Application Of Artificial Intelligence In Healthcare Transformation From Electrical To Medical Industry

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Abstract

Artificial intelligence (AI) has so many exciting applications in healthcare. One of the most important applications is in diagnosis, as there have been several situations in which AI has been able to identify diseases like skin cancer and diabetic blindness better than experts in the field. This paper shows the main role of electrical engineering to medical industry by developing and inventing the medical equipment. Electrical engineers are dedicated professionals who are knowledgeable about how to develop electrical solutions to end application issues. They are responsible for providing industries throughout the world involved with medical, industrial, military, aerospace markets and many more with the solutions they need in order to continue engineering advancements. One of the most prominent industries to benefit from electrical engineering advancements and solutions is the medical industry; the past major milestones are; (a)-Engineers had assisted in the creation of the first portable pacemaker. Designed to assist individual patients who could have the device on as external wear; patients who still were able to maintain their mobility. (b)- Slow release drug systems were invented, which revolutionized chemotherapy treatments and provided patients with an easier way to fight. (c) Engineers also assist in developments and research that is outside direct medicine. The future of healthcare holds many possibilities, and medical technology has a large role to play in ensuring that we are able to tackle all of the biggest health issues we face. Although electrical engineering in the medical field has come a long way, engineers are always looking to further these advancements and continuing help to lead the Healthcare Transformation from Electrical to Medical Industry.

Keywords:- Artificial Intelligence, Healthcare Transformation, Medical Industry, Electrical Engineering, Future of Healthcare.

1. INTRODUCTION

Healthcare is the improvement of health in people through the prevention, diagnosis, treatment, improvement, or cure of illness, disease, injury, and other physical and mental impairments. Health care is delivered by health professionals and allied health fields. The basic objective of health care is to enhance the quality of life by enhancing health. Commercial businesses focus on making a financial profit to support their valuation and remain viable. Health care must focus on generating social benefit to fulfill its promise to

society. The healthcare industry (also called the medical industry or health economy) is an aggregation and integration of sectors within an economic system that provide goods and services to treat patients with curative, preventive, rehabilitative, and palliative care. The purpose of the health care industry is to promote health, heal, provide treatment, and enhance the quality of life of the individuals being served. As India becomes the number one populous country in the world, we are also witnessing a rise in the aging population globally and the implications for healthcare are significant. Not only in the provision of primary health care through general hospitals, but also in terms of care in the community, residential care, etc. The world is also witnessing a severe shortage of healthcare personnel and this is not only repeated in primary healthcare providers, we are talking about state employees and IT workers. Simply put, the worldwide healthcare industry at the center of this explosion is failing to recruit and retain quality employees, and so we need to look at how technology can support and solve this. Technologies such as Artificial Intelligence (AI), Machine Learning, Virtual Care, Internet of Medical Things and 5G are some examples that improve medical facilities. The intersection of engineering and health-care innovation is helping to improve the lives of many people around the world. When thinking of innovators in the world of health care, electrical engineers may not be the first group of people to come to mind. However, while you might think that the two fields rarely overlap, medical and electrical engineering intersect in important ways for society. [1], [4], [5], [10], [11], [14], [15], [16], [17], [18].

2. IMPACT OF TECHNOLOGY IN HEALTHCARE

The pandemic had a very rapid impact on the health industry's need for digitization, but it was not the only driving factor: higher expectations for care, an increasingly aging population and chronically understaffed staff also played a significant role. Health care technology is any technology, including medical devices, IT systems, algorithms, designed to support healthcare organizations by enabling potentially life-saving predictions for patients. Technology helps medical providers ensure better patient care, improve relationships with patients, and deliver medical results directly to patients' phones. Healthcare information systems that are advanced and adaptable will continue to improve the medical quality of health care while reducing costs, increasing efficiency, reducing errors, improving patient satisfaction, and improving reimbursement for outpatient treatment and inpatient health professionals. Patients now have access to prosthetics, implants, hearing aids, dental devices and more that can be 3D printed quickly and cost-effectively. [19], [20], [21], [22], [24], [25], [26].

3. TRANSFORMATION PROCESS

Transformation in the healthcare industry is delivering significant benefits, including improved patient care and outcomes, increased efficiency and cost savings, improved collaboration and communication, and personalization of healthcare services.

➢ **Inputs**
• Input resources are generally classified as: transformed and transformed resources.
• Transformed resources - Pertain to resources that are transformed by operations to produce goods or services. This includes content, information and customers.
• Transformational Resources – Relates to the resources that are used in the transformation process. Conversion resources are of two types – first are the employees or workers and second are the place or places where the conversion process takes place. Inputs include various types of both transformed and transformed resources.

➢ **Transformation Processes**
• Taking one or more inputs, transforming them, adding value, and producing outputs for consumers or customers is known as the transformation process. An example of this is the transformation of a raw material to make a new item.

➢ **Outputs**
• Output in the transformation model may be in the form of goods or services or both goods and services. Change processes must result in good outputs (eg, reducing wasted inputs). To reduce the environmental impact of waste over the entire product life cycle, outputs must be designed to be retained until the point of final disposal.
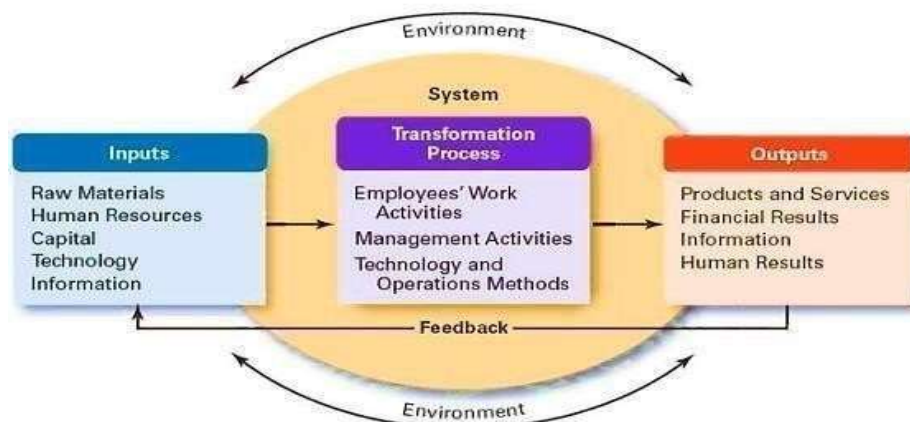
Figure 1 System Transformation Process

4. MAJOR CHALLENGES IN HEALTHCAREINDUSTRY

As this happens, the demand for healthcare will rapidly outpace the number of primary care and specialty providers. Keeping up with the growing demand will likely become one of the biggest challenges facing physicians while serving their patient populations. Some Major Challenges in Healthcare Industry are:-
• High cost of health care. Problem: The most pressing issue in health care currently is the high cost ofcare.
• Health equity concerns
• The Promise (and Pitfalls) ofTechnology.
• Moving towards value based care.
• The Growing Provider Shortage.

5. ROLE OF ELECTRICAL ENGINEERS INMEDICALINDUSTRY

There have been massive medical changes since the 1950s due to the fact that engineers designed and created concepts that helped medical practice to flourish.
• 1950: The first implanted pacemaker was developed; Which in its very first use helped extend the lives of ten different people in a clinicalcase.
• 1958: Engineers assisted in the creation of the first portable pacemaker. Designed to assist individual patients who may place the device as an external wear; Patients who were still able to maintain their mobility.
• To follow, in the 1980s, many different implants were being developed that were able to allow people with hip and knee injuries more mobility intheirlives.
• In the late 90s, slow-release drug systems were invented, which revolutionized chemotherapy treatments and provided patients with an easier way to fightchemotherapy.
• Engineers also assist in development and research outside of directtherapy.

6. FUTURE OFHEALTHCARE

The future of healthcare holds many possibilities, and medical technology has a huge role to play in ensuring that we are able to tackle all of the biggest health problems facing us. Artificial Intelligence (AI) has made a huge impact in a myriad of industries, especially healthcare. This trending technology which was once just a dream is no longer the case. Rather, this emerging technology has become a part of our daily lives in ways we never imagined. The use of AI in the healthcare industry is fundamentally changing the face of the IT industry. However, it is new healthcare technologies that allow medical professionals to make progress in their field save more patients   and fight new diseases, Shown if Figure 2. [2], [3], [6], [12], [13], [19], [20], [21], [23], [24].
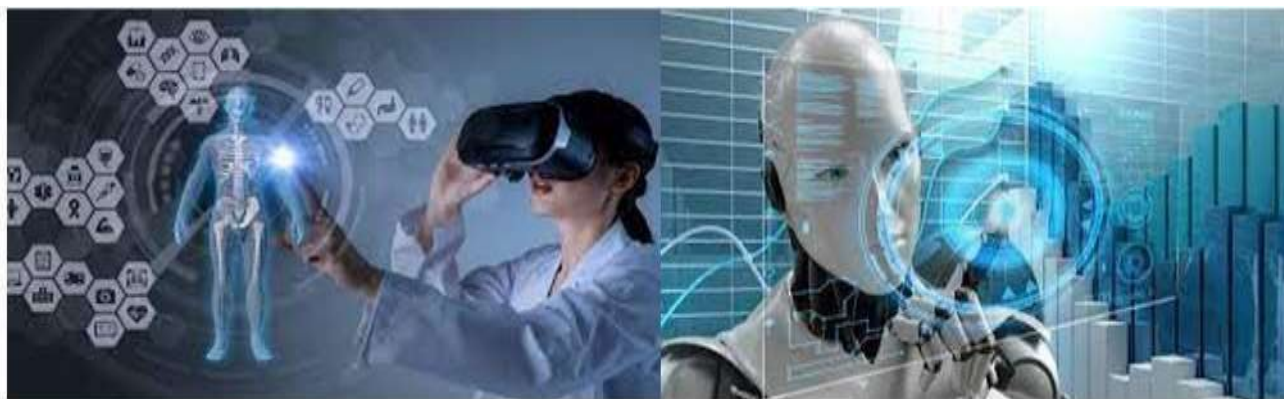
Figure 2 Future of Healthcare Industry

6.1 Artificial Intelligence(A.I)

Artificial intelligence is the intelligence displayed by machines that can be used to perform a number of tasks using sentiment analysis and natural language processing (NLP). This technology allows machines to learn on their own from past data and given information, understand it, and use this information to perform various business tasks. AI is a superset of machine learning and deep learning, and these techniques have their own responsibilities when equipping machines. Hospitals and research institutions will be able to use AI to analyze large amounts of data from electronic health records, lab results and other sources to identify patterns or trends that researchers can use to predict future health outcomes. The unique advantage of artificial intelligence technology is allowing healthcare professionals to scan and use pre-existing drugs to redesign drugs in a way that they fight specific diseases. This makes it cheaper to develop new drugs.

6.2 Role of Artificial Intelligence in Healthcare

From chronic diseases like cancer to radiology, AI is being leveraged to deploy efficient and precise inventions that will help care for patients suffering from these diseases and hopefully find a cure. AI offers several advantages over traditional methods of analytics and clinical decision making. AI algorithms make systems more accurate as they get an opportunity to understand training data, which helps humans gain unprecedented insights into treatment variability, care processes, diagnoses, and patient outcomes.

6.3 Application of Artificial Intelligence in Healthcare

Artificial Intelligence (AI) has many exciting applications in healthcare. One of the most important applications is in diagnostics, as there are many situations in which AI has been able to better identify diseases such as skin cancer and diabetic blindness than experts in the field. Apart from diagnosis, AI can be used to perform routine tasks, manage data, design therapies, administer medication, and monitor health, etc. AI can also be used on robots, and these robots can then act as medical assistants, collect lab samples, assist in surgeries, and disinfect hospital rooms. Here are the various applications of Artificial Intelligence in the Healthcare industry:
• Accurate Cancer Diagnosis
• Early Diagnosis of Fatal Blood Diseases
• Customer Service Chatbots
• Virtual Health Assistants
• Treatment of Rare Diseases
• Targeted Treatment
• Automation of Redundant Healthcare Tasks
• Management of Medical Records
• Reduction of the Dosage Error
• Robot-assisted Surgery
• Automated Image Diagnosis
• Fraud Detection
• Clinical Trial Participation
• Development of New Medicines
• Improved Healthcare Access

7. CONCLUSION

A fundamental goal of healthcare transformation is to enhance the patient and provider experience by allowing for a flexible bidirectional healthcare exchange. Success lies in an organization's ability to create health partnerships that keep patients and providers top of mind. The adoption of artificial intelligence (AI), machine learning (ML), in particular, has been growing at a rapid pace over the past few years, as organizations use their technology to help improve the speed, accuracy of diagnosis, treatment protocols, medicine Take advantage of capabilities. Between discovery, drug development, patient monitoring and patient care. Electrical engineering has come a long way in the medical field; Engineers are always looking to advance these advancements and continue to help lead the healthcare transformation from electrical to medical industry by adopting and implementing AI, MLtechnologies.

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