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Contribution of Human Augmentation in Creating Cognitive and Physical Improvements as an Integral Part of the Human Body

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Abstract

This article is based on the contribution of human augmentation in creating physical and cognitive improvement. Nowadays it makes a positive impact on the medical sector and technological advancement provides outstanding opportunities to lead a better life. It helps to increase the action of the people and also increase the level of activity. Artificial intelligence helps to improve the facilities of technologies and there are various kinds of sensors, devices, and another sensory mechanism that develop the action of the technologies. This study has focused on the construct between human enhancement and human augmentation. This study has also shed light on several kinds of human augmentation and also focused on the collaboration of humans and machines. It has been discussed that neuromorphic technologies achieved so much attention from scientists and it can be considered as a computing system that can mimic the "neurobiological architecture". This study has focused on several kinds of several kinds of technologies that can improve the individuals' difficulties such as artificial limbs, bionics, and other. On the other hand, this study has also elaborated the bonding between machine and collaboration. The "human augmentation" is the combination of biological applications and human beings in the field of medical science. This kind of advancement incorporates with medicines, gene editing, wearable devices and cellular implants. These technological experiments can be implemented on the body of human being and researchers have been working on the area of smart application of drugs to prohibit some serious health complications. These experiments can improve the society as well as make an impact on the people psychology as well.

Keywords

Artificial limbs, genetic alteration, HUMAN AUGMENTATION, human-machine collaboration, implementation of chips, neurobiological architecture
plastic surgery, Prosthetics.

INTRODUCTION

Human augmentation is a process that is based on several technologies and methods. This process also refers to the application that can able to enhance the action, sensing, and other physical and cognitive abilities of humans. It is possible through actuation and sensing technologies, fission and fusion of information, and also artificial intelligence methods. This is divided into three major categories, such as **Augmented sense, augmented cognition, and augmented action.** This study will further discuss those categories elaborately and also try to predict the contribution of society as well. Nowadays human augmentation process is interconnected with human life and it makes a huge impact on health care and treatment. Through this process, people can able to improve their physical condition and also improve their daily life. This study will focus on the concept of human augmentation and its basic difference from human enhancement. The main purpose of human augmentation is to increase the abilities of humans through technology. Sometimes consuming chemical substances can make able to impact health. It can responsible for increasing bad chemical reactions for the body and also may affect the body and organs. Huan augmentation is one kind of strategic advantage that can able to improve the quality of life of a human and also develop the thinning process. This study will shine the light on the several kinds of human augmentation that create cognitive and physical development as an integral part of the body of humans. According, this paper will also highlight the collaboration process of humans and machines and try to understand their connection to each other. In current days, technological advancement brings modernization to the world and society. It also improves the way of thinking that helps to adapt the technical facilities in a preferable manner.

LITERATURE REVIEW

Conception of human augmentation and its difference with human enhancements

Human augmentation can be considered as a totally new type of research field which can further improve the lives of humans through enhancing capabilities in the field of medicines. Therefore, the entire focus of the concept of human augmentation focus on the betterment of the physical and cognitive part of the human body. In recent years, the concept of human augmentation has gained so much popularity after knowing its benefits in various aspects such as health improvement and better performance. Some examples of Human augmentation, that can be further considered as a parts of people's body are, "Prosthetics", " eyeglasses", "pacemakers", "genetic alteration" and "implementation of chips" [1]. Additionally, human

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augmentation also includes the process of "plastic surgery" on the different parts of the body. Modernisation and technological advancement in IT have enabled the availability of wearable and equally performed technologies, that help to engage millions of individuals with the augmentation process. Technological evolution has facilitated the interaction process between human beings and technologies after using devices properly.

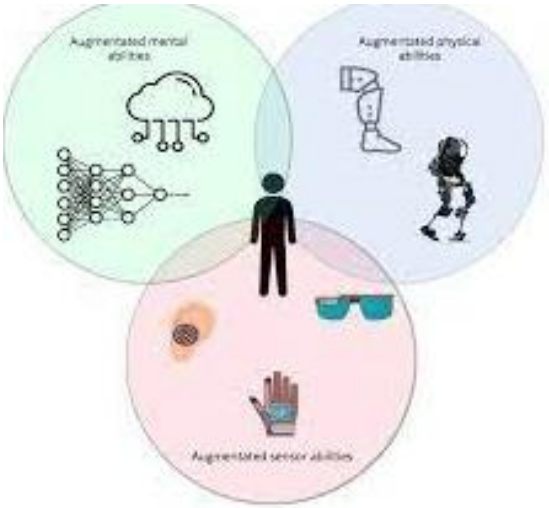

Figure 1: Human augmentation process
Source: [1]

Further observation help individuals to evaluate that human augmentation does not require a specific type of controller because it is already attached to people's bodies. For instance, it can be stated that bionic arm can be used in the arm, socket or hand in case of the amputation process of individuals. Bionic arm has been designed in such a way that can transfer signals from the muscles of users [2]. After putting the bionic arm at the lower portion of the limb, it can produce and transfer electrical signals, which further leads to the movement of those arm in a natural way. Human augmentation process also includes the diagnosis or editing of genes, hence the severity of cancer disease can be reduced with the help of technologies. The ultimate potential of human augmentation can eventually edit the melanin components or genes from the patient's body, therefore it can be advantageous against "skin cancer". Apart from that most of the individuals have been suffering from sensory impairment such as audio visual issues. In order to improve vision, the augmentation technologies have developed AR glasses. Those glasses can also restore the haptic and auditory information for the monitoring process of eyes. Another advanced type of augmentation is enhancing the motion of individuals with the help of prosthetic limbs after the amputation of individuals.

Several types of human augmentation that create physical and cognitive improvement

The area of human augmentation is still required to be expanded for improving capabilities of humans in the medical field. In the realm of medicines, the augmentation have travelled a long path which is capable of saving individuals lives,

Bionics

Bionics can be considered as one of the most promising technologies of the human augmentation process. These technologies have been developed by the combination of engineering and technologies that can be beneficial for amputees. On the other hand, doctors are also suggesting bionic arms for disabled individuals, Paralysed people can easily walk with the help of robotic exoskeleton set on their body [3] . Mostly bionics are attached to the parts of the people's body as a form of physical attachments. In some other cases. It can be observed in the form of exoskeleton robots which can further operate through remotes. Exoskeletons can be moved after utilisation of VR and a headset, hence operators can effectively control it. Bionics can also act as normal hands along with opening and closing pf fingers. Nerves always send signals before doing any activities, and these artificial limbs can act as natural hands that can send signals as per brain activities.

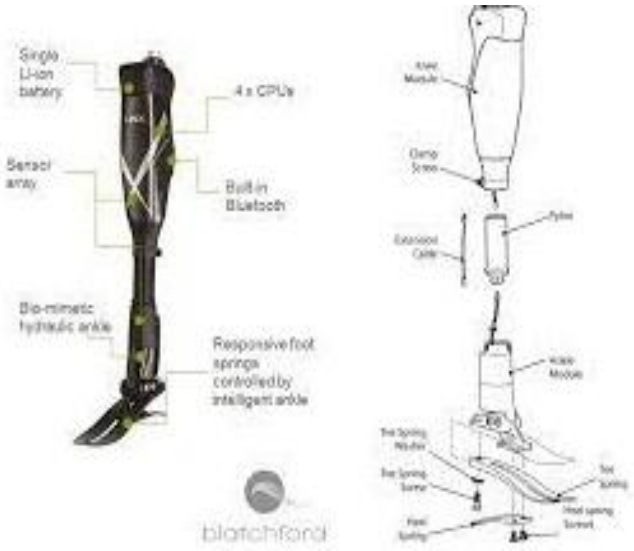

Figure 2: area of Bionics
Source: [3]

Neurotechnology

Neurotechnology are another type of human augmentation and it is mainly related to the coordination of brain activities with computers. The particular augmentation process is not completely related to movement or motion, henceforth, it will further assists in controlling the mind with the help of specific tools. Neurotechnology has been developed by modern scientists , in which a device should be attached to an individual's brain to control the brain's mobility [4]. After targeting the paralysed individuals, the neurotechnology introduced and the improving qualities of their lives can be possible. Additionally, neurotechnology can extend the capacity of human's brain and also able to treat some complicated disease such as Parkinson's.

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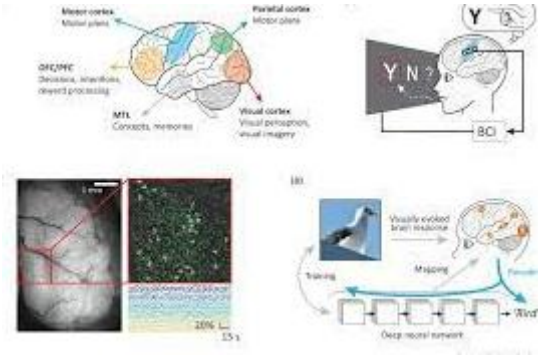

Figure 3: Neurotechnology
Source: [4]

Artificial limbs

People from all over the world who have issues with movement can easily rely on these prosthetic legs. These Human augmentation processes can effectively mimic the overall function of legs and also appear as a real leg. After applying prosthetic legs, people may require some additional supports such as cane and Crutches. In this context, it can be stated that, every individual may not get benefits from prosthetic legs. This augmentation is effective for the individuals , who use it from the upper or lower part of the knee. Individuals with some peripheral disease or diabetes may not show a quick result after attaching prosthetic legs.

It can be further estimated that the market of human augmentation will reach $206.9 billion by the year 2024 [5]. Some other Human augmentation technologies that can be used in day to day lives are wearable devices with less invasive technologies. For instance, one of the most common tool is spectacles. In recent years, most individuals have impairments regarding visuality and some of the most advanced wearable technology is “Microsoft's HoloLens 2”, that can be appropriate for laboratory-based works.

Short briefs of the collaboration of human and machine

In the 20th century people are living within the “fourth industrial era” in which most of the scientists have planned to bring lives to these technologies. This type of alternation can be more fascinating, as it can improve the quality of lives. Therefore, the most intriguing concept is combining biology with machines for the further improvement of the part of human augmentation. Collaboration of humans and machines are still focusing on the areas of “human machine biology” and “Neuromorphic technologies”. In 1980, neuromorphic technologies gained much attention by the scientists and it can be considered as the computing system that can mimic the “neurobiological architecture” [6]. In this way, chips can be inserted within the brain of human beings which can further upgrade the cognitive capabilities of people. The further combination of artificial intelligence and neural networks can enhance the path for Human augmentation. The convergence of technology such as “Neural network” can combine with a brain translator, artificial intelligence and also “ brain implants”. Paralysed individuals can communicate easily with the other people with the help of neural networks, henceforth the role of cognitive imagining system is significant for this aspect. In order to improve the learning and thinking capability of mainly disabled people, neural nanorobotics have been utilised to empower those individuals. Neuroscience have achieved great success after introducing Cranial computers, which can reload all data or information from the brains of individuals. Human brains are required to be connected with that system through surgical electrodes.

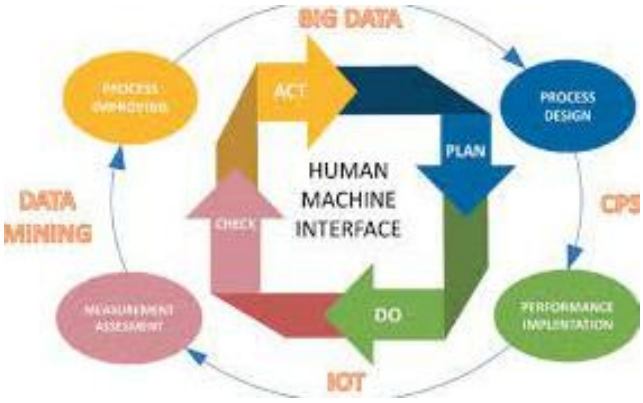

Figure 4: Impact of human machine collaboration
Source: [6]

On the other hand, another important part of “human augmentation” is the combination of biological applications and human beings in the field of medical science. This particular portion of advancement incorporates medicines, gene editing, wearable devices and cellular implants. These technological experiments can be implemented on the body of human being and scientists have been working on the area of smart application of drugs to prohibit some serious health complications. Therefore, drug developers are mainly focusing on introducing “nano scale drugs” which can deliver inside the body through specific bacteria. In future, some other wearable devices are going to be launched in the area of medicines such as artificial organs, bionic eyes and “bionic kidneys” [7]. It can be assumed that this type of revolutionary approach will be soon fulfilled at least by the year 2040. Merger of some biological intelligence with “artificial circuits” can be retrieved as the transduction of magnetic, electrical and mechanical perspective. These devices can collect signals from the different parts of the body also from the diseased organs. These signals are generally received by these artificial organs as a form of codes. In the future, biocomputers will take place and also be able to store data of living DNA. Hence, those biocomputers are also designed in such a way, which can measure some complicated calculations. Additionally, the creation of biologic computers can be further modified by the researchers inside the cells of a bacteria, hence these computers can successfully accomplish some critical tasks.

Accordingly, it can be said that human augmentation one of the innovative ideas that can transform the psychological aspect of human. It has been seen that people are used to take medicine for their difficulties. Those medicine has several

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kinds of side effects and that is not suitable for the health. Some medicines can make the major impact on the health and also responsible for damaging organ. Human augmentation leads to get relief from the issues of human by a technical way. In future, this segment makes a huge transformation in the medical world and also able to develop the individual life.

METHODOLOGY

In an article or research study methodology is one of the essential parts and it has a strong structure and base. The entire research study follows the rules and the process consists of some essential components such as research philosophy, research approach, research design, data findings, and data examinations. In this context, essential information is called data and all the things have been described as per the requirement of the research work. There are various kinds of research philosophy, that generally use on the assumption of the topic, and it is generally based on the knowledge of the researchers. This paper has tried to use the benefits of the positivism research philosophy and it gives the provision to reach the aim and objectives of the study paper. From several studies, it has been seen that researchers used various kinds of approaches for their study, and it has been seen that maximum research preferred deductive approaches for their study. Basically, the deductive approach helps to test the value of hypotheses. In this research study, there are not present any kinds of hypotheses. This is the main reason for using inductive approaches for the study. This style of approach enables the creation of a conclusion and also helps to establish the probability. In addition, the inductive approach also plays a major role to analyze the entire pattern, and sometimes it assists to develop theories.

In other words, the research design is the structural framework that basically based on the research techniques. This study has preferred secondary qualitative methods for collecting data and analyzing the data. In order to find the data on human augmentation for creating, physical and cognitive improvement in the human body is not easy and this process helps to find the appropriate data for the study. The secondary qualitative method provides the provision to extract the relevant data for the source and also inspired the researcher to donate full energy to the experiments. In this context, google scholar, and search engines play an important role. All data or information has been collected from internet sources and it includes electronic articles, journals, books, and other authentic websites. On the other hand, it can be said this method is easier than other processes and it also helps to find the data fast and make a positive impact on the entire search study. This design of the study is called a case study design study and only this method helps to search the data from different sources. All the information are based on relevant and similar case study. Accordingly, the secondary qualitative method provides the opportunity to find the relevant reformation from a king-size database. This process also provides the lesson about inserting the data on the research work and putting the exact data by analysis. It can be stated that this research formula is not much more complicated than others and it also provides suggestions for future research. They also can learn from the research and avoid the gap of these research studies. For future research, it is can be open scope to find the issue and research on this topic. In order to gain knowledge and experience in the research and research-related subject matter. This method helps gain knowledge on human augmentation to create physical and cognitive improvement. On the other hand, this process has provided a large amount of raw data and all data is not sometimes relevant to the study. As per the requirements of the study, some data has been excluded and it helps to sort the essential data. This method does not demand high technical abilities and time for gathering information for research. This is more effortless and also does not require a high-budget plan. The data are always available on the internet and researchers does not require to pay money for this. At last, it can be said the secondary qualitative process is justified for the study and the above factors are enough to justify for use in this research work.

DISCUSSION

From this study, it can be observed that in the current era human augmentation takes an essential part of the whole medical system. This process provides opportunities to lead a better life and get relief from disabilities. This system is based on the various kinds of technologies that improve people's well-being. The human augmentation process is able to enhance the sensing, action, and working capacity of a person through the support of technologies [12]. It has major positive effects on the treatment process also. It has been seen that the huge consumption of chemical substances affects the body and organs badly and also has several kinds of side effects. That is why people need to adopt these technologies for their physical improvement.

From this study it has been seen that, in formation technologies, artificial intelligence, upgraded sensor, modern mechanism and other technologies helps to develop the body parts.

The study clearly provided an overview of human augmentation in case of the further improvement of cognitive and physical abilities. In order to provide a better lifestyle, the medical sector has paid attention to the positive aspects of technological advancements. Mostly disabled, paralysed and medically unfit people get benefited by these external organs. Activities of people can be enhanced after utilisation of technologies because it may lead to improved thinking capacity [8]. The utilisation of Artificial intelligence in the field of medicines have paved the path for the biopharma sector. The crisis in the medical industry regarding improper healthcare assistance, expensiveness and raid alternation of disease, have triggered the utilisation of technologies to enhance the expectancy of life. Utilisation of artificial intelligence, machine learning and big data can be considered as one of the cheapest option for the healthcare industry. In that case, the industry has been focusing on the human

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augmentation process led by multiple methods and technologies.

Applications used in this prowess also includes different types of sensing, activities and cognitive abilities of humans. The current study also helps to evaluate the current issues emerging in case of human machine collaboration approaches. The process of artificial intelligence and machine learning are quite complicated for users. It also required a precise calculator or prediction during the analysis process , therefore most people are unable to provide a deeper understanding on this kind of phenomena [9]. The entire healthcare team is gradually dependent on this biomedical data or information obtained after the augmentation process. Due to the rapid advancement in the "cross industry innovation", the results are basically complicated regarding the adaptation of these technologies. In this context, the role of artificial intelligence can be further observed in the imaging system of cardiology. Further implementation of "deep neural network" can be considered as a promising approach in the medical imaging system [10]. The risk factors of patients can be measured perfectly with the help of these technologies. Apart from that, other risks of misdiagnosis can be easily avoided by the healthcare practitioners with the help of neural networking systems. Additionally, machine learning algorithms have been utilising by most of the cardiologists from all over the world to detect the risk factors of heart related disease. In that case, 3.6% further improvement of accuracy and productivity of ACC/AHA algorithm can be denoted as a progressive step in the medical sector.

The major objective of the application of human augmentation is to enhance the abilities of individuals on a daily basis. The process of augmentation can be divided into three different parts such as Augmented sense, augmented cognition, and augmented action. Overall healthcare and treatment process has highly been influenced by human augmentation. Technological advancement has already shed light on the modification of the genome in a specific area of application. Genome modulation can be further discussed as the innovative way of "gene therapy" and "gene editing". The particular technology that has been associated with the modulation of Genes is mainly known as CRISPR [11]. Gene therapy can include the elimination of melanin from the body of skin cancer affected individuals. Apart from that, gene therapy can solve issues related to blood clotting for new-borns. Most of the patients affected by haemophilia B can be benefitted by the CRISPR technologies. Apart from that the utilisation of bionics can be taken as one of the most promising strategies for the human augmentation process. It can provide external support to those individuals who have lost their arms or hands in any type of accidents. On the other hand, technology can put huge impact on the society and transform the psychological aspect as well. In future, human augmentation helps the people to fight their difficulties in a proper manner and they also can get chances to win their difficulties.

CONCLUSION

From this study it can be concluded that human augmentation is the process and one research field that is able to improve the life of humans. It can enhance the abilities of the human and it is generally focused on the physical and cognitive parts of the body. Accordingly, it can develop the health situation and people can get rid of their difficulties as well. It has a major connection with artificial intelligence, sensors, and various updated devices. This study has focused on the difference between human enhancement and human augmentation. It has been seen that the entire subject matter is based on the future treatment process and this updated equipment has not required any kind of controller and it will be directly attached to the human body. This study has also highlighted the future observation of evaluating the human augmentation. From this study it has been seen that, bionic arm is one kinds of technological arm that can be used in the arm. It can transfer the signals from the muscles of individual. After implant of the bionic arm, it can generate the electrical signals that helps to movements of the arms naturally. Particularly, this study has also focused on the technological advancement and modernization that is able to involve millions of individuals to the advance medical process. The evaluation of technology has facilitated with the process of interaction between the technologies and human being. Accordingly, the human augmentation process is also connected with the diagnosis process as well. On another hand it also may make impact on the gene editing such as severity of cancer disease can be reduced by the technological advancements. On the other hand, this study has also discussed benefit of technological advancements in body or the patients who are suffering from the skin cancer. It has been seen that some individuals are suffering from various kinds of sensory impairments issues, and it can be affects the audio and visual capacity of human. In this context technology is eligible to provides the support to improve the vision. AR glass is one of the innovative things that helps to develop the vision and can monitor eyes as well. Accordingly, this study has also focused on the several types of human augmentation that is able to create cognitive and physical development such as artificial limbs, neuro technology and many more. In order to get all essential data on the specific topic, it helps to get the essential data from the resources. At last, it can be said that human augmentation can be blessing for the individuals and also future generation.

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