

Application of robotics in manufacturing

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ABSTRACT:

Robotics in today's world is life changer for everyone as they change the face of manufacturing. They are designed in such a way that are used to move materials, as well as perform a variety of programmed tasks in manufacturing and production settings. Mostly robots are used to perform task on behalf of humans which are hazardous, or dangerous and repetitious which cause boredom and this leads to inactiveness in the work which causes injuries to the workers.

Industrial robots are used to increase the product quality. Unlike humans' robots are designed to update themselves time to time to meet the present requirements.

A special and famous flexible robot i.e., Cobot (collaborative robots) into manufacturing has made a potential to revolutionize production lines is growing. A lighter, mobile plug and play generation of cobots is arriving on the production floor to work safely alongside human workers.

Keywords: Cobot, Robotics, hazardous, flexible robot.

INTRODUCTION:

Some economists say, the world is entering second machine age, where artificial intelligence (AI) and other advancement are enabling robots to do task which were until now only human eyes, minds and hands could handle.

With this paper, lets travel with the innovation, to meet the next generation of industrial robots, where robots are doing wonders in different areas like manufacturing, operations, supply chain management and also in decision making for the organisations

A **robot** is a machine - especially one programmable by a computer - capable of carrying out a complex series of actions automatically. Robots can be guided by an external control device or the control may be embedded within.

An **industrial robot** is a robot system used for manufacturing. Industrial robots are automated, programmable and capable of movement on three or more axes.

Typical applications of robots include welding, painting, assembly, machine handling for printed circuit boards, packaging and labelling, palletizing, product inspection, and testing; all accomplished with high endurance, speed, and precision. They can assist in material handling [1]

Imagine if humans weren't your colleague but instead robots are. Perhaps it's not unfortunate or untimely to picturise this scenario. by integrating AI into workforce, robots are becoming colleagues and they are helping humans' hand to hand.

OBJECTIVES

- To show the impact of robotics in the field of manufacturing.
- To enlighten on the aspect that advancement of robotics had changed the future of the industries.
- The vivid types of robots available in the market such as cobots, which are made to work with humans' hand to hand
- Manufacturing of aircrafts and spare parts for automobile industries are made easy by the use of robots.
- Rise in new and better job opportunities to the workers by the advancement of technology (robotics).

Robotics in manufacturing

Concept of robotics in manufacturing was there from 1960's itself, but with the advancement of robotics (advancement of AI) had improved at a high phase for instance from Computerised train station assistants to self-serving supermarkets cashiers, the reality is that we are already interacting with 'digital staff' for varying services. In some instances, however, robots are operating like humans

There are different types of robots available in the market which are playing a crucial role in maintaining the workflow. Robots in manufacturing segment is a smarter choice for companies which enable them to produce with high quality, faster production phase, less cost and great safety (removing employees from hazardous working conditions, handling heavy parts). As companies continue to see big benefits from using robots on the factory floor, they are starting to invest in smarter, smaller, more collaborative robots for more delicate or complex operations. In today's competitive world robots are the game changers for the company's future.

Impact of Robotics

Robots first took charge in manufacturing right from welding, painting, machine handling, packing, labelling, assembling, product inspection and so on. Robots had brought a drastic change in assembling department, especially for heavy manufacturing companies like automobiles etc. in today's scenario manufacturing of automobiles or heavy production processes like aeroplanes without robots would be a very tough job for engineers to construct the models.

In construction of aircrafts, their parts and performing its tasks such as drilling, painting, welding, assembling etc., robots are involved. They are changing the phase of construction of aircrafts without compromising in quality and time. Robotics play a crucial role in assembling heavy components. Due to advancement AI in robotics, the management is able to construct advanced aircrafts (auto-pilot, thunder stability, navigation system).

IMPORTANCE

Even though robots have the ability to work at a constant speed without pausing for breaks, sleep, or vacations, and ultimately has the potential to produce more in a shorter time than a human worker. It has its known merits and demerits.

With robots in work floor they are doing incredibly great job in productivity, flexibility and incredible precision.

Robots in productivity: Robots improve productivity when they are applied to tasks that they perform more efficiently and to a higher and more consistent level of quality than humans. since robots (industrial robots) are programmed to accomplish the assigned task, the ability to work at a constant speed helps the robots to achieve higher results than human's outcome. As robots are man-made, they don't have any emotions or any physical stress that effect the work as humans get effected.

Increase in production line would yield higher profits and demand for the company's products. This is particularly important for small-to-medium sized (SME) businesses that are the backbone of both developed and developing economies. It also enables large companies to increase their competitiveness through faster product development, delivery and services.

Flexibility in robotics

Robots have a very good flexibility compared to humans where they can bend and stretch at required angle and a single robot can do multiple task as per the commands or instructions of one or more humans. For instance, COBOT or co-robot which are designed to work along with humans with higher flexibility in the production line.

COBOT – collaborative industrial robot

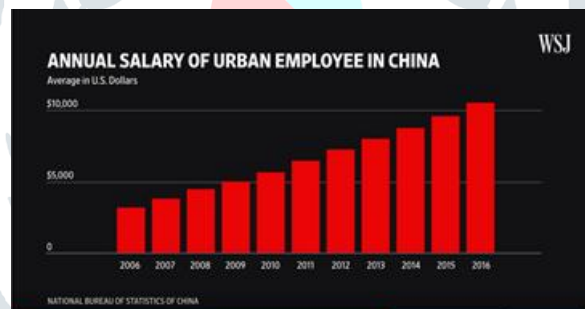
The concept of cobot was introduced in the year 1966 by J. Edward Colgate and Michael Peshkin professors at Northwestern University. These were intended to interact physically with the humans in shared workspace. Cobots are the most popular robots used in the manufacturing segment. This is in contrast with other robots, designed to operate autonomously or with limited guidance which is what most industrial robots were up until the decade of the 2010s.

Cobots have many roles - from autonomous robots capable of working along with humans in an office environment where the ask you for help, to industrial robots having their protective guards removed. Collaborative industrial robots are highly complex machines which are capable to work hand in hand with human. The robots support and relieve the human operator in a conjoint work flow. [2]

More advanced generations of collaborative robots are on the way: smart, mobile, collaborative, and more adaptable. Humans are not strictly necessary, as robots can collaborate effectively with other robots. For example, Great Wall Motors, a Chinese automotive plant, operates a robot-to-robot production line that is one of the most productive ever created. One robot handles and positions the panel, and the other welds it into place. This robotic line performs more than 4,000 welding operations on the car body in an 86-second cycle time, including the transferring operations.

CHANGES IN TRENDS DUE TO ROBOTICS:

- CEO of Chinese largest keyboard and mouse manufacturing company stated that due to hike in salaries in 2008 they introduced robotics in their firm which led to replacement of labour in the organization. But later it also generated new jobs.
- He also stated the scenario when automobile industry started entering the market and caused revolutionary change in employment market. [3]



- Online retail market indulged robotics in their operations which led them to create new strategies and services which is enabling them to produce maximum satisfaction to the customers in minimal time.
- Robotics in medical field has brought a vast change and made wonders in detecting the problems of the patients, with improved robotics its been a very supportive helping hand in operating to the doctors.
- Robotics is not restricted to any particular segment, they are indulged in different areas that include protection & safety systems, logistics, warehousing, and various operations. In other words, it has a huge scope.
- With them incredible precision, productivity, and flexibility. Additionally, factories are also seeing a boom in collaborative robots that are able to seamlessly work hand-in-hand with human workers to further increase flexibility and efficiency.

LITERATURE REVIEW

- Mr. Erik Brynjolfsson (director of Massachusetts institute of technology initiative on technology) stated in one of his interviews- machines earlier need to be trained time to time but, now with advancement in algorithms, machine learning and AI the robots can update themselves time to time by understanding the patterns and act accordingly. He also mentioned that by innovations of robotics in manufacturing may have replaced the old jobs but also created new job opportunities.
- According to Kiplinger Washington in his blog www.kiplinger.com - Over the next decade, the number and variety of robots in the workplace will soar, taking over many jobs that are too dirty, too dull or too dangerous for people to do. Already, about 1.4million industrial robots are deployed around the world, as well as several million robotic devices designed for in-home consumer use. And potential growth is vast: Only about 10% of possible industrial users, for example have actually incorporated robots into their processes. [4]
- According to Mark Crawford (an independent writer) - Robotics will continue to accelerate innovation, thus disrupting and changing the paradigm of business operations in many industries, writes Jing Bing Zhang, research director for IDC for the Asia/Pacific region. "We expect to see stronger growth of robotics adoption outside the traditional manufacturing factory floor, including logistics, health, utilities, and resources industries. We encourage end-user companies to embrace and assess how robotics can sharpen their company's competitive edge by improving quality, increasing operational productivity and agility, and enhancing experiences of all stakeholders. [5]

CONCLUSION

Every manufacturing sector is unique, yet some challenges are common. For example, how to improve quality and reduce delivery time while simultaneously lowering cost? To solve these problems, manufacturers around the country are turning to industrial robots. Robotic solutions to manufacturing challenges reduce process variability, increase capacity and productivity, and sometimes combine process steps.

Robotics is a field that is growing & evolving at an exponential rate in present advanced era. The year 2016 was a huge one for various fields of robotics, and it's only the beginning of a new industrial revolution coming in future years. Robots are developed to work smarter, more skilled, and highly efficient. There are six major types of industrial robots used in manufacturing sector they are, Articulated, Cartesian, Cylindrical, Spherical, SCARA, Delta.

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