



Study of Transformative Role of Artificial Intelligence

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Abstract:

This study delves into the impactful applications of Artificial Intelligence (AI) technology, with a specific focus on its uses in healthcare and transportation. The research provides a comprehensive overview of AI's transformative role in these sectors, highlighting its applications in healthcare diagnostics, personalized medicine, and treatment optimization. In the transportation domain, the study explores AI-driven solutions for predictive maintenance, route optimization, and traffic management.

While acknowledging the broader spectrum of AI applications in diverse fields, this paper concentrates on its pivotal contributions to healthcare and transportation. Ethical considerations and challenges associated with AI adoption in these domains are also scrutinized, underscoring the importance of responsible development. Aimed at policymakers, industry professionals, and researchers, this study offers insights into the nuanced applications of AI in healthcare and transportation, fostering informed decision-making for sustainable advancements in these critical sectors.

Keywords: Artificial Intelligence (AI), Healthcare, Transportation, Diagnostics, Personalized Medicine, Predictive Maintenance, Ethical Considerations

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Introduction

Everyone is occupied with their own life-related tasks in today's rapidly expanding world, such as locating jobs that suit them and studying a lot online, among other things. Many people prefer to complete things alone, but doing so increases the risk of mistakes and interference from others. However, what good is it to have machines that can complete jobs for them quickly and efficiently if they only need to give them instructions? Hearing that is always wonderful. Because of their ability to complete tasks efficiently, artificial intelligence (AI) and machine learning (ML) were created, and they have had a significant impact on society. The British logician and computer pioneer Alan Mathison Turing

completed some of the field's first significant work in the middle of the 20th century, but John McCarthy is recognized as the father of artificial intelligence. By 2035, artificial intelligence is expected to bring in \$15.7 trillion for the world economy. China and the United States are predicted to benefit the most from it, accounting for about 70% of the worldwide impact.

It is widely used in a variety of industries today, including the IT sector, agriculture, healthcare, transportation, and defense services. Since the advent of AI and ML, all of these industries have experienced significant growth. We will discuss applications of AI and ML in the transportation and healthcare sectors in this chapter.



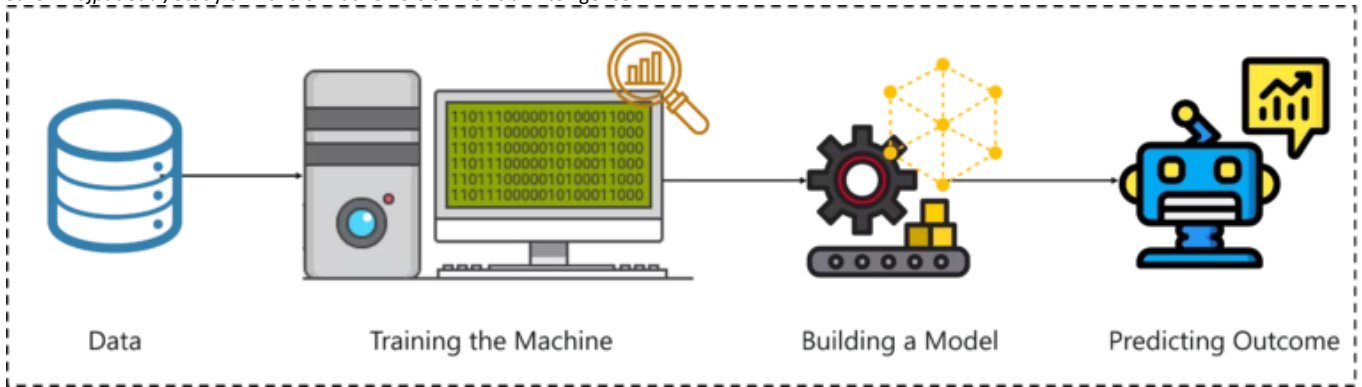


Fig. 1.1 Basic Steps of Implementation in AI & ML. (Zulaikha Lateef, Edureka, 2021)

1. AI in Healthcare

Everybody's health is greatly dependent on the healthcare system, and a person's physical condition has an impact on not just their own life but also the lives of everyone who is connected to them. Many methods of treating people are introduced in the modern world; some are automatic, while others are manual. In order to treat a patient well and prevent further harm in the future, the machinery and equipment utilized in this industry need to be more precise and effective. However, occasionally human error and improper use of the equipment can put patients' lives in danger. For this reason, the machines should be handled carefully and so as not to affect the person using it. Sanitizing the equipment after use is also crucial to ensure that, in the event that a serious patient is treated with it, any bodily residue is removed from it and doesn't affect the person using it next.

In the healthcare industry, automatic equipment that offer improved accuracy and low risk performance are launched to address these kinds of problems. Intelligent and machine learning (AI/ML)-based automatic machines, sometimes referred to as "smart machines," are created by supplying patient-specific data relevant to treatment, based on the system's intended purpose for disease diagnosis, scanning, or other internal problems. These machines, which are employed in the healthcare industry, include CT scanners, MRI scanners, X-ray machines, and others. Aside from these, AI and ML can be applied to administrative and operational tasks in the healthcare industry, such as clinical decision assistance, patient monitoring, and data entry for every patient on the hospital's server to ensure data integrity. Approximately 400,000 hospitalized patients experience avoidable harm annually, and 100,000 of them pass away.

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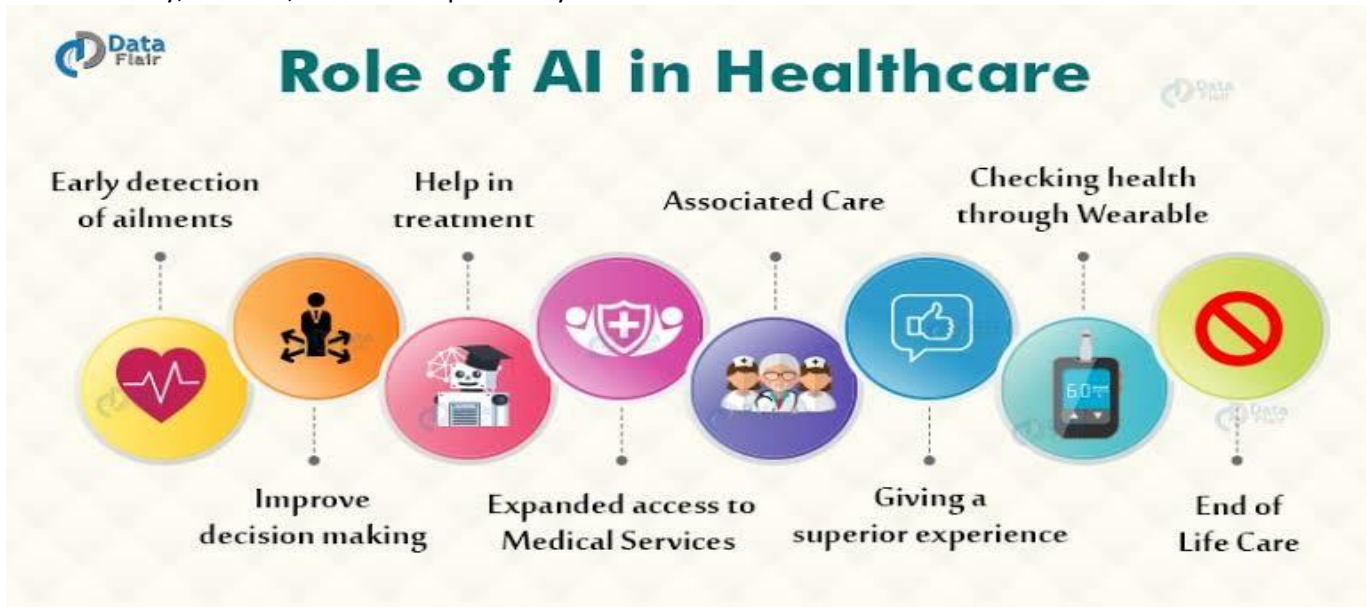


Fig. 1.2 Basic Role of AI in Healthcare Sector. (DataFlair, 2019)

Artificial Intelligence (AI) has numerous applications in the medical field, including robotic-assisted surgery, nursing assistants, cybersecurity, fraud

detection, patient monitoring devices, connected machinery, and medication error reduction. From an individual's point of view, each of these procedures



Sakshi Rajput et al/Study of Transformative Role of Artificial Intelligence is crucial to the daily operations of the medical field. One of the key beneficial elements that AI uses is the Internet of Things (IoT). According to reports, its popularity has been steadily rising over the past few years. Transmitting big amounts of data is now much easier because to advancements in communication technology and data transfer speeds. Furthermore, new IoT markets and applications in real-time analytics and predictive modeling were made possible by the more powerful and sophisticated storage systems and data processing powers made possible by big data analytics and cloud technologies. The healthcare sector is poised for significant growth as a result of these developments in the integration of smart sensors, actuators, and

data analytics in an IoT environment for real-time and continuous healthcare. The Internet of Medical Things (IoMT) and the Internet of Health Things (IoHT) are two new sectors that have emerged and are helping to balance the healthcare management system. (Md. Milon Islam & M. Nasr, 2021).

Figure 1.3 provides an estimate of the funds or prospective yearly value in billions of dollars for each of these components by 2026, if all goes according to plan. Humans will benefit from high-quality equipment and technology as well, as this projected distribution suggests. However, there are advantages and disadvantages to humans becoming more dependent on machines.

APPLICATION	POTENTIAL ANNUAL VALUE BY 2026	KEY DRIVERS FOR ADOPTION
Robot-assisted surgery	\$40B	Technological advances in robotic solutions for more types of surgery
Virtual nursing assistants	20	Increasing pressure caused by medical labor shortage
Administrative workflow	18	Easier integration with existing technology infrastructure
Fraud detection	17	Need to address increasingly complex service and payment fraud attempts
Dosage error reduction	16	Prevalence of medical errors, which leads to tangible penalties
Connected machines	14	Proliferation of connected machines/devices
Clinical trial participation	13	Patent cliff; plethora of data; outcomes-driven approach
Preliminary diagnosis	5	Interoperability/data architecture to enhance accuracy
Automated image diagnosis	3	Storage capacity; greater trust in AI technology
Cybersecurity	2	Increase in breaches; pressure to protect health data

Fig. 1.3 Estimation of different usage of AI in healthcare sector. (Matt Collier, Brian Kalis, Richard Fu, Harvard Business Review, 2018)

1.1 Benefits of AI for Healthcare

AI has a significant impact on the healthcare industry and is bringing about a new medical revolution that benefits both the general public and medical practitioners and specialists alike. The following are some advantages of applying AI to healthcare:

1. High Quality of patient’s lives.
2. Streamlined Workflow.
3. High Accuracy of treatment.
4. High Employee Efficiency.
5. Reduced Costs.
6. Decreased Labor Demand.

7. Higher Employee Engagement with Patients.
8. Reduced Workload.
9. Enhanced Protection against Cybercrimes.

Although there are many more significant advantages, these are the main ones. AI essentially makes medical professionals' jobs easier and enables them to treat patients without difficulty.

1.2 Demerits of using AI System

Everything in the world has advantages and disadvantages that are outweighed by the alternatives, making it the new option for people.



Likewise, the following are some drawbacks of AI machines:

1. Because the prediction system is using data that has already been introduced or used, there is a possibility that it may anticipate the wrong outputs because fresh data requirements cannot be handled at that time, therefore the output is based on cases that have already happened.
2. Because machines are using their own intelligence, sometimes they behave strangely. For example, if a human performed the task, they would consider many factors, such as whether it would be the best course of action, the effects of using it, and a few other random questions. In contrast, a machine would follow instructions, carry out tasks on its own initiative, or act in a way that deviates from human judgment.

These two primary drawbacks have the potential to impact the entire system, but they can be mitigated by keeping an eye on things and doing routine or periodic maintenance on the devices and systems to reduce the likelihood of these kinds of problems.

1.3 Tools & Technologies Used

Many things in AI systems are helpful, but some things aren't so helpful for the intended usage. In the medical field, natural language processing, or NLP, is the most beneficial AI method. Speech recognition software, text analysis software, and translation software are all included. The primary areas of AI use in the medical industry include data processing, prediction, decision making, and automatic operation algorithms. AdaBoost and Deep Learning are two more methods that are frequently employed in computers to carry out tasks autonomously without human assistance. One of the key technologies that can be applied in the healthcare industry is the Internet of Things (IoT). Benefits from it are described as:

1. Simultaneous reporting and monitoring.
 2. Data Analysis and Data Assortment.
 3. End-to-End connectivity.
 4. Remote Medical Assistance.
 5. Tracking and Alerts.
- (S. Mahalakshmi & Dr. R. Latha, 2019)

1.4 Challenges for AI in Health Industry

- The first issue with applying AI to healthcare is that, in order to produce more accurate

and effective results, a significant volume of data is needed.

- If the data used to train the algorithms is not representative of the population as a whole, bias could arise, which is the second challenge.
- Finally, because different AI systems do not adhere to the same standards, it is challenging to compare outcomes or aggregate data from various sources.

1.5 Different Usage of AI in Healthcare

This section will go into further detail on the uses of AI in the healthcare industry as well as potential future applications.

1.5.1 Chatbots

If someone needs urgent medical information or a quick fix for any health issue and it will take them longer to get to the closest hospital, they can use online chat-based bots to solve their problems. These bots also add data about general health issues that can be treated quickly by anyone. It combines AI and ML at the same time to get more accurate and better outcomes. Each user who successfully completes the registration process and all other system-specified authentication procedures is granted user privacy.

In essence, it substitutes a digital algorithm—a program that can be either simple or highly sophisticated—for the "live" customer care worker of earlier decades.

"Having one person call one person takes a lot of human capital"says Dr. Z. Brown of Northwell Health Solutions.

Its development is predicated on predictable dialogue, which means that we have to consider the optimal response to a user's query ahead of time so that the chatbot can provide that information when it is requested.

What desires do all patients have?

1. Custom would govern the questions, which may indicate a variety of patient behaviors.
2. There ought to be fewer on-site visits.

To set up meetings with ease.

What is wanted by the front desk staff?

1. Allow the chatbot to tackle the problems based on the needs of the user.
2. It should clarify to the patient whether there have been any modifications to their job or insurance coverage.
3. The chatbot should be able to schedule available times so that the patient has no problems.

4. The bot will retrieve any available time slot either immediately following the call or before to the appointment; this would be simple if the insurance and employer were

AI-capable; in the absence of such capabilities, the medical assistant would need to schedule a call.

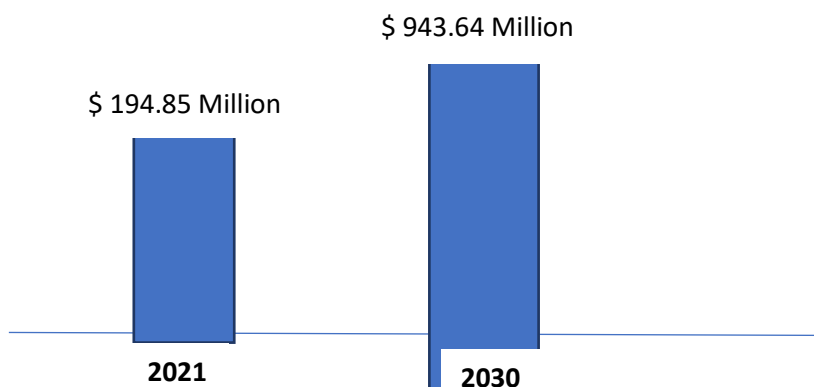


Fig. 1.4 Global Healthcare Chatbots Market Estimation. (Verified Market Research, 2021)

Many hospitals around the nation offer free chatbot assistance as part of their efforts to give those who can't get healthcare on time or at all—such as those living in rural areas—a positive experience. Every administration or control panel in the hospital should periodically verify the bot to ensure security and update it over time to improve user experience.



Fig. 1.5 Sample of an AI Chatbot System for Healthcare. (The Medical Futurist, 2021)

1.5.2 Virtual Nursing Assistants & Patient-Monitoring System

AI can also be used as a worker in a hospital, helping patients with various problems and health-related ones. For example, it can be used to anticipate prescription drugs for common illnesses or to

navigate a patient to a particular location, room, or ward. Additionally, the patient's health status is displayed on AI-based monitors. They are accessible around-the-clock. It can result in financial savings for the healthcare sector of up to \$20 billion a year.



It's getting harder for people to live a healthy lifestyle on a daily basis. A smart health monitoring system is therefore thought to be among the greatest answers to these problems. The creation of intelligent and affordable sensors that can aid in real-time health monitoring of individuals is facilitated by the latest developments in industry 5.0

and 5G. Fast, affordable, and dependable health monitoring services from remote places are now possible thanks to the Smart Healthcare Monitoring (SHM) System, which was previously not feasible with the old healthcare system. (A.V.L.N. Sujith, B. Prasanalakshmi, Shibili Nuhmani, Guna Sekhar Sajja, V. Mahalakshmi, 2021)



Fig. 1.6 Real-life Virtual Nursing Assistants. (Julia Smith, Readwrite, 2020)

1.5.3 Surgeries by Robotic Systems

The use of AI-powered collaborative robots has completely changed how medical surgery research is conducted. It can therefore operate at a very high speed and with remarkable performance while cutting thin and precise incisions. Generally speaking, the outcome of a surgery, particularly a complicated or recent one, can vary depending on the surgeon's skill at treating patients. With changes in cases and improvements in the productivity of physicians—including highly skilled surgeons—the use of AI systems can be minimized. Because AI-based devices operate precisely, there is a lower chance of shudders or other uncertain incidents brought on by erroneous movements during surgery.

AI-assisted robotic systems are notable for their ability to do fundamental operations like precision cutting and stitching with improved accuracy and miniaturization. These systems can also demonstrate a three-dimensional (3-D) magnification for articulation.

During surgery, physicians at the Maastricht University Medical Center in the Netherlands employ a robotic device with artificial intelligence (AI) assistance to suture extremely tiny, 0.03–0.08 mm blood arteries. In addition to these procedures, AI systems can propose novel surgical techniques to treat a variety of conditions with ease by using data from earlier operation records.



Fig. 1.7 Example of Real-time AI-assisted Robots Surgery in India.

With so many people living in a country the size of India, the medical system needs to be robust to handle any emergencies and minimize the number of fatalities. AI helps the medical professional to decrease the likelihood of a mistake during treatment or surgery in order to achieve greater efficiency and speed without having an adverse effect after the procedure.

1.5.4 Medicine Prescription System

It is regarded as one of the most beneficial and well-liked uses of AI in the medical field. It is predicated on the collection of copious amounts of data from diverse unorderly technical innovations, including affordable genome sequencing, sophisticated biotechnology, and home-use health monitoring

gadgets for patients. Deep learning and sophisticated supercomputing algorithms were used. With an accuracy of 85%, Intel has built a deep learning system that can identify 23 people at once who have a high risk of cardiovascular disease but are not picked up by conventional statistical approaches. In addition, IBM Watson and Google DeepMind are renowned for being at the top of the list for developing medical record data mining tools. Its major goal is to produce a competent assistant who possesses a broad variety of clinical (medical) knowledge in addition to a sensible, analytical mindset. Patients will benefit since they won't have to wait in line for an appointment to see a doctor or wait for their turn to receive medication at a hospital.

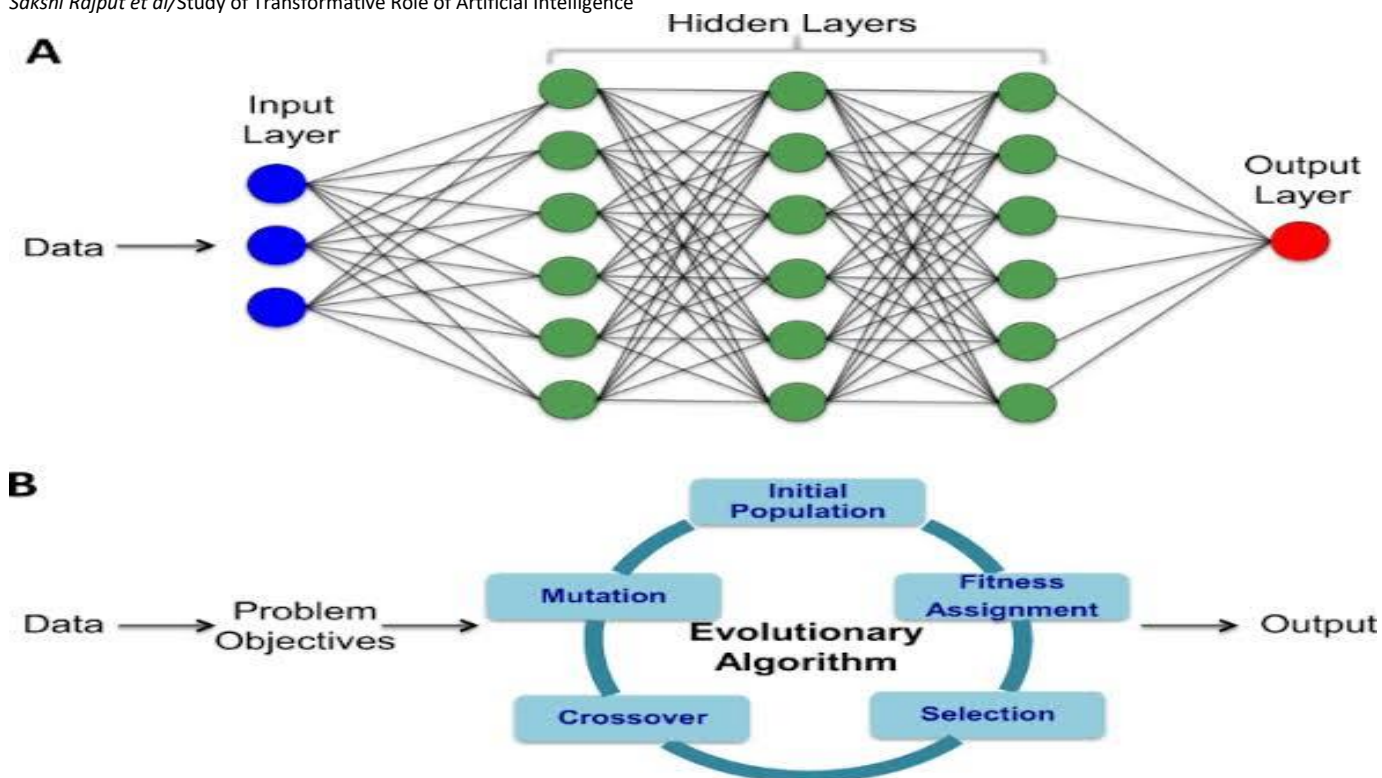


Fig. 1.8 Representation of Data Processing in Precision Medicines. (Yujiang Wang, Mohammad Uddin, Marc Woodbury-Smith, NPJ digital medicine, 2019)

1.5.5 Administrative Workflow Assistant

AI is also applicable to healthcare administration tasks. It involves support for the administration of patient, staff, financial, and other official records. It guarantees that medical professionals, such as doctors, assistants, and nurses, would prioritize urgent situations and try to free up time for their regular duties.

AI has many uses in many industries, but in the health sector alone, it can save over \$18 billion. Cutting-edge tools such as voice-to-text conversion are helpful for the administrative side of the health industry. Automating non-patient care tasks like as ordering tests, creating chart notes, and prescribing medicine is helpful.

1.5.6 Other Aspects about AI in Health Industry

According to estimates, the medical AI market would generate \$45.2 billion in revenue globally by 2026, up from \$4.9 billion in 2020. The startling increase in growth data points to the necessity for medical facilities to use AI in order to provide patients with innovative medical treatments. Medical Institutions & Organizations should align with medical technology providers to gain insight into and utilize the full potential of AI technology. These providers can assist Medical Institutions & Organizations in developing strategies to decide which AI

investments to make, as well as provide field experts' guidance to enable their business to add value for their customers in the future.

2. AI for Smart Transportation

Everyone travels throughout today's hectic globe for a variety of reasons, including visiting their workplaces and spending time with friends and family. Therefore, the quality of the transportation system should be high enough to prevent frustration, but in nations with higher population densities, a significant number of people commute daily on private or public cars. Fuel-based and non-automatic technologies are currently employed in the transportation system, which can occasionally be stressful for people.

The current systems that use systems to get around these problems can be replaced by smart systems. In essence, AI systems are the foundation of smart systems. It can be applied in a variety of contexts, including the conversion of fuel-powered cars to automatic electric cars, intelligent traffic control systems, and navigation systems. All of these areas are significant because they are places where people deal with problems in a variety of ways, including problems involving their vehicles, environmental issues brought on by them, and delays in reaching their destinations due to various issues related to their daily travel routine, whether those problems



involve their vehicle or the route they have chosen to get there.

The term "transport management systems" (TMS) describes the field of managing transportation systems, with a focus on the maintenance operations. These systems' primary goals are to produce effective route planning, transparency, increased flexibility, and load optimization through the use of vast amounts of data. A city's suggested transportation strategies are linked to an informative system for improved administration. This system will concentrate on gathering data, processing it before sending it on, and managing the data bus that the system generates. A few decades

ago, the advent of smart technologies led to the introduction of numerous information systems for logistics and route planning. These systems offer enhanced data processing capacities that make it easier to efficiently organize transportation procedures, which will result in the development of intelligent transportation systems (ITS). An effective ITS may be created using the data that is produced by cars and users. Improving performance interchange, acquisition, and connection between automobiles, urban infrastructure, and other relevant activities is ensured by developing ITS. (Lakshmi Shankar Iyer, 2021)

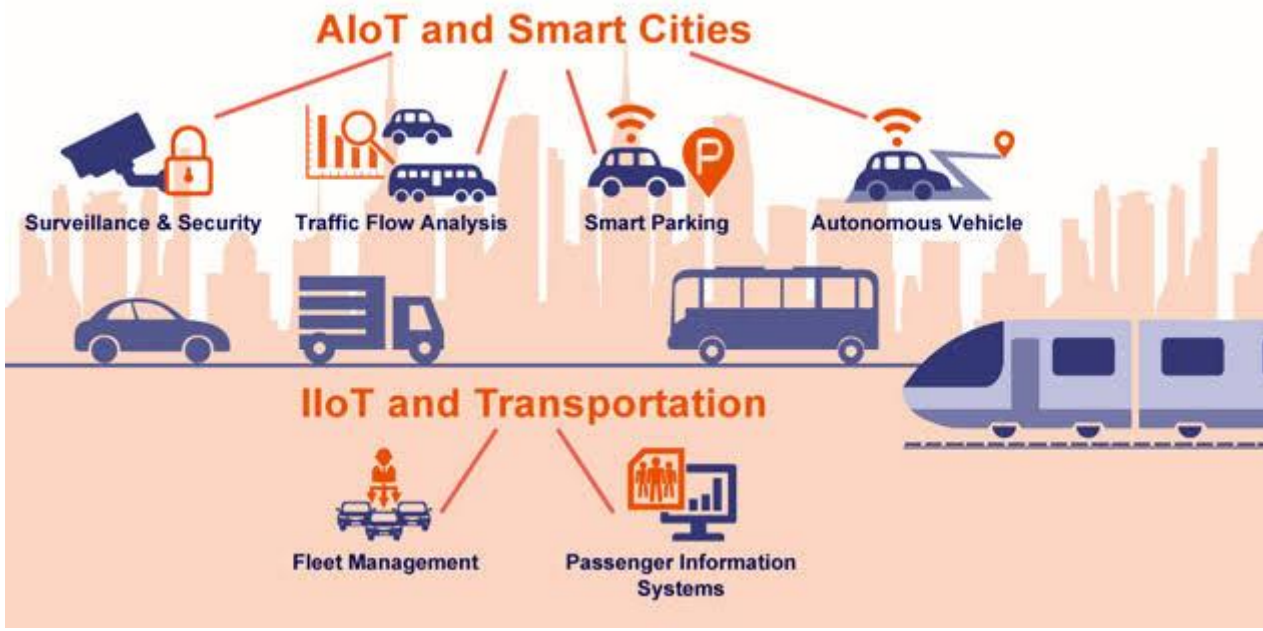


Fig. 2.1 Basic Roles of AI in Smart Transportation System. (Steve Rogerson, IMC, 2020)

2.1 Advantages of AI for Smart Transportation System

Everything that comes into existence has advantages and disadvantages that would be overcome in their alternatives and that is with change of time not in a sudden. AI used in smart transportation system also have advantages and those are given below:

1. It will increase people's safety and lower the number of traffic accidents. An important problem is the amount of truck-related accidents that occur at night. Driverless automated vehicles can assist lower this number.
2. It enhances the capacity to analyze and forecast information and outcomes more quickly than humans, enabling travel and transportation providers (operators) to plan public and private transportation services with far greater efficiency.

3. It might have a significant impact on the creation of fresh, creative solutions for environmental problems like air and noise pollution. It might also assist engineers and scientists in creating more environmentally friendly ways to power machinery and cars for transportation.
4. On occasion, it has a significant impact on how hospital emergency cases are routed. It can be used to divide the path only for ambulances to pass through by using automatic bars from underground so that they can be passed through that path to reach the hospital on time before having any type of critical condition. It can also help in navigating the best way with low traffic and clear route so that the ambulance or people carrying any patient will reach the hospital in



a short period of time without having any critical conditions.

5. It enables automation firms to lower production costs and introduce new revenue streams, such as route optimization, self-driving technology, and system maintenance planning. Fully automated fleets will eliminate the need for long driving hours and stoplight waiting.

2.2 Disadvantages of AI for Smart Transportation System

However, there are certain drawbacks to deploying AI in smart transportation, which present a chance for future system improvements. The following list includes a few of these drawbacks:

1. Although performance and efficiency have increased, adoption will still be significantly hampered by cost.
2. Another element that sometimes leaves engineers disappointed is power. In order to maximize the capability of emerging technologies in the system, artificial intelligence (AI) demands more power for all the systems to operate more intelligently and efficiently.

With the exception of these drawbacks, artificial intelligence (AI) is a fantastic, ground-breaking

technology that, while it has greatly improved transportation systems in the present, much more work needs to be done in this area.

2.3 Different Ways to use AI in Smart Transportation System

AI can be used in a variety of ways in smart transportation systems to make it easier for people to move around. Car navigation systems, autonomous or driverless vehicles, drone deliveries, intelligent traffic management systems, intelligent automated or auto-pilot aircraft, including jets and airplanes, are only a few examples.

2.3.1 Car Navigation System

A few years ago, it was hard to figure out the best route to get somewhere, but these days, thanks to the internet and artificial intelligence, it's extremely easy. The optimum outcome is provided by AI. Vehicles with navigation systems use various routes to obtain the optimal route and traffic status information along with other data, such as the total distance to be traveled. In order to determine the required trip distance and the most efficient route with the least amount of traffic, vehicle navigation systems use artificial intelligence (AI) to gather route data through geographical map analysis utilizing machine learning and data processing. This allows us to get at our destination faster.



Fig. 2.2 Example of Car Navigation System. (Anna Bednarczyk, Tomtom, 2020)

Although many automobiles now come with it preinstalled, some people still purchased it in order to obtain their route information while driving. Depending on the manufacturer and system quality utilized, it has extremely

good efficiency. This can be utilized via Bluetooth or a Wi-Fi connection using the devices we wish to use it with, such as our phone or any other electronic device.

2.3.2 Driverless or Automatic Vehicles

Carelessness can occasionally lead to a high risk of dangerous car accidents, which will have an impact on everyone traveling along the same path as well as everyone connected to someone who may be hurt or killed as a result. In an effort to lower the frequency of these collisions, autonomous or driverless cars are being launched. These vehicles are designed to retain control in the event that a driver becomes distracted for whatever reason or is unable to find a driver for the moment but still needs to get somewhere on time.

This technology has been adopted in numerous nations, and numerous tech giants have stepped into it to provide people with access to it after seeing how much people need it, whether it is for other reasons or because they use fuel-powered vehicles more frequently. Numerous instances of this technology have been demonstrated to us, including sensor-equipped self-driving metros in numerous cities and autonomous electric cars produced by numerous businesses, including Tesla and TATA Motors.

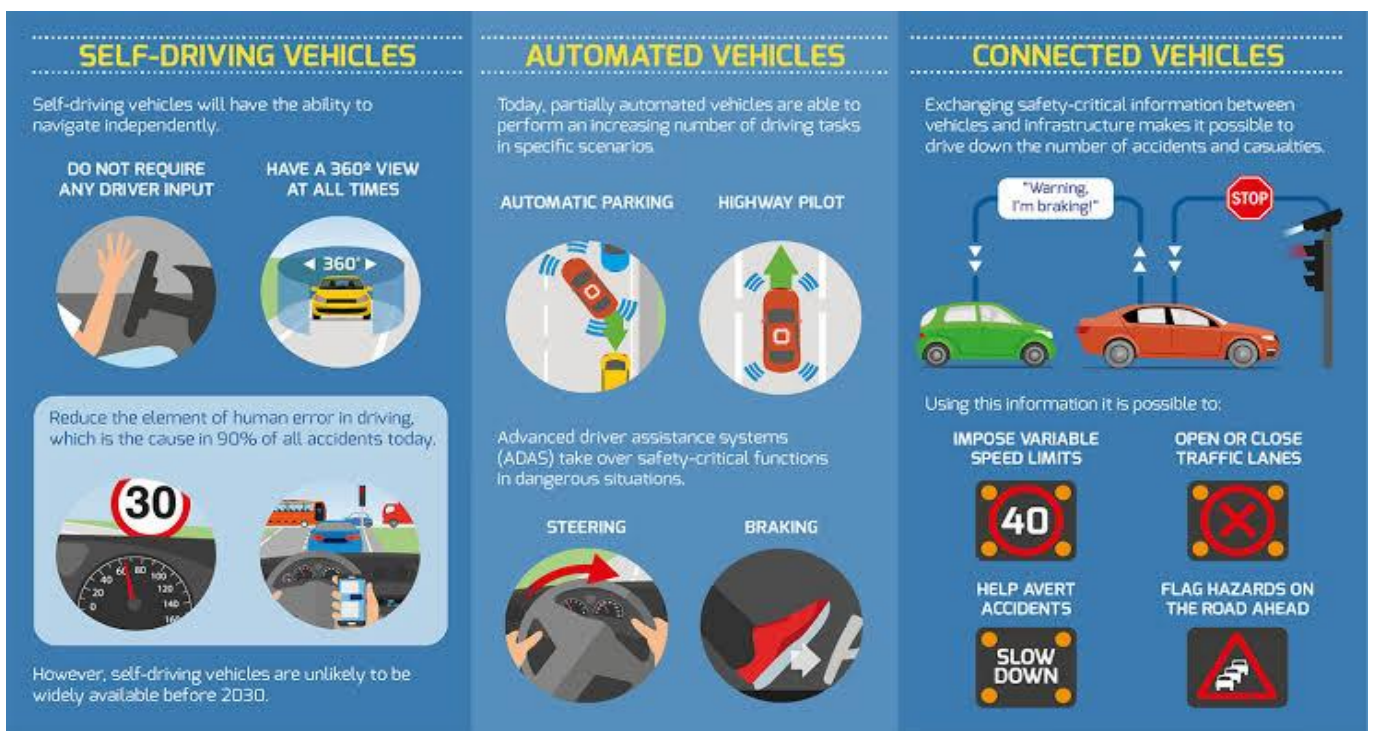


Fig. 2.3 Comparison of Self-driving Vehicles, Automated Vehicles and Connected Vehicles. (Road Safety Facts)

These days, autonomous and self-driving cars are more common in private transportation, whereas linked cars are more common in public transportation vehicles like buses and metros.



Fig. 2.4 Automatic Car Gear Shifter. (Esquire, 2020)

A typical example of an automated vehicle system in action is the automatic car gear shifter (Fig. 2.4), which shifts gears based on the flow of traffic on the road, whether it is empty or congested.

There are further uses for this, such as a brain-controlled automobile for the disabled. These automobiles won't require the user to move physically because they will just rely on their thoughts. The bio-control system is used to do this. The system is built on a technology known as brain-wave sensors, which was first introduced to the public many years ago.

Signals from multiple other systems are integrated by the bio-control system, which then compares them to originals stored in the database. It is made up of the systems listed below:

1. Brain-Computer Interface: EEG (Electroencephalograms) measured from the human scalp.
 2. Automatic Security System
 3. Automatic Navigation System
- (Shriarthi.B, Suganya.B, Mrs. S.Sridevi , 2018)

2.3.3 Drones used for delivery.

A machine works quickly and effectively to do a variety of tasks. There are several ways it may be utilized to serve consumers, and one of these is the drone system, which can be used to carry goods to places where traveling over the roads would take a long time. Drones are robotic aircraft powered by various technological concepts, AI, and ML. It is heavily utilized in defense technology these days to create a variety of arm-deployed weapons.



(a.) (b.)

Fig. 2.5 Various Drone Systems, (a.) General Drone with camera which can be used for delivery of items (Arindam Majumder, Business Standard, 2019)& (b.) Unmanned Combat Weapon Drone System which can be used in wars. (Defence View, 2020)

One of the most significant advances in weaponry is the use of drones, which has revolutionized economic growth, security, and military prowess in numerous nations, including the United States, Russia, China, India, and many more. However, the drone system has significant drawbacks that could make people wonder about its usefulness.

1. It should be operated at a low altitude range since there is a possibility that it could come into contact with an aircraft, which could result in a dangerous occurrence. It also requires practice to prevent any potentially harmful outcomes.
2. Some people might use it for illegal activities like spying, which violates people's privacy.
3. Expensive equipment is needed to achieve high-quality and effective operation.
4. It is prone to manipulation or hijacking.
5. If improperly controlled, it may trespass into allowed areas like military zones and airports.

There are four types of UAVs (Unmanned Armed Vehicles) which can be developed:

1. Fixed-wing: It can carry a payload of up to 1500 kg and travel up to 1850 km at a speed of up to 500 km/h. Its weight ranges from 0.5 to 2500 kg, and its power source is LiPo or petrol. However, it is costly and takes up more room.
2. Helicopters: Its payload capacity is 65 kg, its range is up to 400 km, its top speed is 120 km/h, its flying time is 250 minutes, and its power source is either petrol or LiPo. However, it is costly and requires a lot of maintenance.
3. Multi-copters: Its payload capacity is up to 10 kg, its range is up to 100 km, its speed is up to 30 km/h, its flying time is up to 100 days,

and its power source is a solar battery. However, its cost is high and its wind sensitivity is significant.

4. Loons: It can fly for up to 60 minutes, cover a distance of up to 10 km at a speed of up to 160 km/h, carry a cargo of up to 5 kg, and run on a LiPo battery. It can weigh up to 25 kg, but it is susceptible to wind and has a limited power source.

2.3.4 Smart Traffic Control System

In the last few years, there has been a significant growth in the number of vehicles utilized in cities, which has resulted in a number of serious problems as these cities transform into smart cities, including traffic jams and accidents. One of the main challenges faced by designers and engineers in creating a smart traffic control and management system in recent times has been traffic jams. These systems are intended to use modern technologies such as wireless sensor networks (WSNs), surveillance cameras, and the Internet of Things (IoT) to accurately and efficiently detect and reduce the total density of traffic in most urban areas visited by drivers, such as offices and institutions.

Wireless Sensor Networks (WSNs) are a useful tool for gathering information on vehicle traffic and parking availability in a city. By using an Android mobile application, the system enables drivers to view traffic density data and the number of open parking spaces in between their final destinations. This helps drivers avoid unneeded traffic bottlenecks and choose alternate routes to avoid getting stuck. It also makes it much simpler for people to search for open parking spaces, which reduces the need for lengthy trips. To provide better outcomes, the system integrates three subsystems: parking space management, cross-roads management, and mobile applications that link individuals to a smart city.



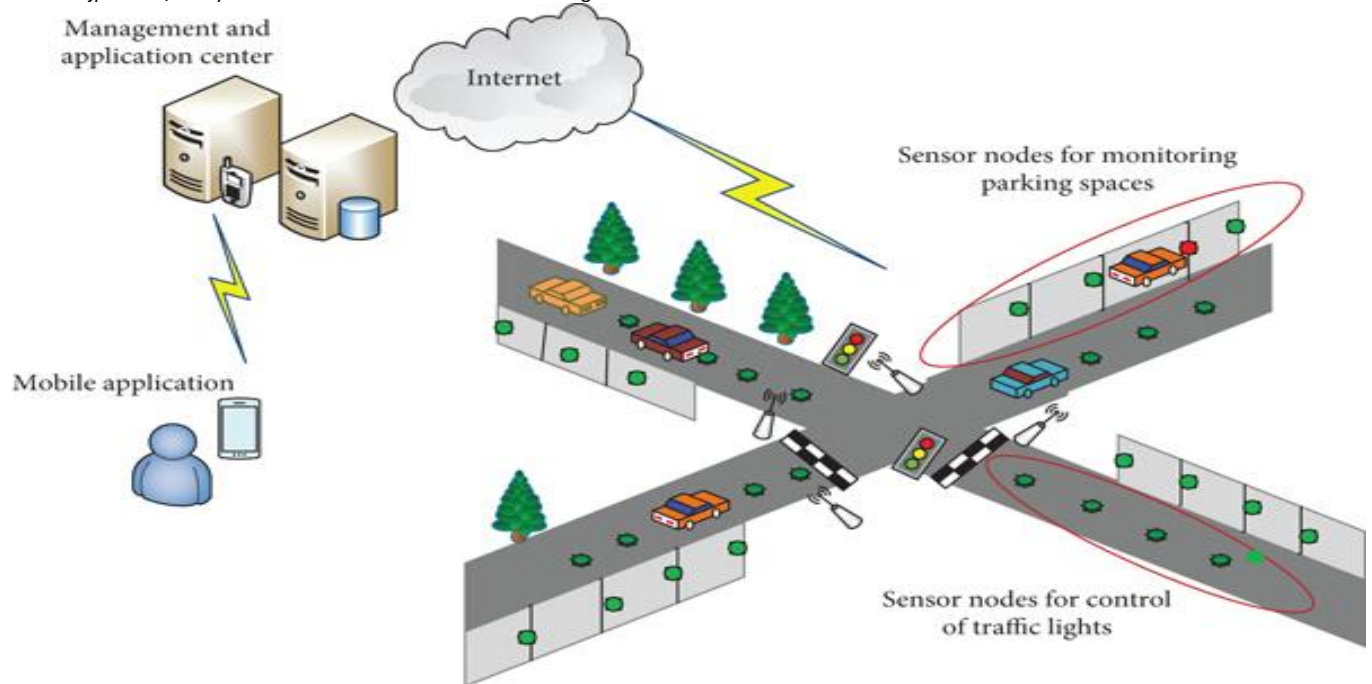


Fig. 2.6 Smart Traffic Control and Management System. (Adil Hilmani, Hindawi, 2020)

Reducing traffic delays and the number of accident cases would be significantly easier with the aforesaid system for traffic control and management. In addition to this, we can utilize smart path dividers whenever an ambulance is close to a traffic light so that it can cross that path without waiting for its turn and get to the hospital on time.

One essential component of Intelligent Traffic Systems (ITS) is Adaptive Traffic Signal Control (ATSC), which reduces traffic congestion by adjusting in real time to changing traffic circumstances. Additionally, these systems have IoT integration. ITS employs MARL (Multi-Agent Reinforcement Learning) to enhance citywide traffic flow. In recent years, ATSC has made use of machine learning techniques like neuro-fuzzy, immune network algorithms, neural networks (NN), and genetic algorithms.

3. Conclusion

Every topic covered is crucial information that individuals should be aware of before beginning any AI-related project in the context of smart transportation and healthcare systems. The majority of the material presented in this chapter are either facts or theoretical ideas derived from research conducted by various groups of people. Other than these two, artificial intelligence systems can be found in a wide range of industries, including wearable smart devices, electronics, agriculture, and household appliances. This technology is one of the best and most well-liked innovations of the modern era due to its efficiency in completing tasks in a

variety of ways—more specifically, the best way—and its ability to integrate with other technologies to increase its power and usefulness in a wide range of development areas. This allows people to live more comfortably and complete tasks more quickly and with less money out of pocket, which is especially important given the current state of affairs.

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