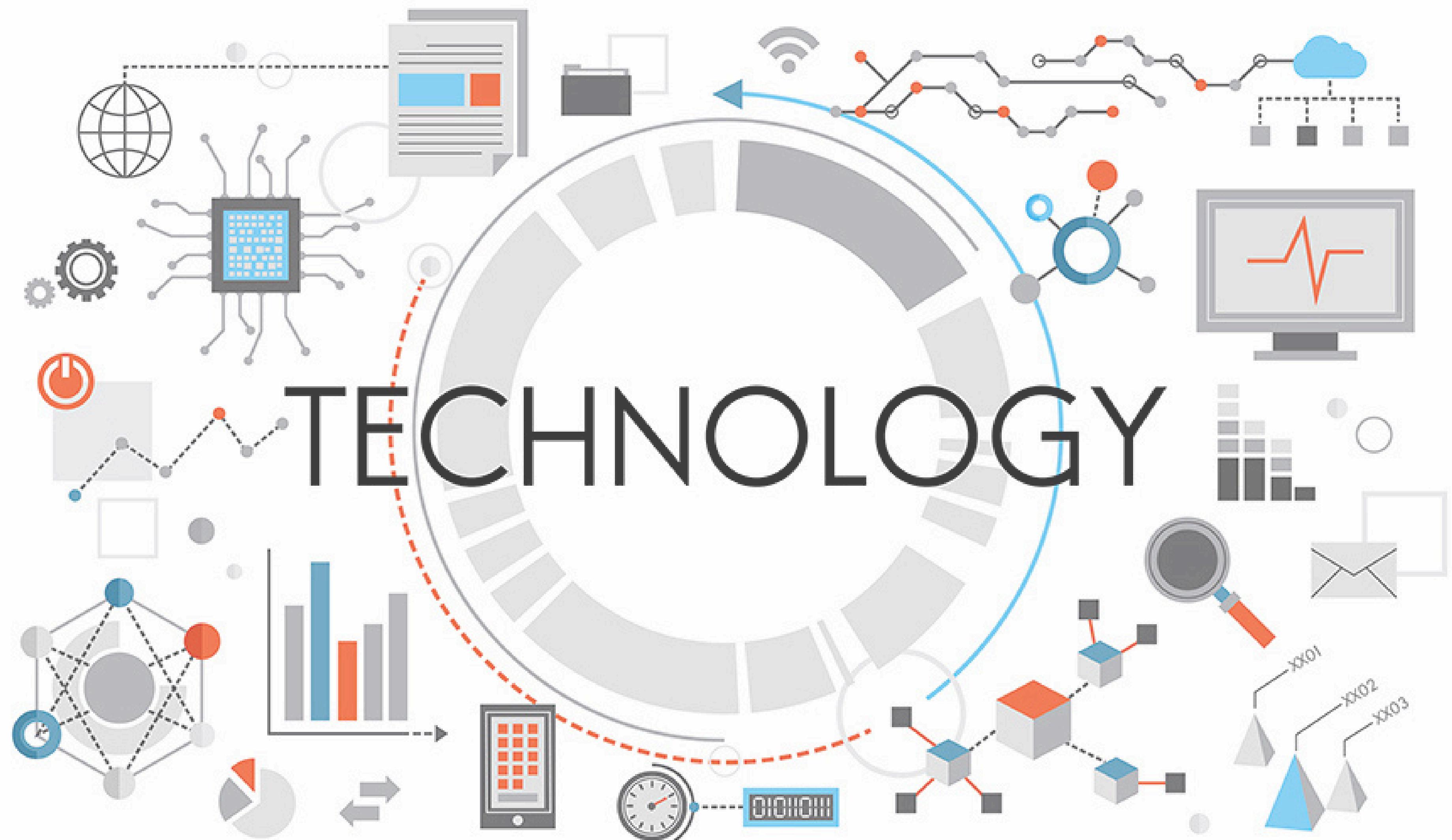


TECHNOLOGY



What is Technology?

- Technology refers to the tools, machines, and systems that people create to solve problems and make life easier. It includes everything from smartphones and computers to cars and medical devices.
- Technology helps us communicate, travel, and even stay healthy.
- Think about your smartphone. It's a piece of technology that lets you talk to your friends, play games, and get information.
- How does it work? Well, it's a complex electronics and software system designed to do these things.
- So technology is like a toolbox full of inventions that improve our lives. It's why we can send messages worldwide and explore the internet.

Overview of Technology

- **Overall Growth:** In 2024, the industry expanded by 3.8%, reaching a valuation of \$254 billion, and employing 5.43 million people.
- **IT Spending:** Projected to grow by 11.1% in 2025, reaching \$138.6 billion, indicating robust investment in technological infrastructure.
- **Software Product Industry:** Expected to reach \$100 billion by 2025, reflecting a strong focus on software development.
- **IT Exports:** Revenue rose by 9% in constant currency terms to \$194 billion in 2023, underscoring India's role as a major IT services exporter.
- **Global Innovation Index:** As of September 2024, India ranked 40th among the top innovative economies globally, highlighting its growing emphasis on innovation.
- **Emerging Technologies:** India is poised to be a key player in domains such as spatial computing, cloud computing, generative AI, and the industrial metaverse, indicating a strategic focus on cutting-edge technologies.

Top 8 Importance of Technology in Life



Evolution of Technology

- **Stone Tools (~3.3 million years ago)**: The earliest known technology, marking the beginning of tool-making and human innovation.
- **Control of Fire (~1 million years ago)**: A pivotal advancement that allowed for cooking, protection, and social gatherings, fundamentally changing human lifestyles.
- **Invention of the Printing Press (15th Century)**: Revolutionized the spread of information, making books more accessible and promoting literacy.
- **Development of the Steam Engine (18th Century)**: Initiated the Industrial Revolution, transforming manufacturing and transportation, and leading to urbanization.
- **Creation of the Internet (20th Century)**: Connected the world digitally, revolutionizing communication, information sharing, and commerce.

Current Scenario of Technology

- **Agentic AI:** Artificial intelligence systems capable of autonomous decision-making and task execution, enhancing efficiency across various applications.
- **Quantum Computing:** Advanced quantum computers solving complex problems more efficiently than traditional systems, impacting fields like cryptography and optimization.
- **5G and Beyond:** The expansion of 5G networks providing faster, more reliable internet connections, enabling advancements in IoT, autonomous vehicles, and augmented reality applications.
- **Extended Reality (XR):** Enhanced Virtual Reality (VR) and Augmented Reality (AR) technologies offering immersive experiences in gaming, education, and remote collaboration.
- **Internet of Things (IoT):** The proliferation of interconnected devices leading to smarter homes and cities, improving efficiency and quality of life.
- **Examples -** Artificial Intelligence (AI), Blockchain Technology, IOT, 5G Networks, Virtual Reality (VR)

Future of Technology

- **Renewable Energy - Market Growth** - The global renewable energy market is expected to reach \$1,512.3 billion by 2025, growing at a compound annual growth rate (CAGR) of 6.1% from 2018.
- **Smart Grid Technology - Investment**: Global investment in smart grid technologies is expected to cumulatively reach \$1.2 trillion by 2025, enhancing the efficiency and reliability of power systems.
- **Sustainable Information and Communications Technology (ICT) - Digital Transformation Spending**: Worldwide spending on digital transformation, a key driver of sustainable ICT, is projected to reach \$3.4 trillion by 2026.
- **Artificial Intelligence (AI) - Adoption Rate**: Approximately 50% of global organizations are projected to adopt AI-driven decision-making in their operations by 2025, transforming workflows and productivity.
- **Internet of Things (IoT) - Connected Devices**: The number of IoT-connected devices is expected to reach 30.9 billion units by 2025, up from 13.8 billion units in 2021, indicating widespread adoption in various applications.

- **Cybersecurity - Market Growth:** The global cybersecurity market size is projected to grow from \$217.9 billion in 2021 to \$345.4 billion by 2026, at a CAGR of 9.7%, highlighting the increasing importance of data protection.
- **Quantum Computing - Market Projection:** The global quantum computing market is expected to grow from \$472 million in 2021 to \$1.765 billion by 2026, at a CAGR of 30.2%, reflecting its emerging significance.
- **5G Expansion - Global Connections:** The number of global 5G connections is projected to reach 1.8 billion by 2025, facilitating advancements in communication technologies.
- **Biotechnology in Agriculture - Market Size:** The agricultural biotechnology market is expected to reach \$74.5 billion by 2025, growing at a CAGR of 10.1% from 2020, indicating its role in enhancing crop production.
- **Autonomous Vehicles - Market Growth:** The global autonomous vehicle market is projected to reach \$556.67 billion by 2026, growing at a CAGR of 39.47% from 2019, showcasing the shift towards self-driving technologies.

Technology Resources

Information Technology (IT) Sector:

- **Hardware:** Servers, data storage systems, networking equipment, personal computers, and peripherals.
- **Software:** Operating systems, enterprise applications, cybersecurity tools, and development platforms.
- **Communication Tools:** Email servers, VoIP systems, and collaboration platforms.

Healthcare Sector:

- **Medical Devices:** Diagnostic equipment (e.g., MRI machines), patient monitoring systems, and wearable health devices.
- **Health Information Systems:** Electronic Health Records (EHRs), telemedicine platforms, and health data analytics tools.
- **Laboratory Equipment:** Automated analyzers and lab information management systems.

Manufacturing Sector:

- **Industrial Automation:** Programmable Logic Controllers (PLCs), robotics, and Computer Numerical Control (CNC) machines.
- **Supply Chain Management Systems:** Inventory management software and logistics tracking tools.
- **Quality Control Tools:** Automated inspection systems and data analysis software.

Financial Services Sector:

- **Trading Platforms:** Electronic trading systems and algorithmic trading tools.
- **Customer Relationship Management (CRM):** Client management software and communication tools.
- **Security Systems:** Fraud detection software and secure transaction processing systems.

Education Sector:

- **E-Learning Platforms:** Online course management systems and virtual classrooms.
- **Administrative Systems:** Student information systems and scheduling software.
- **Interactive Tools:** Smartboards and educational software applications.

Retail Sector:

- **Point of Sale (POS) Systems:** Checkout terminals and integrated payment processing.
- **Inventory Management:** Stock tracking software and automated replenishment systems.
- **E-commerce Platforms:** Online storefronts and digital marketing tools.

Transportation and Logistics Sector:

- **Fleet Management Systems:** Vehicle tracking and maintenance scheduling tools.
- **Route Optimization Software:** Logistics planning and delivery scheduling applications.
- **Automated Warehousing:** Robotic picking systems and warehouse management software.

Technology resources can be used to support:

- **Teaching:** Technology enhances student engagement; 76% of students report that technology makes learning more engaging.
- **Learning:** Students can use technology resources to learn and develop academic skills. Digital tools have positively impacted students' academic performance; 59% of middle school students say digital educational tools have helped them with their grades and test scores.
- **Research:** E-learning and digital education are expanding, with the global e-learning market expected to grow at 17% per year, reaching \$252 billion by 2020.
- **Collaboration:** Technology facilitates collaborative learning through platforms that support communication and group work.

Mechanical Engineering Industry

- Past:

- **Industrial Revolution:** Mechanical engineering was pivotal during the Industrial Revolution, leading to the development of machinery that transformed manufacturing processes.
- **Automotive and Aerospace Development:** The 20th century saw mechanical engineers driving innovations in automotive and aerospace sectors, enhancing transportation and mobility.

- Present:

- **Integration of Advanced Technologies:** The industry now incorporates AI, IoT, and automation to improve efficiency and productivity. For instance, AI can boost production throughput by up to 15% and reduce manufacturing downtime by 20%.
- **Focus on Sustainability:** There's an increasing emphasis on developing eco-friendly solutions, such as renewable energy systems and energy-efficient designs, to address environmental concerns.

- Future:

- **Industry 4.0:** The adoption of smart manufacturing and cyber-physical systems is expected to revolutionize production, enabling more flexible and efficient processes.
- **Growth in Employment Opportunities:** Employment of mechanical engineers is projected to grow 11% from 2023 to 2033, much faster than the average for all occupations, indicating a robust demand for professionals in this field.

- Resources:

- **Bureau of Labor Statistics:** Provides comprehensive data on employment projections and industry trends for mechanical engineers.
- **Deloitte Insights:** Offers analyses on the future of the engineering and construction industry, highlighting emerging trends and opportunities.
- **National Academies Press:** Discusses the future position of U.S. mechanical engineering, providing insights into global industrial opportunities

Electrical Industry

- **Past Developments:**
- **Semiconductors and Chip Manufacturing:** The semiconductor industry has evolved from early integrated circuits in the **1960s** to advanced nodes like **7nm** and 5nm technologies, enabling the proliferation of modern electronics.
- **Energy Storage Systems:** Traditional lead-acid batteries have been largely replaced by lithium-ion technology, which offers higher energy density and efficiency, supporting the growth of portable electronics and electric vehicles.
- **Aerospace and Defense Electronics:** Advancements in avionics and satellite technologies have enhanced navigation, communication, and defense capabilities over the past few decades.
- **Healthcare Electronics:** The integration of electronics in medical devices has revolutionized diagnostics and patient monitoring, improving healthcare outcomes.

- **Present Scenario:**
- **Semiconductors and Chip Manufacturing:** The global semiconductor market is projected to reach \$1 trillion by 2030, with AI chips expected to grow at a CAGR of 35%, reaching \$80 billion.
- **Energy Storage Systems:** The energy storage market is anticipated to hit \$230 billion by 2030, driven by a 25% CAGR, with solid-state batteries contributing \$25 billion, growing at 30% CAGR.
- **Aerospace and Defense Electronics:** The aerospace electronics sector is expected to reach \$80 billion by 2030, with satellite electronics experiencing a 6% CAGR, supporting the deployment of over 50,000 satellites.
- **Healthcare Electronics:** The healthcare electronics market is projected to reach \$250 billion by 2030, with telemedicine services growing at an 18% CAGR.

- **Future Outlook:**
- **Semiconductors and Chip Manufacturing:** Investments in advanced semiconductor fabrication and AI chip development are expected to drive innovation in AI, IoT, and photonic technologies.
- **Energy Storage Systems:** Continued advancements in battery technology, including solid-state solutions, are anticipated to enhance energy storage capabilities, supporting renewable energy integration and electric mobility.
- **Aerospace and Defense Electronics:** The expansion of satellite constellations and advancements in avionics are expected to enhance global communication networks and defense systems.
- **Healthcare Electronics:** The development of advanced medical devices, wearables, and telemedicine platforms is projected to improve healthcare delivery and patient outcomes.

Information Technology Industry

Past:

- **Historical Growth:** The IT sector has seen substantial growth, with historical compounded annual growth rates (CAGR) varying across different sub-sectors. For instance, the Healthcare Information and Technology sector experienced a CAGR of approximately 22.91% over a specific period.

Present:

- **Current Market Size:** As of 2023, the global IT market size was estimated at USD 10,524 billion, reflecting the sector's expansive reach and integral role in various industries.
- **IT Services Segment:** The IT Services market is poised for significant revenue growth, with projected revenue of US\$1,512.00 billion in 2025. Within this market, IT Outsourcing is set to dominate with a projected market volume of US\$591.20 billion in the same year.

Future:

- **Projected Growth:** The IT market is expected to continue its robust expansion, with projections indicating a market size of USD 26,925 billion by 2032, achieving a CAGR of 11.0% during the forecast period.
- **Business Research Insights - IT Services Outlook:** The IT Services market is projected to grow by 5.58% (CAGR 2025-2029), resulting in a market volume of US\$1,879.00 billion by 2029.

Investment Opportunities:

- **AI and Machine Learning:** The AI market is projected to reach \$1.8 trillion by 2030, with a CAGR of 37%, indicating significant investment potential in automation and predictive analytics.
- **Cloud Computing:** With an expected market size of \$1.7 trillion by 2029 (CAGR 15%), opportunities abound in SaaS, hybrid/multi-cloud solutions, and disaster recovery services.
- **Cybersecurity:** As the market is anticipated to grow to \$400 billion by 2026 (CAGR 12%), investments in AI/ML threat detection, IoT security, and blockchain are promising.
- **Internet of Things (IoT):** The IoT market is expected to reach \$1.1 trillion by 2026 (CAGR 26%), offering opportunities in smart devices, 5G-enabled IoT, and predictive maintenance.

Trainings in Technological Sector

Information Technology (IT)

Programming Languages: Python, Java, C++, JavaScript, etc.

Web Development: HTML, CSS, React, Angular, etc.

Cloud Computing: AWS, Microsoft Azure, Google Cloud.

DevOps: CI/CD pipelines, Jenkins, Kubernetes, Docker.

Cybersecurity: Ethical hacking, network security, threat management.

Data Science and Analytics: Machine learning, data visualization tools (Tableau, Power BI), R, Python.

Database Management: SQL, NoSQL (MongoDB, Cassandra).

AI and Machine Learning: TensorFlow, PyTorch, AI ethics, NLP.

Healthcare Technology

Electronic Medical Records (EMR) Software: Training in Cerner, Epic Systems.

Medical Devices: Operation, calibration, and troubleshooting.

Data Analysis in Healthcare: R, Python, SAS for clinical data.

Health Information Systems: HL7 standards, telemedicine platforms.

Regulatory Training: HIPAA compliance, FDA regulations.

Trainings in Technological Sector

Manufacturing and Industry 4.0

Automation and Robotics: PLC programming, SCADA, robotics training.

IoT in Manufacturing: Sensors, connectivity, data processing.

Digital Twin Technology: Simulation software (e.g., ANSYS, Dassault Systèmes).

CAD/CAM Tools: AutoCAD, SolidWorks.

Lean Manufacturing Tools: Six Sigma, Kaizen, Kanban

Banking, Finance, and Insurance (BFSI)

FinTech Tools: Blockchain, cryptocurrencies, payment gateways.

RegTech: Compliance software and regulatory frameworks.

Data Analytics and Modeling: Risk analysis, fraud detection.

CRM Tools: Salesforce, Zoho CRM.

Enterprise Software: SAP for financial transactions.

Trainings in Technological Sector

Automotive and Transportation

Connected Vehicles Technology: IoT devices, CAN bus systems.

Electric Vehicles (EVs): Battery management systems, EV charging solutions.

Autonomous Vehicles: AI/ML for autonomous driving, sensor fusion.

CAD/CAE for Automotive Design: CATIA, NX, MATLAB/Simulink.

Fleet Management Software: GPS tracking, route optimization.

Education and E-Learning

Learning Management Systems (LMS): Moodle, Blackboard, Canvas, AWS Academy, Cisco Academy.

EdTech Platforms: AI in adaptive learning, gamified learning tools.

Content Development Tools: Adobe Captivate, Articulate.

Online Collaboration Tools: Microsoft Teams, Google Classroom, Zoom meeting.

Trainings in Technological Sector

Entertainment and Media

Animation and Visual Effects (VFX): Maya, Blender, Unreal Engine.

Video Editing: Adobe Premiere Pro, Final Cut Pro.

Sound Engineering: Pro Tools, Ableton Live.

Augmented and Virtual Reality (AR/VR): Unity, Unreal Engine.

Agriculture and Agritech

Precision Agriculture Tools: GIS mapping, IoT devices for monitoring.

Drones for Farming: Drone operation and data analysis.

Agri-Databases: Crop modeling and soil data analysis tools.

Sustainable Practices Training: Renewable energy in irrigation.

AUTOMATION

Thank you

