

## Robotic Implementations in Non-Intensive Application Domains and Its Impact on Employee Psychology

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### ABSTRACT

Robotic automation eliminates these hazards by continuously manufacturing and verifying that the goods conform to specified standards. More goods are being produced at better standards, opening up many new commercial opportunities for firms to grow. The use of robotics in manufacturing is highly advantageous. Although industrial robots have historically been employed for high-volume activities, as technology develops and costs come down, more possibilities and opportunities are becoming available for medium to small-scale operations. This review is devoted to the cutting-edge industrial uses of robotic technology. Presentation and analysis of robotic implementations in non-intensive application domains. In this paper, the author talks about the various impacts of robotics in the manufacturing industry and how robotic technology is beneficial for the manufacturing industry. The objective of this review is to understand the impact of robotics in manufacturing and its advantage. In actuality, about half of the world's labor will be replaced by automated machinery. Automation is being used by many sectors, including manufacturing or banking, to increase output, profitability, safety, and quality. In an environment with intense competition, automation will increase connection and dependability.

**Keywords:** Automation, Manufacturing, Technology, Robotics Sensors.

### 1. INTRODUCTION

Certain sections of the manufacturing business may be relatively new to the concept of robotic production systems, despite the technology's existence for decades. By merging classic manufacturing procedures with more contemporary technologies, factory managers and business owners can drastically boost their production rates and bottom line. Robots have significantly altered the manufacturing industry for the better. Automated production has a significant impact on the overall effectiveness and performance of a company [1], [2]. When humans are relieved of tasks that can be readily performed by robots, they can spend more time and energy to delivering vital information and ideas in higher-level organisational roles. Effective application of robotics results in an undeniable improvement in business operations [3], [4].

#### 1.1. Applications of Robots in Manufacturing:

In manufacturing, robots are used to perform repetitive tasks and streamline the workflow throughout the entire assembly process. Humans and robots collaborate to manufacture items. Several occupations are either dangerous or involve huge quantities of materials, both of which pose risks to human employees. Owing to the repeated nature of their task, employees can become temporarily fatigued or distracted, that can result in errors. But due to their high level of dexterity as well as machine learning, robotics can avoid making such errors. According to a survey by the market research firm Vinson Bourne, human factors account for 23percentage points of unexpected downtime in the industrial industry. Human error hurts manufacturing more than most other industries because it frequently causes a whole production line to slow down or stop [5], [6].

It is only one of several factors that point to a bright future for factory robotics. This sector is expected to require sophisticated robots worth \$3.7 billion by 2021. This statistic, which covers the entire world, shows how important industrial robots are among business professionals and production managers everywhere. These advanced robots are evolving in ways that few people could have predicted, yet they nevertheless have benefits and drawbacks like everything else [7, 8].

## **1.2. Development of Robotics:**

These devices' efficiency or the number of applications have continuously grown over the past few decades. Robotic production systems have been here for a lot longer even though many people consider them to be modern marvels. In 1954, George Devol filed a patent application for the first industrial robot, as well as the prototype materialized in 1961. It resembled modern robotic arms in appearance and operation, and it could lift 500 pounds and do jobs that were previously considered to be human-only. From there, these mechanical arms spread across industries producing automobiles and other goods. Robots today have a wide range of characteristics and skills that set them apart from earlier models and increase their adaptability and productivity. For a quicker, more productive workflow, coots, or collaborative robots, may work side by side with humans on the manufacturing floor [9]. A few of them might even allow for direct physical interaction, such as when a user alters a machine's motions directly so that it will learn and repeat them on its own. Both inside and outside of the industrial economy, robots are acquiring senses like touch and vision. These advancements considerably increase a robot's capabilities, enabling it to carry out jobs that it otherwise wouldn't have been able to:

### **1.2.1. Touch:**

Depending on the texture of the garbage, some recycling facilities use robots to detect and sort it. Robots are significantly more adept at sorting trash than human employees are when this characteristic is combined with vision-based computer vision, freeing up the latter from the hazardous labor of garbage management. MIT recently created a computer that can actually recognise an object or element of an item it is contacting just by tactile input.

### **1.2.2. Sight:**

Using laser reflections, certain robots' Light Detection or Ranging (LiDAR) sensors enable them to measure distances. This sense is comparable to echolocation, which is a method of object location utilised by animals like dolphins and bats. One notable example is FedEx's SameDay Bots, that employ LiDAR to navigate around objects and humans.

Hearing: Certain robots can detect vibrations by employing a method called laser micrometry, which is related to both echolocation and LiDAR technology. This ability allows them to virtually hear common noises and even conversations. Even while consumer electronics like smart gadgets presently have a higher prevalence of this, production robotics might eventually catch up with it.

## **1.3. Future of Manufacturing Robotics:**

How will industrial robots be used in the future to expedite production, and what will such applications look like? Here are some examples of how these devices are already starting to change.

### **1.3.1. Manufacturing by Lights-Out:**

Robots can operate unhindered in light-out production. Since machines finish the entire manufacturing cycle, this expression is typically used in fields where there are few, if any, human workers. Although some firms may find it simpler to apply this idea than others, those that do so report significant increases in productivity or labor expenses. Due to reduced demand for climate management and higher lighting, businesses that employ this technique may potentially see improved energy efficiency.

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### **1.4.1. Support for the Internet of Things:**

IoT permit physical objects to become smarter and more perceptive of their surroundings by connecting them with internet applications, such as cloud-based software. Robotics manufacturers are combining the two by equipping their machines with sensors that would allow them to interpret their environment. These gadgets are capable of detecting external data like touch & visual input. These bots can use this knowledge to make informed decisions regarding their next course of action. Predictive analysis or location tracking are examples of IoT applications that are more sophisticated. These devices can be automated to a higher degree by incorporating

these capabilities into their current robotics sensors. An unheard-of level of invention would be stimulated by a robot that could predict the approaching breakdown of another machine or notify production managers of its own planned maintenance schedule [10].

#### **1.4.2. Changes in Cybersecurity:**

Artificial intelligence or cloud-connected robotics may help your business stand out from the competitors, but they may also make it more vulnerable to hackers. To secure sensitive information, businesses will need to step up their cybersecurity procedures as more adopt IoT-based devices. One of the main themes in robots is improved cybersecurity and for good reason. Manufacturers of robots, integrators, and operators are the three main groups with the majority of the security responsibility. Robotic software and firmware are vulnerable to hacking, therefore the company building the bots must give them robust security features from the start.

#### **1.5. Robotic Integration Benefits:**

Profitability will increase as a result of the integration of robots since activities will require fewer resources to complete. Robotics will speed up your workflow and provide consistently excellent output.

##### **1.5.1. Quality labor:**

By incorporating robotics into your existing line process, you will improve accuracy and uniformity across the board. The same level of quality and detail will be applied to each product or material. Companies no longer have to worry about sick days, unforeseen events, or subpar labor by opting for automation.

##### **1.5.2. Longer working hours:**

Industrial robots operate more quickly and don't require breaks or rest periods. Robots can also complete monotonous activities more quickly than humans. Your staff may now delegate time-consuming and laborious duties to robots. Your team may now concentrate on more challenging tasks.

##### **1.5.3. Enhanced safety:**

One of the most significant benefits of incorporating robotics is increased security. For all company owners or plant managers, maintaining the safety of your workplace and employees is essential. Now, robots can do hazardous activities. Employees won't have to lift big things or operate in environments that are too hot. Additionally, businesses will be able to save money by avoiding workplace accidents and the ensuing litigation [11].

Although robots can execute tasks more effectively than humans, they cannot replace occupations. Instead of displacing people from their occupations, robots create new employment options. Industrial robots are only basic machinery without people. Robots will require humans to program their duties since they are unable to perform on their own. Your manufacturing line will be improved by integrating robots, not replacing present employment. Your staff members will have the chance to learn new engineering and technology skills. Industrial robots provide countless benefits for both your company and your personnel.

## **2. DISCUSSION**

Robot integration was introduced, and it quickly became a game-changing invention for the manufacturing sector. Robotics' ability to automate challenging and time-consuming operations changed the sector. Robotics are used in production systems today to increase efficiency, productivity, and the quality of the job. Depending on the setting in which they operate, robots are either stationary or mobile. Fixed robots are most frequently utilized in production because they perform best in areas with clear boundaries. On the other side, mobile robots are made for ambiguous and shifting settings, particularly those where both humans & animals are present.

Industrial robots are made to carry out specialised, repetitive jobs. The material or thing that the machine will often replace already exists. Robots are outfitted with a variety of modern devices, including vision systems and sensors for direction and reaction. Sensors are used in robotic production to locate parts and components, check timing and flaws, and uphold quality control. Several types of sensors include fibre optics and inductive proximity switches.

### **2.1. Robots in Manufacturing: Pros and Cons**

Both the upsides and negatives of these robots should be considered in light of the obvious advantages that factory robotics brings to the workplace as well as the real concerns. These are just a handful of the numerous benefits of using robots in manufacturing:

- A greater rate of ROI.
- Decreased energy and operating costs.
- Increased dependability
- Increased objectivity and accuracy when doing complex tasks.
- More potential for employee advancement within the organization.

The top concerns surrounding industrial robots among production managers, employees, and other stakeholders are as follows:

- Increased safety dangers for workers when they are near strong, massive robots.
- Loss of jobs as a result of the removal of some occupations.
- Limited ability to carry out duties like those of a human.
- Initial robotics installation expenses are high.
- Investing more effort and money in training people to interact with robots.

Humans may predict that robotic economies will eventually become the norm thanks to developments in robotics, AI, and (service) automation. Because of this, all citizens including economists, politicians, businesses, financial institutions, systems of education, or welfare need to be ready for its arrival. When will civilisation advance to the Abenomics stage of economic development? The only individual who can confidently (albeit undoubtedly wrongly) answer this question is a gazer into a crystal ball. Roboeconomy will slowly start to take off, starting in wealthy countries and then expanding to the rest of the world.

### **3. CONCLUSION**

Both offensive and defensive strategies, such as vulnerability testing and the installation of safety measures, can protect these systems against outside interference. For this plan to be effective, integrators and operators must work together. For many entrepreneurs and plant managers, robotic integration remains a top choice for automation. Robotics integration into your production process has countless benefits. Industrial robots consistently and accurately carry out laborious, repetitive tasks. Robots will be able to work quicker and for shorter periods, as well as boost production rates, return on investment, and add new employees. Big judgments, however, need investigation and comprehension. To integrate robots into your environment, you must make an investment, determine your projected return on investment, and accept changes and certain limits.

Researching and creating a system alone is not enough to integrate robotics; it takes much more. Selecting an integrator with the knowledge necessary to create a productive system is crucial. Ensure that the automation group you choose for your robotics integration has access to the most recent sensors, vision systems, conveyors, vision systems, grippers, and PLC technology. To accomplish your company's objectives, it is also crucial to look for a certified group of experts or engineers that can create and produce high-quality solutions. The goal of this review is to understand the role and benefits of robotics in production. Indeed, automated machines will replace almost half of the world's workforce. Many industries, such as banking or manufacturing, are using automation to boost productivity, profitability, safety, or quality. Automation will improve connectivity and dependability in the face of high competition.

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