

NAVIGATING THE FUTURE : UNVEILING THE DYNAMICS OF INDUSTRY 5.0

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PREFACE

In an era marked by technological revolutions, the concept of Industry 5.0 stands at the forefront, promising a paradigm shift in the way industries operate. As we navigate the ever-evolving landscape unravel the intricacies and possibilities that Industry 5.0 holds. “Navigating the Future” invites all attendees to be active contributors to the ongoing dialogue that shapes the future on industries, fostering a community of forward – thinkers and innovators who are well – equipped to drive positive change in the world of Industry 5.0

Industry 5.0 is regarded as a fifth industrial revolution in which consumers could satisfy their individual requirements as per the tastes and expectations. Although the repetitive tasks are done by robots in Industry 4.0 which is at the mass customization level, Industry 5.0 aims to perform mass personalization with help of Artificial Intelligence.

Industry 5.0 is expected to revolutionize the production process with higher autonomy to collaborative robots. Industry 5.0 is the futuristic industrial revolution which is expected to bring in more creativity and innovation in the products by allowing robots to perform repetitive tasks. It is expected to utilize the creative intellectual capability of human optimally. Moving from mass production to custom manufacturing techniques and production system digitization and intelligentization.

In the lines if above, the PG & Research Department of Commerce has organized two days Conference on the theme “Navigating the Future: Unveiling the Dynamics of Industry 5.0” with the following objectives, to understand and gain knowledge on the functional areas of Industry 5.0; to provide a holistic understanding of the multifaceted dynamics of Industry 5.0 and to enhance the research aptitude among the academicians, scholars towards dynamic changing environment.

To get more insights on the above theme, research articles were invited for presentation and publication. The Department has received fifty (50) articles on various sub-themes from Professors and research scholars of various colleges in Tamil Nadu, Kerala and Karnataka. The Editorial Board has reviewed and edited all the papers scrupulously and meticulously with plagiarism check.

The Editorial Board has recommended and forwarded all the articles in the form of Edited Book with ISBN Publication Number for disseminating the knowledge to all the stakeholders of Higher Education Institutions and Industry concerned.

This book is a comprehensive guide for understanding and utilizing on various themes to generate indepth knowledge on it and suitable for research scholars as well as corporates. We hope that you will find this book informative and inquisitive as much as we learnt it.

Editorial Board.

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INDUSTRY 5.0 IMPLEMENTATION: OPPORTUNITIES AND CHALLENGES

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Abstract

Industry 5.0 is expected to revolutionize the production process with higher autonomy for collaborative robots. Industry 5.0 is the futuristic industrial revolution which is expected to bring in more creativity and innovation in the products by allowing robots to perform repetitive tasks.

Keywords : COBOTS, Industrial Revolution, Mass

Introduction

Industry 5.0 is all set to take the stage when Industry 4.0 is still gaining popularity and yet to get matured. Industry 5.0 is regarded as a fifth industrial revolution in which consumers could satisfy their individual requirements as per the tastes and expectations. Although the repetitive tasks are done by robots in industry 4.0 which is at the mass customization level, industry 5.0 aims to perform mass personalization with help of Artificial Intelligence. Industry 5.0 is expected to revolutionize the production process with higher autonomy to collaborative robots. Industry 5.0 is the futuristic industrial revolution which is expected to bring in more creativity and innovation in the products by allowing robots to perform repetitive tasks. It is expected to utilize the creative intellectual capability of humans optimally. Moving from mass production to custom manufacturing at the moment, the need for today's sector is fast progress in manufacturing techniques and production system digitization and intelligentization (Vaidya et al., 2018).

Since the first Industrial Revolution, successive developments have led in manufacturing, from water and steam driven devices to electrical and digital electronic production, making manufacturing processes more complex, automatic and sustainable so that machines can be operated with simplicity, efficiency and persistence (Qin et al., 2016). People nowadays need the human touch of mass personalization, so Industry 5.0 helps them change from mass manufacturing to mass personalization (Haleem&Javaid, 2019). Industry 5.0 is making mass customization a reality and, the fast advances in manufacturing techniques, production system digitization and intelligence are the needs of today's sector (Vaidya et al., 2018). Industry 4.0 previously activated mass customization, which was not sufficient. For instance, type-1 Diabetes is difficult to manage because people have distinct levels of metabolism and distinct dimensions with distinct skin thicknesses, behaviors, lifestyles, etc. Shift to industry 5.0 allows providing people with an

application that follows their habits and routine, producing a diabetes control production method and eventually a lower, more discreet and reliable device tailored to the person. The capacity to produce an Industry 5.0 method would therefore be totally life-changing for diabetes sufferers.

Role of Robots

Robots make an enormous contribution to works such as loading, unloading, painting, welding, etc. An autonomous robot is used to conduct a more accurate independent technique of manufacturing and to operate in locations where human employees are limited to operate. A major trend is a cooperative robot, or so-called "COBOT" intended to operate with human employees to assist them with a multitude of duties (Fukuda, 2019). Industry 5.0 has devices interconnected to optimize productivity and human effectiveness.

Role of Big Data and Artificial Intelligence

In order to generate symmetrical innovation, industry 5.0 can acquire understanding from big data which generates a network of digital knowledge. In order to enhance precision and performance, it utilizes cooperative robots and can do what a person intends to do. For instance, collaborative robots can be used on the operating table to perform distinctive surgery. Big Data comprises four aspects, according to Forrester's concept: information volume, information variety, information value, speed of creation of fresh information and interpretation (Schumacher et al., 2016).

One of the enablers is the IoT, in which sensor-equipped machines with connectivity transmit data to other machines and computer systems, automate many processes and also collect large amounts of new data types (Fukuda, 2019). Big data and IoT is already a game changer in industry 4.0 and these entities create greater impact in industry 5.0. Large amount of data is generated which is analysed using big data analysis techniques and Artificial Intelligence algorithms to make smart decisions. Also, more sensors and intelligent devices are used in industry 5.0 which constitutes for IoT which ensures high quality, precision and productivity with higher customization. Industry 5.0 generates a new kind of job opportunities such as creative and innovative thinking, technology interface, managing COBOTs, creating artificial algorithms, and many more.

Industry 5.0 poses the following opportunities and challenges

Opportunities of Industry 5.0

- Increased automation will impact employment positively in many sectors through the deployment of next-generation technology.
- Highly automated manufacturing systems provide greater opportunity for customization to customers.
- Industry 5.0 provides greater opportunities for creative people to come and work which enables the optimization of human efficiency.\

- Machines are versatile according to employee needs to create a high-level choice and industry 5.0 will help the client digitally in managing repeated follow-up assignments (Haleem&Javaid, 2019).
- Industry 5.0 creates higher-value employment than before because this gives back the liberty to people to be responsible for construction (Rossi, 2018).
- In industry 5.0, the operator within the production cell gets more engaged in the planning method than in the more or less automated manufacturing method (Rossi, 2018).
- It allows liberty of design to function and allows more tailor-made and personal products.
- It enables the automation of manufacturing methods better with Industry 5.0 by feeding the real-time information from the sector.
- Increased safety of the employees at the work floor because COBOTs can take up hazardous and dangerous works.
- More personalised products and services increase customer satisfaction, loyalty and attracts new customers which results in increased profit and market share for the companies.
- It provides great opportunities to start-ups and entrepreneurs in creative and innovative spheres to come up with new products and services allied to industry 5.0 provided adequate funding and infrastructure is available.
- Industry 5.0 provides increased importance to the human-machine interaction subject field and offers a larger platform for research and development in this domain.
- Quality services can be provided at the remote locations with the help of industry 5.0 especially in healthcare industry such as medical surgeries in rural areas by robots.

Challenges of Industry 5.0

- This trend increases work polarization where middle-skill employment is decreasing and the workforce is split into two communities: extremely trained and qualified; low-paid and unqualified employees. This may alleviate the skilled and unskilled divide in the society.
- Due to highly automated manufacturing systems, skill development is a humongous task such as training workforce for adoption of advanced and cutting-edge technologies, and inducing behavioral change for interacting with.
- Collaborative robotics is the method of automation, which together with human co-workers also stays an important danger on the shop floor (Rossi, 2018).
- Smart manufacturing systems demand higher autonomy and sociality capabilities as key factors of self organized systems. The shift from present context to industry 5.0 is difficult due to lack of autonomy in the present systems such as integrated decision making.

- From manufacturing systems, it is difficult to acquire high quality and integrity of the data and it is difficult to accommodate diverse data repositories (Thoben, 2017).
- There is an increased cyber security threat in critical industrial systems and manufacturing lines at industry 5.0 due to its increased connectivity and use of standard communications protocols.
- Industry 5.0 demands a huge amount of investment to fully implement all its pillars which is difficult to industry and especially the SMEs to adopt.
- For instance, industry 5.0 offers a great potential in healthcare industry but high degree of precision and accuracy is needed. The research in this front is still in nascent stage and demands high amount of investments and infrastructure.
- It is challenging for startups and entrepreneurs since industry 5.0 demands high investments and infrastructure with cutting edge technology requirements.
- Challenging to draw regulatory mechanisms in industry 5.0 due to high amount of automation presence. For example, whom to be held accountable in case of failures and to what extent.
- Due to higher levels of automation in the industries, the existing business strategy and business models have to be modified and customized to meet the requirements of industry 5.0. Due to mass personalization, business strategy will be focusing more on customer centric operations. Customer subjectivity changes over time and it is difficult to change the business strategies and business models frequently.
- Business strategies in industry 5.0 demands higher level of dynamism to sustain competition due to differential customer preferences.

Conclusion

This industrial revolution relates to human-machine interaction to make jobs easier and quicker. Industry 5.0 brings the personalization idea to the next stage. Industry 5.0 is used with greater effectiveness to meet the extremely personalized demand and to build a virtual environment, advanced computers and information technologies. Industry 5.0 is the realisation of optimal integration of big data, Artificial Intelligence, internet of things (IoT), cloud computing, COBOTSs, innovation and creativity. Industry 5.0 is expected to create higher-value employment with larger freedom for design thinking and creativity. It helps to improve the productivity of labour and greater opportunity for customization to customers. On the flip side, due to highly automated manufacturing systems, skill development for the workforce is a humongous task. There is an increased cyber security threat in critical industrial systems and manufacturing lines at industry 5.0 due to its increased connectivity and use of standard communications protocols. Even though industry 5.0 provides greater autonomy to robots, important and moral based decision making is vested with humans. Overall, industry 5.0 is expected to revolutionize the production systems and process by allowing larger collaboration between humans and robots in providing tailored products to customers. India is aspiring to become a manufacturing hub through initiatives such as Make in India, Skill India and Start-up

India. Industry 5.0 has great potential to integrate with these programmes and initiatives in making India the forerunner in smart and collaborative manufacturing systems.

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