

## **THE SCOPE OF ARTIFICIAL INTELLIGENCE AND INTERNET OF THINGS**

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DOI: 10.46609/IJSSER.2022.v07i12.005 URL: <https://doi.org/10.46609/IJSSER.2022.v07i12.005>

Received: 5 December 2022 / Accepted: 20 December 2022 / Published: 28 December 2022

### **ABSTRACT**

Indeed, decades back no one might have imagined having a video call with their families in different countries and continents. These days, it is very common. This is because of innovation getting less expensive, and gadgets arising with better than ever capacities. Individuals can totally get their things finished with a click on their cell phone. Sending messages, making payments, transferring cash, or booking a taxi is the simplest task due to the advancement of technologies like artificial intelligence and the internet of things. This paper highlights the Working of AI, IoT, brief history of evolution, working of AI, and the area of wide scope of these technologies.

**Keywords:** Artificial intelligence, Internet of things

### **Introduction**

Today the whole world is well acquainted and revolving around the word ‘**smart**’. Smart TV, Smart watch, Smart locks and many more smart appliances are grabbing the attention of every person. The technology which is behind this smart world is identified as Artificial Intelligence (AI) and Internet of Things (IOT). Artificial intelligence targets at simulating human intelligence by machines like computers. It brings computers to do human-like analysis and logical reasoning resulting in digital transformation of the world. Using specifically programmed algorithms, computers can understand and analyze the data using statistical methods. The whole idea behind artificial intelligence is to make the world and its objects autonomous. In this automation process machines identify the behavior patterns and responses. Machine learning (ML), natural language processing (NLP) and deep learning are the basic technologies used for Artificial intelligence.

ML would facilitate the methods to work with learning in different parts/gadgets of the network to make them programmed and self-standing, while DA would assess and analyze the data based

on past trends to be more operational in future. This pattern has been developing and presently endeavors are being made to integrate ML and DA into sensors of smart gadgets. Digital maps and navigations, face detection and recognition, chatbots, autocorrect features, e-payment etc these days are the best examples of artificial intelligence.

The basic idea behind this pattern is the Internet of things (IoT) , which expects a world equipped with smart gadgets called 'Smart Objects' (SOs) connected through the internet , infrared or Bluetooth etc. The embedded technology used in these objects connect the internal assembly with external surroundings. At the point when these articles sense and interact, it changes decision making choices, and who makes them. It is a cutting edge remote correspondence innovation having its application regions in different versatile areas. The items like Radio frequency identification labels, sensors embedded in various objects like smartphones follow unique addressing schemes enabling the interaction between each other. These interactions can be human–physical objects, and physical –physical objects.

### **A brief history of AI:**

Ancient Greek mythology had the first description of intelligent robots and automation. Syllogism theory and its implementation in deductive reasoning was the first step for humans to understand the perspective of their own intelligence. Some prominent events in evolution of AI are as follows-

- The first model for neural network was published in the paper “A Logical Calculus of Ideas Immanent in Nervous Activity,” by Warren McCullough and Walter Pitts in 1943.
- In 1949 Donald Hebb, concluded that experience creates the neural pathways in mind and those get prominent with the frequency of usage, in the book “*The Organization of Behavior: A Neuropsychological Theory.*”
- In his paper “Computing Machinery and Intelligence,”(1950) , Alan Turing proposed the Turing Test, a testing method to determine if a machine is intelligent.
- Later Minsky and Edmonds ,Harvard undergraduates ,built the first neural network computer, SNARC.
- Programs to play checkers, chess , translate russian language etc were developed by some eminent developers.
- In 1956, The phrase “artificial intelligence” was used at the Dartmouth Summer Research Project on AI.

- John McCarthy started the AI Lab in 1963 at Stanford.
- PROLOG , the logic programming language was developed in 1972.
- In 1982, Japan’s Ministry of International Trade and Industry launched the Fifth Generation Computer Systems to develop supercomputers, and a base platform for AI development.
- The U.S. government assisted research in advanced computing and AI in 1983.
- In 1991,during the Gulf war, U.S. forces developed an automated logistics planning and scheduling tool.
- In 2005 STANLEY, a self-driving car, won the DARPA Grand Challenge.
- The U.S. military invested in developing robots like “Big Dog” , “PackBot” etc.
- In 2008, Google introduced speech recognition in the iPhone app.
- In 2011, Apple developed an AI-powered virtual assistant “Siri”.
- Google made the first self-driving car to pass a driving test in 2014.
- Amazon introduced “Alexa”, a virtual smart device.
- The first “robot citizen,” Sophia, with capability of facial recognition and verbal communication was developed in 2016.
- In 2020 , GPT-3, a natural language processing model was developed.
- In 2022,DeepMind created an AI system to perform hundreds of tasks , named “Gato”.

### **Working of AI :**

A foundation of specific hardware and software is needed for creating machine learning algorithms. There is no single dedicated language for AI, but few programming languages like Java, Python and R are widely used for the same purpose. Artificial Intelligence technology works by performing a series of tasks like taking huge collections of labeled data, identifying the patterns and trends using statistical analysis methods like correlation, and making future predictions based on these patterns. Using this methodology, chatbots which are fed with

samples of chats, access the data and generate live chats with people. Similarly, the image recognition applications identifies the objects in images using millions of fed examples to it.

There are three cognitive processes involved in Artificial Intelligence: learning, reasoning and self-correction.

1. **Learning** : This process of AI deals with collecting data and creating rules to convert data into required information. The algorithms provide step by step instructions to computing devices for completing the task.
2. **Reasoning** : This process deals with choosing the right algorithm to generate desired outcome.
3. **Self-correction** : This process focuses on continuous development of algorithms so that most accurate results can be generated.

#### **AI enabled IoT :**

IoT is an umbrella term which includes combinations of sensors, data collections, and data processing techniques connected with each other through the internet. Hence, IoT-enabled devices can sense its environment, save and manipulate the data gathered and work accordingly. Real smartness of an IoT device depends on the process and performance of it.

However, a smart IoT system serves the aim of automation. Some of the existing IoT services are

- **Robots:**

Robots are the human-like machines, which interact, understand , reciprocate and express some emotions like humans.They are the IoTs made up of numerous sensors and actuators along with AI, assisting in continuous learning and upgrading. Pepper from SoftBank Robotics, Sophia from Hanson Robotics are best examples of Robots.

- **Voice assistants**

These are the voice based utilities acting as a personal assistance service for users.They assist in performing different tasks through other smart devices present nearby them and third party utilities. They can handle our queries , call cabs, play music and switch smart light or AC on and off, and many other tasks by recognising the user's voice commands. Alexa from Amazon, Siri from Apple Inc, Google Assistant used in Google Home are some of the well-known voice assistants.

- **Smart devices**

There are a number of smart devices which are making human complex tasks easy to do. AI enabled smart devices use applications like face recognition, voice recognition, speech identification, object recognition, neural networks etc. for their best performances. Smart ovens designed with AI, enable the ability to cook and bake food items perfectly without much human intervention. The food thermometer and HD camera monitor the food inside the oven and change various cooking modes and operations accordingly. This oven can recommend different auto cook methods depending upon the users likings and dislikings. It can be controlled by Alexa.

Smart lights are also the AI supported devices which can be operated with smartphones or Alexa and Google Assistant. Brightness and color modes of these lights can be changed using smart devices. SkyBell is a smart doorbell that is AI supported and can detect the face of a person at the doorbell, send the live feed and converse with the homeowner, even from a remote location through the internet. It can help keep the burglars and trespassers at bay.

### **Scope of Artificial Intelligence and IoT:**

The versatile nature and advanced technologies, contributes to usage of Artificial intelligence in numerous fields. The future and scope of Artificial intelligence is very promising. It is currently in an infant stage but many sectors like healthcare, IT, manufacturing, pharmacy, automobile are manifesting the powers of AI. Many industries are there where this power is still unexplored.

The potential that artificial intelligence holds can be perceived by the different advances that are covered under the umbrella of artificial intelligence. The instances of such innovations encompass self-improving programming and algorithms, Pattern analysis, Big data, machine learning, Enormous Information, and numerous others. In the following couple of years, it is anticipated that there will barely be any industry left immaculate by this useful asset. This is the reason for why artificial intelligence has such a lot of potential to flourish in India.

Areas in which Artificial intelligence is being utilized:

- **Banking:**

Banking isn't new to the usage of Artificial intelligence and machine learning advances. The area has quickly adopted this new innovation to keep themselves aware of updates with the current business sector. It utilizes this innovation to keep track of client information, which was prior to a repetitive manual activity. With the quick expansion in how much information that is being produced and stored in the banking area, today, AI and ML permit experts to do the same task precisely and productively. A portion of the manners by which artificial intelligence has had a

tremendous effect in the field of banking include better client care, improved information quality, fraud prevention, computerized assistance, and that's only the tip of the iceberg.

- **Medicine and Healthcare :**

As per one of the Forbes surveys , the extent of artificial intelligence can enhance the value of life as it has now been observed in recent years. Additionally, Data Science in Medical care helps in different fields. The healthcare sector involves this innovation for its potential advantage in many ways and keeps on doing so. A well known utilization of artificial intelligence in this area is the Collaborative Cancer Cloud created by Intel and the Knight Career Institute. The cloud gathers the past information of Cancer patients and different patients with the same symptoms so they can assist doctors with diagnosing disease at a beginning phase in light of the side effects they show and compare them with the past saved information. The best treatment for this deadly illness is to keep it from arriving at higher stages.

An artificial intelligence based robot, Eve, designed by a group of researchers from the top colleges of Aberystwyth, Manchester, and Cambridge, found the component that is present in toothpaste and can recover Malaria. Artificial intelligence has a huge opportunity and role in the clinical field in the future. Artificial intelligence is also effectively being used in other healthcare fields like drug testing, drug designing, nanotechnology and so on. It is evident that artificial intelligence will speed up research and innovative work in the field of medicine.

- **Business**

Business sector is witnessing major changes and revolution in multiple facets with the use of artificial intelligence. The major shift on online business platforms for targeting global customers along with friendly experience at their comfort zones, is the contribution of AI.

Data science along with AI, collect huge amounts of consumer data and analyze it for making informed decisions based on their buying patterns. Companies fetch the customer information to understand and predict their buying habits, and decide which product or service is best for them with the data analysis process. Based on this analysis, they send customized recommendations to the consumer to gain their attention. This process works smoothly just because of AI.

- **Education**

Education plays an important role in everyone's life. In a country like India, with a huge young population, quality education is a dire need. With the advancement of AI, Atal Innovation Mission's ATL AI-Base Module, Planet code have played significant roles in the education

sector of India. Taking quality global education from well known universities and colleges around the world is not a dream anymore.

AI has the magical power of reinventing the education sector with more strength and ease.

- **Agriculture**

In highly populated countries like India, advanced agriculture technology has a hugescope. With the help of AI, it is easy to predict the crops that can give better yields. By the year 2052, sudden climate changes may cause trouble in farming along with the conversion of cultivable land into deserts, and many more challenges. AI can be the best option to estimate the best dates for sowing crops and managing various resources like water, fertilizers etc to get the best result. With the help of advanced IoT farming devices, removing weeds, sowing seeds, proper irrigation, detecting crop diseases, weather forecasting will become much more accurate and easy.

- **Manufacturing**

AI technology has exemplary scope in the manufacturing industry. Many new startups are taking advantage of AI, to serve the manufacturing sector. With the assistance of these simulated intelligence arrangements, organizations further cultivate development and abundance. The outstanding capability to analyze information and make forecasts is making remarkable help to understand the past year sales and market patterns to predict the future demand-supply needs. This further empowers companies to make quicker decisions. In the coming years, AI will have a wide scope in the manufacturing field.

- **Transportation**

AI has gigantic potential in the transportation business as well. So, we can consider the instances of airplanes that have been utilizing autopilot starting around 1922. Another region where artificial intelligence holds massive potential is auto driven vehicles. As the latest trend is vigorously towards autonomous vehicles, specialists accept that machine learning and AI will make a drastic change in the transportation field, with error free driving and lower emission rates.

### **Conclusion**

In today's technical era , Artificial intelligence and machine learning are the hot discussion topics as they have huge scope and possibilities in numerous fields existing these days.

.As a matter of fact, experts began utilizing artificial intelligence and Machine language to gain more insights and experiences related to various fields and utilizing them for further

functionings. IoT uses the power of AI to resolve multiple cumbersome manual tasks with remarkable accuracy.

Because of the pandemic, the interest for computer based intelligence and ML designs additionally expanded in the IT area. In these critical events, when the country had huge layoffs , the IT sector remains least affected. In fact, usage of AI based IoT have reported to be growing with passing years. The Data analysis and forecasting functionality made this technology ace throughout the globe, assisting multiple sectors to grow and foster with huge further scope.

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