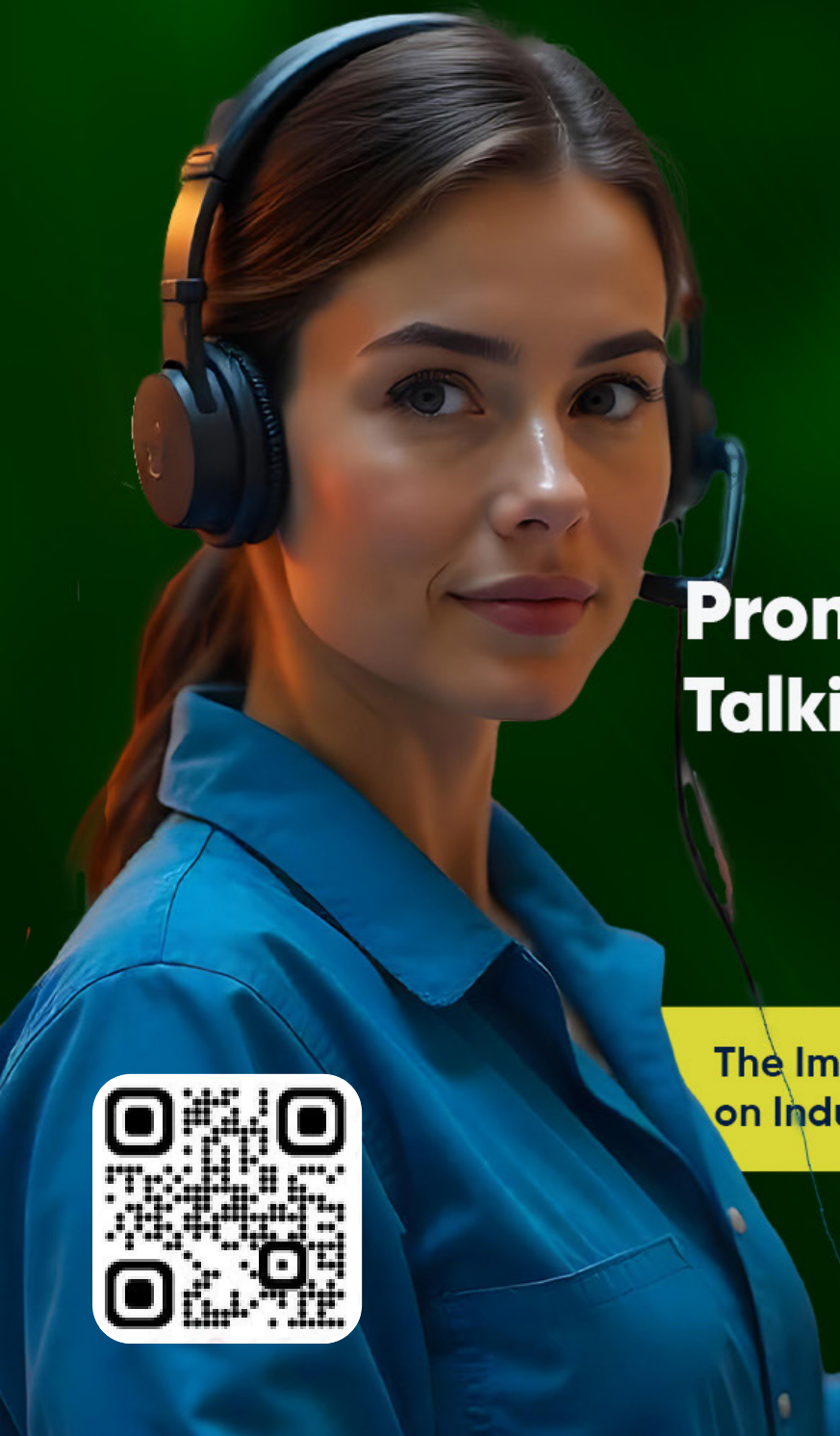# Signature Testing Analysis Using
Leuven Measurement Systems

Prompt Engineering :
Talking to AI Like a Pro

The Impact of Additive Manufacturing on Industrial Automation

Authors

Ubaidulla Mekkuth

Director, IPCS Global

Thoufeek. S

Digital Marketing Trainer, Kollam

Githeesh S B

Technical Lead, Trivandrum

Siva Shankar.J

Project Engineer, Tirunelveli

Amit Rao Perka

Senior Technical Head, Hyderabad

Sakthivel S

DM Analyst, Madurai

Nandhakumar

IT Engineer, Coimbatore

Authors

Hima B Suresh

DM Analyst, Trivandrum

Dinesh

Junior Project Engineer, Anna Nagar

Navya Rajan

Junior Project Engineer, Kollam

Aneesh

IT Engineer, Coimbatore

Anchana. S

Customer Relation Executive, Kollam

Visakh. S

Corporate Relation Officer, Trivandrum

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About Us...

In 2008, we embarked on our journey by establishing the inaugural office of the company in Kochi, where an operational team commenced the execution of industrial automation projects. Within a year, we inaugurated our first training center in Kozhikode. By delivering exceptional service, we quickly attracted students from various regions of India and even from Africa. Subsequently, we broadened our training centers to multiple locations across India, Nigeria, Qatar, the UAE, Kenya, and the Kingdom of Saudi Arabia. As of 2024, we proudly operate a total of 32 branches. IPCS Global has emerged as one of the most esteemed core technical training providers globally, offering a wide array of programs that are future-oriented.

The selection of training programs is guided by several factors, including the potential for growth within each field, the employability prospects for our trainees, the accessibility of various job markets, and other relevant considerations. Our current offerings encompass Industrial Automation, Building Management and CCTV Systems, Embedded Systems and Robotics, the Internet of Things, Digital Marketing, IT and Software Development. Key features of our programs include 100% live and interactive classes, global certifications, and placement opportunities.

We aim to establish a network of 50 centers by 2025, reflecting our commitment to expansion and excellence. We welcome motivated entrepreneurs to collaborate with us in achieving this vision. You can join us as a franchisee, operating under our brand and business model, or as an investor to support our growth. Together, we can create a lasting impact in our communities. Visit https://ipcsglobal.com/ for more details.

Our goal at IPCS is to expand globally, preparing students for future careers by staying updated on emerging trends and maintaining ethical standards. We emphasize teamwork, professionalism, and mutual respect within our organization. Understanding the impact of technology on our lives is crucial in today's digital era, as it drives business success and innovation. By prioritizing these values, we ensure client satisfaction and student excellence across all fields.

Team IPCS has introduced "Iziar," a magazine focusing on technology trends and market developments. The goal is to increase awareness and accessibility of technology for all. Content covers technology, startups, cyberpunk culture, and more, aiming to inform readers about the latest innovations and trends in the industry.

Technology is like air; you can't live without it. We invite you to immerse yourself in the technological realm of Iziar.

"TIME AND TECHNOLOGY WAIT FOR NONE"

Director Desk

**Ubaidulla Mekkuth**

PASSION AND PROFESSION

We are all dedicated to pursuing our passions, which differ from person to person. When we engage in activities we are passionate about, we don't experience boredom or fatigue, even when working long hours in our jobs. However, the question remains: are we truly happy in our professions? In contrast, we find joy in pursuing our passions.

Take Mahatma Gandhi, for example. He was a lawyer by profession and traveled to South Africa to represent Gujarati businesspeople. During a train journey, he was forced to leave a first-class coach due to racial discrimination. This pivotal moment transformed Mohandas Karamchand Gandhi into Mahatma Gandhi, as he discovered his true passion was advocating for the underprivileged. We remember him for this passion rather than his legal career.

Similarly, consider Steve Jobs. His passion and profession aligned perfectly—he aimed to create world-class products for Apple. His dedication to this passion led him on unique journeys that many people may not understand. He successfully communicated his vision to his team, inspiring them to work tirelessly to innovate for Apple.

Therefore, if you find that your passion and profession do not align, it can hinder your performance at work and diminish your happiness in life. When you work with passion, your days are filled with joy, leading to greater productivity. The combination of inner passion and consistent effort is essential for achieving success in life.

"DO WHAT YOU LOVE AND LOVE WHAT YOU DO"
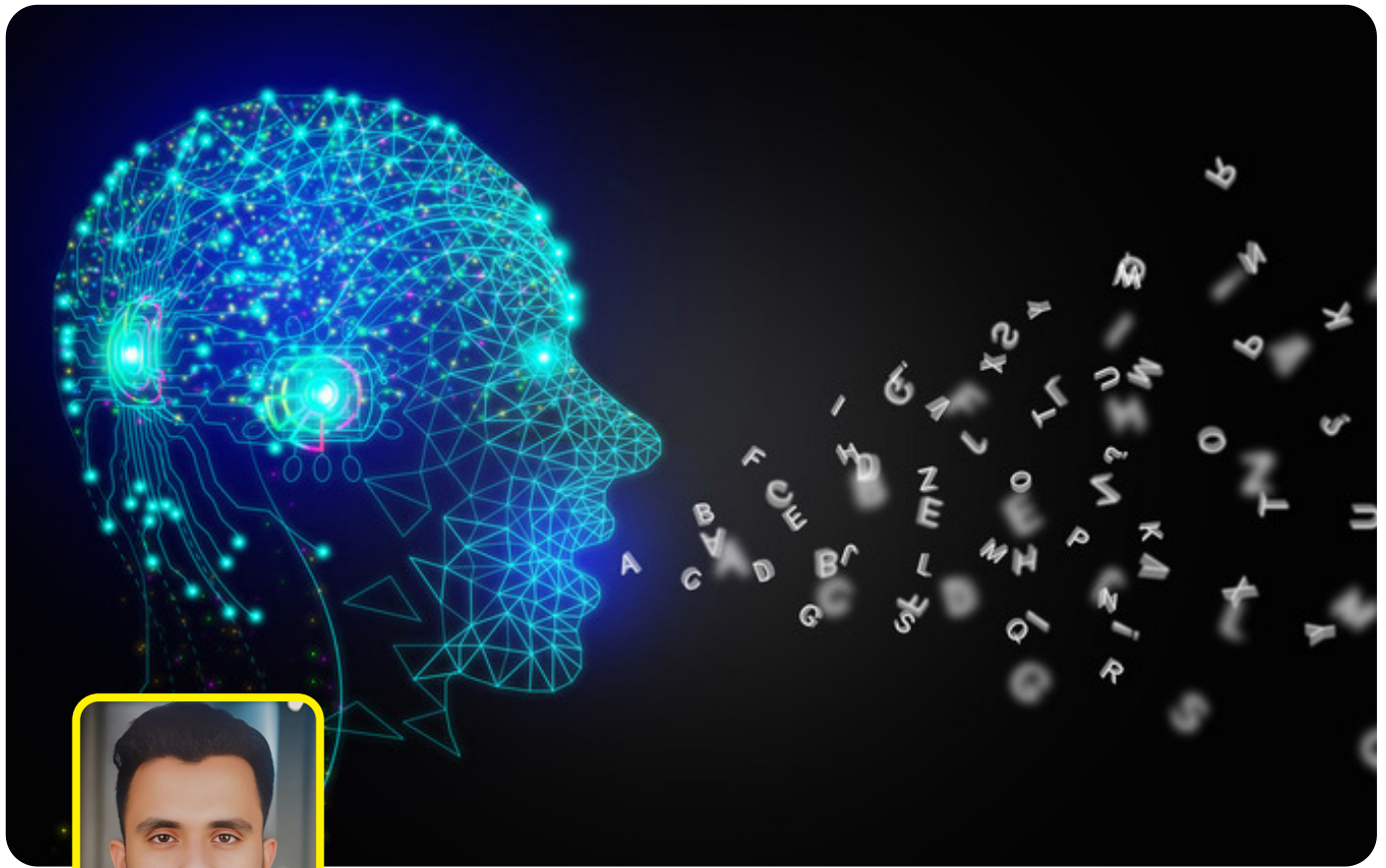
Thoufeek. S
Digital Marketing Trainer
Kollam

I serve as a Digital Marketing Trainer at IPCS Global, located in the Kollam branch, specializing in SEO, social media, and affiliate marketing. My enthusiasm lies in assisting students and businesses in effectively navigating the digital environment by integrating practical strategies with innovative insights.

Prompt Engineering
## Talking to AI Like a Pro

Consider yourself attempting to engage in conversation with a friend who is intelligent but somewhat literal-minded. Sometimes they simply don't get what you're trying to communicate, even if you know they're really intelligent. Prompt engineering is the art of interacting with artificial intelligence in a way that maximizes its potential, and that's exactly how it feels.

A Personal Journey into AI Communication

I'll tell you a story. I initially believed that AI was as easy as typing a question and receiving a response. I was mistaken, boy! It's similar to picking up a new language—one that blends mechanical accuracy and human ingenuity.
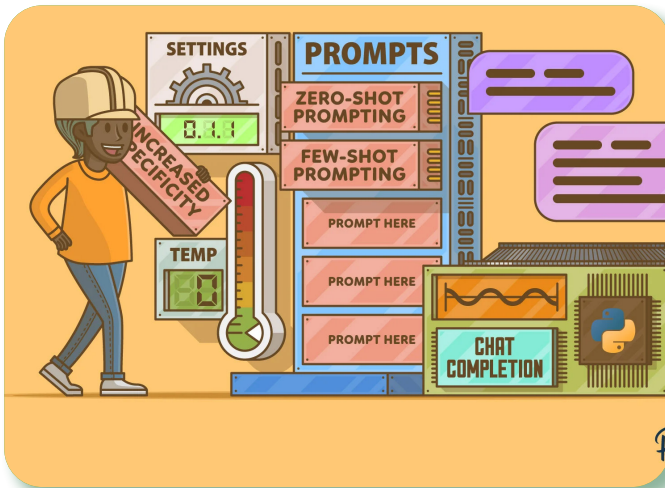
What exactly is Prompt Engineering?

Consider quick engineering to be AI's coach and translator. You're assisting the AI in comprehending the complex terrain of your request rather than only providing commands. It involves creating signals that direct the AI to deliver just what you require, be it a thorough study synopsis, an original piece of writing, or a sophisticated solution to a challenging issue.

The Human Touch in Technology

Though quick engineering shows a more collaborative aspect, we tend to think of AI as being cold and mechanistic. It's a communication dance between algorithmic power and human inventiveness.

◆ Provide clear context
◆ Break down complex ideas
◆ Guide step by step
◆ Be patient and specific

A Real-World Example

Let me explain. Consider requesting that an AI write a piece about climate change. The following could be a simple prompt: "Write about climate change." A well-written prompt, however, would go more like this: "Write a thorough yet approachable article about climate change that is aimed at young professionals. Add facts from science, possible fixes, and an optimistic outlook on both individual and group efforts.

Can you see the difference? The AI has a clear road map to follow thanks to the second request

The Emotional Side of Prompt Engineering

It may sound odd, but engineering can be prompted by emotional intelligence. You're developing an understanding relationship rather than merely entering data. Every interaction serves as a teaching moment for both you and the AI.

Learning from Mistakes

If your initial attempts don't produce flawless outcomes, don't give up. In reality, every "unsuccessful" challenge teaches us something useful. It requires patience, practice, and a readiness to adapt, much like meeting someone from a different cultural background.

Practical Tips for Aspiring Prompt Engineers

◆ Be Specific: The more detailed your prompt, the better the result.
◆ Provide Context: Give the AI background information.
◆ Define the Role: Tell the AI what perspective to take.
◆ Iterate and Improve : Treat each prompt as a draft.

The Future is Collaborative

The goal of prompt engineering is to enhance human creativity rather than to replace it. We're creating a new kind of communication that combines algorithmic strength and human intuition

A Personal Reflection

Prompt engineering is incredibly fascinating to me as someone who is interested in the nexus between technology and human communication. It serves as a reminder that in the end, technology is a tool for problem-solving and human expression.

The Future of Prompt Engineering

With new technologies promising progressively more complex human-AI interactions, the field is changing quickly. The lines separating human and machine communication are getting increasingly hazy as machine learning models get better at comprehending intricate, multi-step suggestions.

Learning and Mastering Prompt Engineering

▸ Becoming proficient in prompt engineering requires:
▸ Deep understanding of AI model capabilities
▸ Strong communication skills
▸ Creative problem-solving
▸ Continuous learning and experimentation
▸ Recommended Learning Paths
▸ Online courses in AI and natural language processing
▸ Practical workshops
▸ Experimental projects
▸ Community forums and discussion groups
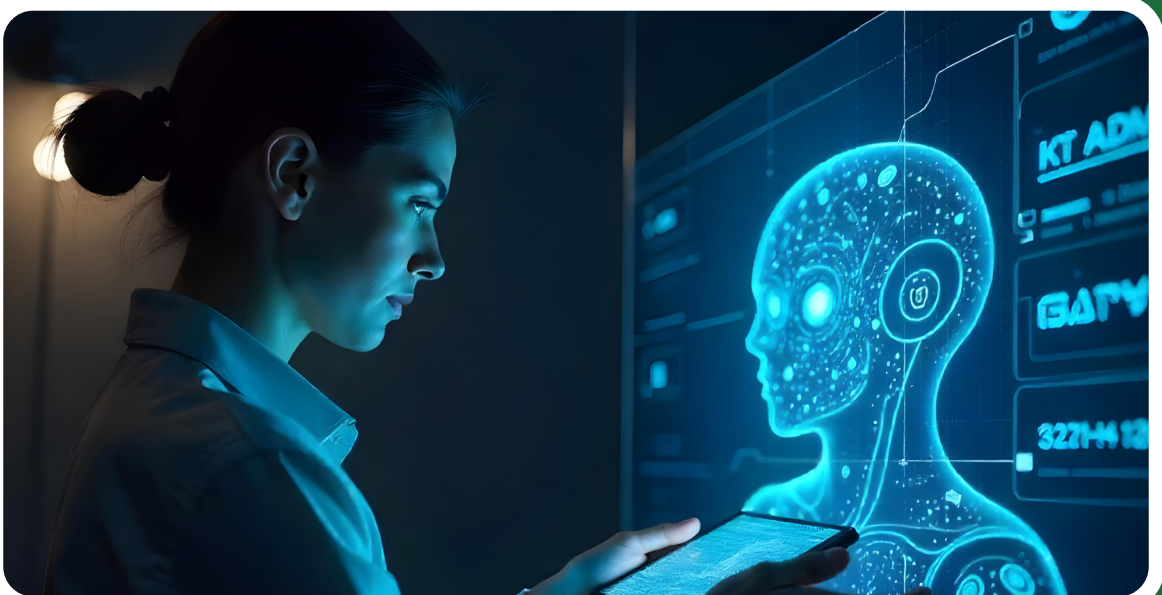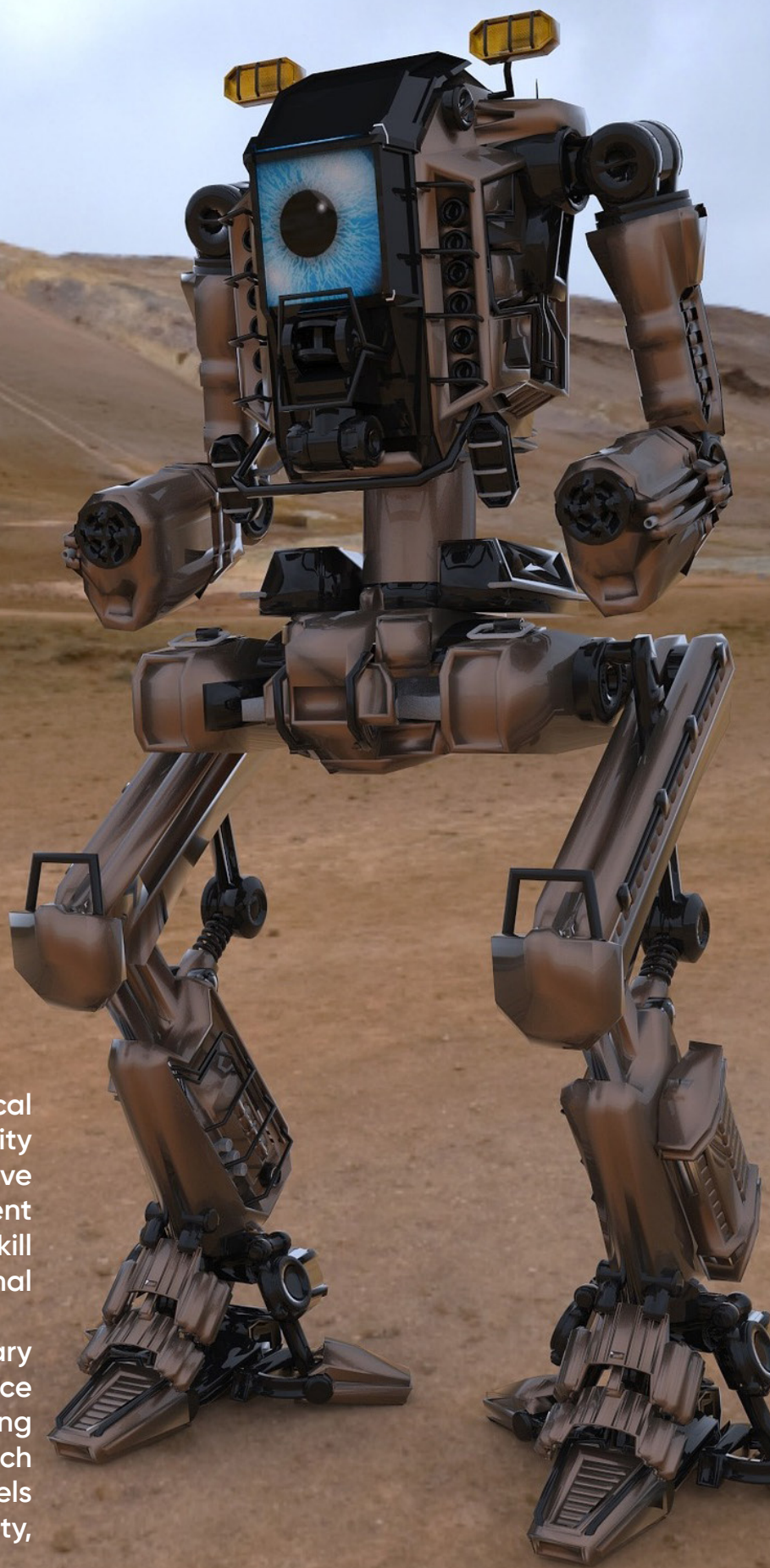
Conclusion

An intriguing nexus between technical innovation and human ingenuity is prompt engineering. Effective communication with these intelligent systems will become a more valuable skill in both the personal and professional spheres as AI develops.

People may unleash the revolutionary potential of artificial intelligence by becoming proficient in creating accurate, context-rich prompts, which will transform complex language models into effective instruments for creativity, invention, and problem-solving.

The Impact of Additive Manufacturing on
Industrial Automation

Githeesh S B
Technical Lead,
Trivandrum

I am Githeesh S. B., serving as the Technical Lead at IPCS Global in Trivandrum. My area of expertise lies in industrial automation and building management systems (BMS). With five years of experience in the field of industrial automation, I aim to enhance my knowledge by delving into emerging technologies and making significant contributions to my team.

Additive manufacturing (AM), commonly known as 3D printing, is transforming the field of industrial automation. Unlike conventional manufacturing techniques that involve removing material from a solid block through cutting, drilling, or shaping, additive manufacturing constructs objects layer by layer from a digital design. This transition from subtractive to additive methods is revolutionizing industries by promoting more efficient production, minimizing material waste, and encouraging innovation. When integrated with industrial automation, additive manufacturing significantly boosts productivity, flexibility, and cost efficiency. This article examines the essential role of additive manufacturing in industrial automation and its influence on manufacturing processes across different sectors.

Facilitating Complex Designs and Customization

A key benefit of additive manufacturing in industrial automation is its capability to create complex geometries those traditional manufacturing struggles to produce. Unlike conventional techniques, which are often restricted by tool limitations, 3D printing can generate intricate shapes and internal structures that would be nearly impossible to achieve through milling, turning, or casting.

For industrial automation, the ability to design and manufacture complex components on demand allows manufacturers to enhance the functionality and performance of their products. For instance, sectors like aerospace and automotive can create lightweight, high-strength components with internal lattice structures to decrease weight while maintaining structural integrity. These optimized components can be customized for specific applications, improving overall system performance.

Additive manufacturing also supports mass customization. Industrial automation systems utilizing 3D printing can efficiently produce unique components or tailored products based on specific requirements. This feature is particularly beneficial for industries such as consumer electronics, medical devices, and automotive, where specialized applications may necessitate customized parts.

Accelerated Prototyping and Shortened Time-to-Market.

In the competitive industrial environment, speed is essential, and additive manufacturing greatly accelerates the development and testing of new products. Traditional prototyping methods often involve lengthy processes like tooling, molding, or casting, which can take weeks or even months. In contrast, additive manufacturing enables designers and engineers to quickly produce prototypes within hours.

In the realm of industrial automation, this rapid prototyping leads to shorter product development cycles. Engineers can swiftly test designs, make adjustments, and identify potential issues before production starts. Consequently, time-to-market is reduced, allowing companies to launch products more quickly and gain a competitive advantage.

Additionally, additive manufacturing offers cost-effective prototyping. Traditional prototyping often incurs high initial costs for tooling or molds, but with 3D printing, these expenses are eliminated. Manufacturers can easily create prototypes or small batches without the financial burden of developing custom molds or setups for conventional manufacturing methods.

Tools and Production Support.

In the realm of industrial automation, tools like jigs, fixtures, and assembly aids are crucial for achieving precision, uniformity, and speed. Traditionally, creating these tools involves substantial investment in machining, casting, or molding processes. However, additive manufacturing allows for the quick creation of customized tools and production aids at a significantly lower cost and in less time.

For instance, specialized fixtures that secure parts during assembly can be rapidly 3D printed, facilitating swift modifications to the production workflow without the delays associated with conventional tooling production. Likewise, 3D printing can be utilized to create tailored robotic end-effectors or tools designed for specific functions within automated production environments. This capability to swiftly adapt and manufacture custom tools enhances efficiency and accuracy in industrial automation.

Additionally, 3D printing permits the incorporation of intricate designs in tooling that may be challenging or unfeasible with traditional manufacturing methods. These sophisticated tools, which might feature elements like internal cooling channels or lightweight lattice structures, enhance the performance of industrial automation systems by decreasing cycle times, increasing precision, and optimizing energy use

Economical Low-Volume Production

Additive manufacturing is particularly effective for producing small batches or low-volume parts. Conventional manufacturing techniques, such as injection molding or CNC machining, often necessitate expensive molds or tooling that are only economically viable for large-scale production. In contrast, additive manufacturing enables the creation of low quantities of parts without the significant initial costs tied to traditional manufacturing methods.

This capability is especially beneficial in sectors where low-volume production is prevalent, including aerospace, automotive, medical devices, and custom consumer goods. In these industries, manufacturers can leverage additive manufacturing to produce specialized components or replacement parts without the need for costly molds or tooling.

Furthermore, additive manufacturing supports on-demand production, which lessens the necessity for large inventories and allows manufacturers to create parts as needed, thereby reducing storage expenses and minimizing the risk of overproduction. Industrial automation systems can be integrated with 3D printers to facilitate just-in-time production, enhancing operational efficiency and decreasing waste.

Flexibility in Supply Chain and Management of Spare Parts.

In the realm of industrial automation, disruptions in the supply chain can lead to expensive downtime, especially when essential spare parts or components are not available. Additive manufacturing offers a solution by allowing for the on-demand production of spare parts on-site. Through 3D printing, manufacturers can quickly create replacement parts, eliminating the wait for shipments from suppliers or distributors.

This capability is especially beneficial in sectors where downtime is costly, such as manufacturing facilities or factories that depend on automated systems. Rather than maintaining a large stock of spare parts, manufacturers can keep digital files of essential components and print them as necessary, ensuring that production can resume promptly without major delays.

Moreover, additive manufacturing enables the production of obsolete or hard-to-source parts. Instead of hunting for discontinued components from third-party vendors, companies can simply print the required parts, thereby extending the operational life of equipment and machinery within automated systems.

Environmental Sustainability and Waste Minimization

Sustainability is becoming a key priority for industries globally, and additive manufacturing plays a role in fostering more sustainable manufacturing practices. Unlike traditional subtractive manufacturing, which involves removing significant amounts of material from a solid block, additive manufacturing utilizes only the necessary material to create the part, greatly minimizing material waste.

In the context of industrial automation, this reduction in waste translates to lower production costs and a reduced environmental impact. Additionally, 3D printing facilitates the use of recycled or sustainable materials, further enhancing its ecological advantages. Companies can utilize biodegradable, recyclable, or recycled filaments and powders to manufacture components, decreasing their dependence on virgin materials and supporting a circular economy.

This sustainable approach is particularly crucial in industries with high production rates or intricate supply chains, where material waste can accumulate rapidly. By embracing additive manufacturing, manufacturers can lessen the amount of scrap material produced, thereby improving both cost-effectiveness and environmental stewardship.

Integration with Industry 4.0.

Additive manufacturing is a key component of Industry 4.0, the latest industrial revolution marked by the extensive use of smart factories, automation, data sharing, and cutting-edge manufacturing technologies. By combining additive manufacturing with other Industry 4.0 technologies like the Internet of Things (IoT), artificial intelligence (AI), and robotics, a more interconnected, intelligent and agile manufacturing environment is created.

For instance, in an automated industrial setting, 3D printers can be linked to sensors that track the production process. These sensors gather real-time data that can be utilized to enhance the printing process, identify malfunctions, and make necessary adjustments to maintain high-quality output. AI can be employed to analyze this data, forecast maintenance requirements, or optimize production schedules, ensuring the system operate efficiently.

Additive manufacturing also provides the flexibility and scalability essential for Industry 4.0. Automated systems utilizing 3D printing can be easily modified to meet varying production demands, whether it involves changes in part design, production volume, or material specifications. This adaptability is crucial for sustaining a competitive advantage in a fast-evolving industrial landscape.

Automation of the 3D Printing Process.

Although additive manufacturing is inherently a form of automation, further automating the 3D printing process enhances efficiency. Robotic arms, conveyor belts, and other automated systems can work alongside 3D printers to load and unload materials, manage finished products, and even oversee the printing process.

This fully automated method enables manufacturers to operate 3D printing activities continuously, boosting productivity and minimizing the need for human involvement. Automated systems also help maintain consistency in 3D printing processes, enhancing part quality and decreasing the likelihood of errors or defects in the final products.
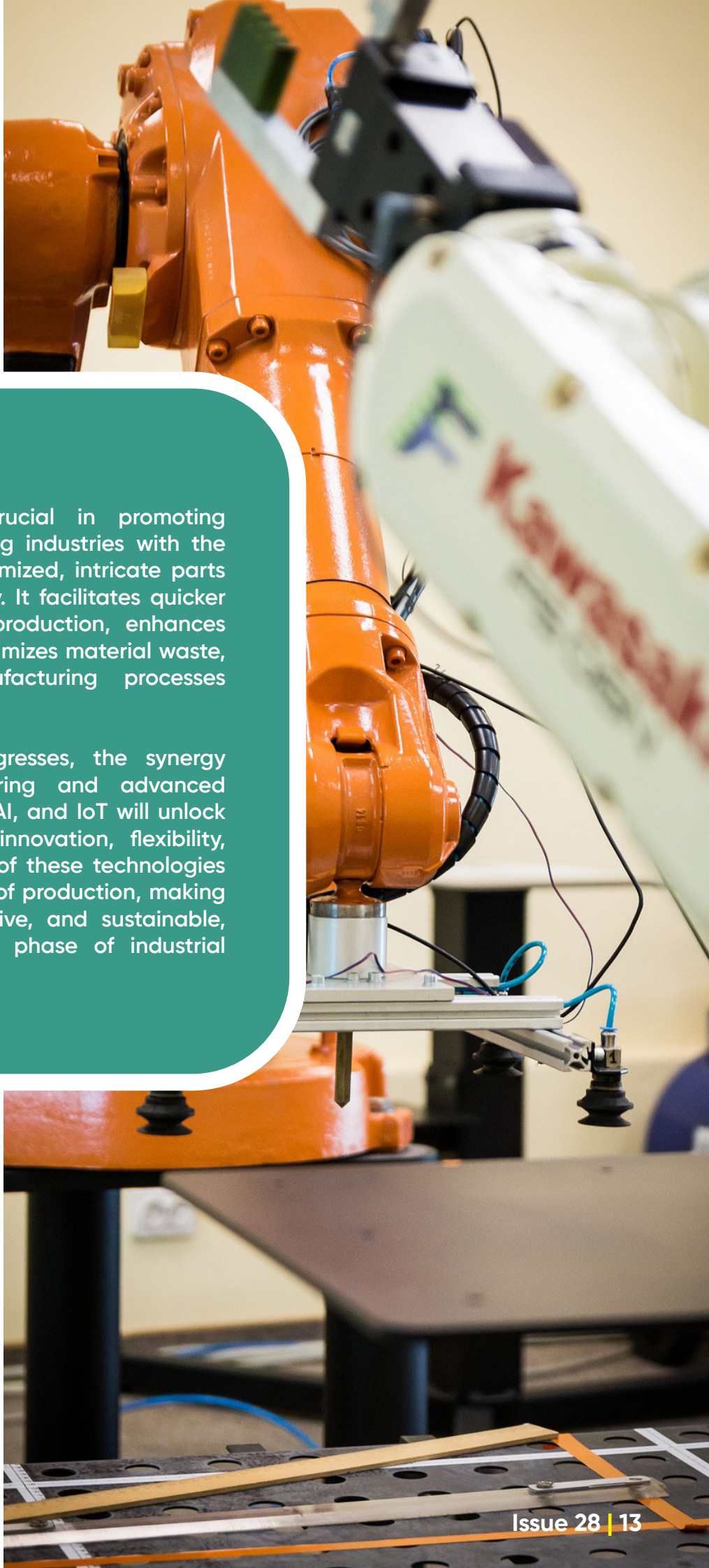
Conclusion:

Additive manufacturing is crucial in promoting industrial automation, equipping industries with the means to produce highly customized, intricate parts more efficiently and sustainably. It facilitates quicker prototyping and low-volume production, enhances supply chain resilience, and minimizes material waste, thereby revolutionizing manufacturing processes across various sectors.

As industrial automation progresses, the synergy between additive manufacturing and advanced technologies such as robotics, AI, and IoT will unlock even greater possibilities for innovation, flexibility, and efficiency. The integration of these technologies is poised to reshape the future of production, making it more responsive, cost-effective, and sustainable, ultimately propelling the next phase of industrial growth.

Signature Testing Analysis Using Leuven Measurement Systems

Siva Shankar.J
Project Engineer
Tirunelveli

I possess expertise in general electrical maintenance and industrial automation. My involvement in Total Productive Maintenance (TPM) activities includes metrics such as Mean Time to Repair (MTTR) and Mean Time Between Failures (MTBF), along with the justification for analysis derived from root cause assessments and the implementation of preventive strategies. This experience encompasses the use of electrical drives, Programmable Logic Controllers (PLCs), Supervisory Control and Data Acquisition systems (SCADAs), and Human-Machine Interfaces (HMIs).

Signature testing examines each machine's distinct vibration patterns to identify problems and track the condition of the equipment. High-precision instruments for condition monitoring, problem identification and predictive maintenance in a variety of industries are provided by KU Leuven's Leuven Measurement Systems (LMS).

Overview of Leuven Measurement Systems

Leuven Measurement Systems (LMS) specializes in offering sophisticated and trustworthy methods for fault detection and vibration monitoring. These systems make it possible to collect and evaluate high-fidelity data from a variety of sensors, giving real-time information about the health of the machine

Key components include

- ❖ Multi-axis Vibration Sensors: Used to measure vibrations from different directions (vertical, horizontal, axial), providing a comprehensive view of machine conditions.
- ❖ Signal Processing Algorithms: Algorithms like Fourier Transform, Envelope Analysis, and Wavelet Transform are used to detect anomalies and diagnose faults.
- ❖ Data Acquisition Systems (DAS): These systems gather vibration data from sensors and transmit it for further processing.
- ❖ Condition Monitoring Software: Real-time monitoring, predictive analytics, and trend analysis are facilitated by specialized software that interprets the vibration data

Signature Testing Methodology in Leuven Systems

Signature testing with Leuven systems typically involves four key steps:

Step 1: Data Acquisition

Vibration data is collected from machinery using sensors like accelerometers, velocity sensors, and displacement sensors, placed strategically to measure vibrations in different directions. The data is captured at high sampling rates and sent to the data acquisition system for processing.

Step 2: Signal Processing

Once vibration data is collected, Leuven systems apply advanced signal processing techniques to analyze the data

◆ **Fourier Transform (Frequency Domain Analysis) :** Breaks down the vibration signal into frequency components, helping to identify fault frequencies (e.g., imbalance or misalignment).

◆ **Time Domain Analysis:** Examines changes in vibration amplitude and waveform over time to detect sudden changes or trends.

◆ **Envelope Analysis:** This technique is useful for detecting bearing faults by identifying high-frequency modulations in the vibration signal.

◆ **Wavelet Transform:** An advanced method that breaks the signal down into both time and frequency components, which is useful for detecting transient faults.
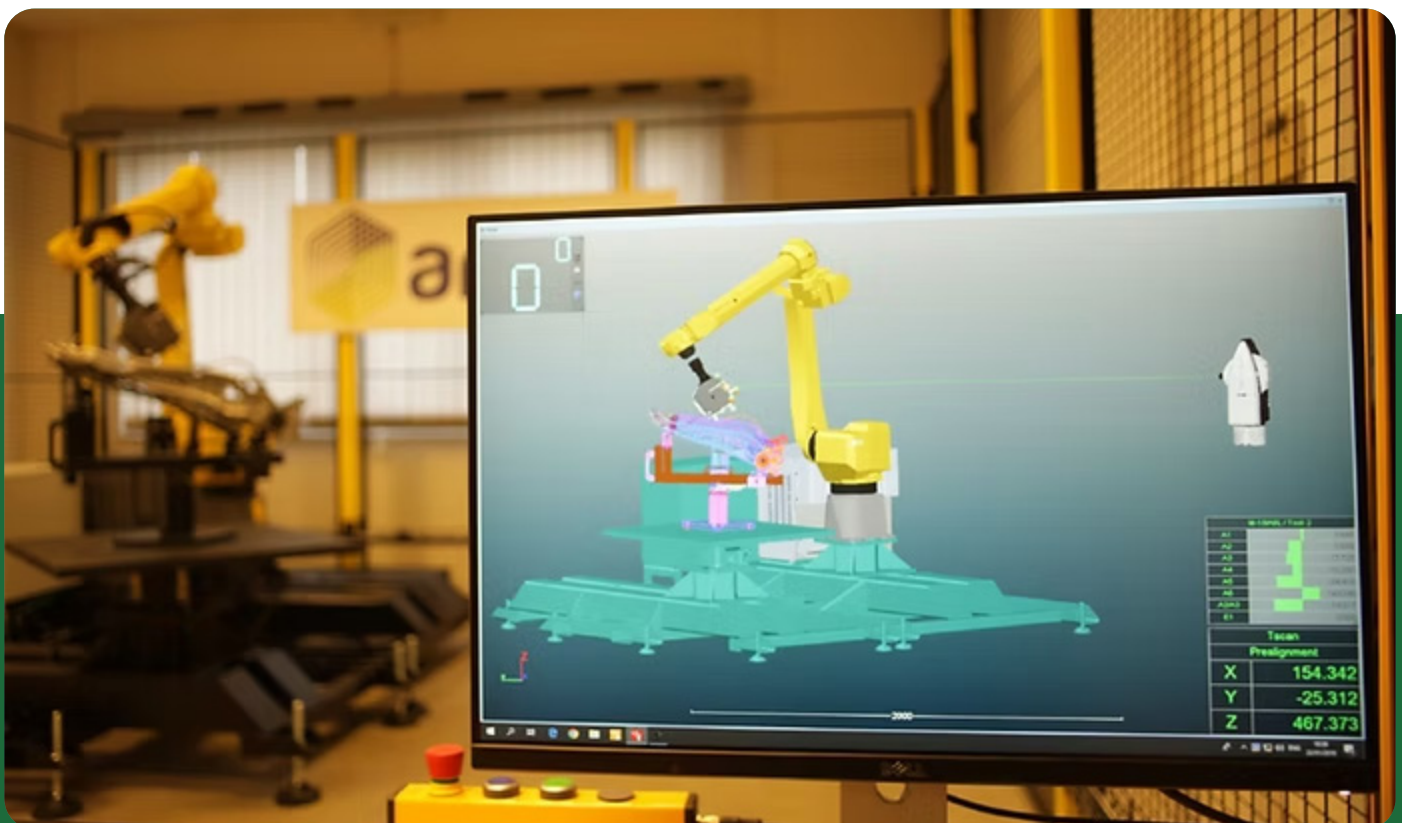
Step 3: Signature Comparison

Reference signatures from machinery in good condition are compared to the recorded vibration data. In order to find differences and determine the kind and severity of faults, such as imbalances, misalignments, or bearing failures, Leuven systems employ a vast database of fault signatures.

Step 4: Fault Diagnosis

The system generates diagnostic reports based on the analysis:

◊ Fault Detection: Identifying whether a fault is present.
◊ Fault Type: Determining the nature of the fault (e.g., imbalance, misalignment, bearing wear).
◊ Fault Severity: Assessing the extent of the fault and its impact on machine performance.
◊ Trend Analysis: Reviewing historical vibration data to see if the fault is worsening over time.
◊ This process helps in predictive maintenance, allowing for timely interventions before a critical failure occurs.

Benefits of Signature Testing Using Leuven Measurement Systems

▸ Signature testing using Leuven measurement systems offers several advantages:
▸ Early Fault Detection: The ability to detect problems in their early stages prevents catastrophic failures and reduces unplanned downtime.
▸ High Accuracy and Precision: Leuven systems use high-quality sensors and sophisticated algorithms to provide precise data and accurate fault diagnosis.
▸ Comprehensive Diagnosis: The system can detect a wide range of mechanical issues, such as misalignment, imbalance, bearing wear, and gear faults.
▸ Real-time Monitoring: Continuous data collection provides an up-to-date snapshot of machine health, enabling quick responses to any emerging issues.
▸ Condition-Based Maintenance: Maintenance is performed based on the machine's condition rather than on a set schedule, leading to cost savings and more efficient resource use.
▸ Trend Analysis: Over time, the system builds a comprehensive performance history of the machinery, helping to predict future failures and optimize maintenance schedules.

Applications of Signature Testing in Automation

Signature testing with Leuven measurement systems is used in various industries relying on rotating machinery and automated systems:

◆ Manufacturing: Monitors motors, pumps, and conveyors in sectors like automotive and food processing.

◆ Power Generation: Tracks turbines, generators, and compressors to detect faults early and reduce downtime.

◆ Oil & Gas: Monitors pumps, compressors, and drilling equipment to prevent production halts and costly repairs.

◆ Mining and Metals: Assesses heavy machinery and crushers to avoid unexpected failures.

◆ Aerospace and Defense: Ensures the reliability of critical systems in sensitive environments.

Conclusion

Leuven measuring systems for signature testing provide a dependable way to keep an eye on the condition of machinery. Predictive maintenance, precise diagnosis, and early fault detection are made possible by these systems' use of high-precision sensors and sophisticated signal processing. In order to guarantee system lifespan and dependability, industries implementing automation and IoT technologies must use this strategy, which improves operational efficiency, minimizes downtime, and maximizes machine performance.

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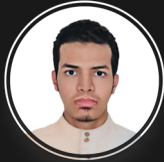- Project Engineer
- SCADA Engineer
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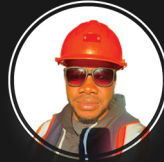# Our Placements

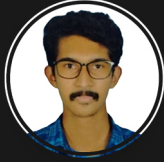**SULTAN BAMUKHIER**
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CONTACT : +91 9846770771

The Golden Age of Manufacturing in India :
A Renaissance of Industry

Amit Rao Perka
Senior Tech Head
Hyderabad

Amit Rao Perka is a seasoned professional with a Master's degree in electronics and over 10 years of experience in industrial electrical and instrumentation, complemented by 8 years in training. Currently serving as the Technical Head of the Automation Division and Senior Corporate Trainer, Amit has extensive expertise in Industrial Automation, Electrical and Electronics Systems, Field and Process Instrumentation, PLCs, HMI, and SCADA. In addition to his industrial accomplishments, Amit has conducted international training for renowned organizations such as Masafi Mineral Plant (Al-Fujairah), Veolia Water Treatment Plant (Sharjah), and Gulf Cable (Kuwait). He is also the author of the book "SCADA & Its Substation Applications," reflecting his deep knowledge and contribution to the field.

India is on the verge of a manufacturing revival, often referred to as the "Golden Age of Manufacturing" by experts. This era is characterized by a growing economy, a favorable demographic profile, and supportive government initiatives, all of which could significantly reshape India's industrial sector and establish it as a global manufacturing leader.

Industry experts highlight this transformative phase as a time of significant progress in manufacturing, marked by increased mergers and acquisitions, government-backed production capacity growth, and substantial investments from private equity and venture capital. These developments are expected to lay a solid groundwork for the country's long-term economic prosperity.

India's GDP growth is projected to propel the nation towards becoming a USD 5 trillion economy by 2025. The central government has increased its capital expenditure for infrastructure development to 11,110 billion rupees (approximately US$133.3 billion) for the fiscal year 2024-2025, reflecting an 11.1% rise from the previous year's 10,000 billion rupees (around US$119.97 billion).

In the fiscal year 2023-24, foreign direct investment (FDI) in India reached US$17.96 billion, with regional FDI totaling US$11.54 billion. The top five sources of FDI were Mauritius (26%), Singapore (23%), the United States (9%), the Netherlands (7%), and Japan (6%).

India has established over 42 trade agreements, including preferential ones, with various nations and regions. For new manufacturing units registered by March 31, 2024, the corporate tax rate will be lowered from 22% to 15%.

The manufacturing sector in India is anticipated to reach USD 1 trillion by 2025-26, with Gujarat, Maharashtra, and Tamil Nadu leading the way, particularly in the automobile, electronics, and textiles industries. Government initiatives like Make in India and Production-Linked Incentive (PLI) schemes are driving growth, attracting FDI, and enhancing industrial infrastructure and quality.

The Indian mobile phone manufacturing sector is projected to generate between 150,000 and 250,000 direct and indirect jobs within the next 12-16 months. By 2028, India is expected to create 2.73 million new technology jobs, primarily due to advancements in artificial intelligence (AI). Service Now's AI Skills Report emphasizes the need for Upskilling in software development, data engineering, AI, and cloud computing, which present numerous career opportunities. Despite having the world's second-largest AI talent pool of 420,000 professionals, India faces a significant challenge with a 51% gap between the supply and demand for AI skills. To address this, the country is launching unprecedented initiatives aimed at transforming the workforce and bridging the AI skills gap. The IT sector in India is currently grappling with a surplus of graduates but a lack of industry-ready professionals skilled in cloud, data, and AI.
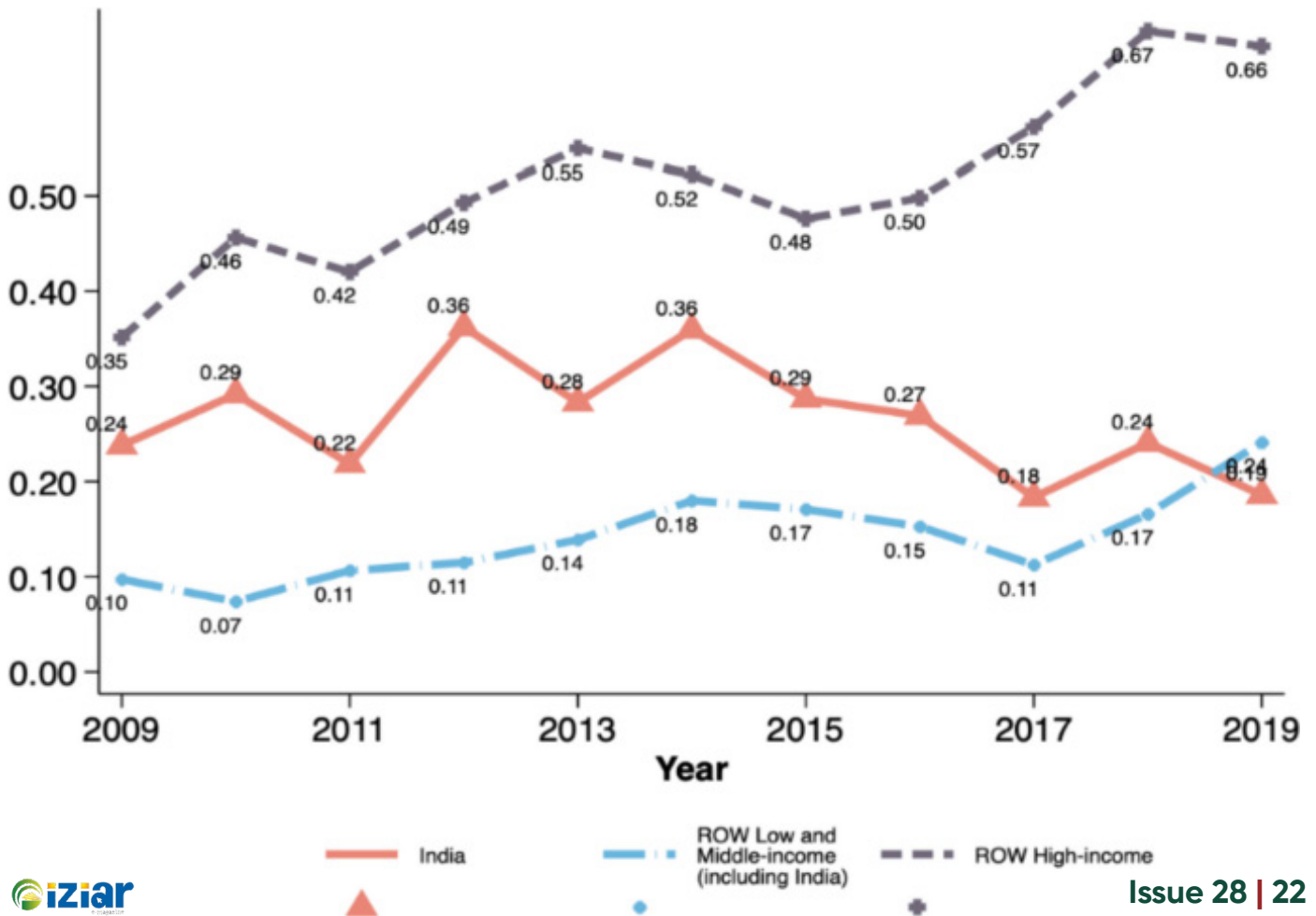
Key Sectors Leading the Charge

Several industries are at the forefront of this manufacturing renaissance:

» **Automotive :** India is the fourth-largest automotive market and is becoming a hub for electric vehicle (EV) production.

» **Electronics :** The government's PLI scheme has spurred investments in electronics, with smartphone production leading the way.

» **Pharmaceuticals :** The pandemic highlighted India's role as the "pharmacy of the world," with a growing focus on biosimilars and vaccines.

» **Defense Manufacturing :** Indigenous defense production is gaining momentum under the Atmanirbhar Bharat (Self-Reliant India) initiative.

Challenges to Address

Despite the promising outlook, challenges remain. Infrastructure gaps, inconsistent policy implementation, and skill mismatches must be addressed to fully realize the sector's potential. Additionally, India needs to enhance ease of doing business, streamline labor laws, and foster innovation ecosystems to sustain long-term growth.

The Power of Authenticity in Branding

Sakthivel S.
DM Analyst,
Madurai

My name is Sakthivel S., and I work as a Digital Marketing Executive at IPCS Global in Madurai, where I focus on Digital Marketing. I have a Bachelor's degree in Mechanical Engineering and possess four years of industry experience, along with ten years of teaching experience at a Polytechnic College and two years in the Digital Marketing sector. At IPCS Global, I train and mentor students in these areas, having successfully guided over 100 students through theoretical, practical, and hands-on projects. Additionally, I have been actively involved in various initiatives that are vital to our organization and continue to play a significant role in shaping the future of Digital Marketing at IPCS Global.

Today's consumers have access to a vast array of brands, leading to information overload. To differentiate your brand and gain recognition in this noisy environment, authenticity is essential. As our lives become increasingly artificial and virtual, the desire for genuine and real experiences grows stronger.

Statistics back this

When selecting brands to support, 86% of consumers prioritize authenticity. Studies have consistently shown that a company's brand image is shaped by its honesty and sincerity. If you think that merely endorsing good causes will make you appear genuine, you're mistaken. Only 1% of millennial surveyed in a consumer study indicated they would trust a brand based solely on its advertising. Today's consumers are more informed and discerning than ever, able to spot insincerity from afar. Thus, you can't deceive people; you need to follow through on your claims to earn their trust. This is where brand authenticity becomes crucial.

Brand Authenticity

When selecting brands to support, 86% of consumers consider authenticity to be crucial. Studies have consistently shown that a company's brand image is shaped by its genuineness. At the heart of brand authenticity lies a company's commitment to honesty and accountability towards its customers and itself. To be seen as a credible brand, you need to be reliable and trustworthy. An authentic brand will resonate more easily with consumers and bridge any gaps in connection. Simply put, there are four elements that make up brand authenticity:

- Continuity (trustworthiness of the brand),
- Credibility (as reported by its clients),
- Integrity (driven by responsibility and compassion)
- Symbolism (helping customers stay loyal to themselves)
- Now that you are aware of the characteristics of an authentic brand, evaluate your own brand by posing the following queries:
- Is your brand authentic?
- Does your messaging remain the same over the course of your company's existence?
- Do you really are what you portray yourself to be?

You need to adopt a more genuine approach if you answered any of the questions negatively. Let's start by looking at the advantages of brand authenticity for you before we provide any help with it.

CREDIBILITY

INTEGRITY   TRUST   RELIABLE   AUTHENTIC   COMMITMENT   REGARD   REPUTATION

What Are the Advantages of Brand Authenticity?

Regrettably, having an excellent product alone is not enough in today's market. Consumers are attracted to thriving businesses due to their genuine sense of authenticity. Moreover, there are many other advantages that brand authenticity can provide:

◆ Financial success

Consumers are increasingly likely to make their buying choices based on their feelings towards authentic brands. They seek transparency and are unwilling to spend money on your products unless you offer it. In fact, 62% of shoppers take a company's authenticity and ethical values into account when purchasing, while 74% want more clarity on how businesses highlight issues. This suggests that a strong sense of brand authenticity will attract more customers.

◆ Cut Through the Noise Easily

As we have discussed, the twenty-first-century customer is knowledgeable, technologically adept, and discerning about whom to trust. They can easily recognize insincerity, making authenticity essential. By being genuine, you can build a connection with customers, fostering trust that encourages them to buy your products. Once they trust you, they will promote your brand, ensuring that your reputation spreads through word-of-mouth and referrals, ultimately reaching every household.

◆ Establishing More Powerful Emotional Bonds

Genuine messages have a profound impact on people. Such messages foster an emotional bond between the brand and its customers. By expressing your true feelings, you can reach a wider audience and cultivate lasting relationships with your clients. These customers are crucial for any brand's success. A 2015 article in the Harvard Business Review highlighted that "fully connected" customers are 52% more valuable than those who are merely "highly satisfied." This is just one of many reasons why brand authenticity is essential. In a world saturated with advertisements, the only way for your brand to differentiate itself is by truly embodying its core values.

6 Awesome Tips To Build Brand Authenticity

Be Real

Although it may seem straightforward, authenticity poses a significant challenge for numerous brands. While it appears easy, many brands struggle with the idea of being genuine, viewing it as a potential risk. To truly be authentic, you need to understand your roots and the purpose behind your existence. It's essential to identify your brand's main objectives and fundamental values. Research indicates that successful brands have a clear mission and purpose that underpins the products and services they provide.

◈ To determine your mission, you can ask yourself the following questions:
◈ Who are you?
◈ What motivates your business?
◈ What are you trying to accomplish?
◈ Start with coming up with a clear idea today if you haven't already. Choose your values, and then you must be open and honest with the world about them.

Start Creating Connections

Now that you understand your core values, embody them and communicate them to the world. Customers are interested in the true essence of your brand, including its challenges and successes. Provide them with that insight. The key lies in brand storytelling, and authenticity will aid you in this endeavor. Moreover, these connections can lead to impressive results: 76% of consumers prefer a brand over its competitors, and 57% are likely to increase their spending with a brand they feel connected to. By sharing your story with your customers, you can unlock the power of brand authenticity.

Be Consistent

When utilizing multiple marketing platforms, it can be simple to lose consistency. It's essential to maintain a unified and steady voice across all your efforts, which should be your primary guideline. This voice should remain unchanged over time and across different channels. Failing to do so can damage your credibility and create confusion and distrust among your customers. To address this, consider creating a brand manifesto that brings everyone together. Alternatively, you can provide clear guidelines for every employee to ensure clarity in your brand voice.

Walk the Talk

Even with top-notch PR services and an excellent team, you can face significant issues if your actions don't match your words. A strong motto won't have any impact unless it's backed by equally strong actions. Consumers can easily see through any deception, so attempting to mislead them is counterproductive to sincerity. Authenticity requires genuine effort; let your actions demonstrate your values!

Hold Yourself Accountable

The harsh reality is that no business is perfect. You will encounter failures, make mistakes, and may not always achieve your goals. The positive aspect is that your audience understands this too; all you need to do is recognize it. When authentic brands err, they own up to it and apologize while the issue is still manageable. For example, the CEO of Domino's Pizza acknowledged that their reviews were lacking. Consequently, they chose to completely overhaul their business model and create a more cohesive and improved organization. This led to a doubling of their sales and profits. Interesting, right? As the saying goes, honesty will set you free—and help you succeed!

Showcase Your Shining Repute

You can still appreciate the positive responses your brand and product get by being authentic. Highlighting your strengths is just as crucial as acknowledging your weaknesses! You can also build trust by focusing on your good reputation, but it's important to be honest and not create false reviews. Using testimonials is a powerful way to do this; research shows that 72% of customers feel more confident in a business when they see positive reviews and testimonials. This is an excellent way to remind yourself and others of all the great achievements your company has made!

It's Time to Reflect: Is Your Brand Genuine?

The advertising and marketing industry is undergoing a revival. Brands need to adapt to the evolving preferences of consumers, as old methods are becoming obsolete.

"And being genuine is the best course of action!"

Consider this: emphasizing sincerity and honesty can significantly improve your customer service. Faking your identity can only get you so far before it falls apart. By being genuine and true to yourself, you'll draw in loyal customers who will help you establish a solid reputation as you launch your business. Moreover, you shouldn't postpone making this crucial shift. You either embrace it or risk falling behind. Now is the time to uncover the true essence of your brand. We believe that with these suggestions, you'll become authentic and start achieving greater success in no time.

Streamlining Quality Control Processes with
Python and Computer Vision

Nandhakumar
IT Engineer,
Coimbatore

I am NandhaKumar. As an experienced Full Stack Developer proficient in Python and Java, I utilize my expertise to foster innovative solutions and make significant contributions to technology projects. My enthusiasm for knowledge dissemination drives me to mentor students in various programming languages, including Python, Java, C, C++, and PHP. Committed to continuous learning, I aim to leverage data to address real-world challenges and further my development as a professional.

The growing competitive pressure in global markets compels manufacturers to accelerate the introduction of new products, as customers are highly attentive to product quality. Quality control (QC) is a crucial aspect for all organizations and industries. Traditionally, QC has relied mainly on human inspectors, which can often be tedious, imprecise, and expensive. However, advancements in technology, particularly in computer vision, have paved the way for automated inspection and other QC processes. Python, with its various libraries and frameworks, facilitates the implementation and deployment of computer vision applications for quality control. In the upcoming sections, we will explore how computer vision could transform quality control practices and the role Python can play in this transformation.

A Term of Computer Vision Explained

Human and animal vision is improved by their brains, and the process of machines mimicking this is known as computer vision. To achieve this, machines must be provided with various data sets to learn from. The fundamental aspects of computer vision include image processing, comprehension, and interpretation, which also influence video analysis. These systems possess several capabilities, including:

◊ Object detection and recognition
◊ Pattern recognition and anomaly detection
◊ Measurement of dimensions and distances
◊ Product classification by establishing criteria

These characteristics demonstrate why computer vision is particularly well-suited for quality control tasks in sectors such as manufacturing, food processing, and pharmaceuticals.

Key Applications of Computer Vision in Quality Control

1. **Defect Detection**. The computer vision system can identify flaws like scratches, cracks, or absent components in a product. For instance, it can address soldering issues on circuit boards in the electronics sector.

2. **Dimensional Measurement.** Vision systems assess measurements and ensure they fall within the required tolerances, which is particularly crucial in the automotive and aerospace sectors.

3. **Surface Inspection.** High-resolution cameras directed at surfaces can identify surface flaws like minor dents, color variations, and contaminants on materials such as metals, plastics, and glass.

4. **Sorting and Classification**. Products can be categorized and organized based on their visual features, such as color, shape, and texture. For example, in the food processing industry, computer vision systems can be employed to sort fruits based on their level of ripeness.

5. **Barcode and Label Verification.** During the packaging process, vision systems are utilized to ensure that barcodes, QR codes, and labels are scanned correctly.

6. **Assembly Verification.** Every piece of a part in a product can be scanned with a computer vision system to check if it was assembled correctly. For instance, in automotive manufacturing, it is able to ascertain whether the correct parts have been fitted

```python
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing.image import img_to_arra

# Load pre-trained model
model = load_model('quality_control_model.h5')

# Load and preprocess image
image = load_img('product.jpg', target_size=(224, 224))
image = img_to_array(image) / 255.0
image = image.reshape((1, 224, 224, 3))

# Predict quality
prediction = model.predict(image)
print("Prediction:", prediction)
```

TensorFlow and PyTorch : These libraries are widely used for building and deploying deep learning models for tasks like defect detection and image classification.

1. For image processing Scikit-Image packs a number of algorithms which covers segmentation\, filtering and morphology, as a part of it image processing analysis section.

2. YOLO which stands for You Only Look Once has been found to be a widely utilized computer vision technology which can be fueled via Python for in process defect recognition and thus saves a lot of time as it does not consume much time for object detection which also makes it effective for environments with high-scale requirements when it comes to quality control.

3. When it comes to harvesting and processing such kinds of effective data- filtering approaches particularly in NumPy and Pandas prove to be very helpful as these libraries support toolsets that are great for managing and analyzing data set up in terms of quality control while complementing certain computer vision technologies.
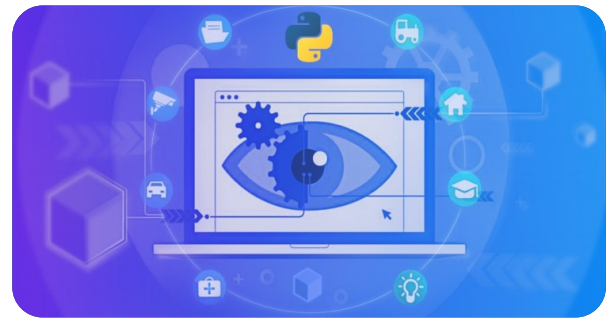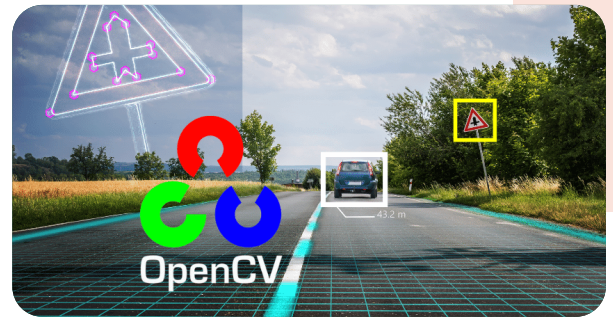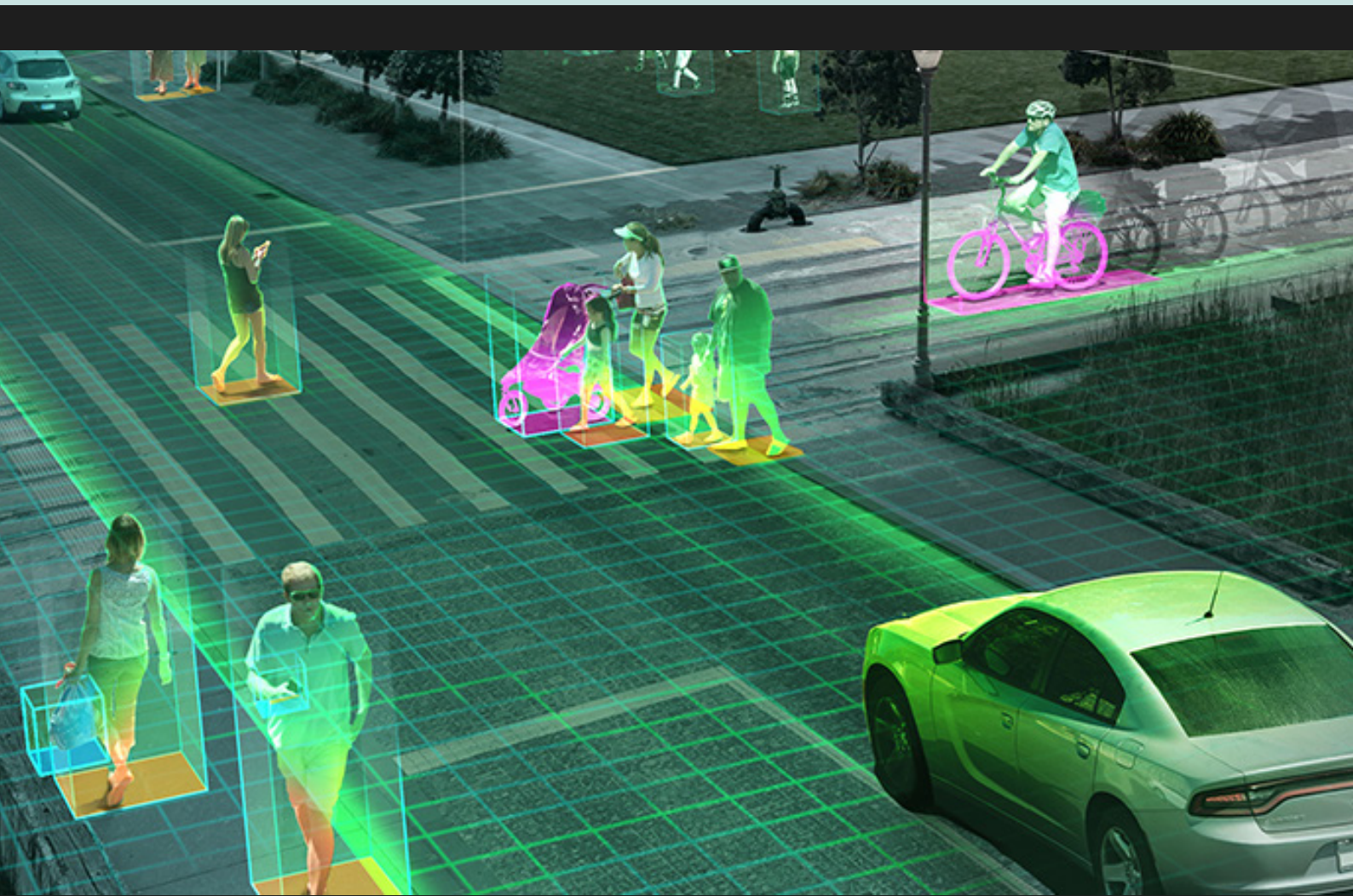


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Conclusion

AI is transforming Quality Control in ways that were previously unattainable due to the advent of automated inspection processes. With the availability of Python libraries for implementing these systems, they can be easily adapted for various industries. By incorporating computer vision, businesses can ensure consistent product quality across their operations, enhance customer satisfaction, and reduce costs. This technology not only lowers expenses and boosts operational efficiency but also helps build a strong market reputation for the company. Given the current trends in AI and advancements in hardware, computer vision technology is expected to play an increasingly vital role in quality control in the near future.

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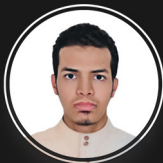- Software Testing
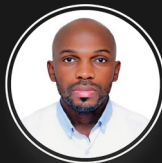- Python & Data Science
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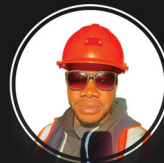
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CONTACT : +91 9846770771

Adapting Your Content for Zero-Click Searches :
A Step-by-Step Approach

Hima B Suresh
DM Analyst
Trivandrum

I am Hima B Suresh, a digital marketing professional and educator dedicated to imparting knowledge. My enthusiasm lies in developing impactful online strategies and assisting individuals in navigating and thriving in the digital landscape. In this article, I will present my insights and experiences to simplify digital marketing and enhance its utility for you.

Significant advancements have been made in search engine optimization, or SEO, in recent years. A significant shift is the increase in "zero-click searches." Businesses and marketers have both opportunities and challenges as a result of these searches. However, what are zero-click searches, and how can your SEO approach be modified? Let's investigate.

What Are Zero-Click Searches?

A zero-click search is when a search engine answers a user's question directly on the search results page. This means the user doesn't need to click any links. These answers often appear as follows:

▸ Direct Answers: A clear, short answer at the top of the page.
▸ Knowledge Panels: Information about a topic, brand, or person in a box.
▸ Local Packs: Maps and details about nearby businesses.
▸ Quick Tools: Features like weather updates, calculators, or definitions.

Zero-click searches are popular because they make it easier for users to get quick answers. However, this can reduce clicks on traditional website links

Why Are Zero-Click Searches Important?

Nowadays, zero-click searches account for over fifty percent of all searches. This trend shows that user behavior is changing. Here's why this matters:

◈ Fewer Website Visitors : People find answers directly on the search results page, so fewer visit websites.
◈ Higher Competition : Businesses compete for space in search features, not just rankings.
◈ Evolving User Expectations : People expect fast, accurate answers.

How to Modify Your Search Engine Optimization Approach for Zero-Click Searches

Zero-click searches don't mean SEO is no longer important. They require a new approach. Here are some ways to adapt:

Target Featured Snippets

Featured snippets are a key part of zero-click searches. To appear in these:
- Write simple, understandable responses to frequently asked questions.
- Use headings, bullet points, and numbered lists to make content easy to read.
- Find out which terms in your field trigger snippets

Boost Local SEO

If you have a physical business, focus on local SEO. Many zero-click searches show local results. Here's how to improve:
- Claim and optimize your Google Business Profile.
- Keep maintaining the name, address, or phone number of your business.
- Get positive customer reviews.
- Use local keywords in your content

Create Valuable, Detailed Content

Some users still click for in-depth information. To attract them:
- Offer detailed, helpful content that goes beyond the basics.
- Share unique insights, case studies, or downloadable tools.
- Make your information appealing by including pictures and videos

Build Brand Awareness

Zero-click searches can make your brand visible, even without clicks. Strengthen your brand with:
- Regularly posting valuable content.
- Being active on social media.
- Partnering with influencers or industry experts.

Boost Local SEO

Voice searches often lead to zero-click results. To prepare for this:
- Write content in a conversational tone.
- Focus on long-tail keywords and questions.
- Ensure your site is mobile-friendly and loads fast

Schema markup helps search engines understand your content. Your chances of showing up in rich results are increased as a result. Add schema for:

- ▸ FAQs
- ▸ Events
- ▸ Products
- ▸ Reviews

Additional Tips to Succeed in the Zero-Click Era

Engage Your Audience on Social Media

Social media platforms can help compensate for any lost website traffic. Share snippets of your content to drive curiosity and encourage users to visit your site.

Regularly Update Your Content

Search engines favor fresh and relevant information. Regular updates to your content can improve your chances of being featured in snippets or other SERP elements.

Invest in Video Content

Videos are becoming an essential part of SEO. Many search results now include video snippets. Create short, informative videos that address common questions in your niche.

Analyze Search Intent

Understanding why users search for specific queries is key. Cater your content to meet their needs, whether they want quick answers, detailed guides, or product recommendations

Measuring Success in the Zero-Click Era

Traditional metrics like click-through rates (CTR) don't tell the whole story any more. Instead, track these:

◆ Search Visibility: Check how often you appear in snippets or local packs.

◆ Brand Mentions: Monitor how often people mention your brand online.

◆ Engagement: Track how visitors engage with your content, such as how long they spend on your website.

◆ Conversions: Focus on turning visitors into leads or customers.

Challenges and Opportunities

TZero-click searches come with challenges, such as:

◆ Lower Website Traffic: Fewer people might visit your site, even if you rank high.

◆ Complex Optimization: Getting into SERP features takes extra effort.

◆ But there are also opportunities:

◆ Better Visibility: Appearing in featured snippets boosts brand exposure.

◆ User Trust: Providing quick answers builds trust.

◆ Future Growth: Voice search optimization prepares you for the next big trend.

Final Thoughts

SEO is evolving due to zero-click searches. Focus on brand-building, excellent content, local SEO, and featured snippets if you want to be successful. Gaining trust and adding value are more important than merely getting clicks.

The search environment is constantly changing. Be adaptable, try out different tactics, and focus your efforts on the demands of your users. Zero-click searches might be an opportunity to expand rather than a cause for concern if handled properly.

SIS Integration with Control Systems :
A Complex Balancing Act

Dinesh
Junior Project Engineer
Anna Nagar

I have a degree in mechanical and automation engineering and am proficient with PLCs, SCADAs, VFDs, and HMIs, among other industrial process control devices. The goal of "Get better Everyday" is to help me grow as a person outside of my field. I'm also interested in expanding my active area and scope outside my skills.

Safety Instrumented Systems (SIS), which are intended to reduce risks and avoid accidents, are essential parts of many businesses. To guarantee a SIS's optimum performance and dependability, installation and commissioning must be completed successfully. Safety, dependability, and security must all be carefully considered when integrating Safety Instrumented Systems (SIS) with control systems, especially in vital sectors like nuclear power, chemical, and oil and gas.

Why Integrate SIS and Control Systems?

While SIS and control systems are designed to operate independently, integration can offer several benefits:

❖ **Enhanced Safety :** By sharing information and coordinating actions, integrated systems can respond more quickly and effectively to hazardous conditions.

❖ **Improved Efficiency :** Integration can streamline operations and reduce downtime by optimizing control strategies and maintenance schedules.

❖ **Enhanced Security :** A unified security approach can help protect both systems from cyber threats

Key Considerations for Integration

1. Functional Separation

■ Hardware Separation: Physical separation of hardware components, including power supplies and communication networks, is crucial to maintain SIS independence.

■ Software Separation: Software applications for SIS and control systems should be distinct to prevent unintended interference.

2. Data Exchange:

■ Secure Communication: Data exchange between the two systems must be secure and reliable, using protocols that prioritize safety and integrity.

■ Data Filtering: Only essential data should be shared between the systems to minimize the risk of compromising SIS functionality.

3. Human-Machine Interface (HMI):

■ Clear Differentiation: The HMI should clearly distinguish between SIS and control system information to avoid confusion during emergencies.

■ User Access Control: Access to SIS functions should be restricted to authorized personnel to prevent accidental or malicious manipulation.

4. Testing and Validation:

■ Rigorous Testing: Integrated systems must undergo rigorous testing to ensure they meet safety and performance requirements.

■ Regular Validation: Regular validation and verification are essential to maintain system integrity and identify potential issues.

Challenges and Best Practices

- ❖ **Complexity :** Integrating complex systems can introduce new risks if not done carefully.
- ❖ **Cybersecurity :** Protecting integrated systems from cyber threats is crucial.
- ❖ **Human Error :** Human error can lead to misconfigurations or unintended consequences.

Best practices include

- ❖ **Adhering to Standards :** Following industry standards like IEC 61511 for SIS and IEC 61508 for functional safety can help ensure safety and reliability.
- ❖ **Independent Verification and Validation (IV&V):** Independent experts should review the design, implementation, and testing of the integrated system.
- ❖ **Regular Security Audits:** Conduct regular security audits to identify and address vulnerabilities.
- ❖ **Emergency Shutdown Systems (ESD):** Ensure that ESD systems remain independent and can function even if the control system fails.

Key Stages of SIS Installation and Commissioning

1. Pre-Installation Activities:
- Site Preparation: Ensure the site is prepared for installation, including power supply, grounding, and environmental conditions.
- Equipment Inspection: Verify the integrity and completeness of all delivered equipment.
- Review Documentation: Review all relevant documentation, including P&IDs, wiring diagrams, and functional design specifications

2. Field Installation:
- Field Device Installation: Install field devices (sensors, actuators, etc.) according to the design specifications, ensuring proper calibration and alignment.
- Cable Installation: Install cables, conduits, and junction boxes, adhering to wiring diagrams and electrical codes.
- Logic Solver Installation: Install the logic solver and other control hardware, configuring power supplies and network connections

3. Functional Testing:
- Loop Checks: Perform loop checks to verify the correct functioning of field devices and their connections to the logic solver.
- Logic Solver Testing: Test the logic solver's configuration and functionality, including input / output modules, processor, and communication interfaces.
- Safety Function Testing: Test the safety functions to ensure they operate as designed, including proof tests and simulations.

4. System Integration:
- Integration with Control Systems: Integrate the SIS with other control systems, such as DCS or PLC, to ensure seamless communication and coordination.
- Interface Testing: Test the interfaces between the SIS and other systems to verify data exchange and control signals.

5. Commissioning and Validation:
- Commissioning Procedures: Develop and follow detailed commissioning procedures to ensure a systematic approach.
- Functional Tests: Perform functional tests to verify the operation of all safety functions, including response times, trip settings, and alarm conditions.
- SIL Verification: Validate the Safety Integrity Level (SIL) of the SIS to ensure it meets the required safety performance level.
- Documentation: Update all relevant documentation, including as-built drawings, test reports, and maintenance procedures.

6. Hand-over to Operations:
- Operator Training: Provide comprehensive training to operators on the operation, maintenance, and troubleshooting of the SIS.
- Documentation Transfer: Transfer all relevant documentation to the operations team.
- Post-Commissioning Support: Provide post-commissioning support to address any issues or questions.

Best Practices for Successful SIS Installation and Commissioning

- **Adherence to Standards**: Follow industry standards such as IEC 61511 for functional safety.
- **Experienced Personnel**: Employ experienced personnel with knowledge of SIS design, installation, and commissioning.
- **Rigorous Testing**: Perform thorough testing at every stage of the process.
- **Clear Documentation**: Maintain accurate and up-to-date documentation.
- **Effective Communication**: Establish clear communication channels between all project stakeholders.
- **Continuous Improvement**: Continuously review and improve the installation and commissioning processes.

Conclusion

The integration of SIS and control systems can offer significant benefits, but it requires careful planning, execution, and ongoing maintenance. By following best practices and addressing potential challenges, organizations can achieve a safer and more efficient operation. By following these guidelines, organizations can ensure the successful installation and commissioning of their SIS, thereby enhancing safety and operational reliability
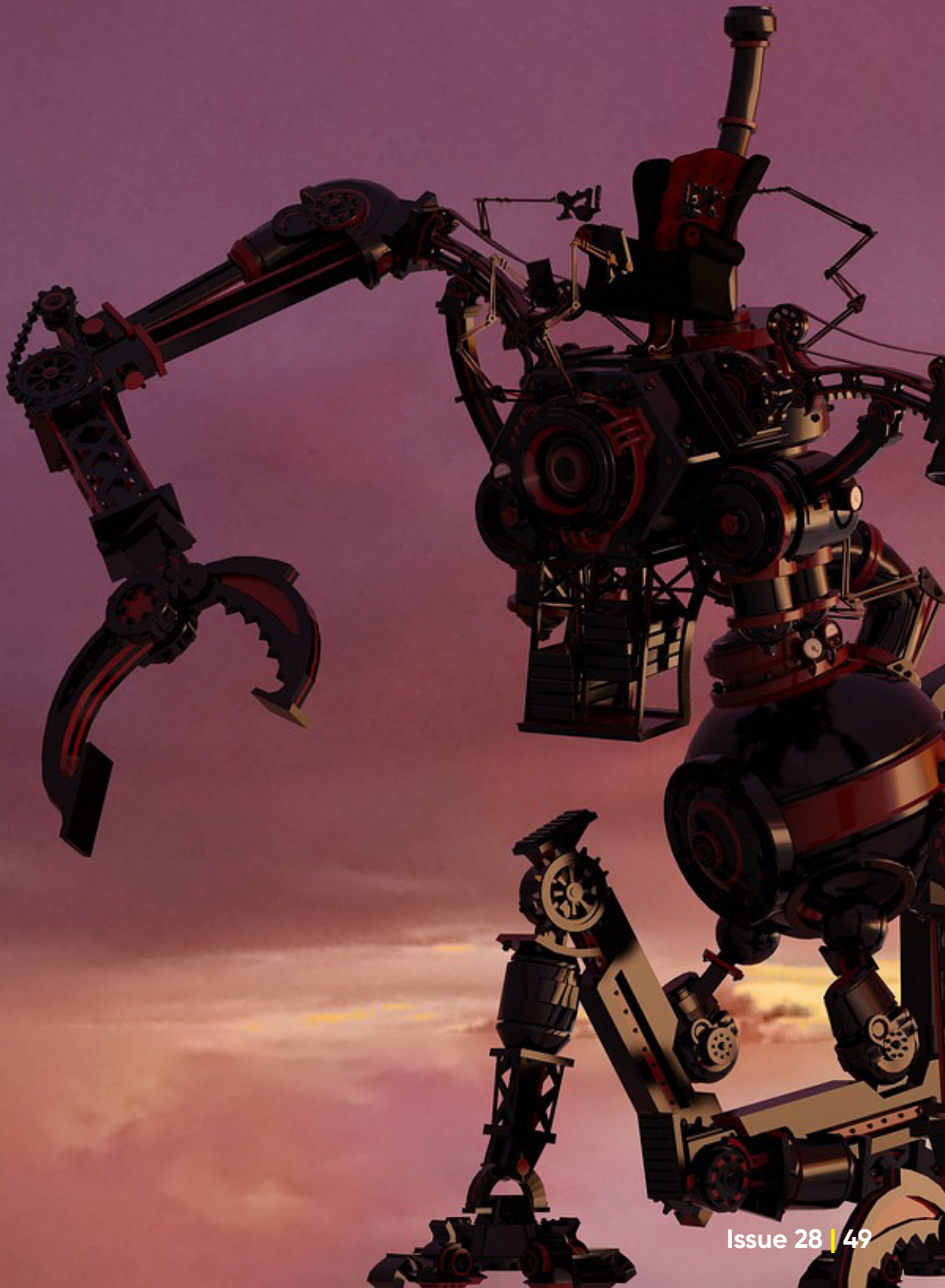
Navya Rajan
Junior Project Engineer
Kollam

I am Navya Rajan, having completed my Bachelor of Technology in Electronics and Instrumentation, followed by a Postgraduate Diploma in Industrial Automation. I am a highly driven automation engineer with a strong enthusiasm for creating innovative engineering solutions. I possess experience in employing a diverse array of engineering techniques to design efficient, cost-effective, and dependable automated systems.

The Social Impact of
Automation on Jobs and the Economy

This document examines the various effects of automation on today's workforce and economy. It looks into job displacement, economic upheaval, and possible strategies for adapting to this changing environment. Additionally, it addresses the ethical implications of automation and emphasizes the importance of education and workforce development in preparing for the future job market. Automation, fueled by advancements in artificial intelligence, robotics, and machine learning, is rapidly transforming numerous industries. Currently, AI and robotics are enabling machines to take on tasks that were previously performed by skilled human workers. From self-driving cars and robotic assembly lines to AI-driven customer service and data analysis, automation is infiltrating sectors such as manufacturing, retail, healthcare, and finance. While automation enhances efficiency and productivity, it also raises concerns regarding its effects on employment and societal welfare.

The productivity gains from automation can result in lower production costs, benefiting businesses and potentially leading to lower prices for consumers. However, the concentration of automation technologies among a few large corporations could worsen economic inequality. Small and medium-sized enterprises (SMEs), which may not have the resources to implement advanced automation, could find it difficult to compete with larger, more technologically adept companies. This disparity could result in market monopolization, diminishing competition and innovation over time.

Moreover, automation has the potential to exacerbate social inequalities. Wealthier individuals and nations that can invest in education and technology are likely to gain the most advantages. Conversely, economically disadvantaged groups may be left behind, further widening the divide between the rich and the poor.

Displacement of Human Labor : Jobs at Risk of Automation

Concerns regarding job displacement are raised by automation's growing ability to carry out jobs that were previously completed by people. Industries that are especially at risk include manufacturing, transportation, and customer service. Job losses may result from the automation of repetitive and routine operations, particularly in sectors with minimal skill requirements. It's important to recognize, though, that automation can also lead to the creation of new jobs in industries like maintenance, data analysis, and technology.

Impact on Manufacturing

While factory automation has improved production and efficiency, it has also resulted in job losses. Human workers are being replaced by robots and automated systems for jobs like welding and assembly.

Impact on Transportation

Delivery drones and self-driving cars have the potential to replace truck drivers and other delivery workers as they transform transportation. Nonetheless, the creation, upkeep, and use of these technologies are creating new employment opportunities.

Economic Disruption: Potential Job Loss and Income Inequality

Concerns over economic disruption are raised by the possibility of mass job relocation. Automation may make it difficult for workers to find new jobs, which could result in unemployment and income inequality. Additionally, existing income disparities may be made worse by the concentration of wealth in the hands of people who own and manage automation technologies. In the manufacturing, retail, and administrative industries, repetitive, routine jobs are replaced by advanced technologies, which lowers the demand for specific skill sets. Workers in higher-income nations are impacted by outsourcing and offshoring, which shift jobs to areas with cheaper labor costs. A divided labor market with few benefits and no job stability is brought about by an increase in contract and freelance work. Lower-income groups' economic stability is hampered by fewer prospects for upward mobility. Growing inequality fuels institutional mistrust and civil instability.

Emerging Job Opportunities in the Age of Automation

Even though automation eliminates some occupations, it also opens up new career paths in fields like data analysis, technological development, and AI upkeep.

Higher education and technical proficiency are frequently needed for these positions, highlighting the need for a workforce that is knowledgeable and flexible. Additionally, automation may result in the development of new business models and industries, which would increase employment prospects.

Robotics Engineering

The development and maintenance of robots is a rapidly growing field. Engineers with expertise in robotics, automation, and AI are highly sought after.

Data Analysis and Science

With the increasing use of data in decisionmaking, the demand for data analysts and data scientists is booming. These professionals are skilled in collecting, analyzing, and interpreting large datasets.

Social Safety Nets and Universal Basic Income

In the face of potential job displacement, social safety nets play a critical role in providing a safety cushion for workers affected by automation. Unemployment benefits, retraining programs, and other forms of social support can help individuals transition to new careers. The concept of a universal basic income, which provides a guaranteed minimum income to all citizens regardless of employment status, has also been proposed as a means of addressing income inequality and providing a safety net in a rapidly automating world
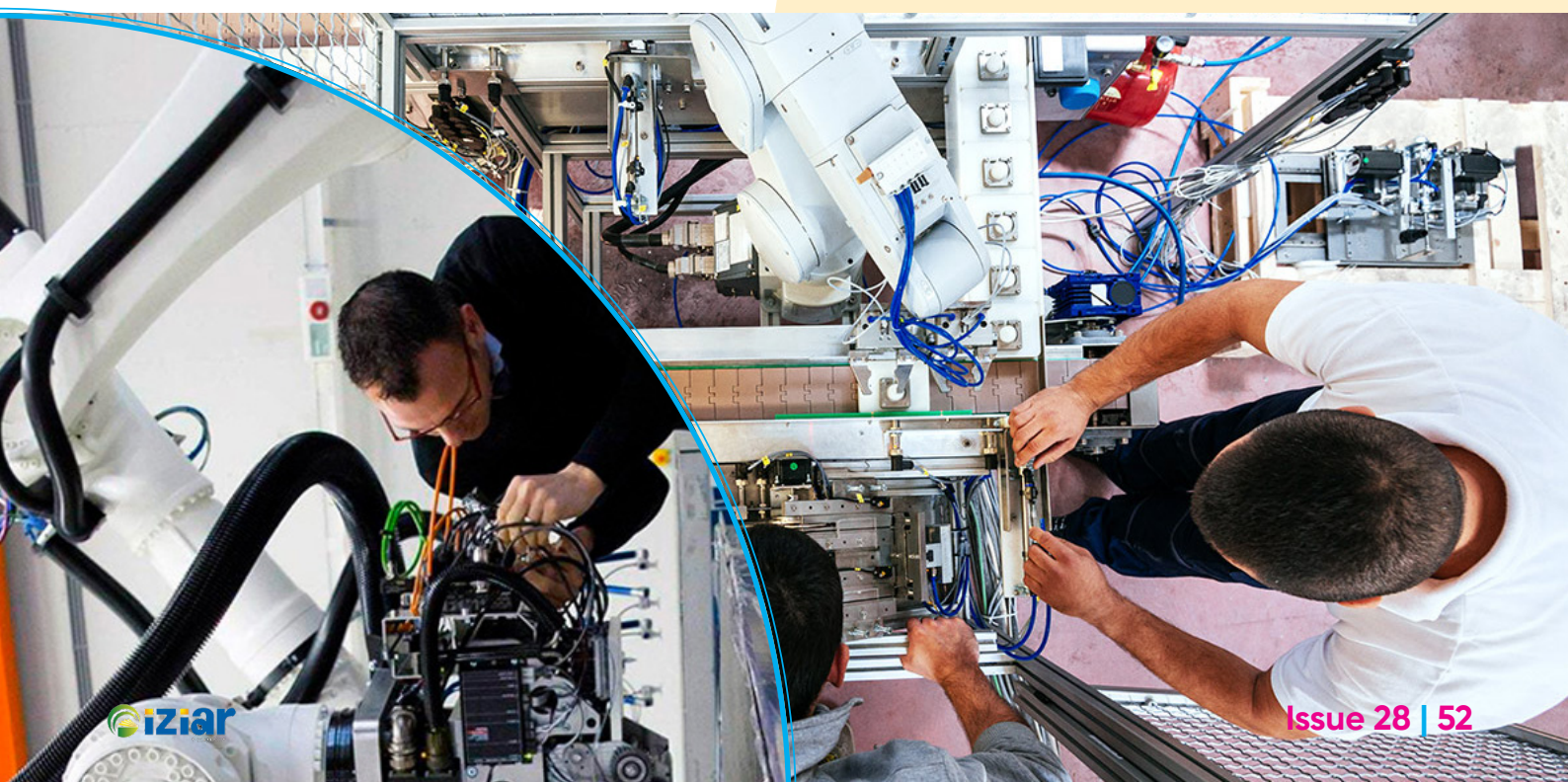
Policy Responses to Mitigate the Negative Impacts

Governments and policymakers have a crucial role in shaping the future of work and mitigating the negative impacts of automation. Policies that promote retraining and reskilling, support the development of new industries, and address income inequality can help create a more equitable and prosperous society. It is essential to create a policy environment that fosters innovation while ensuring that the benefits of automation are shared broadly.

Tax Incentives

Tax incentives for businesses that invest in retraining and reskilling programs can encourage the creation of a more skilled workforce.

- **Public Investment** Increased public investment in education and training programs can equip worker with the skills needed for the jobs of the future.

- **Minimum Wage in Education** A higher minimum wage can help address income inequality and ensure that workers are compensated fairly, even in the face of automation.

Ethical Considerations and the Future of Work

There are important ethical issues raised by the growing automation of labor. It is crucial to deploy automation responsibly and equitably so that its advantages are distributed properly. To guarantee that economic distribution and the changing nature of work are handled in a technologically advanced society, we must create ethical standards.

The Role of Education and Workforce Development

In order to prepare people for the evolving labor market, education and workforce development are essential. Critical thinking, innovation, and adaptability should be emphasized in curricula. Additionally, technical abilities in fields like AI, data analysis, and computer science are becoming more and more crucial.
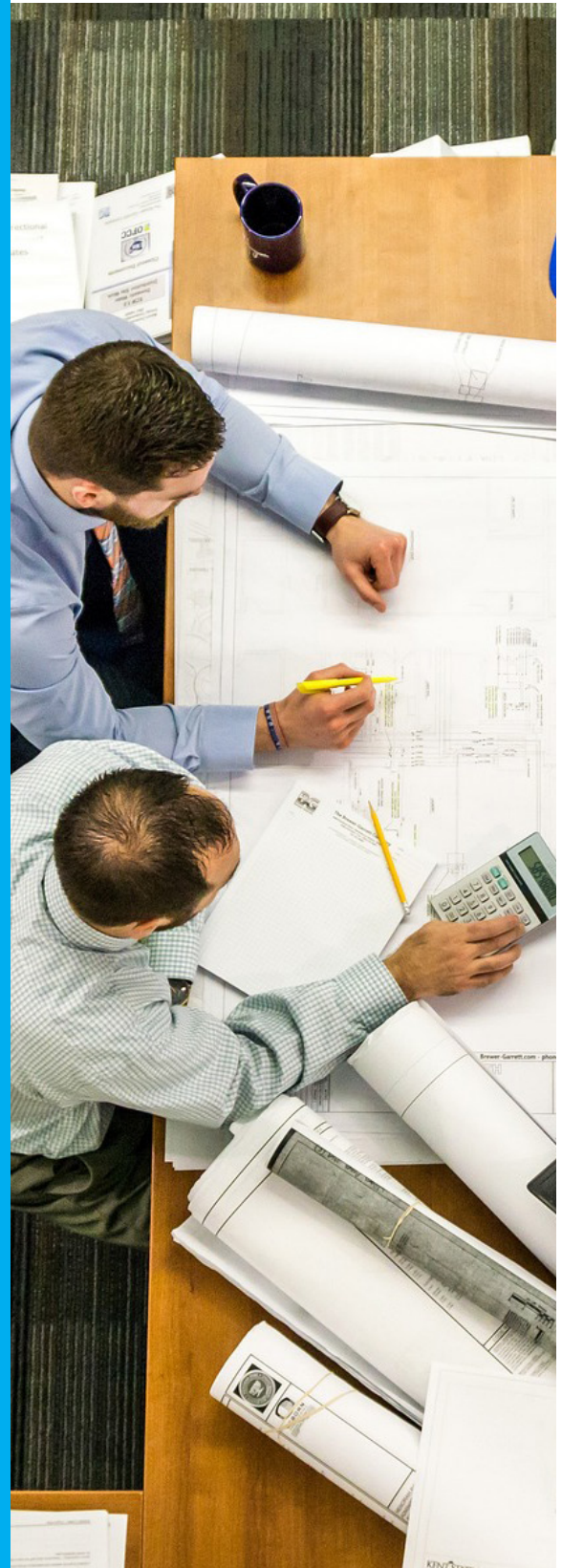
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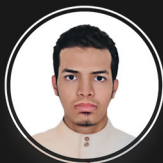- Python & Data Science
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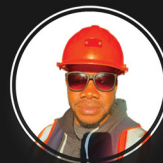## Our Placements

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DM EXECUTIVE
Tech Ads

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ELECTRICAL AND AUTOMATION MANAGER
Republic Of The Congo

BATANAI MUTAMBUDZI
PROJECT MANAGER
Zimbabwe

MUHAMMED ABD ELGADIR BAKIR
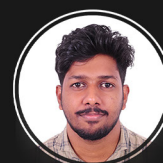AUTOMATION ENGINEER
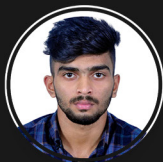SUDAN

MUHAMMED SHAMWEEL
BMS TRAINEE
SURYA SANC

VISHNU DEV B
CCTV TECHNICIAN
Hawksight

ABHIRAJ
BMS ENGINEER
Sharja

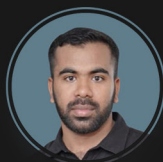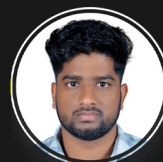**MUHAMMAD NISAM**
CCTV ENGINEER
RP Square Syatems

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LNG

MUHAMMED MUNEER
CC TV TRAINEE
Insight IT solutions

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MADHYA PRADESH | CHHATTISGARH | WEST BENGAL

CONTACT : +91 9846770771

The Future of
Fog Computing and AI

Aneesh
IT Engineer
Coimbatore

As an IT engineer with a focus on artificial intelligence (AI) and data science (DS), I am dedicated to mentoring students in both fundamental and advanced topics. I support them in building effective models and producing comprehensive reports. My solid technical foundation drives my commitment to enabling students to enhance their skills and broaden their comprehension of this rapidly changing domain. I am convinced that it is essential to prepare them to develop innovative solutions in the ever-evolving realms of AI and DS.

Fog computing can be viewed as a shift away from centralized storage and computing resources, enhancing the concept of cloud computing. It functions as a unique network of interconnected devices and gateways, allowing for data processing and analysis right at the source of its generation. This emerging paradigm, combined with the computational capabilities provided by AI, holds the potential to revolutionize various industries by creating specialized and knowledgeable systems that can transform different sectors of the economy.

Fog Computing

Decentralization : The functional capability and the data storage is spread across a web of edge devices thus reducing dependence on the central remote server or a cloud system.

Proximity : Allows for data processing which is nearer to the environment where it came from thus saving time and space.

Real-time Processing: For time critical applications to lessen response time due to events or changes in the environment.

**Enhanced Scalability :** Built on geographically dispersed assets that can respond to changing workloads.

Artificial Intelligence (AI) : An umbrella term that covers a wide range of techniques and processes intended to replicate human cognition through computer systems.

Machine Learning : Computer programs that use data inputs to create algorithms that self-enhance their own performance without needing any prior specific coding.

Deep Learning : A more advanced form of machine learning where complex data features are identified via processing through multiple layers of artificial neural networks.

Natural Language Processing (NLP) : This capability allows computers to analyze, understand, and create natural languages.

Computer Vision: Is to help the computer system be able to scan visual data around itself and make reasonable sense out of it
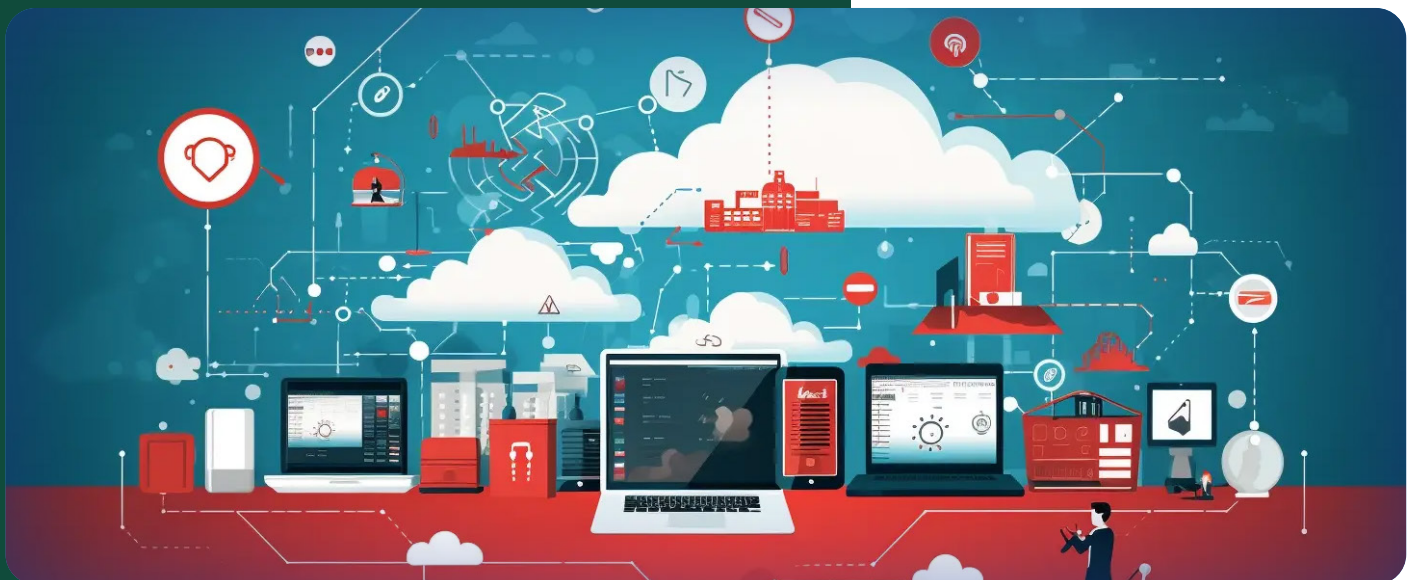
The Synergy of Fog Computing and AI :

How They Help One Another It is the expansion of fog computing and AI which creates one tremendous synergy boosting development in many areas.

Reduced Latency : Fog computing enables the deployment of AI applications like autonomous driving, industrial automation, and smart grids that demand quick responses, as it reduces the time required to send data to the cloud by processing it locally.

Enhanced Bandwidth Efficiency : It reduces the volume of information generated at the edge, sent to the cloud and the traffic on the network as remote data provisioning loads the data analytics functions to the edge.

Improved Data Privacy and Security : The practice of bringing in only a few bits of sensitive information like a user's password into the cloud would afford the said user enhanced security in the event that their pieces of information are made available to the public.

Increased Reliability and Resilience : The use of the multi devices edge topology enhances the dependability and resistance of the system to partial or complete failures.

Real-time Insights: Integration of AI algorithms whereby AI based fog devices are employed would enable real time analysis and hence provision of insights.

Important Areas of Fog Computing Integration with Artificial Intelligence

Industrial Internet of Things (IIoT)

Predictive Maintenance : Fog devices can be equipped with AI algorithms that monitor the sensors of industrial machinery, allowing them to anticipate potential equipment failures ahead of time, thereby reducing the risk of machine breakdowns.

Quality Control: The data received from production can be thoroughly assessed during the production process to find any defects or anomalies in manufactured items.

Process Optimization : Automatic industrial processes can be controlled and improved by artificial intelligence algorithms, reducing the waste of energy.

Smart Cities:

Traffic Management : Fog algorithms are capable of analyzing real-time traffic data and implementing suitable strategies to reduce delays and enhance the efficiency of public buses.

Smart Grids : AI technologies can ensure the effective energy supply into the network, regulation of the network load and use of alternative energy sources.

Public Safety: CCTV and IoT can be able to proactively scan the environment for dangers like fires, floods, and even crimes.

Autonomous Vehicles:

Decision Making in Environments with Autonomous Vehicles: Decisions related to autonomous vehicles can be made in real-time using effective AI algorithms that operate on Edge devices, enabling the automatic and immediate assessment of data from cameras, lidar, and radar sensors.

Ensured Vehicle Security: AI can aid in the interpretation of diverse failsafe parts of a vehicle to enable a security component that assists to the prediction of potential vehicle failures.

Communication and Traffic Management Technologies: Traffic of autonomous vehicles can be better managed with AI algorithms that need communication between the automated vehicles.

Healthcare:

Assisted Telemedicine Prescriptions: Remote health metrics such as sleep patterns can be collected by sensors and will be converted into data by AI algorithms in-fog that relay to health grocers for the tension of the kids.

Remote Healthcare Services: While AI is utilized to monitor patients' health while being at home hence, giving a strong foundation for remote healthcare developers to do consultation based on fog computing.

Healthcare Optimizations Tools: Algorithms can imitate a person's thought processes, permitting the assessment of various features of a huge number of patients to assign specific doses of medications that are most suited to individual patients.

Updated Farming Approached:

AI Based Crop Production: Using AI computer technology trained algorithms integrates information from sensors and drones, optimising irrigation, fertilisation and pest control. All increasing the yields and decreasing the ecological footprint.

Technology Props Agriculture: AI will also assist in the supervision of livestock so that issues with livestock health can be solved.

Issues and Factors.

Security and Data protection: When dealing with cloud or edge devices, it is essential to implement proper precautions for processing sensitive data on edge devices. Security measures such as encryption and access control must be established to safeguard this type of information.

Interoperability: It is equally important to set interoperability standards for fog devices and AI algorithms as there will be issues of integration and scalability without them.

Resource Management: Proper use of computational power on edge devices is also important to achieve the required performance and save energy.

Deployment and Management: Managing and deploying a distributed network of fog devices can be complex. Effective management tools and frameworks are essential for ensuring smooth deployment and ongoing maintenance of the network.

Ethical Considerations: Some ethical issues such as privacy of data, bias attached to algorithms and the role of AI in work and society need to be dealt with.

Future Directions

Edge AI Chips : The rise of edge artificial intelligence chips will also encourage the use of fog computing with AI.

5G and Beyond: 5G and 6G networks will inevitably provide the required bandwidth and latency for efficient fog computing applications.
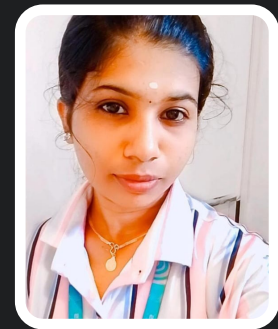
Federated Learning: Federated learning approaches will allow the distributed training of models across different edge devices while keeping the data secure.

Conclusion

AI-driven fog computing represents the next phase in the development of computing infrastructure, enabling an intelligent computing architecture that combines a network-brain and network-skin at the edge. This transformation of the computing environment opens up a wide range of opportunities in areas such as industrial systems, smart cities, healthcare, and autonomous vehicles. As technology advances, we can expect to see even more innovative applications of AI in fog computing that will influence the future.

Exploring the Synergy between
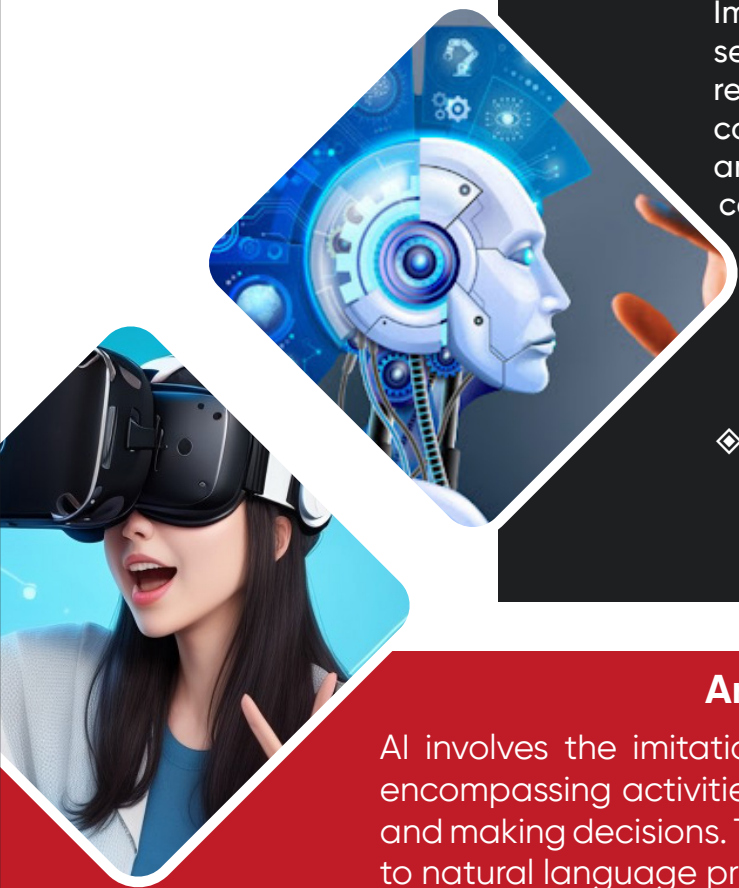# AI and Immersive Technologies

Anchana. S
Customer Relation Executive
Kollam

I consider myself to be a candid and sincere individual who values transparency and strives for fairness in all my endeavors. I am deeply committed to my profession and possess the skills necessary to accomplish tasks effectively. As a devoted fan of Naruto, I aspire to embody the uniqueness that characterizes the series in my work. Additionally, I have a passion for reading and writing stories in my native language. Regardless of the challenges I may face today, I maintain the belief that tomorrow holds promise.

Immersive technologies, including virtual reality (VR), augmented reality (AR), and mixed reality (MR), along with artificial intelligence (AI), are revolutionary areas in technology. However, they each possess unique traits, objectives, and uses. We will examine them across various aspects to grasp their differences, overlaps, and possible collaborations.

iZiar

Immersive Technologies (XR - Extended Reality):

Immersive technologies generate simulated settings that engage users in virtual or augmented realities. This encompasses virtual reality (VR), which completely envelops users in a digital environment, and augmented reality (AR), which adds digital components to the real world.

◈ **Core Technology :** They depend on devices like headsets, smart glasses, and motion sensors, along with software that engages users' senses, mainly sight, and occasionally touch, sound, and even smell.

◈ **Primary Goal :** To provide immersive experiences by creating a sense of presence, helping users engage with digital content in real-time.

Artificial Intelligence (AI):

AI involves the imitation of human cognitive functions by machines, encompassing activities such as learning, reasoning, problem-solving, and making decisions. This can range from machine learning techniques to natural language processing (NLP) and computer vision.

◈ Core Technology : AI relies on algorithms, data sets, and computational models to mimic or simulate aspects of human cognition and behavior.

◈ Primary Goal : To automate intelligent behavior, enabling machines to perform tasks that would typically require human intelligence, like data analysis, pattern recognition, and decision-making.

Applications

Immersive Technologies:

Entertainment & Gaming : VR and AR create interactive, immersive worlds for gaming, movie experiences, and digital entertainment.

Education & Training : VR can simulate realistic environments for training (e.g., medical surgery, flight simulators) or virtual classrooms, making learning more engaging.

Healthcare : VR is used for rehabilitation, pain management, and mental health therapy, while AR helps surgeons with real-time information during surgeries.

Retail & Marketing : AR enables customers to "try" products virtually (e.g., trying on clothes or visualizing furniture in their homes).

Architecture & Design : VR/AR is used for visualizing and prototyping designs before they are physically built.

Artificial Intelligence:

Automation : AI powers robotic systems, chatbots, autonomous vehicles, and customer service automation.

Healthcare: AI is used in diagnostic tools, medical imaging, personalized treatment plans, and drug discovery.

Finance: AI algorithms are used for fraud detection, algorithmic trading, and personalized financial advice.

Natural Language Processing (NLP) : AI enables virtual assistants (like Siri, Alexa, and ChatGPT), text analysis, sentiment analysis, and language translation.

Data Analytics: AI is applied to process vast amounts of data, identifying patterns, insights, and making predictions.

Technological Foundations

Immersive Technologies:

▸ **Hardware :** VR headsets (e.g., Oculus Rift, HTC Vive), AR glasses (e.g., Microsoft HoloLens), motion trackers, haptic feedback devices.

▸ **Software:** 3D modeling tools, game engines (e.g., Unity, Unreal Engine), spatial computing software.

▸ **Key Technologies:** Computer graphics, real-time rendering, sensor integration (motion, location tracking), and spatial mapping.

Artificial Intelligence:

▸ **Core Technologies:** Machine learning (including deep learning), neural networks, natural language processing, computer vision, reinforcement learning, and expert systems.

▸ **Hardware:** AI applications run on general-purpose processors, but more specialized hardware like GPUs and TPUs are used for heavy computational tasks (e.g., training large AI models).

▸ **Key Technologies :** Data mining, predictive analytics, decision trees, and algorithms for pattern recognition.

Interaction with Humans

Immersive Technologies:

❖ **User Interaction:** The focus is on user engagement and sensory immersion. The user interacts with the virtual environment using controllers, gestures, or even voice commands.

❖ **Experience:** Immersive tech is primarily concerned with creating a sensory experience, whether through fully virtual worlds (VR) or overlaying digital objects on the real world (AR). The user is often immersed or "present" in a simulated reality.

Artificial Intelligence:

❖ **User Interaction :** AI enables interactions where the machine responds intelligently to human input, often in the form of conversations (chatbots), recommendations (e.g., Netflix, Spotify), or decision support (e.g., predictive analytics in business).

❖ **Experience :** AI is more focused on cognitive assistance rather than sensory engagement. It's about intelligent decision-making, pattern recognition, and automating processes.

Synergies between Immersive Technologies and AI

While immersive technologies and AI are distinct, they can complement each other in several ways:

AI-Powered Virtual Worlds :

In virtual reality (VR) or augmented reality (AR) settings, artificial intelligence (AI) can enhance the realism and interactivity of virtual environments. For instance, AI-powered non-playable characters (NPCs) in games or simulations can behave intelligently, adapt based on user actions, and respond in a manner that resembles human behavior.

Personalization:

AI has the ability to tailor immersive experiences by examining user data and modifying the virtual environment or content to align with personal preferences. For instance, AI might adjust the storyline or interactions in a VR game according to the user's actions.

Enhanced User Interactions:

Natural language processing (NLP) and AI-powered voice assistants can enhance the naturalness of interactions in immersive environments. In a virtual reality (VR) context, an AI assistant could help users by providing guidance, responding to inquiries, or modifying the virtual surroundings according to voice commands.

AI in AR for Real-Time Object Recognition:

In augmented reality, artificial intelligence can improve the recognition and tracking of real-world items. For instance, AI can detect objects using a smartphone camera and superimpose pertinent information or animations related to that identification.

Data Analysis and Feedback in VR Training:

In immersive training environments, such as those used in medical or military contexts, AI has the capability to assess a user's performance. It can deliver immediate feedback, modify the difficulty level, or provide tailored advice to enhance their skills.

Ethical Considerations and Risks

Immersive Technologies:

- **Privacy Concerns :** Immersive tech often collects data about users' movements, emotions, and behavior. This can raise concerns about surveillance and data security.
- **Social Isolation :** Excessive use of VR can contribute to social isolation, as users may prefer virtual interactions over real-world ones.

Artificial Intelligence:

- **Bias and Discrimination:** AI systems can perpetuate biases if trained on biased data. For example, facial recognition systems may be less accurate for people of color, leading to unfair outcomes.
- **Job Displacement:** AI's automation potential can lead to job losses in fields that rely on repetitive tasks, such as manufacturing or customer service.

Conclusion

Immersive Technologies and AI are both transformative, albeit in distinct manners. Immersive technology aims to create captivating experiences, whereas AI is focused on enhancing the intelligence and autonomy of systems. AI improves immersive technologies by making virtual environments more interactive and responsive, while immersive settings offer dynamic spaces for users to interact with AI-driven systems. As both areas progress, we can anticipate a closer integration, leading to more personalized, realistic, and adaptive AI-powered immersive experiences. Nonetheless, it is crucial to address ethical issues related to data privacy, social implications, and bias to ensure the responsible use of these technologies.
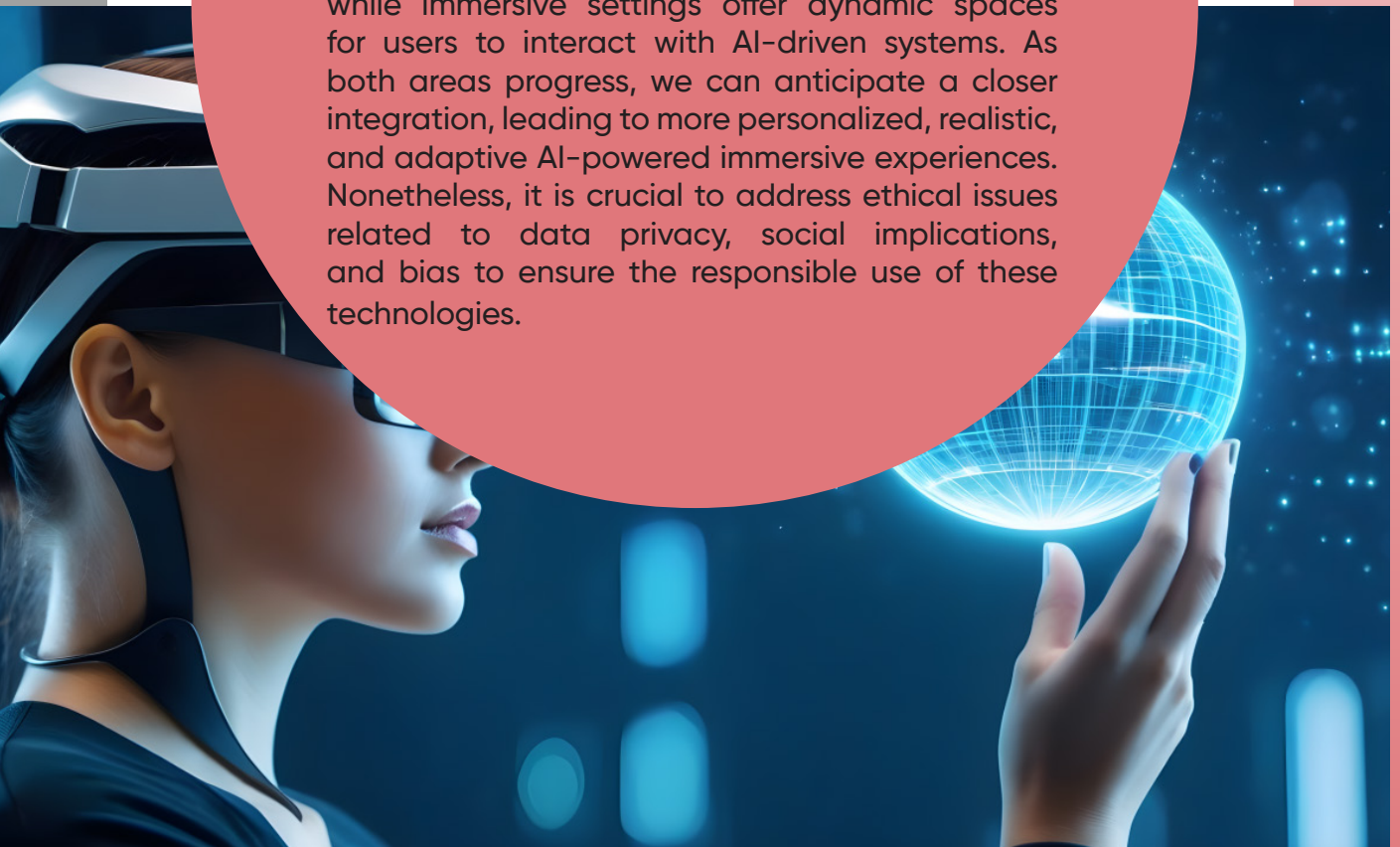
Quantum Computing :
The Next Frontier in Problem-Solving
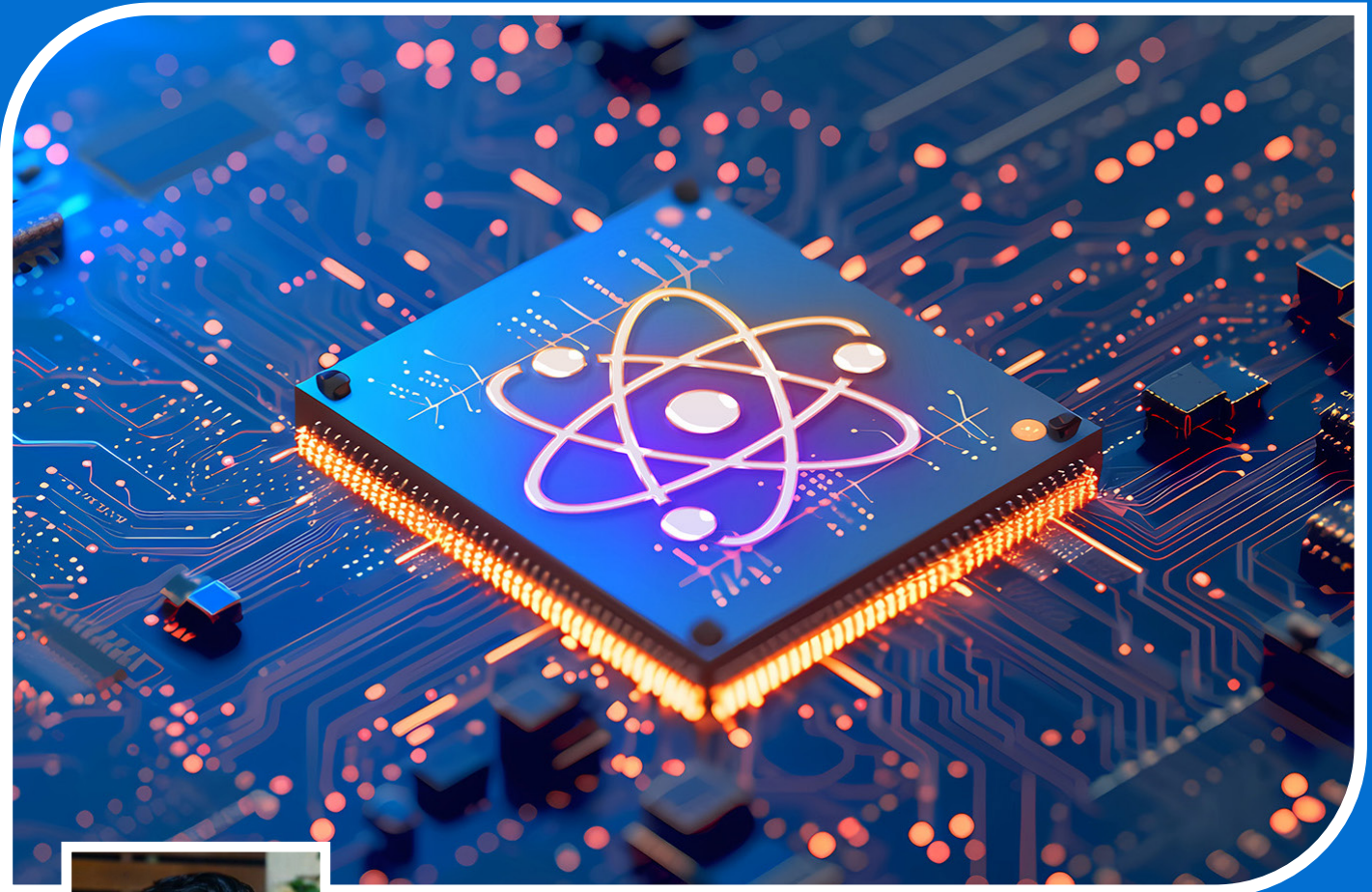
Visakh. S
Corporate Relation Officer
Trivandrum

I am a committed and results-oriented Territory Placement Officer, enthusiastic about linking skilled individuals with promising career prospects. With more than two years of experience in the placement sector, I have cultivated a deep understanding of the job market and established a successful track record. In my present position, I have had the opportunity to collaborate with a wide array of students and professionals, successfully placing over 50 students in various roles within the last eight months.

The computing industry is about to undergo a significant change. A new era of computing has developed one that promises to address some of the most difficult and unsolvable issues in domains like medical, cryptography, artificial intelligence, and climate research, despite the fact that traditional computers have transformed industry for decades. Welcome to the quantum computing universe.

The Rise of Quantum Computing

Quantum computing uses the principles of quantum mechanics to process information in fundamentally different ways than classical computers. At the heart of quantum computing are qubits, which, unlike classical bits that are either 0 or 1, can represent multiple states simultaneously through superposition. This makes quantum computers potentially exponentially more powerful for specific tasks.

What Makes Quantum Computing Different?

1. Superposition : A qubit can exist in multiple states at once, allowing quantum computers to perform numerous calculations simultaneously.

2. Entanglement: A unique property where qubits that are entangled can influence each other, regardless of distance. This enables quantum computers to solve problems that would take classical computers millennia to compute.

3. Quantum Interference : By using interference, quantum algorithms can amplify the probability of correct answers, leading to faster problem-solving.

The Potential Applications of Quantum Computing

1. Cryptography

Quantum computers could break current cryptographic protocols, making traditional encryption obsolete. However, they also promise to create quantum-safe encryption methods that would be far more secure.

2. Drug Discovery and Healthcare

By simulating molecular structures at the quantum level, these computers could revolutionize drug discovery, enabling the design of new medicines faster and at a fraction of the cost. Quantum chemistry could also help understand complex biological processes, leading to groundbreaking treatments.

3. Artificial Intelligence and Machine Learning

Quantum computing could greatly accelerate AI by processing vast datasets and learning from them more efficiently. Quantum algorithms might outperform classical machine learning techniques in finding patterns, recognizing images, and making decisions.

4. Optimization Problems

Quantum computers excel at solving optimization problems in areas such as logistics, finance, and manufacturing. Tasks like finding the most efficient delivery routes, maximizing profits, or designing complex systems could be solved much faster.

5. Climate Modeling

Quantum computers have the potential to simulate the behavior of Earth's complex climate systems, which classical computers cannot do accurately. They could help predict climate changes with better precision, informing policy and solutions for environmental protection.

The Challenges Ahead

Quantum computing is still in its infancy, with several major hurdles to overcome:

- **Quantum Decoherence :** The fragile nature of qubits makes them susceptible to errors caused by environmental factors.
- **Error Correction:** Quantum error correction is crucial for practical quantum computing but is extremely resource-intensive.
- **Scalability:** Current quantum computers have a small number of qubits, and scaling up to a full quantum system requires immense advances in technology.

Leading Players in Quantum Computing

- **IBM:** With its Qiskit platform and IBM Quantum initiative, IBM is pushing the boundaries of quantum research and development.
- **Google:** Known for achieving quantum supremacy, where they demonstrated that a quantum computer could solve a problem faster than a classical supercomputer.
- **Rigetti Computing:** A startup that aims to build quantum hardware and software accessible to researchers and enterprises.
- **Microsoft :** Focusing on developing topological qubits, they are also pioneering in quantum software development with Azure Quantum.

What's next for Quantum Computing?

Quantum computing has a bright future ahead of it, but we are just getting started. In order to address practical issues, scientists are attempting to construct more stable qubits, enhance quantum error correction, and develop hybrid systems that integrate classical and quantum computing.

Quantum computers may be able to address some of the biggest problems facing humanity in the coming ten years, such as the development of sustainable energy sources and the treatment of illnesses. The impact of quantum computing may be as revolutionary as the invention of the computer itself, despite the lengthy path ahead.

Conclusion

The full potential of processing power is about to be unlocked via quantum computing. We are about to enter a time when the seemingly impossible is achievable as science and technology advance. The key that unlocks new possibilities in problem-solving will be quantum computing, whether it is used to solve intricate scientific puzzles or transform entire businesses

Thanks

Expert panels

Ajith Surendran
Rakesh K C
Jayakumar M
Subeesh
Ubeesh

Magazine Editor

D A Anand

Content Editing

Thoufeek. S, Githeesh S B, Siva
Shankar.J, Amit Rao Perka,
Sakthivel S, Nandhakumar, Hima
B Suresh, Dinesh, Navya Rajan,
Aneesh, Anchana. S, Visakh. S

Design

Merin Sujith M.R

Editing

D A Anand