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Robotics for Business

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ABSTRACT

Rapid advances in technology have led to an interest in automation and robotics. Driving this interest is both a fascination with the potential of robots to change our lives and the fear that robots may cause loss of jobs. A robot is a programmable machine that can complete a task and replicate or substitute for human actions. Robots are tools that can autonomously sense, reason, plan, and action. Robotics is the discipline of creating robots. It is a multidisciplinary field involving computer science, engineering, and technology. This paper explores the uses of robots in the business community.

KEYWORDS: *robots, robotics, business, robotics in business*

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INTRODUCTION

Robots are no longer something you see in the movies and TV shows. They are currently in homes and businesses. They are becoming more and more common in our society and more integrated into our lives. This is due to the fact that they are becoming smarter, smaller, cheaper, faster, more flexible, and more autonomous than ever before, largely due in part by incorporating artificial intelligence. Robots are being used in a variety of areas such as manufacturing, healthcare, entertainment, military and defense, service industries, design, construction, law enforcement, education, shopping, and agriculture. Today, there are robots that can autonomously sense, reason, plan, act, move, communicate, and collaborate with other robots. The robot revolution is going to change us as humans [1,2].

WHAT ARE ROBOTS?

Robotics is a relatively new field that is dedicated to the design, construction, and use of robots. It is a technology field that uses electronic or mechanical technology to replace human labor. Robots are machines with enhanced sensing, control, and intelligence used to automate, augment, or assist human activities. They are currently used in manufacturing and production firms. They are expanding to other business industries.

The word "robot" was coined by Czechriter Karel Čapek in his play in 1920. Isaac Asimov coined the term "robotics" in 1942 and came up with three rules to guide the behavior of robots [3]:

1. Robots must never harm human beings,
2. Robots must follow instructions from humans without violating rule 1,
3. Robots must protect themselves without violating the other rules.

Robotics has advanced and taken many forms including fixed robots, collaborative robots, mobile robots, industrial robots, medical robots, police robots, military robots, officer robots, service robots, space robots, social robots, personal robots, and rehabilitation robots [4,5]. Robots are becoming

increasingly prevalent in almost every industry, from healthcare to manufacturing.

Although there are many types of robots designed for different environments and for different purposes/applications, they all share four basic similarities [6]: (1) All robots have some form of mechanical construction designed to achieve a particular task; (2) They have electrical components which power and control the machinery; (3) All robots must be able to sense its surroundings; a robot may have light sensors (eyes), touch and pressure sensors (hands), chemical sensors (nose), hearing and sonar sensors (ears), etc. (4) All robots contain some level of computer programming code. An autonomous robot must have a basic body structure (the chassis), sensors, a central control system (microprocessor), actuators (motors), a power supply and an overall program for its behavior. Programs are the core essence of a robot since they provide intelligence. There are three different types of robotic programs: remote control, artificial intelligence, and hybrid. Some robots are programmed to faithfully carry out specific actions over and over again (repetitive actions) without variation and with a high degree of accuracy.

The advantages of robotics include heavy-duty jobs with precision and repeatability. Despite these advantages, there are certain skills to which humans will be better suited than machines for some time to come. Humans have the advantages of creativity, decision-making, flexibility, and adaptability. Figure 1 indicates that robotics is one of the branches of artificial intelligence.

TYPES OF ROBOTS

Depending on applications, there are many types of robots including the following [8]:

- *Industrial:* One of the most common tasks robots perform for businesses is product assembly in an industrial space. The most common use of robots in industry is for simple and repetitive tasks. The role of robots is becoming substantial for industrial applications. Examples include assembly line processes, picking and packing, welding, and similar functions. Robots can reduce risk of injury to humans in dangerous work environments.
- *Military:* In the military sectors, robotic technology is being applied in many areas. More recent developments mean that military forces worldwide use robots in areas such as UAVs (Unmanned Aerial Vehicle), UGVs (Unmanned Ground Vehicle), drones, and surveillance. Military drones flying over areas of war and conflict, in hostage situations, and for natural and manmade disasters.
- *Exploration*: Robots are often used to reach hostile or inaccessible areas. A good example of exploratory robots is in space exploration. Robots can go to the planets. They can be used to explore space.
- *Healthcare:* Robotics may also shape the future of healthcare. Robots can be used in managing laboratory specimens or assisting with surgery, rehabilitation, or physiotherapy. Surgical robots can perform extremely precise operations.
- *Entertainment:* Robots can be used in entertaining audiences. Increasingly (particularly during the pandemic), people are buying robots for enjoyment. There are several popular toy robots, and there are even robot restaurants and giant robot statues. Figure 2 shows a robot for entertainment [9].
- *Education:* A single teacher does not have the capability to meet the needs of personalized learning for every student. A robot does not replace the teacher but allows students to learn at their own pace.
- *Journalism:* Another popular use of emerging robotics in business is robot journalism or automated journalism. It lends a helping hand to journalists, content creators, and publishers. Automated journalism is also used to test headlines, source information, and identify trending stories.
- *Drones:* These are flying robots, a type of robots, that are poised to proliferate in certain commercial sectors. Drones can help utility crews after a storm by quickly and safely identifying areas in need of repair. Drones can also help with maintenance tasks, such as surveying solar panels for damage.
- *Chatbots*: They have empowered the banks and other financial institutions by simplifying the complex processes. We interact with Facebook Messenger bots all the time. Messenger bots are revolutionizing the small business world. Messenger bots can answer customers' questions, collect user's info, organize meetings, reduce overhead costs, and engage in other business tasks. Big companies like Walmart, Alibaba, and Amazon have been benefitting the help of bots.

APPLICATIONS

It may sound like science fiction, but advances in automation, robotics and artificial intelligence are revolutionizing how businesses are run. Modern

robots are far more capable than their early predecessors. They have transitioned beyond the production line to see widespread use in homes, restaurants, hotels, offices, retail outlets, and hospitals. Small, medium, and large businesses have integrated robotics in order to achieve higher levels of efficiency and productivity. There are many potential applications for robots. Some of these application areas in business are presented as follows [11,12].

- *Marketing:* Businesses use robots for their marketing purposes. Robots compete for attention with more traditional marketing tools during trade shows. Market leaders have upgraded their strategic plans with a focus on driving enhanced business opportunities. Chatbots can convincingly deliver a script, just like a human.
- *Telecommunications:* Businesses require some form of telecommunications infrastructure to communicate with customers and partners. Robots can handle incoming phone. An automated call center uses a programmable interface to greet callers and direct them to the appropriate department.
- *Inventory:* Businesses with large warehouses use robots to perform inventory tasks. Inventory robots are essentially driver-less vehicles that can navigate a warehouse and select specific pieces of merchandise. They save time and also reduce the likelihood of human error.
- *Agriculture:* The agriculture industry has been actively adopting different forms of robotic technology. Farmers have already been using tractors and harvesters that are self-guided by GPS. Robots can be used to harvest produce, provide care to plants, and, using attached sensors, send information to farmers to determine the needed levels of water, nutrition, and pesticides. As a result, the robotization of equipment in farming yields higher productivity levels and reduces costs. Drones are used in agriculture to gather information as shown in Figure 3 [13].
- *Manufacturing:* Robots can build and assemble anything from candy to computers. They can perform specialized tasks that require great precision. For example, the automotive industry uses robots for the assembly process and product testing. Assembly may involve welding, painting, coating, sealing, lifting, and material removal. Figure 4 displays how robots are taking a place on the production line [14]. The use of robotics has the potential to bring more manufacturing production work back to developed countries.
- *Workplace:* In the past, humans and robots were even kept away from each other to protect people from injury. Robots have started to mingle with humans in their workplaces. Robots in the workplace offer safety and prevent the employees from overworking themselves to meet deadlines. Robots can do dangerous tasks and they can remove some of the risks. Robots do not take breaks or vacation. They do not get tired or stressed out. Robots can perform tasks that are repetitive, dangerous, or unenjoyable to the employees. The incredible amount of time saved by using robots is hard to deny.

ADVANTAGES

The rise of robots has made a profound impact on industrial employment around the world. Businesses are increasingly adopting robots to meet different operational challenges brought about by new technologies. Robots can often take over repetitive or boring tasks, leaving humans to do more fulfilling work. They can be programmed to do many of these tasks, reducing the potential harm to humans. Other advantages of robots include [8]:

- They can offer increased productivity, efficiency, quality, and consistency in certain settings.
- They are cost effective because robots do not get tire, and therefore need no breaks, no holidays, no sick leave and they don't need to work shifts. Unlike humans, robots don't get bored.
- They can help businesses save money
- They can help businesses improve safety. Safety is the most obvious advantage of utilizing robotics.
- They are good at repetitive work that make humans tired.
- Until they wear out, they can repeat the same process continuously.
- They can be very accurate, even to fractions of an inch, making them particularly useful in the manufacturing of microelectronics.
- Robots can work in environments that are unsafe for humans, such as with dangerous chemicals, high radiation, underwater or hazardous environment.
- They do not have physical or environmental needs in the same way humans do.
- Some robots have sensors and actuators which are more capable than humans.
- The negative effects of robotization are disproportionately felt in the lower-income developing nations.

DISADVANTATGES

The use of robots has some disadvantages. These include constant electricity use, limitations in their programming, and the high cost of purchasing and maintaining them. Although robots are poised to displace millions of humans in various industries, they are nowhere close to behaving like humans. Other disadvantages include [8].

- Robots inspire two kinds of fear: that they might take over our jobs and that they could take over the world.
- In some industries, robots are replacing human jobs, which can create job losses and economic problems.
- On the whole, robots can only do what they are told to do, meaning they cannot improvise (although AI and machine learning is changing this).
- Current robotics technology means that most machines are less dexterous than humans and cannot compete with a human's ability to understand what they can see. Although experts are working on developing robots that can better sense the world.
- Robots with practical applications are generally expensive in terms of the initial cost, maintenance, the need for extra components, and the need to be programmed to do the task.
- Robotics requires a substantial amount of initial or start-up cost.
- They need constant power supply and maintenance to keep them running.

FUTURE OF ROBOTS

There is no doubt that robots will play a major role in the future of the economy, both local and global. However, it is hard to predict how prevalent robots will be in upcoming years. Understanding where the field of robotics is heading is basically using our insights on the impact robots might make in the near future. Due to the incredible potential of robotic technology, application opportunities are limitless in the future. Current trends lead many people to believe they will take over the workforce in many sectors and there will be increase in demand for automation [15].

The world is constantly changing, and so is its technology. Robotics is continually evolving. Robots are meant to make human life easier and offer a more comfortable future. As technology advances and robots become more affordable, we will see more industries embracing robots and all they can do to boost our standard of living. The robotics industry is expected to grow significantly over the coming years. Since modern robots are far more capable than their early predecessors, future robots will outshine today's robots. Robotics promises to see significantly improved pricing and performance over the next decade. Robot costs will decline, while performance will improve.

The robotics revolution is inevitable. It is rapidly accelerating, as technology advances in automation, engineering, energy storage, and artificial intelligence converge. Humans in manual labor jobs need to prepare for adding new skills or starting a whole new career. Robots are moving into the business world in a big way and they might shape the future of business. Looking ahead, automation will likely play a large role in the business sector. New business models for industrial robots are not only possible; they are necessary. Customers demand shorter product lead times, higher variation in the products, and higher production quality [16]. The future is expected to bring significant advances in technology with improved efficiency and new transformations with the robot workforce.

CONCLUSION

A robot is essentially an automatically controlled, reprogrammable, multipurpose machine programmable in three or more directions. Robots are now used for a variety of tasks, from automated home cleaning to providing customer service. In today's world, robots serve people as first-responders, companions, entertainer, and problem-solvers. More and more businesses are turning to robots to help with various tasks. Businesses around the world are increasing their use of robots.

The skills in robotics is highly sought after in business and other sectors. If you aspire to be a roboticist, you will need some key skills, such as mathematics, science, A robot is a programmable machine that can complete a task and replicate or substitute for human actions, programming, and problem-solving. For more information about robotics in business, one should consult the book in [17] and the following related journals devoted to robotics:

- Robotica
- Robitics and Autonomous
- Robotics and Computer-Integrated Manufacturing,
- Advanced Robotics
- Autonomous Robots
- Journal of Robotics
- Journal of Robotic Systems

- Journal of Robotic Surgery
- Journal of Robotics and Mechatronics
- Journal of Intelligent & Robotic Systems
- Journal of Mechanisms and Robotics-Transactions of the ASME
- Journal of Automation, Mobile Robotics and Intelligent Systems
- Journal of Future Robot Life
- IEEE Robotics and Automation Letters
- IEEE Transactions on Robotics
- International Journal of Medical Robotics and Computer Assisted Surgery
- International Journal of Robotics Research
- International Journal of Social Robotics
- International Journal of Humanoid Robotics
- International Journal of Advanced Robotic Systems

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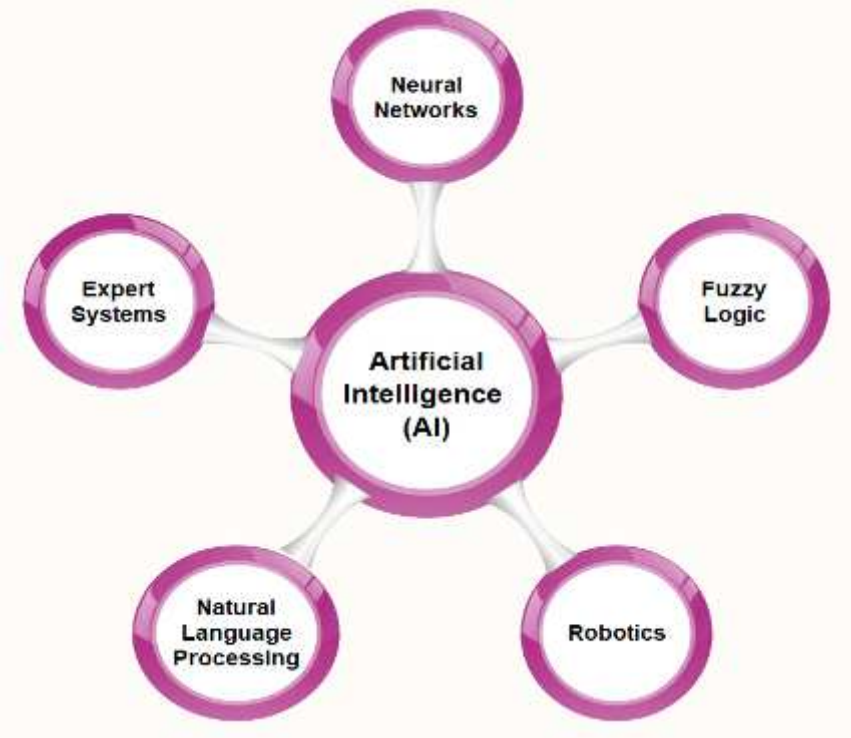

Figure 1 Robotics is one of the branches of artificial intelligence.

Figure 2 A robot for entertainment [9].

Figure 3 Drones are used in agriculture to gather information [13].

Figure 4 Robots are taking a place on the production line [14].