Artificial Intelligence, Robotics And it's Effects on Society Review Paper

Kumar H T[1], Dr. K R Prakash[2]
[1]*M. Tech in Industrial Automation and Robotics, Student of NIE College Mysuru, India*
[2]*Head of Department of Mechanical, Engineering, The National Institute of Engineering Mysuru*

***Abstract*—A general overview of artificial intelligence (AI) and robotics, as well as its underlying ideas, are provided in this lecture, with the main focus being on the potential effects of these technologies on society and daily social interactions. In artificial intelligence, abstraction is frequently used to explain the use of several detail levels in a particular representation language or the capability to switch between levels while maintaining beneficial attributes. Soft robotics is the science and engineering of robots that are composed mostly of soft materials, components, and monolithic (or continuum) active structures so that they can interact with their environment safely and better adapt to it than robots made of hard materials.**

I. INTRODUCTION

There is a drive to employ robots and machine learning more often in these fields due to the increased interest in robotics and artificial intelligence for use in manufacturing, healthcare, the armed forces, and domestic uses. The number of activities that have been carried out by machines and computers over the years appears to be increasing exponentially. In order to make computers or machines that are as intelligent as people, it has long been thought that these machines may be combined with the computing capacity of computers. Early work of Alan M. Turing, well known for "The Imitation Game," in which the topic "Can machines think?" is taken into consideration and assessed. Turing published "Computing Machinery and Intelligence" in 1950.

Many researchers, like Marvin Minsky, John McCarthy, James McClelland, David Rumelhart, and Lofti Zadeh, rose to prominence as a result of this question, and as a result, a significant amount of work in the field of artificial intelligence has been produced. The Massachusetts Institute of Technology (MIT)'s Marvin Minsky and John McCarthy, both cognitive scientists, founded the MIT Artificial Intelligence lab, where a great deal of work was done on Perceptrons and on creating a framework for knowledge representation. In reality, the phrase "Artificial Intelligence" was reportedly coined by John McCarthy. James McClelland and David Rumelhart investigated parallel distributed computation (PDP), a synthetic neural network method based on the traits of parallel neural processing but with a general mathematical foundation.

In "Fuzzy Mathematics," key methods in the field of artificial intelligence, Lofti Zadeh made a contribution (Connectionism, 2016). Machines that are most frequently controlled by computers are called robots. They have the ability to autonomously carry out a variety of complicated tasks. Robots can be controlled externally (with a remote control, for example) or internally (by a device that is implanted into the robot itself). In his 1920 play R.U.R., Czech author Karel apek coined the term "robot" to describe a fictitious humanoid. George Devol created the first digital, programmable robot in 1945. It was sold to General Motors in 1961 so that they could use it to lift hot metal components.

II. ARTIFICIAL INTELLIGENCE

Artificial intelligence was created by John McCarthy, who described it as "the science and engineering of creating machines with intelligence, especially intelligent computer programmes." Making computers, computer-controlled equipment, and software clever enough to learn, make decisions, and act in a way that resembles how a human brain works and functions is known as artificial intelligence.

In a word, the goal of AI is to develop computer intelligence that closely resembles human intelligence. In general, it is thought that artificial intelligence is concerned with using computers to

perform activities that call for knowledge, perception, reasoning, comprehension, and cognitive capacities.
The science and technology of artificial intelligence is based on fields like biology, computer science, linguistics, psychology, engineering and mathematics. The development of computer abilities corresponding to human intellect, such as learning, reasoning and problem-solving, is where AI is primarily focused.
The AI approach used should be capable of receiving information, organising it to create knowledge, using it effectively so that it can be understood by individuals who offer it, and modifying to fix any faults that arise during the buildup process. The decisions made during the procedure of accumulating information are probably either insufficient or not very accurate, but valuable in many circumstances.

III. COMPONENTS OF AI

Calculation, reasoning, perception of connections and analogies, learning from expertise, information storage and retrieval, figuring out solutions, natural language processing, categorization, generalisation, and adaptation should all be abilities of intelligent computer systems.

What makes up AI is as follows:

1. Problem-Solving

Problem-Solving Heuristic knowledge-based methods are used in games like tic-tac-toe, chess, and poker in order to identify the best move given the most possible movements.

Solving problems is one of AI's capabilities.

2. Logical Reasoning

Logical Analysis A series of procedures known as logical reasoning allow us to establish a foundation for judgement, decision-making, and prediction. Deduction, the solution of challenging mathematical equations, and the proof of theorems all involve logical reasoning and a small collection of data.
Deductive reasoning and inductive reasoning are the two styles of reasoning that are employed. A wide generalisation is reached through the appropriate combination of specific observations, which are the foundation of inductive reasoning. Deductive reasoning looks at the possibilities to arrive at a logical conclusion after beginning with an assumption or broad generalisation.

Inductive Reasoning:
Maximilian is a dog who was found in a shelter.
He is content.
Dogs in shelters are all content.

Deductive Reasoning:
Maximillian is a dog who was found in a shelter.
Dogs in shelters are all content.
Consequently, he is joyful.

3. Natural Language Processing

The processing of natural language is the process of interacting with computers that includes text comprehension, query retrieval, and written language translation. The text written on paper is read by handwriting recognition software, which then deciphers the letter shapes and turns the text into editable text.
When a human speaks to a voice recognition system, the machine has the ability of hearing and interpreting the syntax in terms of statements and their meanings. It is able to distinguish between accents, background noises, and any modifications in a person's voice (such as those brought on by a cold).

4. Learning

The process of acquiring new skills or specialist information through study, practise, instruction, or personal experience. Learning can take the shape of playing, observing, writing, recognising, and categorising. It can also take the shape of listening, hearing, recalling things like a sequence of events.

A. AI in Medicine

AI may use reasoning strategies that relate to things based on heuristics rather than mathematical or data-processing procedures as problem-solving methodologies. On the other hand, heuristic methods, while not always successful, will locate solutions far faster than a forceful approach. The challenge in medicine is that there aren't many problems that have algorithms that are both workable and reliable. Physicians are therefore expected to use judging principles and empirical relationships to explain the sickness.

IV. WEAK AI AND STRONG AI

1. Weak AI

Weak AI (artificial intelligence) focuses on a specific assignment, like gaming tic-tac-toe or chess, wherein a programme is not supposed to think instead to find the best move within its library of rules and strategies that have been created by people over time.

Siri is a machine-based response service that can respond to a limited range of queries for which it was created. In order to solve problems rather than ponder and learn, weak AI systems were primarily focused on problem-solving.

2. Strong AI

Strong AI (artificial intelligence) systems can be created to closely resemble the brains of humans by giving them intelligence, understanding, perception, beliefs, and some human-like behaviours.

Strong AI systems would possess the aforementioned Artificial Intelligence components as well as additional ones in order to mimic or even outperform the human brain.

The robots in films like The movie Terminator and the movie Iron Man are examples of powerful AI. Strong artificial intelligence machines are currently a long way off from being a reality.

V. ROBOTICS

The term "Robotics" was first used by Columbia University alumnus Isaac Asimov in 1945. Robots are constructed from gear that manipulates to carry out specific set jobs. By itself, robots are stupid and lack intelligence. Artificial intelligence is combined with the robot's hardware in the field of robotics to give it knowledge and let it perform tasks without human supervision.

However, there are both regulated and uncontrolled methods of controlling robots. Tyrants are just one type of the many different sizes and shapes of robots (used in manufacturing), robots that are mobile (such those used for automated transport during production processes), and robots with humanoids (which resemble humans in appearance).

The relationship between perception and action is a key topic in robotics. Robots become intelligent thanks to AI, which addresses the knowledge that is needed in the area of thinking, how to express the knowledge, and the way this is to be employed. The effectiveness that a robot's physical effectors, sensors, and processors is increased by AI. Modern manufacturing, assembling, cleaning, painting, and other services all make use of intelligent robots. Robots are being employed in medicine to treat cancer patients and perform neurosurgery. Robotic household services like cleaning and security have become more prevalent and will remain so in the future.

To assist the elderly and sick who are housebound, major providers of services are now aiming to offer robotic services located in the home. Robots are being employed in Japan to assist the blind. Additionally, NASA is testing and assessing humanoid robots for use in deep space exploration. Since space missions to Mars as well as other planets involve risky severe space environments, dexterous autonomous Robots are needed. In order to achieve complete autonomy, areas including grasping of unidentified items, limited motion control and planning, and human-robot interaction are studied and reviewed.

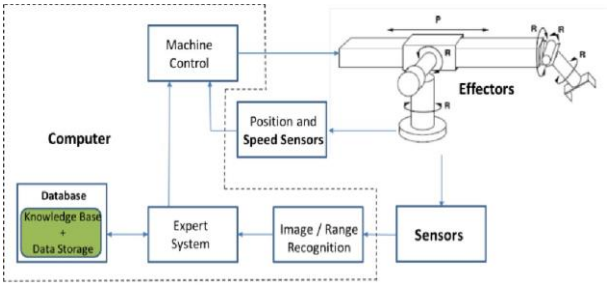

Figure1. Components of an Intelligent Robot

A. Various Intelligent Robotics Components The parts of an Intelligent Robot are depicted in a block diagram in Figure 1.0.

1. Sensors

The sensors provide the perceptual connection between a robot and its surroundings. The two fundamental categories of sensors are active detectors and passively detectors. In order to locate the robot with regard to the target item, active sensors like laser, radars, and sonar are frequently utilised to measure distances like length or depth. By radiating energy, they accomplish this, and the distance between them is calculated by observing how much of the energy returns back. Ultrasonic detectors are close-range sensors, and GPS sensors are far-reaching ones. Sensors may also be auditory monitors in order to

hear and comprehend spoken instructions, speech, and communications.

In order to prepare for a robotic setup, AI determines the knowledge needed for logic, presentation of understanding, and its application. Additionally, it collects information to update the global mode, understanding base, and produced plans. Images of the surroundings are captured using passive sensors, similar to recording devices, so they may be investigated with artificially intelligent (AI) and image recognition systems.

2. Effectors

Robots manipulate their surroundings through the use of effectors, which can move or change shape. the Wheels, grippers, and revolving joint make up effectors. It typically takes 6 DOF (degrees of freedom) to move and position an part from one location to another. Roll, pitch, and yaw are the additional three degrees of freedom in addition to the three axes (x, y, and z) that make up all three degrees of freedom. Additional degrees of freedom make a robot easier to control. A robot arm manipulation with a total of six degrees of freedom is shown in Figure 2.0. It has a prismatic joint for sliding and five revolute joints for rotation.

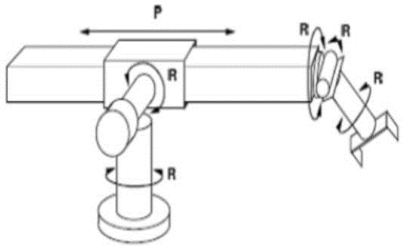

Figure2. Robot Arm Manipulator

Robots on wheels and tracks also have legs. These are what they use to get from one place to another.

3. Computer

In this case, the computer is home to a multitude of artificial intelligence programmes made up of its many parts. There may be one or several processors in the computer being utilised. The database is populated with the raw sensor data after it has been collected, organised, and saved. The data is handled so that the Robot can decide how to move or how to carry out the connected activities correctly. The basic and sensory capacities of the Robot implicitly determine the tasks that it is capable of performing. These skills are updated and enhanced on a regular basis.

B. Guided Robots and Autonomous Robots

1. Guided Robots

These robots are equipped with one or more cameras that serve as its "eyes" and provide visual information to the operator, which is who uses it to guide a robot towards its destination and complete the necessary task(s). Typically, the operator is absent from robot's line of sight or unable to view the robot, except through the video data it transmits back, which shows the robot's surroundings. Vision Guided Robots (VGR) are another type of guided robots that use video data to monitor, position, and carry out the necessary activities, particularly in production (in a production plant). Markers or Robot tracks (also known as waypoints) are used to guide an Automatic Guided Vehicle (AGV), a mobile robot, through its environment. They are primarily utilised in industrial settings for the movement of huge goods within the warehouse.

2. Autonomous Robots

Intelligent components are built into autonomous robots, enabling them to carry out necessary activities in an unsupervised way without the need for human supervision. Robots that operate autonomously have a high degree of autonomy. For some jobs, like housecleaning, painting, and transportation of goods, this is necessary. They are capable to learn about the natural world in which they work and quickly acclimatise to that environment's changing conditions. These robots have the ability to move across air, water, and underground tunnels. Robots like MDARS of General Dynamics (GD) and Cataglyphis of NASA are capable of independent decision-making processes, specimen identification, the extraction process, and return. These machines were made to travel outside.

VI. IMPACT ON SOCIETY

Will the planet be taken over by robots? Will robots annihilate humanity? Will we end up being robots' biological slaves? Or perhaps a more pertinent question is: Will machines replace us? For many people, the threat that machines will supplant people in the workforce is growing. This issue already affects people

because many of them lose their jobs to robot replacements who show up for work rather.

There are several benefits and drawbacks to this topic, as well as ethical conundrums. Would you allow a driverless car to take you somewhere? Would you allow a robot to perform your surgery? Would you offer your elderly mother's prescribed medication from a robot? Would you rather that machines participate in combat on your behalf? More importantly, who's responsibility is it when something goes wrong? Do you believe the maker or owner of the robot should accept accountability? These questions deserve answers because robots continue to be a part of our daily lives.

1. Jobs

The development of robotics that finally displaced human workers is something that many people would want to blame on engineers, but in actuality, engineers are also building robots to substitute themselves. Robots can easily take the position of engineers in the fields of programming and software development. The occupations most at risk of being supplanted by robots or computers with intelligence include the postal service, jewellers, Cooks, cashiers, auditors with accounting legal secretaries, fashion models, drivers, credit specialists, the procedure of milling and planning gadget setters, managers, and bids, packaging and filing controllers of machines, and roofers are among the valuable metal and stone workers.

2. Driverless Cars

Through new and sophisticated methods, driverless cars are becoming a reality, but as with all wonderful things, there are drawbacks. The development of autonomous vehicles is intended to make commuting easier for everyone. What transpires, however, if something goes wrong? One such scenario may be a self-driving car that is responsible for bringing you for a friend's party on time could serve as one such example.

In this situation, the car will proceed at the greatest speed possible, choose the shortest route, ignore all posted limits on speed, violate every property in the region, kill and injure many, and do all of this while exceeding all posted speed limits.

3. Killer Robots

Worldwide, robots are employed by a variety of businesses and organisations, including the military. Currently, unmanned tanks, drones, and robotic weapons are examples of how robots are used in the military. Robotic warfare has the potential to lower the number of fatalities among humans. The amount of labour required can also be decreased using robots.

What if, on the other together, the obtained superintelligence is put to destructive use? This might turn out to be disastrous.

4. AI’s role in Water Scarcity

Artificial intelligence (AI) development and application must follow ecologically friendly procedures due to the large water footprint of AI models. Although the use of artificial intelligence (AI) has made remarkable strides, a recent study reveals how much water AI models in data centres use, raising environmental concerns. The study highlights the need for environmentally friendly practises by revealing the harmful effects of developing and implementing massive AI models.

Large AI models with a hidden footprint of water are GPT-3 and GPT-4. Up to 700,000 litres of fresh water—the same amount needed to build hundreds of cars—are used during GPT-3 training in Microsoft's US data facilities. Given its billions of users, ChatGPT "drinks" a five hundred millilitre bottle of water for a straightforward chat.

VII. CONCLUSION

The use of AI with sophisticated architectures and deep algorithms for learning will be the foundation of future research. The current issue with this is how long training takes. This strategy ought to enable artificial intelligence (AI) to be strong enough to think like humans. In order to create robots that resemble humans, further research is needed in the sensor fields, where the ability to feel and touch must be perfected. Can we actually create Humanoids that accurately represent humans using the technology we now have? Will robots eventually rule the world? The future? Time will only tell.

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