# Artificial Intelligence in Industrial Automation : A Primer

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**Imprint Automation mantra is to provide solution and sourcing. AI is the most repeated solution by every tech wizard. Adoption of AI is impossible by the manufacturing company. Reading this primer will explain the difficulties. However, automation solutions promising AI is the only way to exploit artificial intelligence. Utthunga evidently is such a company we are glad to introduce.**

**Indian manufacturing only hopes of competing globally is to leap-frog into highly automated manufacturing equally exploiting AI data knowledgeably. Imprint advice is to focus on manpower that can deliver. Cheers!**

## Role of Artificial Intelligence in Industrial Automation

For many people, Artificial Intelligence (AI) means robots performing complex human tasks in sci-fi movies. Actually, it is partially true. Whatever AI offers to the world is allowing the indutralmachines to carry out superintelligent tasks. As the global industries and decision makers are facing new challenges, thereis an urgent requirement to propel manufacturing by using the most advanced technologies. Industries need to restructure & revamp their control systems and other industrial assets (software or hardware)

in order to keep pace with the unprecedented speed of change. Artificial Intelligence or AI could potentially help meet these goals. AI applications are already becoming pervasive in industries like banking, gaming, retail, entertainment and more. The fourth industrial revolution is driven by new ways of automating the industrial tasks with smarter sensors, controllers, IO modules, PLCs, gateways, enterprise systems, etc. and restructuring the ways humans and machines interact to create a stronger digital ecosystem.

# Artificial Intelligence

## Role of Artificial Intelligence in Industrial Automation

With the growing changes in the customer behavior in regard to product quality and customization, it is difficult for the businesses to make changes in their system. That is where Machine Learning (ML) benefits the industries. ML is a subset of AI and empowers the computers to learn automatically from the data inputs and applies that information without any human intervention. ML aids in optimizing the production and supply chain efficiency, fraud detection, risk analysis and risk mitigation, portfolio management, GPS based predictions, targeted marketing campaigns, to name a few. Machine Learning algorithms are categorized as:

### Supervised

This model needs to have a dataset with some observations and labels of the observations that can be used to predict the future events.

### Unsupervised

This model needs to have a dataset with some observations without the need of labels of the observations. It does not predict the right output but explores the data and draws inferences from the data sets.

### Semi-supervised

This model is positioned between the supervised and unsupervised Machine Learning families. It uses both labeled as well as unlabeled data.

## How AI impacts the Industrial Automation?

### Get Valuable Insights from Data

Industries generate tons of valuable data in a single day. With the right industrial AI models, all the raw data can be turned in to useful insights that can lead the designers or engineers in to discovering new ways to improve and update according to the latest technologies.

### Improve Product and Service Quality through computer vision

Computer vision tends to replicate the functionalities of human vision and extract important information from the images and videos. Computer vision operates on three main elements that include visual data. high-processing computers , smart algorithms. From the industrial automation perspective, this contributes to the overall increase in production, efficiency, plant safety andsecurity.

### Enhance Manufacturing techniques and handle conceptual data with Data-driven Deep Learning and Cognitive Computing

Deep Learning uses ML techniques based on artificial neural networks and is capable of extracting high level insights from the raw data inputs. congnitive computing is attentive on comprehending and reasoning at an advanced level, and is capable of handling even symbolic or conceptual data.

## Boost Productivity and Safety with Collaboration Robots (Cobots) and Digital Twins

Cobots play a significant role in industries or laboratories. These autonomous systems intend to work alongside humans to pick, place, inject, analyze and pack items. They can also keep track of motion and avoid accidents or errors. Digital Twins can decrease the downtime and cost to set up such robotic systems.

## Aid in Decision making with Reinforcement learning and Big Data Analytics

Reinforcement learning is a cutting-edge ML technique that attempts to train the ML models for advanced decision making. The ML model uses trial and error to find the appropriate solution to any complex problem. This technique is widely used in games but it can also shape other industries. Big Data Analytics enables to discover valuable patterns, trends, correlations and preferences for industries to take better decisions.

## Making Machine Learning accessible to the end-user with AI enabled chips

The cloud servers hold most of the computational, storage and networking capabilities. Cloud-based services are great for those who have access to reliable connection and high-speed internet but they are unatt ainable for those in remote areas. AI enabled chips can provide access to intelligence without cloud-based services and benefit theindustries, especially the ones operating in the remote areas.

## Analyze and Predict Future Trends by Deep Learning Platforms

Deep Learning models use unstructured data sets to predict the future trends. Deep learning is crucial for image and speech recognition and depends on three different factors including intelligent algorithms, tons of data and Graphics Processing Unit (GPU) to accelerate learning.

## When AI Goes Wrong?

Now AI is playing an increasingly bigger role in our lives. It appears in everything from manufacturing, retail, education and scientificresearch to banking, criminal justice, hiring and entertainment, to name a few. However, the more we trust this new technology to take important decisions, the higher is the chance for large-scale errors. To prevent such errors, we must understand how and why AI reaches certain conclusions. The two terms which come up in the mind while thinking about improving AI are:

## Explainable AI

It comprises of techniques that allow systems to explain their decision making and also offer insight in to the weak and strong parts of their thinking. It will enable us to know how much we can rely on AI results and how to make improvements.

## Auditable AI

It takes the help of third parties to test the thinking of the AI system by giving varied queries and measuring the results to find flawed thinking or errors.

# Future Trends of Industrial Automation

## Further Expansion of IIoT with Predictive Analytics

Predictive maintenance programs are used to track equipment real-time to enhance responsiveness and decrease unplanned outages, resulting in safer opera tions,lower expenses& higher customers satisfaction.


## Growth of Edge Computing

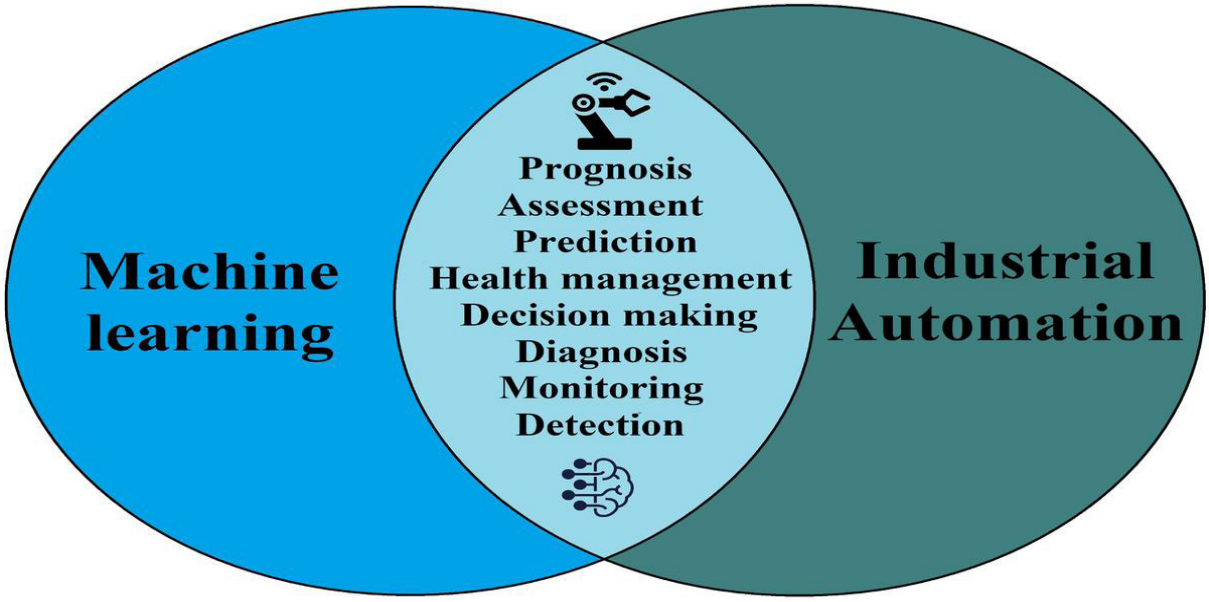
The significant rise in data from devices which operate 24/7 often cause band-width issues as well as slow processing times. Edge computing technology shirfts the information storage and processing from cloud services or data centers towards the specific location where it is required, which is often the device itself. Edg computing can enable the connected devices to make use of more real-time data for bussiness deci-sions and process controls Since more and more IoT devices are being used, edge computing is expected to increase.

## Increased Implementation of VR and AR Tools

Augmented Reality (AR) an Virtual Reality (VR) tools offer interactive experiences that are specifically used for personnel training. Historically, the personnel training programs have been one size fits all but with AR and VR tools, the training will be more customized based on the skills of the trainee. These technologies will also enable the personnel to train in non-disruptive and safe environment, especially when the training is on rare operations that may be difficult to understand and experience in real-world.

## Expansion of Smart Robot Usage

With advent of 5G network technology, availability of faster and more reliable internet connectivity along with improved satellite coverage to remote areas, the use of smart robotic applications in industries will expand rapidly.




## Some Statistical Information on AI

After being a distant aspiration for the industries for many years, we are now more close to adoption and meaningful ROI of AI systems in the industrial landscape. As we see above, the potential advantage of AI adoption into the industrial ecosystem are huge. However, the articulation of the problem statements and the mapping of the right AI tools/technologies to these problem statements is fraught with several challenges. Internal champions (in the plant floor and above) and external technology providers have to collaborate deeply. The promise is there, the execution is the key. Surely, some of these technologies will get even more mature and "easy" to use with time, but choosing to wait and delay implementation will lead to a competitive handicap. Industries should act now, start small, but start now. Utthunga is a leading engineering and industrial solutions company that can tranform your business to leap in to a new world with intelligent, fast, secured and scalable end-to-end intelligent solutions. We understand the industrial domain very well, and are well positioned to leverage the new techn ologies to deliver the best -inclass solutions to our customers. For more informationon how to build an automated system with Artificial Intelligence and offer the best-fit solution for your industry requirements, contact Utthunga.