



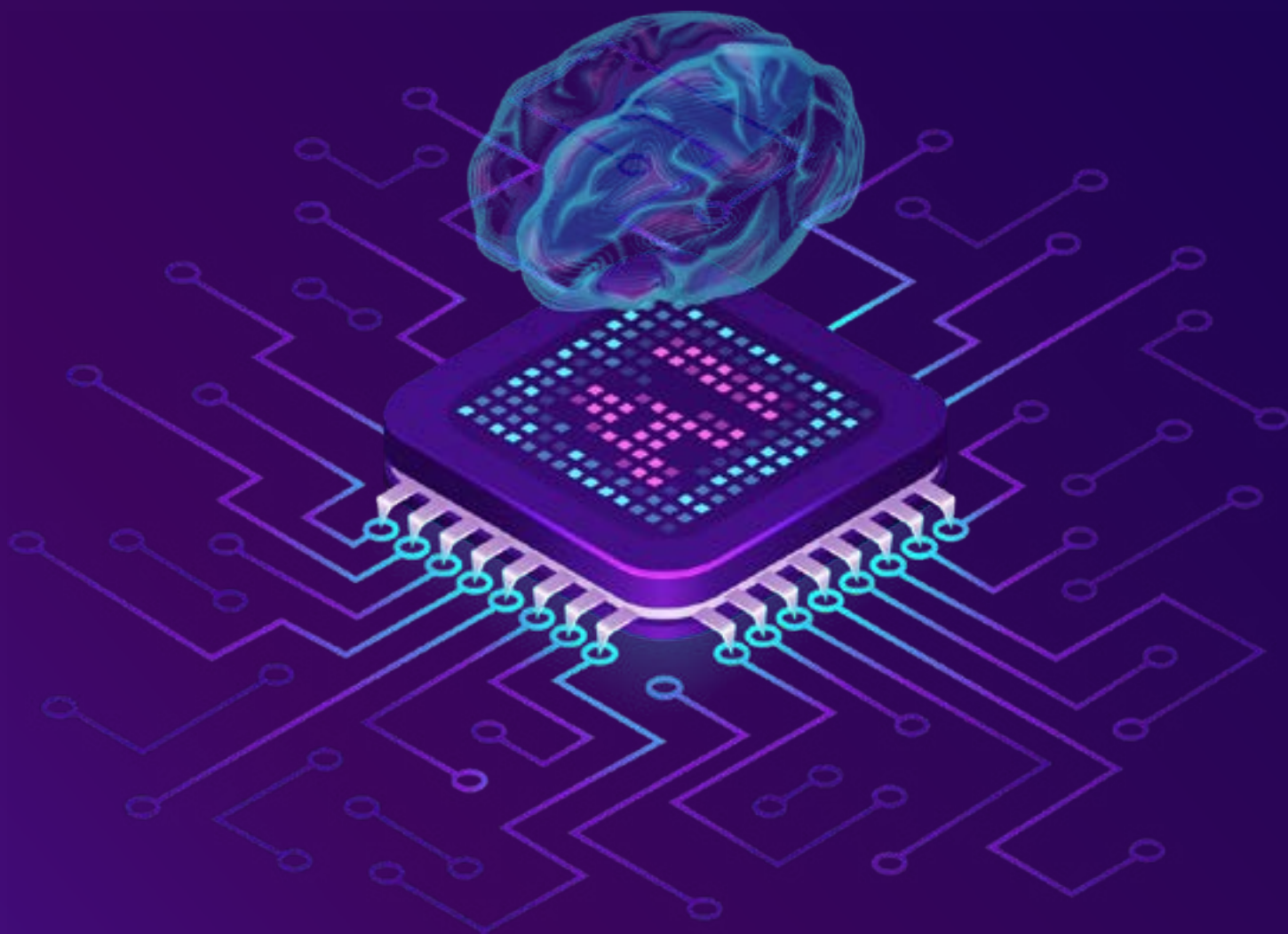
NMIMS
MUKTAJEEVI EDUCATION SOCIETY

**MUKESH PATEL SCHOOL OF
TECHNOLOGY MANAGEMENT
& ENGINEERING**

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ABOUT IETE

The Institute of Electronics and Telecommunication Engineers Student Forum (IETE-SF) is India's leading recognised professional society devoted to the advancement of Science and Technology of Electronics, Telecommunication & IT. Founded in 1953. The IETE-SF is the National Apex Professional body of Electronics and Telecommunication, Computer Science and IT Professionals.

The objectives of IETE-SF focus on advancing electro-technology. The IETE-SF conducts and sponsors technical meetings, conferences, symposia, and exhibitions all over India, publishes technical journals and provides continuing education as well as career advancement opportunities to its members.

The IETE-SF focuses on advancement of the Science and Technology of Electronics, Telecommunication, Computers, Information Technology and related areas. Towards this end the Institution promotes and conducts basic engineering and continuing technical education programmes for human resource development.

PRESIDENT'S NOTE

Looking at the future, we must understand that the unexpected rollercoaster of opportunities, emotions and experiences is the new normal. IETE-SF being a technical committee, we work smartly and strategically to create a vast sea of opportunities that will inspire and create a positive attitude towards learning and growing with a technical background.

At IETE-SF we aim to create a future-focused, practical and innovative working culture and this newsletter is our next step towards achieving it. What an incredible adventure life would be if we chose to embrace both successes and failures, taking advantage of the educational and networking opportunities IETE-SF brings to the table.

I'd like to thank our faculty coordinators and all the members of the committee for their contribution, without whom the 4th edition of Resonate would've have been impossible. I invite you to embrace your experiences as they await you, learn something new from this issue and keep working towards a bright future and building a successful career. Cheers!

-Anshu Poswalia

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“HEY SIRI, TELL ME SOMETHING ABOUT ROBOTICS AND ARTIFICIAL INTELLIGENCE”



Artificial Intelligence and Robotics: All the Facts You Need to Know

To defy it in simpler terms, AI acts as the brain whereas robotics is the body. Artificial intelligence (AI) and robotics are a powerful combination for automating tasks inside and outside of the factory setting. In recent years, AI has become an increasingly common presence in robotic solutions, introducing flexibility and learning capabilities in previously rigid applications.

WHAT EXACTLY IS A ROBOT?

A machine that is capable of sensing its environment and carrying out arithmetic and logical computations to execute any task catering to real world actions can be defined as a robot.

WHAT IS AI?

Now let us take a look at what the talk of the town “AI” stands for and what it means. It is a computer program and it primarily caters to the development as well as the analysis of algorithms. To put it simply, AI is a computer program that is capable of creating a machine having its intelligence and behavior.

HOW IS AI RELATED TO ROBOTS?

Artificial Intelligence or AI provides robots with a vision to navigate, detect and derive their reaction accordingly. Robots learn how to perform any tasks via humans and through machine learning [ML].

The AI part of robotics helps to learn a model to perform a specified task, apart from this it also helps machines be more intelligent in various scenarios.

There are multiple functions incorporated into robots, for example, computer vision, motion control, grasping the objects, and training data to understand physical and logistical data patterns and act accordingly.

And to understand the scenarios or recognize the various objects, labeled training data is used to train the AI model through machine learning algorithms.

CLASSIFICATION OF AI

Artificial Narrow Intelligence (ANI)

This form of artificial intelligence encompasses all existing AI, including the most complex and competent AI ever developed. Artificial narrow intelligence refers to AI systems that can only do a single task autonomously while emulating human skills. These machines have a very limited or narrow range of capabilities since they can only accomplish what they are programmed to do. These systems relate to all reactive and limited memory AI, according to the aforementioned classification approach. ANI includes even the most complex AI that employs machine learning and deep learning to teach itself.

Artificial General Intelligence (AGI)

Artificial General Intelligence refers to an AI model's ability to learn, observe, understand, and function in the same way that a human does. These systems will be able to build various competencies on their own, as well as make connections and generalizations across domains, significantly reducing training time. By mimicking our multi-functional capacities, AI systems will be just as capable as humans.

Artificial Superintelligence (ASI)

The development of Artificial Superintelligence will be the pinnacle of AI research, as AGI will become by far the most capable form of intelligence on the planet. ASI will be overwhelmingly better at everything they do, in addition to mimicking human intellect's multifaceted intelligence. This is due to higher memory, faster data processing and analysis, and decision-making skills. While the prospect of having such powerful tools at our disposal may appear tempting, these machines may also pose a threat to our existence, or at the very least, our way of life.

Reactive Machines

Reactive Machines have limited functionality. As the name suggests, these react to any stimuli given. Their functionality isn't memory-based, which means they can't "learn" or use any previously gained experience and will only respond to a limited set of inputs.

Limited Memory

In addition to having the capabilities of reactive machines, limited memory machines can "learn" from previously used data. Large amounts of training data are stored in the memory to form a reference that can help solve future problems. Most present-day AI systems like those in deep learning use training data. Some instances are image recognition AI, chatbots, virtual assistants, and self-driving vehicles.

Theory of mind

The theory of mind AI is a recent innovation, unlike the two explained above, which are pretty abundant. The concept of the theory of mind AI is that it will be able to you better understand the users' needs, emotions, beliefs, and thought processes and act accordingly. While artificial intelligence is an area of interest for many researchers, achieving artificial emotional intelligence is still a leap. It needs to understand emotions and their reasoning.

Self-Aware

Self-awareness AI is the final stage of AI development, which presently only exists hypothetically. As the name suggests, Self-aware AI is an AI that has evolved to become so familiar with the human brain that it has developed self-awareness. This type of AI will be able to understand and bring out the emotions of the user and will also be capable of displaying emotions, needs, beliefs, and a desire of itself. This type of artificial intelligence is what we have seen in many movies and shows that show a self-aware AI. Once the AI becomes self-aware, it can think of ideas such as self-preservation which might cause it to rebel.

AI IN RETAIL

AI indeed can transform so many things behind the scenes, but the exact opposite is the full-throated adoption of AI by retail to boost the bottom line, improve profit margins, maintain customer satisfaction, and reduce inefficiency at scale. Here are a few sites that successfully endorsed AI the right way.

Amazon – The AI Ecosystem to Rule Them All

Let’s get this out of the way. Did you ever think, “Well, that was kind of cliché” after watching a television show or film that broke all the rules of its day and thought It’s not that this show is cliché, however? It fundamentally changed everything that came after it, spawning both copies and improvements.

AI-driven platforms, such as Amazon’s recommendation engine, have changed the world. In addition to keeping customers clicking and searching, it checks on empty carts, alerts users to sales and new inventory, and acts as a personal assistant. This energy extends throughout the Amazon ecosystem. Customers can search for products, talk to Alexa, then pick up a few items from Amazon Go without having to wait in a checkout line. It’s the foundation for all AI integrations in retail.

1-800 Flowers – AI Chatbots

The majority of companies now employ chatbots, with Gwyn (Gifts When You Need) from 1-800-Flowers being a great example. Gwyn communicates directly with its customers through a messaging platform, a common communication platform. As a result of Natural Language Processing, Gwyn can respond to customer queries, develop tailored offers and gift ideas, and guide customers through the shopping process. 80% of customers stated they’d use Gwyn again and the company increased sales by 6.3% from the previous year.

Rebecca Minkoff – Unified Commerce and the Store of the Future

Since 2015, we have had the store experience of our dreams thanks to the clothing designer. AI powers touch screen mirrors, enabling shoppers to browse the inventory for inspiration and specific items. Fitting rooms with interactive lighting provide customers with customized lighting, and RFID technology can suggest inventory based on what they are trying on. Rebecca interacts with customers via touchscreens, and customers do not need a cashier to check out. Sales tripled during the first year.



AI IN ASTRONOMY

With advancements in the field of Artificial Intelligence, Astrophysics has an advanced hand in hand.

Using newly developed sophisticated Technologies and equipment, Space research has now escalated to the next level where we can very easily explore the deep dark space Millions and Billions of Km's away from us.

More and more astronomers are using AI as an asset to explore space, collect a massive amount of data, find pulsar stars, find new celestial bodies, and look as far as our imagination. Astrophysicists from around the world are now using Artificial Intelligence more and more every day and a new term being coined is "Artificial Astronomers".

There has been a huge advancement in technology and many telescopes are being invented every day, improving the technologies, overcoming loopholes. Many telescopes like Gran Telescopio Canaries,

Atacama Large Millimetre Array (ALMA), Jansky VLA, SDSS, ZTF, PanSTARRS, VLT Survey Telescope (VST), and many others. Next-gen telescopes such as the Large Synoptic Survey Telescope (LSST) and the Square Kilometre Array (SKA) are also being used. These telescopes are a result of successful artificial intelligence and cannot be accessed manually.

Concepts such as machine learning and gaining knowledge about the operational engineering of the machinery being used to make these components, distributed and natural computation, probabilistic modeling, statistics are made much easier using these machines. Let's now take a look at the achievements of scientists from around the world.

In Japan, scientists are using Artificial Intelligence to make a tool that helps them to understand and predict the structure of the universe.

NASA's James Webb Space Telescope is soon going to be able to give users access to galaxies that were formed just a couple of hundred million years after the big bang. With such amazing technology, we can only imagine the magnitude of the breakthroughs and discoveries in the upcoming years.

In many AI software such as Morpheus, we can picture objects with great accuracy and precision to gather as much information about them as possible. We can talk about the evolution of galaxies, the formation of worlds, our creation with very little thought and effort.

With the advancements in AI and many astrophysicists also accepting and improvising accordingly, they can achieve so much with very little effort.

Today, we have AI-enabled telescopes and many other special types of equipment. Artificial Intelligence is a boon in the field of Astrophysics.



ROBOTICS IN EDUCATION

Education methods, approaches, and techniques are being developed day by day. We all know without education, there is no progress. Education to know more about the importance of technology in education. Robotics is used in various educational fields so that students get hands-on experience via simulation.

Robotics is used in engineering fields too like civil, chemical, biomedical, etc. The area of the highest economic benefit of robotization in the building industry is that of the structural system. A range of devices exists for concrete handling – placement, screeding, and finishing. For mechanical handling, there are manipulative devices for panels and wallboards.

Simulation technology is utilized in a variety of college degree focuses, offering complete real-life scenarios. In the space of medicine, a lot of thorough exploration of the human body is required. This is where simulators come in and provide exceptional methods of crisis and disaster training for emergency response. These types of all-encompassing simulators offer a choice and response technology, helping/training the doctors to make quick immediate decisions and study the outcomes of their actions.

There is rapid development in the pharmaceutical industry due to the application of robotic hardware, control software, data processing techniques, and many more by pharmaceutical companies. They offer many off-the-shelf units available to both industry and dedicated to academics helping to train the next generation.

The rapid progress of robotic techniques provides new opportunities for biomedical and healthcare engineering. For instance, a micro-nano robot allows us to study the fundamental problems at a cellular scale owing to its precise positioning and manipulation ability.

The medical robot paves a new way for low invasive and high efficient clinical operation. This special issue aims at exhibiting the latest research achievements, findings, and ideas in the field of robotics in biomedical and healthcare engineering.

21st-century skills are the new focus of education, to infuse habits and develop these skills is not at all an easy task. Schools and parents, now understand the need of the hour of overall development have become more aware of coding and robotics importance. And now that the technology is shaping what the future would look like, it will be impacted by yesterday and today.



HEALTHCARE

Healthcare is the maintenance or improvement of health via the prevention, diagnosis, treatment, amelioration, or cure of disease, illness, injury, and other physical and mental impairments in people.

Natural Language Processing

Making sense of human language has been a goal of artificial intelligence and healthcare technology for the past 50 years. Most NLP systems include forms of speech recognition or text analysis and its translation. A common use of AI in healthcare involves applications that can understand and classify clinical documentation. These systems can analyze clinical notes on patients, giving detailed insight about the patient, providing better and more accurate remedies.

Robotic surgeries

Robots have revolutionized surgeries in terms of their speed, and depth while making delicate incisions. Since robots don't get tired, fatigue is not a hindrance in long surgeries. These robots are also able to analyze data from previous operations to develop new more efficient methods for surgery. The preciseness of these robots minimizes the possibility of any unintended or accidental movements during the surgeries.

Virtual Nursing Assistant

AI systems have led to the development of virtual nursing assistants that can perform a range of tasks from conversing with patients to directing them to the best and most effective remedies. These virtual nurses are available 24/7 and can respond to patients as well as examine them and provide solutions. Currently, the main goal of these virtual nursing assistants is to avoid unnecessary hospital visits. The world's first virtual nurse assistant Care Angel conducts checks through voice and AI.

The DaVinci Surgical System

The Davinci Surgical System lets surgeons carry out complex surgeries with precision. The system is designed to expand the surgeon's capabilities and offer an option to open surgery. It provides the surgeons with enhanced vision, dexterity, and precision allowing more surgeons to perform complex procedures involving delicate dissection or reconstruction.

The Future of AI in Healthcare

The greatest challenge to AI in healthcare is not whether the technologies will be capable enough to be useful, but rather its integration in daily medical practice. Perhaps the only healthcare providers who will lose out on the full potential of AI in healthcare maybe those who refuse to work alongside it.



The DaVinci Surgical System

AI & ROBOTICS USED IN MILITARY

Robotic Technology is being used in a variety of ways in the military and public safety sectors such as Unmanned Drones. On the battlefield, these robots can be utilized for observation and support missions. Military drones may assess threat levels and deliver real-time information to soldiers and first responders in places of war and conflict, hostage situations, natural and man-made disasters. Drones are transforming disaster response because they can get to dangerous regions faster and more precisely without putting human responders in danger.

Artificial intelligence was initially utilized against Iraq in 1991 during the Gulf War when the US used smart bombs and smart weaponry, but things have altered dramatically since then. With automated weaponry, the continual progress of artificial intelligence is undoubtedly altering the battlefield.

The US unveiled its AI strategy in the first half of last year, stating how artificial intelligence will be used across their military forces, from decision-making to predicting faults in planes and ships.

Their forces are required to train an AI to change their skill and approach, according to the strategy. The United States claims to be pushing AI into every aspect of the military, including operations, training, sustainment, force protection, recruiting, and healthcare.

Project Maven is another example of the US going beyond just by bringing computer algorithms and artificial intelligence to conflict zones. Project Maven is a blend of machine learning and neural networks that finds objects on its own, in addition to computer vision. Other nations, especially China, Russia, Israel, and South Korea, are investing heavily in AI for military purposes. For example, South Korea has deployed the Samsung SGR-AI, a sentry gun that can track movement and shoot without human interaction. Another example will be AI-controlled robots that are being trained in the California desert alongside the US military.

China, by developing greater AI cyber weapons and killer robots, is also playing a significant role in this AI arms race. Smart surveillance cameras, voice recognition capabilities, and big data services are supplied to the government by companies like SenseTime, Megvii, and Yitu, and are primarily used for the country's welfare.

Israelis are not far behind with their IAI Harpy systems, which are trained to keep monitoring along with detecting and engaging targets, while Russia is developing tanks and drones which will be able to operate autonomously.

AUTOMATION AND ROBOTICS IN AUTOMOBILES

Nations must envisage and strategize their AI battle for the future to survive the current predicament. Unmanned aerial vehicles, autonomous weaponry, target recognition systems, threat monitoring systems, smart missiles, and other advancements are all visible.

In the past few decades, in the automotive industry, robots are handling even the most complex manufacturing tasks and completed them several times faster than human workers. Although much of robotics technology such as AI or IoT is in its infancy, it is still a colossal leap from what our industries had until the late 1980s. It is barely possible to tabulate an exhaustive list of all the intriguing marvels erupting from the most brilliant, industrious minds in the industry.

Here are the four most advanced automation technologies used in the automotive industry:

- Machine Vision
- Collaborative Robots
- Artificial Intelligence for Driverless/Autonomous Cars
- Cognitive Computing in IoT Connected Cars
- Machine Vision

The need for safer, more reliable, and robust automobiles to justify price points is pushing automakers to adopt machine inspection. And Machine Vision (MV) helps them fulfill this need by providing an automated internal machine inspection method.

MV is a mother lode of a large number of high-end technologies, software and hardware products, integrated systems, and of course, expertise. This technology works like the eye of the automotive production process using imaging processes including conventional imaging, hyperspectral imaging, infrared imaging, line scan imaging, 3D imaging of surfaces, and X-ray imaging.

Collaborative Robots

Generally called Cobots, these are often confused with robots that collaborate with humans. While that is partially true, Cobots are robots that work independently without humans invading their workspace. Cobots help human technicians by handling a large part of the job. When a certain job requires multiple functions to be done at once, the cobot will allow the laborer to work on it and later shut down once the latter's job is done. However, not all Cobots are made equally. Some are designed to stop while others are not.

Artificial Intelligence for Driverless/Autonomous Cars

Artificial intelligence in cars works by first creating and storing an internal map of the surroundings (street, locality, or region) using smart sensors such as radar, sonar, and/or laser.

It is processed by some inputs, plots the most plausible trajectory, and sends instructions to the vehicle's actuators which control acceleration, braking, and steering. Coded driving protocols, obstacle avoidance algorithms, predictive modeling, and smart object discrimination (like., knowing the difference between a bicycle and a motorcycle) help the car follow traffic rules and navigate past obstacles.

Cognitive Computing in IoT Connected Cars

Cognitive Computing (CC) is a technology platform based on artificial intelligence and signal processing. These platforms encompass and use machine learning, reasoning, human language processing, speech and object, human-computer interaction, dialog, and narrative generation, among others.

While connected cars are vehicles that use the internet to connect and communicated with one another to build safe, easy, non-intervening traffic. Some companies such as IBM (Watson AI) and BMW are combining CC and IoT to invent autonomous cars that communicate with each other while recognizing and linking driving patterns to the emotional response of their human drivers during all possible scenarios.

AI IN GAMING

Artificial intelligence (AI) is a term used in gaming to describe responsive and adaptive video game experiences. NPCs, or non-player characters, are commonly utilized to generate AI-powered interactive experiences, and they act intelligently or creatively as if commanded by a human game player. RBS (Rule-Based System) was originally developed for board games such as tic-tac-toe, dots-and-boxes, checkers, and chess. However, the AI in older games differs from that in more current games in a few areas. The AI always has perfect knowledge: it knows where all of its pieces are, as well as where all of its opponents' pieces are, and it can calculate all possible available movements for both players, at least for the next turn, and typically for future turns as well. When compared to more recent video game genres such as First-Person Shooters (FPS) or MMORPGs, the number of rules for a game, the number of actions allowed in each game, and the number of physical spaces where actions can occur are all quite limited. The AI must account for the countless actions at their opponent's disposal, the majority of which may be available at any given time. The board on which these games are played is rather large, with practically infinite locations or courses a player could take. Finally, these games normally do not give players turns; instead, they are free to perform as many acts as they want, as quickly as they want, while their opponent is unable to do so. Game makers have been developing software in such a way that it not only acts like a person but also assists in the creation of virtual worlds from the ground up without the need for human intervention. It revolves around the creation of a collection of complicated mechanisms that result in emergent gameplay. For example, Red Dead Redemption 2, Rockstar's hyper-realistic Western game, allows players to engage with non-playable people in a variety of ways, triggering diverse reactions depending on everything – including activities such as wearing a hat or even the bloodstains on it. Deep Learning, a subset of the Machine Learning revolution that has led to advancements in self-driving cars, computer vision, and natural language processing, has yet to make a significant impact in commercial game development. However, it appears that a time will come when creators will have access to these resources to create immersive and intelligent games. This would result in creating tools that automate the fundamentals of complicated games capable of altering and responding to user feedback, as well as in-game characters that mature over time.

IN OTHER NEWS...

AI influencers

AI has advanced a lot in recent years, and while it holds a lot of potentials, it has advanced on to social media in the form of social media influencers. Social media users worldwide can share their opinions and thoughts. A social media influencer is anyone who has a large following and can persuade or sway the opinion of that audience. They may do that by sharing their expertise or experience or simply by creating creative content. Social media influencers are virtual “people” that have the personality, characteristics, and features of humans. They promote various fashion and lifestyle brands. Instagram is being used for some influencers such as:



Lil Miquela: 3.1 M followers



Shudu: 223K followers



Bermuda: 279K followers

Now the question arises how do they work?

Behind each virtual influencer are smart brands and individuals with a keen eye for technology. These people are responsible for growing them into becoming as internationally as they are quickly becoming. Their creators choose their outfits and mould their personalities. They can also decide whom they hang out with, date, have a falling out or with, and even whom they accept brand deals from. It is the best possible deal as they get all the promotional money. These creators then edit their influencers into whatever backdrop they want.

For example, if they created an influencer that likes to travel, they can add a background suitable for the same. So, the influencer has traveled to that destination. Brands also benefit as it is more convenient and gives more control over the deal.

For example, a simple mistake that could lead to lots of complications in real life can just be edited in a matter of a few minutes.



Blawko: 147K followers



Imma: 355K followers

ARTIFICIAL INTELLIGENCE IN THE METAVERSE

What is the metaverse?

The metaverse is a virtual space where users can interact with 3D avatars and digital objects in a way that is similar to the real world. The idea originates back to the early '90s by science fiction writer Neal Stephenson and has been brought to life by companies such as Decentraland, Microsoft, and Meta (formerly Facebook).

Use Cases of AI:

The accuracy

An AI engine will be able to analyze images and will be able to come up with a similar creation including things such as emotions, hair, age factor to give the avatar a more realistic feel. Meta and Ready Player Me are already working on this.

Humans in the metaverse

Digital humans are built solely through AI, from NPC's to assistants in VR workplaces, everything is being worked on by companies such as Unreal. Multilingual usage is also made possible by AI as it takes less than a second to translate English into languages that a computer may be able to read and can change to multiple languages so anyone can understand. AI advancements also have brought into the light the sense of touch in the metaverse with the help of a specialized VR headset.

THE 411_SERIES

The 411series is an Instagram series created by and for engineers, according to the **IETE MPSTME** Team. The 411's mission is to assist, motivate, and identify India's future generation of change-makers. Engineering Insider, Re-Engineered, and Tech Talk are some of the segments we are proud to have. Engineers from all professions join us on Engineering Insider to share insights into their work and lives. In Re-Engineered, we discuss the various engineering career pathways that are viable and can be pursued, as well as the steps required to get there. Tech Talk are snippets of interviews or talks given by a variety of engineers from various industries.

We make posts about well-known people and their entire careers. We also have some inspiring quotes from some of the world's most illustrious engineers. We've heard four remarkable folks speak about their engineering careers and how they choose to be more than just engineers in the last four weeks. On our Instagram page (@the411series), we've had well-known guests such as Vedant Gandhi, the Co-Founder and Director of RecycleX Pvt Ltd, Devashish Sardana, an author and mechanical engineer, YouTubers and computer engineers Desi couple on the go, and a well-known actor from South India Sreejith Ravi go live with us.



CHECK ME OUT

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