly – all without requiring an engineer to create and maintain scripted automated tests. ■

▼ The distributed, remote and on-demand nature of crowdtesting gives brands unparalleled scalability and time-to-results when compared to traditional testing methods. It also delivers unmatched and nearly limitless coverage across testing scenarios

# Microservices: Challenges, Mistakes, and Learnings for the Future

Gautam Rege

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Microservices are the architecture to build future expansion plans, but the decision-making and actual shift can be a bit overwhelming for the IT leaders. Here are some common concerns and myths about this migration, and guidance on how leaders can make this decision slightly less complicated

**O**ftentimes, the simple things around us can act as our greatest inspirations to bring about innovation. Take Lego building blocks for example – they let your imagination run far and wild with each piece that's stacked on top of another. Each building block is unique, comes in different colours, and adds to the overall structure. And when you're finished, this structure can be disassembled, and the same blocks can be assembled to create something new again! It's amazing how much one can learn from simple exercises like these.

Microservices follow a similar approach to Lego blocks, when it comes to building applications and IT infrastructure. It is not surprising that the IT and technology sector is one of the fastest growing industries in the world. In fact, research reports state that the microservices category is projected to grow at a massive 22.5% every year, for the next five years. Every digital first and agile enabled business today, whether it operates in IT or not, is making the move to microservices and letting go of age old monolithic structures. Debates about the pros and cons for each continue to take centre stage, as microservices is one of the hottest topics in developer discussions today.

The choice between sticking with monoliths vs adapting to microservices, can indeed be a tricky one. Microservices offer users multiple benefits including modularization of components and individual services, efficient organization and decoupling of units as per their need. This modernized approach also reduces the scope of error, since it is highly automated, more flexible in terms of developer on-boarding and processes easily scalable across the enterprise, which makes for massive cost savings.

Sure, monolithic architecture has significantly lesser cost overheads and simpler testing mechanisms, but in the longer run, it leads to a lot of developer conflict owing to slow build-and-test processes and tightly integrated applications. Moreover, adding any third party support is time, resource and cost intensive. Initially teams may find microservices to be complex, coupled with a higher efficiency overload, but eventually, it aids data consistency, secure



**GAUTAM REGE**, Co-founder & Director, Josh Software

cloud management and an overall more productive and agile culture for the entire company.

Let's take a look at some common concerns and myths about this migration, and how leaders can make this decision slightly less complicated:

**Every business needs a microservices backed architecture:** Not true. The usage and dependencies of the business should be factored in before considering this migration. Align these with the overarching objectives to understand what it is that you really want to improve. Are you looking for more agile processes? Do you want to cut down on resource costs and invest in automation, to make your processes more digitally led? Ask yourself and your teams all these questions before migration, for going overboard may only lead to more complications

**Microservices architecture is not dependable:** On the contrary, microservices-based architecture is not just reliable, but also cost effective in the long run. Sure, the approach may be non-traditional, but the truth is that it is hard for monolithic applications to keep up with growing customer demands. Microservices not only allows developers to break free of operational and maintenance

issues, but also enables easy app scalability.

**Monolithic applications can be converted to microservices easily:**

This is one of the most common misconceptions that have been going around. Microservices and monoliths are structurally very different, and converting one to the other is not possible.

In order to do this, the entire software code needs to be rewritten, and the time and effort taken for this is quite intensive.

**Microservices only works for cloud based and SaaS applications:** Microservices definitely are a great way to build SaaS applications, but their benefits go far and wide as compared to only this. They can be used to standardize traditional processes, bring agility to entire operational models and foster a digital first work culture at enterprises for startups, SMBs and large organisations alike. On premise applications get a great boost with microservices.

Basically, adapting microservices will not solve all, or rather any monolithic related problems, but gives enterprise leaders a different outlook towards solving infrastructure related problems. There are enough and more case studies to prove this point, but perhaps the most interesting one has to be from one of the world's favourite conglomerates – Netflix! That's right. All the Netflix and chilling is possible only because of their holistic, tightly integrated and openly documented microservices-based architecture.

Long before the term microservices was in the picture, Netflix, after moving to an OTT subscription-based model from their earlier DVD renting business- was facing major challenges related to consumer requests at scale, speed and solution availability. They



need an architecture that would allow the platform to run 24/7, without it affecting the speed of operations. Their earlier monolith code had crashed several times, caused outages and it was also unable to process the data of their rapidly evolving consumer base. Netflix then followed an incremental improvement approach with movie encoding, and moved customer facing pieces of their website on to AWS. One API at a time, by 2011, they had entirely moved to the cloud and broken their monolith into thousands of individual microservices packets. The result? The API gateway can handle upto 2 billion requests every day without a single glitch! That's awesome.

All in all, it is evident that microservices are the architecture to build future expansion plans, but how the choice to move and the actual shift can be an overwhelming one for IT leaders, but there are many global companies who are already creating future-ready enterprises on the backs of this architecture. The catch, though, lies in adoption strategies. It takes time, effort and more than anything, SMART goals to implement microservices properly. Having an expert team on board who is familiar with this migration can help strategic decision making, and enable successful modernized, digitally-led operations. ■

The author is Co-founder & Director, Josh Software



**ABHISHEK AGGARWAL**, Co-Founder & CEO, Trinity Gaming

# Esports can be a viable career option

**Boudhaditya Sanyal**

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**E**sports has been rising in India at a very fast pace. The growth can be significantly seen in the mobile esports genre. To get more insights about the same, we spoke to **Abhishek Aggarwal, Co-Founder and CEO, Trinity Gaming**.

## ▼ Indian esports in the next 5 years

Esports will be a big industry in the upcoming time because the new generation is taking an interest in gaming, and it will give this industry a big boom. It's encouraging to see that even the mindset of Indian parents has started to change positively towards gaming. We are waiting for the day when esports matches will be telecasted on television channels, and people will eagerly wait as they do for physical games.

## ▼ The biggest challenge for esports in this country

The challenge is that Indian parents are taking the time to understand the value of esports. They should realize that esports can also be seen as a viable career option and an excellent source to generate money if taken seriously and showed full support. Other things can be, as esports is mostly a teenage centric industry, they should understand the value of studies and play games to satisfy their career needs but not as an addiction. It can be a downfall to the child, his studies, and indirectly to the

In the past couple of years we have witnessed a huge growth in gaming, and the pandemic multifold shift

gaming industry as well.

## ▼ Esports titles that have scope in esports

As PUBG is a mobile game, many games also get a tremendous amount of recognition like Free fire, Call of duty Mobile etc. Not forgetting about the PC games like Valorant and CS-GO, this will be taking over the gaming market very soon.

## ▼ Your responsibility as a talent management company

As a talent management agency, we aim to connect potential gamers and brands so that both can be benefited – our aim to boom the future of gaming and esports in India. We pick potential creators and help them in their grooming process to become successful content creators.

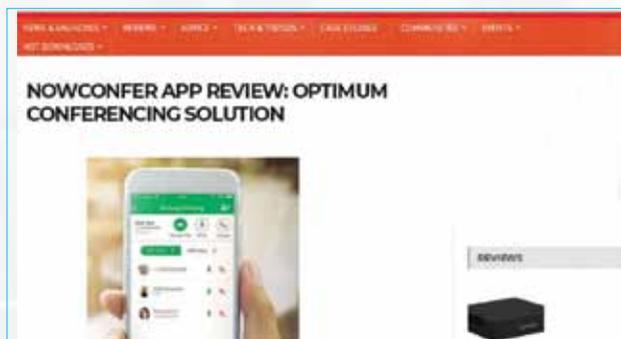
## ▼ What is the ratio of female representation in esports in India?

As Trinity is a gaming content-centric company, we cannot specifically say the percentage of females in esports. However, if we talk about the percentage of females as gaming content creators, we can say it's almost 40%-45%. ■

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LG 29WN600

# ULTRA WIDE MONITOR

Price: ₹ 20,295

**W**ork from home and online classes have become a norm nowadays, due to Covid-19 lockdown. Our screen time has increased a lot as almost everything is online, resulting in eye strain, headache, etc. LG's new 29WN600 UltraWide monitor targets those pain points to reduce strain and other bad effects of increased screen time.

### ▼ Wide enough to manage two workspaces

The 21:9 UltraWide screen give you 33 per cent more space compare to other FHD displays. This extra space let you manage two workspaces in one. You can keep your eyes on your video meeting plus edit the documents. Full HD resolution (2560×1080) screen is perfect for students and professionals as well. No need to toggle between two different apps, keep it in a single view, Side-by-Side.

The 29-inch ultrawide monitor looks pretty cool. It has quite thin bezels with matte anti-glare coating to eliminate reflections. The display supports 5ms MPRT response time and a swift 75Hz refresh rate. The screen has Flicker-Safe technology to reduces invisible flickering on the screen and Reader Mode that provides a more comfortable working environment for your eyes.

LG monitor comes with AMD FreeSync technology that enhances the gaming experience by virtually eliminating screen tearing and stuttering.

### ▼ Vibrant colours

The display is perfectly fine with vibrant colours, excellent brightness levels and wide viewing angles. Having the IPS panel, the experience with the monitor was immersive. The screen was looking good most of the



Overall: **9/10**

### SCORE

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

#### KEY SPECS

29 (73.66cm) UltraWide Full HD; IPS Display; sRGB 99% (Typ.); HDR10; MaxxAudio; AMD FreeSync

#### PROS:

Ultrawide; Thin bezels; Decent colours and resolution; Brightness levels

#### CONS:

No height adjustment and limited tilt

times, having a pretty good resolution. It was able to produce smooth images even in the most frantic of exchanges. It was able to do great with bright colours, and the dark shades and black colours were deep as well.

To test its gaming ability, we played different games including Assassin's Creed Valhalla, Ghostrunner, Call of Duty Modern Warfare, etc. The screen was able to deliver an enjoyable experience. The colours were looking pretty good, dark scenes were also nice.

Having two 7W Stereo Speakers with MaxxAudio that produces rich sound, you can enjoy music, movies and gaming as well. Overall, it is a decent monitor that offers a decent balance of speed and picture quality.

**Bottomline:** The ultrawide monitor is perfect for multitaskers. Whether you are a professional or a student, you can split the screen into two and can enjoy multitasking without toggling between apps.

# BLUESTACKS 5

Price: **Freemium**

**D**o you want to play your favourite android games on your PC? Recently BlueStacks released its latest version 5 (GA) emulator. The latest version has got new features and upgrades. So let's have a look...



## ▼ Installation and UI

Download the latest version and run the 'exe' file and follow the simple steps. If you have used the previous version of BlueStacks, upgrade your existing emulator with the new one. It takes hardly a few minutes.

The BlueStacks's app drawer, which is essentially the home screen, has multiple options for you. The Play Store icon and a folder named "System Apps" that includes Chrome, Camera, Setting and a 'Media Manager' folder are available on the home screen.

On top, you can see the 'Home' and 'Recent Apps' buttons. On the left bar, you can see numerous options including Volume control, game controls, Install APK, etc. It has a clean UI that can be easily navigated. No messy layout no bloatware, however, the home experience can be changed using the 'Device Settings' where you can choose the device profile and network provider.

## ▼ Keyboard and Touch-Screen Input

With a touchscreen PC, you would enjoy playing different games on BlueStacks. It supports multitouch and sensor integration which will enhance your gaming experience.

On the other side, using the emulator without a touch screen could trouble you with some of the games. BlueStacks is designed for keeping non-touchscreen PCs so you get on-screen controls. Also, using the "Keyboard"

Overall: **9/10**

## SCORE

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

### KEY SPECS

Android Nougat emulator; Windows 32/64 Bit; MacOS

### PROS:

User-friendly UI; Simple to setup

### CONS:

Running on Android Nougat; Not compatible with some of the latest apps/games

icon you can customise controls with your keyboard. However, it could bother with some of the games like Extreme Car Driving Simulator.

## ▼ The older Android version

Any app that supports Android Nougat will run on this emulator smoothly but apps or games that required higher or latest version Android won't run on your device.

## ▼ Performance

BlueStacks does its intended job, you can enjoy different Android games on your PC. I enjoyed playing Fifa, Asphalt, Clash of Clans, etc. It managed all of them smoothly without a hitch. The graphics look smooth and it did not eat up PC performance. We ran multiple games simultaneously without any visible performance lag.

**Bottomline:** The new version of BlueStacks lets you play numerous games. Running on old Android Nougat, this supports are limited as most of the latest apps and games won't run on Nougat. It doesn't harm your PC performance and lets you enjoy mobile games on bigger screens.

The speaker comes with an elegant design and premium look and also offers USB playing for ease. Designed for music lovers, VingaJoy GVT-298 is equipped with the latest Bluetooth feature V5.0 and a 1200 mAh battery.



POCO M3 Pro



iQOO Z3 5G

Powered by the latest Qualcomm Snapdragon 768G 5G Mobile Platform Equipped with 55W FlashCharge and smooth 120Hz Refresh Rate. Delivers enhanced gaming experience with innovative gaming feature and technology including Five-Layer Liquid Cooling System and 180Hz Touch Sampling Rate. Loaded with 64MP AutoFocus Main camera along with 4k video@60FPS.

The slim smartphone sports a 6.55-inch AMOLED DotDisplay, it features a triple-camera setup 64+8+5MP, and has a 16MP front camera. Powered by Qualcomm Snapdragon 732G based on an 8nm manufacturing process offering a perfect blend of power, efficiency, and speed. Paired with LPDDR4X RAM and UFS 2.2, it hosts a bunch of performance boosters.



Category: **WEARABLE**

Mi Watch Revolve Active flaunts a premium design highlighted by a 1.39-inch AMOLED screen. It comes with LifeQ Health algorithm, an industry-leading provider of health information that can accurately monitor and analyse over 30 key data points. It offers 117+ workout modes to empower users to lead a healthy life.

## Mi Watch Revolve Active



## AQFIT W9 BT Calling Smart Watch

AQFIT W9 BT is crafted with the latest technology, keeping a tab on Heart Rate, Blood Oxygen, and Calorie Count. It features Bluetooth Calling, BT 5.0, enabling calling capabilities right from your wrist. Encased in a beautiful 3D curved screen sculpted in Zinc-Magnesium Alloy body, it has a 1.33 inch HD IPS displays with and certified with IP67 making it sweat or water-resistant and dust-proof. It packs a 280mAh battery that lasts up to 7-10 days on regular use.

Designed for a smart, comfortable and fun-filled calling and entertainment experience, these smart calling watches are powered with dedicated Bluetooth for calling as well as music. Debuting unique health, fitness and trendy features for the rising Smart and Stylish Bharat.



## Gionee STYLFIT Smart Calling watches



## pTron Pulsefit P261 Smartwatch

The Smartwatch features an elegant 1.54-inch curved display with a metal casing and a 240 x 240 HD resolution. Packed with advanced features, 8 sport modes and customizable watch faces, the smartwatch is expected to be India's new affordable destination of fashion, connectivity, and health tracking.

The next member of Sony's EXTRA BASS compact wireless series of speaker offers deep and punchy bass sound. It is equipped with the new Sound Diffusion Processor for enhanced beats and a wider sound spread along with many more features like a built-in mic and Google Fast Pair that makes it more interactive than its predecessor. It offers 16 hours of battery life.



**Sony SRS XB13**



**Portronics SoundDrum 1**

The newly launched premium wireless speaker delivers a whopping 10W powerful audio enhancing the musical experience for party animals. It comes with a 2,000 mAh battery. The speaker has an in-built FM for all radio lovers. Portronics "SoundDrum 1" is exclusively available at an introductory price of INR 1,399.

The earbuds have been designed to offer an impressive musical experience along with crystal-clear call quality. The Dual Equalizer and 6mm driver allow the user to balance the sound quality between normal and bass modes to offer a whimsical musical experience. With a Type-C charging case, the earbuds can be used for 4.5 hours in a single charge.



**Noise Buds VS201**



**Noise Air Buds Mini**

The earbuds are designed with a glossy finish and come in two colour variants – Pearl White and Jet Black. Equipped with a 14.2mm speaker driver, Tru Bass™ technology and individual mics, it delivers superior audio quality with crystal-clear sound for calling and music. The earbuds can go up to 15 hours of uninterrupted usage with the support of a Type-C charging case, which comes with charging indicators and can be charged in 2 hours.

The next member of Sony's EXTRA BASS compact wireless series of speaker offers deep and punchy bass sound. It is equipped with the new Sound Diffusion Processor for enhanced beats and a wider sound spread along with many more features like a built-in mic and Google Fast Pair that makes it more interactive than its predecessor. It offers 16 hours of battery life.



## LAVA ProBuds



## Boult Audio ProBass Escape Wireless Neckband Headphones

The newly launched premium wireless speaker delivers a whopping 10W powerful audio enhancing the musical experience for party animals. It comes with a 2,000 mAh battery. The speaker has an in-built FM for all radio lovers. Portronics "SoundDrum 1" is exclusively available at an introductory price of INR 1,399.

The speaker comes with an elegant design and premium look and also offers USB playing for ease. Designed for music lovers, VingaJoy GVT-298 is equipped with the latest Bluetooth feature V5.0 and a 1200 mAh battery.

## VingaJoy GVT-298 Junior Tower Bluetooth Speaker



## Boult Audio AirBass Q10 TWS Earbuds

The AirBass Q10 is pretty sleek and features a very sporty look with a dual-tone body and smooth textures. Built using Bluetooth v5.0, the AirBass Q10 can instantly pair with your devices. The earbuds feature the hall switch technology that allows to instantly pair with your smartphone or laptop when opening the case lid. It will be available at the price of Rs 1,299.

The ThinkPad X1 Fold is the first of its kind in a new personal computing category. The X1 Fold offers a revolutionary mix of portability and versatility that defines a new computing category enabled by Intel Core processors, with Intel Hybrid Technology and Intel's Project Athena innovation program. With a folding OLED screen, the device comes bundled with the Lenovo Easel Stand for easy portrait or landscape placement on a desk, and a Bluetooth Mini Fold Keyboard that nests inside the system and are wirelessly charged by being magnetized to the screen when the system is closed.



## Lenovo ThinkPad X1 Fold



## Asus ROG Zephyrus M16

ROG Zephyrus M16 has an immersive 16-inch display that combines a high WQHD resolution with a fast 165Hz refresh rate, 3ms response time, and Adaptive-Sync. Powered by up to an 11th Gen Intel Core i9-11900H, GeForce RTX 3070 Laptop GPU and a six-speaker system with dual force-cancelling woofers.

ROG Zephyrus S17 is an all-new, premium gaming laptop with a rising optical-mechanical keyboard that enables superior cooling. It delivers top-of-the-line performance for gaming and more in a slim package with the style for any occasion. Powered with an 11th Gen Intel Core i9-11900H CPU and NVIDIA GeForce RTX 3080 Laptop GPU.



## Asus ROG Zephyrus S17



## Asus TUF Gaming F15 and F17

The combination of 11th Gen Intel Core CPUs and GeForce RTX 30 Series GPUs prime the new TUF Gaming F15 and F17 for gamers who demand powerful components, sensible style, and reliable performance at an accessible price. Sleek Eclipse Gray and bold Graphite Black colour options bring different looks to the new TUF Gaming F15 and F17.

The Canon PIXMA PRO-200 offers high-quality printing with a unique 8-colour dye ink system. The Optimum Image Generating (OIG) System on the printer also analyses each area of print and chooses the best ink mixture to ensure the most accurate colour representation in print.



Canon PIXMA G670



Canon PIXMA G570

The Canon imagePROGRAF PRO-300 is equipped with the LUCIA PRO pigment ink system and Crystal-fidelity digital image processing workflow. The printer is built with Canon's L-COA processor easily handles large image data.



Canon imagePROGRAF PRO-300

The G570 and G670 printers feature 6 colours all dye ink tank system. Along with Cyan, Magenta, Yellow and Black, these printers have Red and Grey Ink. The red ink supercharges photographs ranging from blood-red sunsets to automobiles in gleaming red. Grey ink ensures consistent monochromatic accuracy in print after print, while Black ink adds contrast, enhancing subject focus as well as fore from background separation.



Canon PIXMA PRO-200

Mi 11 Lite

The smart TV got a fresh look with a premium metal bezel-less design. It features a 93.7% screen to body ratio and 178-degree viewing angle. It also features Mi's proprietary Vivid Picture Engine (VPE) technology ensuring stunning visuals and true-to-life colours. It comes with the Android TV 9.0 and supports 20W stereo speakers. Mi TV 4A 40 Horizon Edition is priced at INR 23,999.



## Mi TV 4A 40 Horizon Edition



## ViewSonic Wireless Presentation Display Solution

ViewSonic's CDE20 series has 4K Ultra HD resolution and runs on android OS, combines 3GB RAM and 16GB storage. It is compatible with Intel's Open Pluggable Specification (OPS), allowing for cable-free integration. It also contains USB Plug and Play and built-in apps for easier accessibility and feasibility. The 65"/75"/86" have a slot-in OPS and WiFi module. The series also comes with the ViewSonic Cast app, to share content from mobile devices. The CDE20 series displays come in different sizes: 43", 55", 65", 75", and 86".

Eufy by Anker enhanced its product line of the robotic vacuum cleaner – Robovac G30 Hybrid, which brings together vacuuming and wet mopping capabilities in one modestly designed robot. With smart navigation, app control, and Amazon Alexa/ Google Assistant voice-command support, the robotic cleaner is priced for Rs. 23,999.



## Eufy Robovac G30 Hybrid

Category: **SSD**



Utilizing the latest PCIe 4.0 technology, KLEVV's CRAS C920 SSD offers up to 2-3 times the speed of current mainstream PCIe Gen3 SSDs. This SSD boasts speeds of up to 7000MB/s read and 6850MB/s write and is available in both 1TB and 2TB capacities.

## KLEVV CRAS C920 PCIe 4.0 SSD

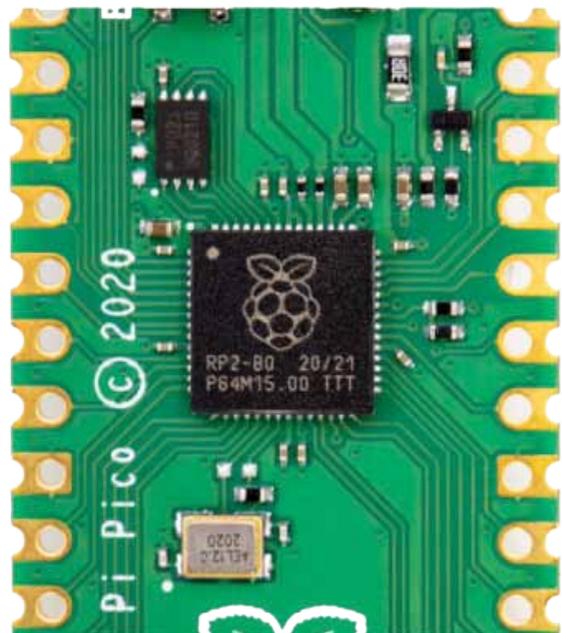
The PCIe Gen3x4 CRAS C720 is a smart and affordable upgrade that can raise your system to a new level, with speeds up to 3400MB/s read and 3100MB/s write. It is available in capacities from 256GB to 2TB to suit all storage scenarios.



## KLEVV CRAS C720 PCIe SSD

Category: **CHIP**

Raspberry Pi designed silicon chip found at the core of popular Raspberry Pi Pico development board now available as a standalone chip. The microcontroller offers high performance for integer workloads, a large on-chip memory, and a wide range of I/O options, making it a flexible solution for a wide range of microcontroller applications. It packs Two ARM Cortex-M0+ cores clocked at 133 MHz, 264 kB of on-chip SRAM, 30 multifunction GPIO pins and built-in USB 1.1 with host and device support.



## Raspberry Pi PR2040 chip



## COLORFUL GeForce RTX 3080 Ti

Powered by the NVIDIA Ampere architecture, it has features like ray tracing, NVIDIA DLSS performance-boosting AI, NVIDIA Reflex latency-reduction, NVIDIA Broadcast streaming features and additional memory that allows it to speed through the most popular creator applications as well. It packs a triple-fan cooler with a 13-blade cooling fan design and the iGame Vacuum Copper Plated Technics, delivering superb cooling to achieve high and stable overlocks.



## COLORFUL iGame GeForce RTX 3070 Ti Advanced OC-V

The COLORFUL iGame GeForce RTX 3070 Ti Advanced graphics card packs a triple-fan cooler in a premium metallic shroud with an “Energy Core” central fan with a sophisticated “Lighting Frozen” lighting effect. The Advanced OC model features five 8mm-diameter high-performance heat pipes for aggressive heat dissipation. The graphics card also features COLORFUL’s One-Key Overclock button at the rear I/O, pushing performance to 1830MHz in just a push of the button.



## ASUS GeForce RTX 3080 Ti and GeForce RTX 3070 Ti Series Graphics Cards

ASUS NVIDIA GeForce RTX 3080 Ti and GeForce RTX 3070 Ti GPUs are powered by the NVIDIA Ampere architecture. The GeForce RTX 3080 Ti delivers an incredible leap in performance and fidelity with acclaimed features such as ray tracing, NVIDIA DLSS performance-boosting AI, NVIDIA Reflex latency-reduction, NVIDIA Broadcast streaming features and additional memory that allows it to speed through the most popular creator applications as well. The GeForce RTX 3070 Ti brings more CUDA, RT and Tensor cores to bear for mainstream systems.



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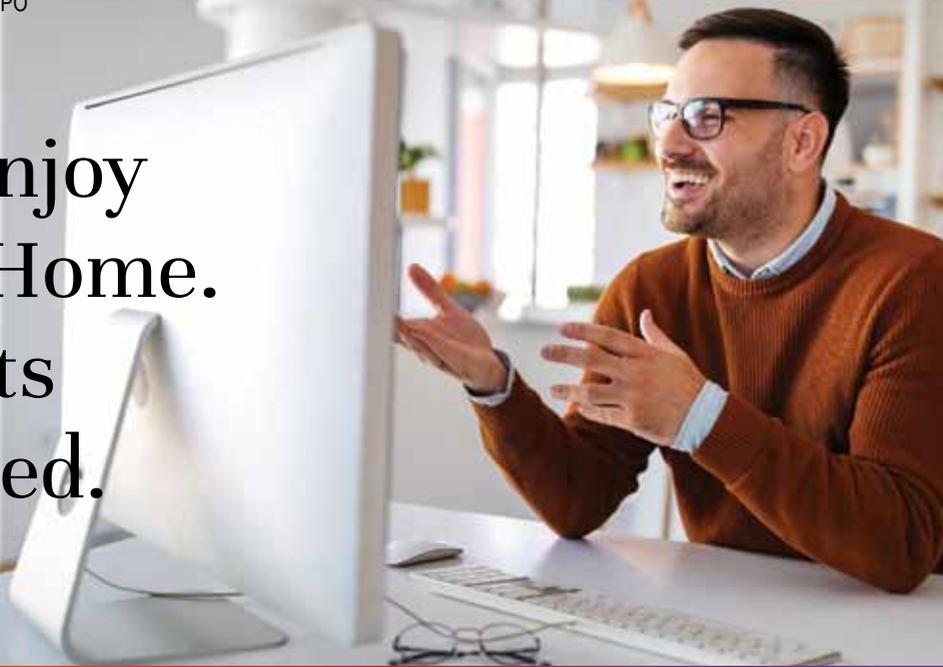
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