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INTELLIGENT MANUFACTURING WITH THE ADVENT OF INDUSTRY 4.0 IN MANUFACTURING INDUSTRY: A SYSTEMATIC REVIEW AND GROWTH OPPORTUNITIES

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Abstract

Industry 4.0, or called as the fourth industrial revolution, is the modern movement of automation and data exchange in manufacturing technologies. It comprises cyber-physical production systems (CPPS), cloud computing and Internet of things (IOT). Our main spotlightis on the three levels of CPPS: (1) In the "Smart Connection Stage", concerndeals with tether-free communication and sensor networks. (2) The "Data-to-Information ConversionStage" thinkstopics such as smart investigative for component machine health and deprivation and performanceforecast. (3) The "Cyber Level" considers priorities such as the twin model (or digital twin) for apparatus andmachine components, instrument time-variation recognition and memory and data clustering for data mining.We are also taking into consideration the role of humans, both as labour and supervisors, within modern manufacturingenvironments. We are fascinated in the adaptation of control architectures and the use of technology (e.g.wearable eye-tracking systems) to smooth the progress of the integration of humans in manufacturing systems. It is vital to support organizations to implement innovative tools, making the production automated.

Keywords: Industry 4.0, IOT, CPPS, modern manufacturing, cloud computing.

Introduction

In Seventies and Eighties when the rise of machines in manufacturing industries takes place it was first industrial revolution which cause worries many people due to reduction of manual workers and lack of labour jobs.

It is all going ahead in 1784 with the intromission of the first machines that used steam for power. The second industrial revolution, which starts begin in 1870, underway the assembly line production system which mostly used electricity and mass production of components was possible in this period (schuh et. al, 2015). The third industrial revolution flagged off with the introduction of the first programmable logic controller in the year 1969 using automation (Greenwood et. al, 1997). Efficient working machine toolsand machinerobots were used in automation of manufacturing industries in which the computer system and automation is broadly used to assemble parts. At last in the year 2013 the fourth industrial revolution model is based on the internet of things (IOT), cyber physical systems (CPPS) and cloud computing to make the components (Bartodziej et. al, 2017). The real world and the virtual world growshastily together with the Internet of the Things (IOT), which has encouraged organisations to start an ambitious journey towards Industry 4.0 (Shrouf et. al, 2014). Industry 4.0 has become a trend that illustrates the movement towards digitalization and automation of manufacturing environments (Oesterreich et. al, 2016). “Industry 4.0” comes to an extent at the first at the famous Hannover Fair in 2011. It was a project tactics of the German Industry (Devezas et. al, 2017). The term was later comes to existence in the year 2015 World Economic Forum (WEF) in Davos, Switzerland and also come along in “The

Fourth Industrial Revolution," by Klaus Schwab, who is the founder and president of WEF (Unnikrishnan, A. (2017).

The industrial automation systems permits much pioneering functionality by allowing the networks and cyber world which in turn produces latest business presentations, work processes and growth. These changes will have ainsightfuloutcome on society and people (Jazdi, N. 2014). IT perspective of Industry 4.0 includes a new phase of production, networking data processing and data integration. A technology such as Internet of Things, Big Data or Cloud Computing give rise the key to Industry 4.0. Smart manufacturing, Internet of things (IOT) and Cloud-based manufacturing are supposed to be the basics of the latest Industrial Revolution (Jazdi, N. 2014) (Trappey et. al, 2016) (Wan, J. 2016) (Wang, K. 2016).Industry 4.0 gives permission tomachinery, mechanism, commodities, components, persons, properties and ICT systems to build a smart network in a complete value range (Mrugalska, B., &Wyrwicka, M. K. 2017). A characteristicplan for Industry 4.0 was put forward by Hermann et al. (2015) by means of a schemeof literature review. The review pinpointed four fundamentalessentials Internet of Things, Internet of Services, Cyber-Physical Systems and Smart Manufacturing. Smart commodities and machine-to-machine contact are not isolated Industry 4.0 elements. It is the originator of the Smart merchandise and Internet of Things are a sub element of CPS. The Fourth Industrial Revolution is similarly related to as "Smart Industrial Product", "Industrial Internet" or "Integrated Industry" (Hofmann, E., &Rüsch, M. 2017.In other countries it is also known as "Industry du Future" in France, in United States it is called as , "Industrial Internet" and "Industrial 4.0" in German.

Literature Review

Industry 4.0 is a grouping of Cyber-Physical Systems (CPPS) correlated to the supply chain and manufacturing processes with usage of the Internet of Things (IOT) and Industrial developments (Bartodziej et. al, 2017). An explanation for Industry 4.0 is that it is an revolution towards digitalization. A very indistinct statement for Industry 4.0 was made by the FU in 2011. It states that Industry 4.0 as: 1. "The term Industry 4.0 attains as the fourth industrial revolution. It is known better as a latest stage of control and organization over the value chain of the product lifecycle, it is decided on being customer needs. The cycle of this starts from the product idea. Then order placement takes place as second stage and product goes through the development and manufacturing. Then it makes its own path to product delivery for the end customer where the cycle moves forward to the end phase, recycling. The accessibility of relevant data information in real time by linking all the activities of the value chain makes the basis for the fourth industrial revolution. The association of systems, things and people makes self-organizing environment, dynamic movement, real-time optimized value-added dependent connections across organizations. They are again and again optimised in order to different criterion like availability of stuff, total costs and consumption of resources."

This description seems to be complex at a view, so a more preciseand a simple explanation by Acatech, (2013) is given: he briefs Industry 4.0 as the technological combination of Cyber physical Systems into logistics and manufacturing with the use of internet of services and things in the industry process. They have implications for downstream services, value creation, work organisation and business models."(Jazdi, 2014) by giving his opinion explains that: "The ultimately motive of the Industry 4.0 is the coming out of digital factories that are to be categorized by following features: smart networking with a great, mobility, flexibility of the system, integration of customers and new pioneering business models." "The completethought of Industry 4.0 is to use the up-and-coming information technologies to put into practice Internet of Things (IOT) and services so that business processes and engineering processes are extremely integrated building production operate in a flexible way, efficient manner, and green way with continuously high quality and low cost." (Wang et al., 2016)

(Yen et al., 2014) stated the term as: "The concept of Industry 4.0 core is as same as decentralized idea through the intelligent system and Cyber Physical Systems to reach at smart production, green production and urban production."

Conclusion

Now a day's Industry 4.0 is a new concept technology and there is a lack of efforts and knowledge in the methodical review of the topic. The main motive is to aware ourselves to this new concept and to aware and give knowledge to others by studying in depth the research articles from different journals and conferences on the topic Industry 4.0 thus making it easier for future researches. This study of industry 4.0 is to consolidate the literature reviews presented on the topic and be available in a form that the researchers and academicians to focus and establish their knowledge on the topic, further identifying areas for future research. There is a requirement for the implementation of Industry 4.0 in various industries (mainly manufacturing and IT industries) to study the impact of the expansion on the outcome of a company. So there is Need for more conceptual methodology in research is needed to effortlesslyunderstand the concept and help to work more reliable and to grow efficiently**.**

Future Scope

More researches till date are based on descriptive studies relatively than empirical studies. The amount of conferences is more than journals which means that Industry 4.0 has a broad scope for further future research. Most of the researches have a theoretical type approach rather than data driven type or problem-solving type approach. Hence, future researches can be completed by focusing on the hindrances and critical success factors of Industry 4.0 in different manufacturing industries**.**

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