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Automating Tomorrow: The Convergence of AI and Robotics

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Abstract: The distinction between AI—the capacity of machines to simulate human thought—and robots—traditionally programmed devices—is becoming increasingly hazy. This study examines this fascinating convergence, in which artificial intelligence (AI) gives robots more freedom and flexibility. We explore how artificial intelligence subfields—such as computer vision for object detection, machine learning for navigation, and natural language processing for communication—are reshaping robots. This gives rise to a new class of intelligent robots: autonomous mobility robots navigating warehouses, collaborative robots working alongside humans, service robots helping in healthcare and customer service, and industrial robots completing complex tasks with greater precision. These developments in a range of businesses will be demonstrated through case studies. Intelligent robots have enormous potential to change our future, from manufacturing to healthcare and agriculture.

Keywords: *Artificial Intelligence, Autonomous, Reshaping Robots, Computer Vision*

1. Introduction

Robotics is the study of creating, constructing, and managing machines (robots) to carry out tasks is the emphasis of the engineering and scientific discipline of robotics. These jobs can be repetitive and automated, or they can include some degree of sensory control and feedback. AI is the field of computer science known as artificial intelligence (AI) is concerned with developing intelligent machines that possess human-like abilities to reason, learn, and behave. Artificial Intelligence (AI) is a broad field that includes techniques like computer vision, machine learning, and natural language processing that allow machines to simulate cognitive capabilities. The 1920s through the 1950s saw the early stages of AI and robotics, which set the foundation for their eventual confluence. Although the idea of robotics dates back many centuries, industrial robot research for manufacturing gave rise to the contemporary field in the 1950s [4]. Although these early robots were incredible feats of engineering, they were essentially pre-programmed devices made for a certain purpose and lacked actual intelligence. However, in 1956, when the phrase artificial intelligence was first used, the field was only getting started. Early research concentrated on creating algorithms for games and problem-solving, but the link to robots was not yet clear. This time frame prepared us for the day when these two domains would merge to produce a new generation of intelligent machines. The 1960s and 1970s saw the sowing of the seeds for the confluence of robotics and AI. In the 1960s, Shakey the Robot—a historic project—was born. Shakey was a pioneer even though he was simple by today's standards. It could overcome obstacles and carry out rudimentary duties because it was equipped with cameras and basic sensors. This demonstrated how robots may engage with their surroundings, which is an important step toward increased intelligence. Furthermore, significant progress was made in AI subfields like computer vision and machine learning in the 1960s and 1970s. Although these developments were not yet directly incorporated into robots, they set the stage for artificial intelligence to eventually play a bigger role in enhancing robotic capabilities. The fusion of artificial intelligence and robotics had a notable surge in the 1990s and beyond. One of the main drivers of this age was the exponential increase in computing power. Both robots and AI benefited from this increase in computing power. While robots were able to perform complex computations required for making decisions in real time, AI algorithms became more sophisticated and complex. Furthermore, robots are now capable of learning from their experiences and adjusting to changing situations thanks to the integration of AI techniques like machine learning. The development of actuators (movement control) and sensor technologies (vision, touch) further enhanced this jump in intelligence. Robots now have a more comprehensive understanding of the environment and can communicate with one another thanks to their enhanced sensory capacities and greater motor control. Robotics is the study of how perception and action are connected, and for that relationship to be intelligent, artificial intelligence must play a major part in robotics. The important problems of what knowledge is necessary for any part of thinking, how that knowledge

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should be represented, and how that knowledge should be applied are all addressed by artificial intelligence. By requiring AI to interact with actual items in the real world, robotics puts AI to the test [1] . Methods and models created for exclusively cognitive issues—typically in the toy industry—may not always be sufficient to handle the difficulty. Robots are composed of computers, sensors, and mechanical effectors. AI has significantly improved each component. Automation is being revolutionized by AI and robotics coming together. Robots with intelligence are no longer limited to pre-programmed activities; instead, they can learn, adapt, and navigate challenging settings. Machine learning and other AI subfields enable robots to learn from data and enhance performance. Robots in warehouses are able to optimize pathfinding by using their prior experiences. Moreover, machine learning facilitates adaptation, allowing robots to recognize irregularities or unforeseen impediments. Robots with computer vision have "eyes" that can perceive and comprehend their environment. They can now precisely navigate, identify objects, and carry out visual-based jobs like manufacturing quality control. The communication gap is filled by natural language processing, or NLP. Because they can comprehend and react to human language, robots encourage teamwork. Consider an NLP-equipped robot nurse. It can interact with patients, help with medical duties, and comprehend spoken commands. The real strength of intelligent robots is found in their increased flexibility, autonomy, and capacity for learning. Different from their inflexible, pre-programmed predecessors, these robots are capable of functioning without continual human oversight. They are able to manage problems on their own since they base their decisions on their surroundings and pre-programmed objectives. Their plasticity serves to reinforce this autonomy. The days of robots being limited to one particular, static task are long gone. These clever devices have the ability to change their behaviour instantly. The robot is able to assess the environment and modify its mobility strategy as necessary. Lastly, these robots are always picking up new skills and developing. Over time, they become more proficient and hone their talents through experience and data analysis.

2. AI Techniques for Robotics

Science fiction no longer exists in the world of sentient robots. Technological developments in subfields of Artificial Intelligence (AI) are quickly converting cumbersome machines into useful allies. This shift is primarily being driven by three fields: computer vision, machine learning, and natural language processing. These fields are collaborating to produce a symphony of intelligence [5]. Imagine a robot that can navigate a room like we do, avoiding obstacles and identifying objects. This is the power of computer vision. By analysing visual data from cameras, robots can “see” their surroundings. Machine learning algorithms are trained on massive datasets of images and videos, allowing robots to recognize objects, classify environments, and even track movement. This enables robots to perform tasks like picking and placing objects in factories or assisting surgeons in delicate operations [2] [3].

For many years, conventional robots have served as the backbone of automation. They are exceptionally skilled at precisely completing repetitive jobs and assiduously adhering to pre-programmed instructions. But AI-powered intelligent robots have a new set of powers that drastically alter the way they interact with the outside environment. Autonomy is one essential differentiator. Intelligent robots have some autonomy, while traditional robots need continual human supervision and control. This permits them to function autonomously within specific bounds. An intelligent warehouse robot, for example, may utilise sensors and computer vision to explore its surroundings and find and pick up objects on its own without the assistance of a human operator. Adaptability is yet another essential quality. Intelligent robots are different from their fixed-function predecessors in that they are able to adapt to changing conditions. They can evaluate information from sensors and historical events thanks to machine learning algorithms, which give them the ability to modify their behaviour in real time. An intelligent robot in an assembly line may come across a part that is slightly misplaced, for instance. It can successfully accomplish the task by modifying its grasp or movement plan thanks to its versatility, negating the need for human intervention to re-program it for the particular circumstance. Intelligent robots exhibit a decision-making capability not found in conventional robots. They are able to make well-informed decisions within the parameters of their pre-programmed goals by utilising AI algorithms and analysing information from their surroundings. An obstruction in a collapsed building, for example, might be encountered by an intelligent search and rescue robot. It can determine whether to try navigating around the obstruction or initiate its emergency measures to send out a signal for assistance by analysing sensor data.

Robots may now learn from experience in a similar way to humans thanks to machine learning. Robots can gradually become more efficient through algorithms that examine data and spot patterns. For instance, constant exposure to labelled photos can teach a robot entrusted with weeding a garden to distinguish between plants and weeds. Robots must be able to adjust to changing circumstances in order to function well in dynamic contexts.

Robots are now able to comprehend and react to human conversation thanks to natural language processing, or NLP. This opens the door for people and robots to interact naturally. Imagine using voice commands to instruct a robot or getting progress reports in a simple, understandable manner. These scenarios are becoming possible thanks to advances in NLP. Robots with natural language processing (NLP) capabilities can work alongside people in offices, follow directions at home, or even be a senior citizen's friend. These branches of artificial intelligence are interdependent. Together, they build a machine that is more resilient and clever.

Computer vision models can be enhanced by machine learning methods, and natural language processing can gain from the capacity to comprehend visual context. Because of their interconnection, robots are able to gain a more thorough grasp of their surroundings. Robots with intelligence have a bright future. Robots should grow much more advanced as these AI subfields develop, able to carry out difficult tasks and blend in with our daily lives with ease. Robots have the ability to change several sectors, enhance our daily lives, and push the envelope of what is conceivable in the future.

Consider a chef robot that is trained to prepare omelettes. Robots can learn new skills through trial and error thanks to reinforcement learning. The robot is rewarded for good deeds and punished for bad ones. It continuously improves its motions and tactics as it gains knowledge about the best approach to accomplish a task over time. This method is very useful for robots that have to do intricate tasks in dynamic environments, such search and rescue robots that have to navigate through rubble. Good communication becomes increasingly important as robots become more and more ingrained in our daily lives.

The goal of human-robot interaction (HRI) techniques is to build user-friendly interfaces that let people naturally communicate with robots [3]. This can entail teaching robots to comprehend human intent through facial recognition, gesture control, or speech recognition. Robust HRI facilitates seamless teamwork and lowers the entry barrier for engaging with robots. Numerous sensors, including cameras, LiDAR, temperature sensors, and others, are installed on robots. Sensor fusion methods bring together information from several sources to produce a more comprehensive picture of the surroundings. Imagine a self-driving car that combines GPS coordinates, LiDAR readings, and camera data to create a complete image of the road, pedestrians, and traffic signals for safe and knowledgeable navigation.

The fundamentals of AI are what make intelligent robots possible. All of these together will allow us to build robots that will not only be physically strong but also intelligent, adaptive, and able to collaborate with people to build a better future. A tabulation of AI techniques for Robotics is depicted as Table 1.

3. New Generation of Intelligent Robots

Our relationship with machines is about to be redefined by the next generation of intelligent robots. The cumbersome, pre-programmed automatons of the past are not these robots. With their capacity for learning, adapting, and gaining autonomy, they represent a technological and artificial intelligence marvel. Table 2 explains the same detail.

With the convergence of AI and robotic, development of new types of robots has been emerged, some of them are listed in Table 3 [6].

Table 1. AI Techniques for Robotics

AI Technique	Description	Benefit for Robots
Computer Vision	Analyse visual data to "see" the environment	Object recognition, environment classification, path planning
Machine Learning	Learn from data and improve performance over time	Adaptation to new situations, task optimization
Natural Language Processing (NLP)	Understand and respond to human language	Natural human-robot interaction, following instructions
Reinforcement Learning	Learn skills through trial and error	Mastering complex tasks in dynamic environments
Path Planning	Determine optimal routes for navigation	Efficient and safe movement, avoiding obstacles
Simultaneous Localization and Mapping (SLAM)	Build a map of surroundings while tracking robot's location	Navigation in uncharted or changing environments
Human-Robot Interaction (HRI)	Create intuitive interfaces for human-robot communication	Smooth collaboration, easier interaction with robots

4. Case Studies

Automation and artificial intelligence are merging to change sectors at a rate never seen before. Founded in 2003, Kiva Systems (Fig 1) led the way in the development of autonomous mobile robots, or AMRs [7]. Their orange, compact Kiva robots have a lifting mechanism, wheels, and a box-like form. Kiva robots, in contrast to conventional fixed-path robots, navigated warehouses and avoided obstacles by utilising cutting-edge AI and sensor technology. The warehouse management systems (WMS) and these robots operate together well. Specific Kiva robots are assigned jobs by the WMS in response to orders placed by customers. The robots then cruise the warehouse using sensors and artificial intelligence (AI), find the shelves containing the ordered items, lift the shelves, and deliver the items to pre-designated pick stations. Pickers at the warehouse take the items here and finish the order fulfilment process. The Kiva robots eventually head back to their recharge stations in anticipation of their upcoming task.

When one thinks of industrial robots in manufacturing, they frequently picture enormous, potent machines operating alone. But the scene on manufacturing floors is evolving thanks to a new breed of robots called collaborative robots, or cobots [8] (Fig 2). cobots, in contrast to their industrial siblings, are made to securely operate with humans in a collaborative setting. One of the best examples of a business using cobots is General Motors. On their assembly lines, they have placed cobots from renowned robotics manufacturer ABB. Instead of taking the place of human workers, these cobots are designed to help them with laborious and physically taxing jobs.

Table 2. Capabilities of New Generation Intelligent Robots

Feature	Description	Benefit
Advanced AI	Subfields like machine learning, computer vision, and NLP create a powerful cognitive engine	Perceives environment, understands instructions, makes real-time decisions (e.g., robot surgeon adapting to patient)
Enhanced Dexterity & Physical Capabilities	New materials and advancements give robots human-like dexterity and superior strength/agility	Grasps delicate objects, operates tools precisely, navigates complex terrain, performs demanding tasks
Power of Learning & Adaptation	Machine learning allows robots to continuously improve performance	Improves with experience (e.g., robot assembling product becomes faster, more efficient)
Human-Robot Collaboration	Advances in NLP enable robots to understand and respond to human instructions	Fosters seamless teamwork (e.g., robots handle heavy lifting on construction sites)
Evolving Landscape of Applications	Enhanced capabilities transform numerous industries	Applications in healthcare (surgery), manufacturing, logistics, agriculture, customer service, and scientific exploration

Table 3. Types of Robots and its Application

Robot Type	Description	Applications
Autonomous Mobility Robots (AMRs)	Intelligent robots that navigate warehouses without direct human control.	*Material handling (transporting goods) *Order fulfillment (picking & delivering items) *Inventory management (tracking stock levels) *Pallet jack replacement
Collaborative Robots (Cobots)	Robots designed to work safely alongside humans in shared workspaces.	* Assembly line tasks (e.g., parts manipulation) * Material handling (e.g., assisting with heavy lifting) * Machine tending (e.g., loading/unloading machines) * Quality control (e.g., visual inspection)
Service Robots	Robots designed to perform tasks in service industries.	* Healthcare * Patient care (e.g., medication delivery, rehabilitation) * Surgery (e.g., assisting surgeons) * Disinfection * Welding (precise and consistent welds) * Painting (applying paint evenly and efficiently)
Industrial Robots with Enhanced Precision	Robots designed for high-precision tasks in manufacturing environments.	* Assembly (precise component placement) * Micromachining (creating tiny, intricate features) *Material handling (transporting goods)
Autonomous Mobility Robots (AMRs)	Intelligent robots that navigate warehouses without direct human control.	*Order fulfillment (picking & delivering items) *Inventory management (tracking stock levels) *Pallet jack replacement

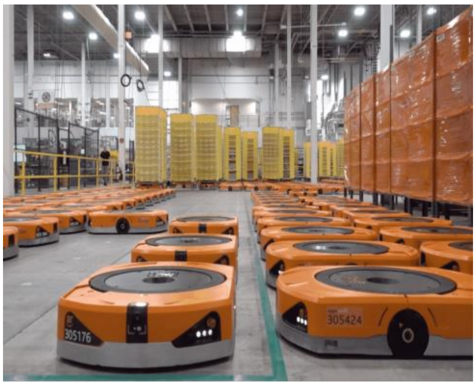

Fig 1. Kiva robots in an Amazon warehouse

Fig 2. Cobot

Table 4. Industrial Robots and its application

Robot Type	Description	Applications
Articulated Robot	Most versatile type, with multiple joints allowing a wide range of motion like a human arm.	Assembly, welding, painting, material handling, machine tending
SCARA Robot (Selective Compliance Assembly Robot Arm)	Faster and more precise for specific tasks due to its arm structure with a fixed vertical post and rotating arm.	Electronics assembly, food packaging, small part handling
Cartesian Robot (Gantry Robot)	Moves linearly along X, Y, and Z axes, offering high precision for specific movements.	Machine loading/unloading, pick-and-place tasks, CNC machining
Delta Robot	Three arms connected at the top with a fast, spider-like design for high-speed pick-and-place	Food processing, packaging, pharmaceutical

Apart from Cobot, there are other robots that are used in industry sectors (Table 4) [16].

Intelligent robots are revolutionizing healthcare in a number of ways. Robots such as Da Vinci in surgery provide more precise, minimally invasive procedures that result in quicker patient recovery and reduced scarring. AI-powered exoskeletons aid patients in regaining their mobility during rehabilitation, and additional robots offer individualized therapy and track patients' progress. Robots can be incredibly helpful in helping individuals who require long-term care with everyday duties, fostering their independence and dignity. Robotic remote patient monitoring improves overall results by enabling early health issue discovery and prompt response. Conversational robots provide friendship and basic help to individuals experiencing anxiety or loneliness, thereby improving mental health as well. Last but not least, robots save healthcare professionals a great deal of time by automating repetitive jobs like maintaining supplies, sterilizing equipment, and managing medication distribution. Imagine a day in the future when minimally invasive, unmatched precision is used to undertake difficult surgery. Thanks to service robots like the da Vinci Surgical System, which is revolutionising the healthcare industry, this future is already here. The da Vinci Surgical System (Fig 3) [9] , created by Intuitive Surgical, is a shining illustration of how robots are revolutionising healthcare delivery. This complex device functions as a highly developed extension of a surgeon's expertise and skills rather than being intended to function on its own. The da Vinci Surgical System consists of three interconnected machines rather than a single one. The surgeon may see the operating site in amazing detail while seated comfortably at a console featuring high-definition 3D images. Additionally, the console features controls that convert the exact movements of the surgeon's hands and feet into movements for the robotic instruments. There is a cart with four robotic arms on the patient's side. These tiny miracles can carry out intricate tasks with greater dexterity than a human hand since they are outfitted with a variety of surgical instruments. And lastly, a high-definition 3D camera on a vision cart serves as the surgeon's aerial eye. The surgeon can see everything in the operating field because to this camera's crisp, magnified vision.

Fig 3. Da Vinci Surgical System

Apart from Da Vinci, there are other robots that are used in healthcare sectors (Table 5) [13].

Imagine a world where seniors in eldercare facilities aren't just cared for, but also have a friendly robotic companion to brighten their days. This is the reality for many thanks to Pepper, a social robot created by SoftBank Robotics. A humanoid robot called Pepper [4][10] was created with social interaction in mind. In contrast to industrial robots designed to perform monotonous duties, Pepper possesses sophisticated artificial intelligence and sensors that enable it to perceive emotions in people, identify faces, and carry out dialogues. Because of this, Pepper is a useful tool in assisted living facilities. SoftBank Robotics' social robot Pepper fights loneliness in senior care institutions with games, laughter, and conversation. She is a true gem. In addition to keeping brains active and possibly preventing cognitive deterioration, memory games and educational quizzes facilitate social contact and provide much-needed companionship. In addition to helping with medication schedules and appointments, Pepper can lighten the atmosphere for senior citizens by dancing, singing, and telling stories. This creates a more upbeat and engaging environment for them.

Apart from Pepper, there are other robots that are used in social interaction (Table 6) [14],[15] .

Table 5. Robots in health care and its applications

Robot Type	Description	Applications
Surgical Robots	Assist surgeons with minimally invasive procedures, offering greater precision and control.	Laparoscopic surgery, orthopedic surgery, cardiac surgery
Rehabilitation Robots	Assist patients with physical therapy exercises and recovery.	Stroke rehabilitation, gait training, limb strengthening

Assistive Robots	Provide physical and emotional support to patients, especially the elderly or disabled.	Transferring patients, medication reminders, companionship
Telepresence Robots	Allow doctors to examine and interact with patients remotely.	Rural healthcare, critical care consultations, post-operative monitoring
Disinfection Robots	Use UV light or other methods to disinfect hospital surfaces and reduce the risk of infection.	Room disinfection, operating room sterilization, outbreak control
Pharmacy Robots	Dispense medications accurately and efficiently, reducing medication errors.	Inventory management, medication dispensing, medication tracking
Service Robots	Perform various tasks in hospitals, such as delivering supplies or transporting laundry.	Logistics and material handling, lab sample delivery, waste disposal

Imagine a well-organized drone fleet, like to a swarm of bees, carefully observing large areas. This is not science fiction; rather, it is the actual story of how swarm robotics is revolutionising the agriculture sector. At the forefront of this change are businesses like PrecisionHawk, who use drone swarms with AI and sensors to address complex agricultural problems. PrecisionHawk uses fleets of UAVs (Unmanned Aerial Vehicles) (Fig 5)[11] to harness the power of swarm robotics. Together, these drones operate as a synchronised network to accomplish a shared objective.

Fig 4. Humanoid Robot Pepper by SoftBank

Traditionally, pesticides are sprayed widely over a wide range of fields, which frequently results in overapplication and harm to the ecosystem. Drones from PrecisionHawk can have targeted spraying systems installed. The drones considerably reduce waste and environmental effect by applying pesticides only to afflicted regions based on crop health data. Swarm robots has a number of benefits over conventional techniques. Drone swarms can swiftly and effectively cover enormous regions, collecting data and finishing activities in a fraction of the time compared to manual labour. Drone swarms are a more economical approach for data collecting and targeted interventions as compared to more conventional techniques such as manned planes. Most significantly, using pesticides precisely lowers waste and the agricultural industry's total environmental impact.

Table 6. Humanoid Robots with Social Interaction

Robot Name	Developer	Key Features	Applications
Pepper	SoftBank Robotics	Friendly appearance, emotional recognition, speech recognition	Customer service, education, healthcare, entertainment
Sophia	Hanson Robotics	Human-like facial expressions, ability to hold conversations	Research on human-robot interaction, public engagement, education
NAO	SoftBank Robotics	Highly customizable, programmable for various tasks	Education, research, customer service, healthcare
Ameca	Engineered Arts	Expressive face and hands, advanced kinematics for lifelike movement	Research on human-robot interaction, education, entertainment
Promobot	Promobot	Modular design for various configurations, can be customized for specific roles	Retail sales, event promotion, information booths
FURHAT	Furhat Robotics	Expressive face with a wide range of emotions, advanced dialogue system	Customer service, education, information kiosks
Kinova	Kinova Robotics	Dexterous arms and hands for manipulation tasks, can be integrated with various social interaction modules	Research on human-robot interaction, education, rehabilitation

Fig 5 Swarm of agricultural drones flying over a field

Agriculture is being revolutionised from seed to harvest by intelligent robots. Robots (Fig 6) or robots like drones (Fig 7), outfitted with artificial intelligence and sophisticated sensors, can quickly collect high-resolution data across large areas, giving farmers a comprehensive view of their land and crop health [12]. By using this data, crop loss may be minimised and resource utilisation can be optimised through the early diagnosis of issues and focused actions. Robots can save expenses and increase efficiency by automating laborious chores like spraying and field mapping. Most significantly, by reducing pesticide waste and maximising water use through precision agriculture methods, these advances support sustainability. In general, data-driven, efficient, and environmentally friendly agriculture is entering a new era thanks to clever robots.

Fig 6 Swarm Robotics using robots in Leafy vegetable cultivation

Fig 7 Swarm Robotics robot like drones in fields

5. Future of Automation

The development of AI-powered robots has the potential to drastically alter every aspect of our lives, including the way we work and the structure of society as a whole. Without a question, automation enabled by robots with artificial intelligence is changing the workforce. Robots are becoming more and more capable of replacing labour-intensive, repetitive activities, which could result in job displacement in some industries. Still, this creates room for new occupations that demand distinct skill sets to emerge. It's conceivable that the emphasis will move to human-robot collaboration, in which people use their inventiveness, aptitude for solving problems, and interpersonal skills to collaborate with robots for maximum effectiveness. Robots driven by AI are capable of tasks with unparalleled speed, accuracy, and diligence. This results in notable increases in productivity in a variety of sectors, including manufacturing, agriculture, healthcare, and logistics. Robots can automate repetitive jobs, freeing up human workers to concentrate on more intricate and imaginative projects. A greater standard of life and economic growth may result from this general rise in efficiency.

Table 7. Positive Impacts and Negative Impacts of Future of Automation

Aspect	Positive Impacts	Potential Challenges
Transformation of the Workforce	* Increased productivity and efficiency * New jobs requiring different skillsets * Human-robot collaboration for optimal results	* Job displacement in certain sectors * Need for upskilling and reskilling initiatives * Potential for job polarization
Increased Productivity and Efficiency		

	* Faster, more precise task completion by robots * Tedious tasks automated, freeing up human workers * Overall economic growth and higher standard of living	
Evolving Nature of Work	*Shift towards a knowledge-based and service-oriented economy * Potential for universal basic income or similar social safety nets	* Need for re-evaluation of traditional work concept
Ethical Considerations and Societal Impact		* Issues with bias in algorithms * Concerns about safety, security, and misuse of AI * Need for clear regulations and ethical frameworks

The emergence of AI robots will probably force a reconsideration of the conventional definition of work. The emphasis may move towards a knowledge-based and service-oriented economy as replaces more tasks. Initiatives aimed at reskilling and upskilling people will be essential to ensuring a seamless transition for those whose occupations are affected by automation. Additionally, if the nature of work continues to change, conversations about universal basic income or other comparable social safety nets might gain greater traction. Many ethical questions are brought up by the growing use of AI robots. Careful thought must be given to problems like algorithmic bias, job displacement, and the possibility of employment polarization—the development of high- and low-skilled positions. Furthermore, talks about security, safety, and possible misuse are necessary given the growing capabilities of AI robots. To ensure a good societal impact, it will be imperative to set clear legislation and ethical frameworks for the development and deployment of AI robots. Table 7 shows both positive aspects (increased efficiency) and potential challenges (job displacement) of Future of Automation.

6. Conclusion

Robotics and AI coming together is revolutionary. Artificial Intelligence infuses robots with intelligence, allowing them to learn, adapt, and make decisions in real time. This gives robots more autonomy and dexterity to perform difficult jobs. On the other hand, AI algorithms are given a physical form by robots, which enables them to engage with the outside world, carry out tasks, and collect information to improve their learning capacities. This potent combination is automating jobs, changing sectors, and developing whole new uses, such as AI-powered companions and robots for precise surgery. But there are still difficulties. Automation-related job displacement calls for worker reskilling programmes. Furthermore, to guarantee the responsible development and application of this game-changing technology, open dialogue and explicit laws are required due to ethical concerns including bias in AI and its exploitation. Intelligent robots have considerably more revolutionary potential than just automation. Robotics and AI convergence creates opportunities for whole new markets and applications. Imagine robots helping doctors with delicate procedures in the healthcare industry, providing unmatched precision and lowering human error. Imagine compassionate, intelligent robots that look after the elderly, giving them much-needed support and social connection. The possibilities are endless and ever-changing, having the ability to impact every facet of our life, from logistics and transportation to scientific discovery and study. Although there is no denying the potential advantages of intelligent robots, the path ahead necessitates serious assessment of the difficulties and moral conundrums that come with this revolutionary technology. Automation-related job displacement is a serious issue that calls for proactive steps like upskilling and reskilling programmes to prepare the workforce for the evolving labour market. Furthermore, because AI robots are becoming more and more capable, it is necessary to have honest conversations and establish policies about things like algorithmic bias, potential abuse, and data privacy. It will be essential to properly develop and implement intelligent robots, with an emphasis on ethical issues and human-robot collaboration, to guarantee that this technology advances humanity and builds a more wealthy and sustainable future.

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Author contributions

Gayathri Dili, Dr Sarika S : Conceptualization, Comparative study **Amrutha Muralidharan Nair, Sharika T R:** Data curation, Writing-Original draft preparation, Future scope discussion **Akshay S and Richard B Melath:** Visualization, Writing-Reviewing and Editing.

Conflicts of interest

The authors declare no conflicts of interest.

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