

Title: Advanced Industry 4.0

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Industry 4.0 has revolutionized the Automation, monitoring, and analyzing of supply chains through smart technology.

Industry 4.0 is powered by the Industrial Internet of Things (IIoT), and cyber physical systems smart, autonomous systems that use computer-based algorithms to monitor and control physical things, like machinery, robots, and vehicles.

Industry 4.0 has become a major part of any company's digital transformation.

Industry 4.0 technology and innovations bridge the physical and digital worlds and makes smart and autonomous systems possible.

Industry 4.0 is built in nine technology pillars.

1. Big Data and AI Analytics

Big Data is collected from a wide range of sources, from factory equipment and Internet of Things (IoT) devices to ERP and CRM systems.

2. Horizontal and Vertical Integration

The backbone of Industry 4.0 is horizontal and vertical integration. With horizontal integration, processes are tightly integrated at the field level on the production floor, across multiple production facilities. With vertical integration, all the types of an organization are tied together, and the data flows freely from shop floor to the top floor and back down again. In other words, production is tightly integrated.

3. Cloud Computing

Cloud computing is the great enabler of Industry 4.0 and digital transformation. Today's cloud technology goes way beyond speed, scalability, storage, and cost efficiencies.

It provides the foundation of the most advanced technologies, from AI and machine learning to

the Internet of Things (IoT) and gives businesses the means to innovate.

The data that fuels Industry 4.0 technologies resides in the Cloud, and the cyber-physical systems at the core of Industry 4.0 use the Cloud to communicate and coordinate.

4. Augmented Reality (AR)

Augmented Reality, which overlays digital content on a real environment, is a core concept of Industry 4.0. With an Augmented Reality (AR) system employees use smart glasses or mobile devices to visualize Real-Time IoT Data, digitized parts, repair, or assembly instructions, for training content and more.

AR is still emerging but has major implications for maintenance, service, and quality assurances as well as technician training and safety.

5. Industrial Internet of Things

Industrial Internet of Things is so central to industry 4.0 that the most physical things in Industry 4.0 devices, robots, machinery, equipment's, products - use sensors to provide real time data about their condition, performance, or downtime.

6. Additive Manufacturing /3D Printing

Additive manufacturing or 3D printing is another key technology driving Industry 4.0. 3D was initially used as Rapid prototyping tool, but now offers a broader range of applications.

7. Autonomous Robots

With Industry 4.0, a new generation of autonomous robots is emerging. Programed to perform tasks with minimal human intervention, autonomous robots vary greatly in size and function, from inventory scanning drones to autonomous mobile robots for pick and place operations.

Equipped with Cutting-Edge software, AI, sensors, and machine visions, these robots can perform difficult and delicate tasks.

8. Simulation/Digital Twin

Digital twin is a virtual simulation of a real-world machinery, product, process, or system based on IoT sensor data.

This core component of Industry 4.0 allows businesses to better understand, analyze and improve the performance of industrial system and products.

This process could be use of our workplace as it will help engineering department to identify a

specific malfunction part, to predict potential issues and improve uptime.

The downfall with this is, the company may not be able to afford or want to invest the money to acquire such a system, hence the PPM (planned preventative maintenance) is in place.

9. Cybersecurity

With the increased Connectivity and use of Big Data in Industry 4.0, effective Cybersecurity is paramount. By implementing a Zero Trust, architecture and Technologies like machine learning and block chain, companies can automate threat detection, prevention, and response.

Current workplace use of such Industry 4.0

In our workplace we can use Industry 4.0 in a near future, where breakdowns, productivity, and man management can be monitored and corrected via AR, and IoT. It would be an implementation that would benefit the company in a long term, but with the price and programming being at high price, would be difficult to convince the people at the top.

However, at this present time, we use Servo Line, where machines recognize glass shapes and size to carry out the next step.

Industry 4.0 plays role in data loaded via IoT.

All data on glass shapes and sizes is linked to each machine via the Internet, and then loaded onto each machine that carries out the work.

Although glass is manually transported from the cutting table for instance to the next machine, in this case being the Arrisser machine where glass is beveled, it uses the Internet to link with the next machine telling it the size and shape. It transfers all the data required to the next machine via ethernet connectivity. It uses sensors to provide real time for the next station to complete the circle, otherwise it would crash causing thousands of pounds in damage.

It also uses air switches for machine safety purposes, even to tell machine if it's the wrong shape as it won't recognize it, and this is done via Servo Link.

Also, the machine uses old simulation system, where it's programed to analyze different parts of machine to find correct faults, machine is programed to bypass safety and some other functions where normally not able to carry out checks to repair or find fault.

Augmented Reality would be a great pillar to have in this case as it will help our engineering department to carry out checks preventing future break downs and in more depth of analyzing

these issues, but it would come at a high price as the cost of such program and copy rights are not cheap.

As we are building a new factory (Super Factory) and some robot machinery will also be installed, the AR, IoT, and the Cloud can all be implemented to help productivity, management and preventive maintenance.

LiseC Production network with server and clients



